8. RESPONSE MANAGEMENT

A. Emergency Response Organization

Note: This section (Section 8) has been designed to be used as an operational manual for Response Management personnel. It is a detachable portion of the Vermont Radiological Emergency Response Plan.

Response management encompasses the activation of personnel and facilities, the assignment of responsibilities, and the operations performed by Vermont State personnel in response to a radiological emergency at the Vermont Yankee Nuclear Power Station. It requires coordination among utility, state, local, federal, and private agencies and organizations participating in the response and response support effort. This section describes the emergency organization that would respond to an emergency at Vermont Yankee. The major responsibilities of each organization are also discussed and Table 8-1 outlines the matrix for the state EOC emergency response organization responsibilities.

(1) Concept of Operations

Effective management of the off-site response to a radiological emergency at Vermont Yankee requires an extensive emergency response organization that involves state, local, federal, and private organizations. This organization utilizes the specialized skills of each individual and provides staff assignments which may cross agency or organizational lines. The role of each organization comprising the state emergency management structure is described functionally aligned consistent with the State Emergency Operations Plan (SEOP).

The SEOC Manager, acting directly under the Governor, assumes command and control of the off-site response. The SEOC Manager will be supported at the EOC by qualified representatives from the following State Support Functions (SSFs)/agencies which would respond:

(a) Governor's Office

(b) SSF 1 (Transportation) and 3 (Public Works & Engineering) – Agency of Transportation with supporting agencies as needed.

(c) SSF 2 (Communications) – Department of Information and Innovation and Department of Public Safety, Criminal Justice Services with supporting agencies as needed.

(d) SSF 4 (Firefighting) – Department of Forest, Parks and Recreation and Department of Public Safety, Division of Fire Safety and supporting agencies as needed.

(e) SSF 5 (Emergency Management, Recovery and Mitigation) – Department of Public Safety, Division of Emergency Management and supporting agencies as needed.

(f) SSF 6 (Mass Care, Housing, Emergency Assistance and Human Services) – Agency of Human Services with the American Red Cross and other supporting agencies as needed.

(g) SSF 7 (Resource Support) – Department of Buildings and General Services and Commission on National and Community Services with supporting agencies as needed.

(h) SSF 8 (Health and Medical Services) – Department of Health with supporting agencies as needed.

(i) SSF 9 (Search and Rescue) – Department of Public Safety, Vermont State Police with supporting agencies as needed.

(j) SSF 10 (Hazardous Materials) – Department of Public Safety, Division of Fire Safety with supporting agencies as needed.

(k) SSF 11 (Agriculture and Natural Resources) – Agency of Agriculture, Food and Markets and Agency of Natural Resources with supporting agencies as needed.

(l) SSF 12 (Energy) – Department of Public Service with supporting agencies as needed.

(m) SSF 13 (Law Enforcement) – Department of Public Safety, Vermont State Police with supporting agencies as needed.

(n) SSF 14 (Public Information) – Department of Public Safety, Division of Emergency Management

(o) Military Support – Vermont National Guard with supporting military components as needed.

(p) Other Amateur Civilian Emergency Services

(q) Other agencies and organizations as necessary

Qualified representatives will be assigned specific responsibilities to carry out mission assignments. The qualified representatives are authorized to serve as agency spokespersons.

TABLE 8-1

State EOC Emergency Response Organization Responsibilities Matrix

P = PRIMARY RESPONSIBILITY S = SUPPORT RESPONSIBILITY

	Command and Control	Alerting and Notification	Communi cations	Public Infor-mation	Accident Assess-ment	Public Health and Sanitation	Social Services	Fire and Rescue[1]	Traffic & Access Control	EMS	Radiation Exposure Control	Law Enforce-ment	Transpor-tation	Protective Response
SEOC Manager	P	P	S	S	S	S	S	S	S	S	S	S	S	P
Operations Sect Chief	S	S	S	S										S
Public Information Coord		S		P										S
PIO Deputy Coord		S		S										S
EAS Writer		S		P										S
Public Service Coord (SSF 12 Lead)					P	S								P
Nuclear Engineer					P	S								S
Military Support								S	P			S	P	S
Natural Resources Coordinator (SSF 11 Co-Lead)					S	S						S		P
Environmental Coordinator					S	S						S		P
Health Service Coord (SSF 8 Lead)				S	P	P		S		P	P			P
Radiological Health Advisor				S	P	P					P			P

	Command and Control	Alerting and Notification	Communi cations	Public Infor-mation	Accident Assess-ment	Public Health and Sanitation	Social Services	Fire and Rescue[1]	Traffic & Access Control	EMS	Radiation Exposure Control	Law Enforce-ment	Transpor-tation	Protective Response
Medical Service Coordinator						S		S		P				S
Dose Assessment					P									
Police Service Coord (SSF 13 Lead)		S	S					S	P			P	S	P
Transportation Coord (SSF 1 Lead)		S						S	S				P	S
Communications Coordinator		S	P											S
Public Notification Technician		P	S	S										S
Human Service Coord (SSF 6 Lead)						S	P			S				S
Agricultural Coordinator				S	S	S								P
Civil Air Wing Military Support			S										S	S
Disaster Liaison (American Red Cross)						S	P							S
RACES Coordinator			P											

(1) Fire and rescue is primarily a local function
Supplemental resources, if needed, are coordinated through mutual aid networks, the Staging Area, and State EOC
(2) The Governor is responsible for ensuring that all state resources are available and utilized in the response
(3) The Commissioner of Public Safety may serve as an advisor to the Governor

Operational procedures are prepared and maintained by each assigned State agency. The Director of each organization with an identified emergency response role must maintain an adequate emergency response capability by ensuring that the organization can be notified and mobilized on a 24-hour basis. Each organization is also capable of 24-hour staffing for the duration of the emergency.

The State organization will interface with the utility, local, federal, and private organizations. The interrelationship of these organizations is shown in Figure 8-1.

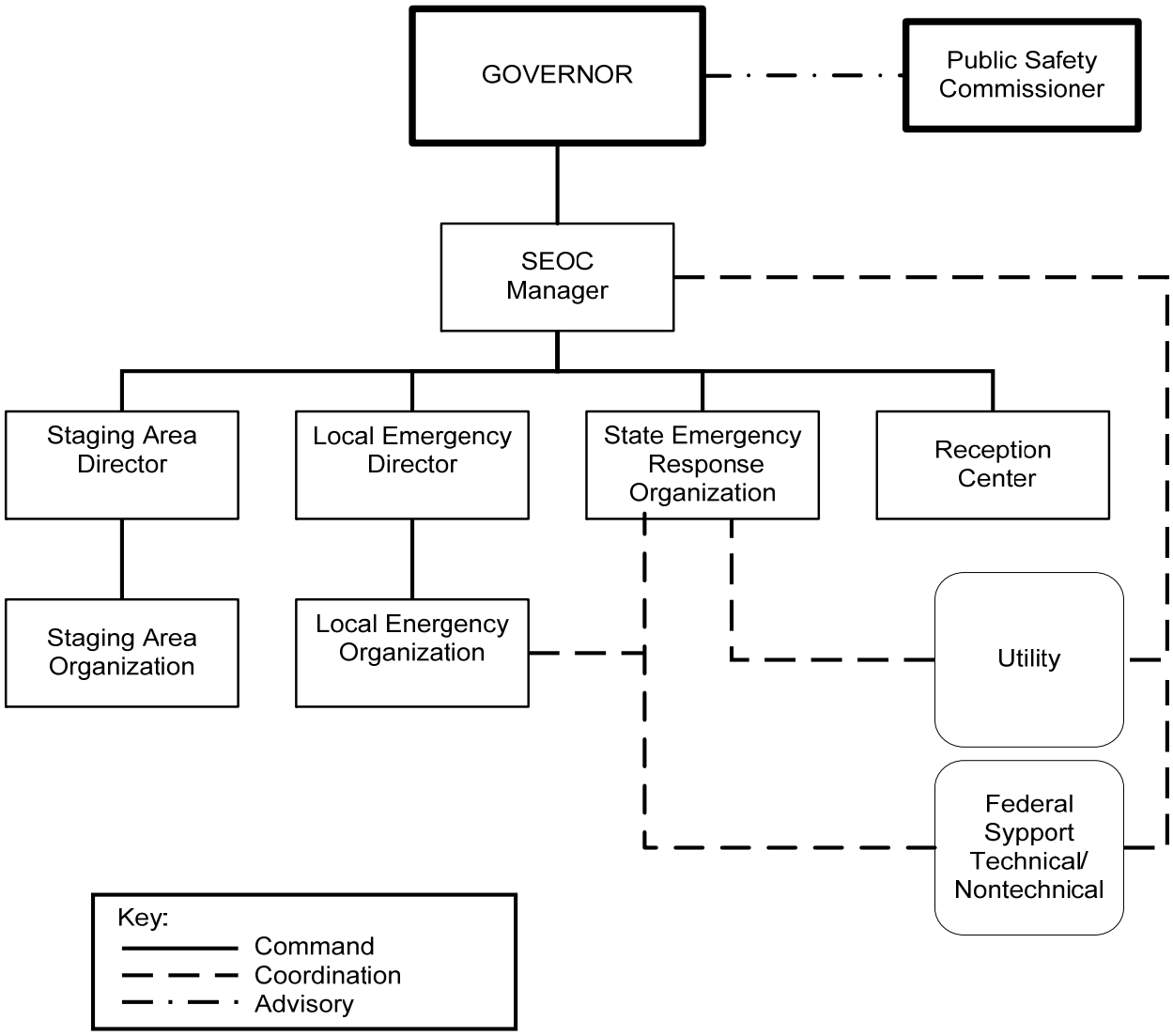

FIGURE 8-1
Emergency Response Organization Interface

(2) State Government Command and Control

This section identifies the State agencies that comprise the State Emergency Response Organization and the major responsibilities of their essential personnel staffing the State Emergency Operations Center (SEOC). Unlike incident management for most other emergencies, in which local incident commanders make decisions about protective or precautionary actions, many of those decisions are made at the state level in coordination with the local jurisdictions in the Emergency Planning Zone (EPZ) and the states of New Hampshire and Massachusetts. The State Emergency Operations Center (SEOC) essential personnel staffing as the Incident Coordination Team (ICS Organization) and the State Emergency Response Organization are shown in Figures 8-2 and 8-3 respectively.

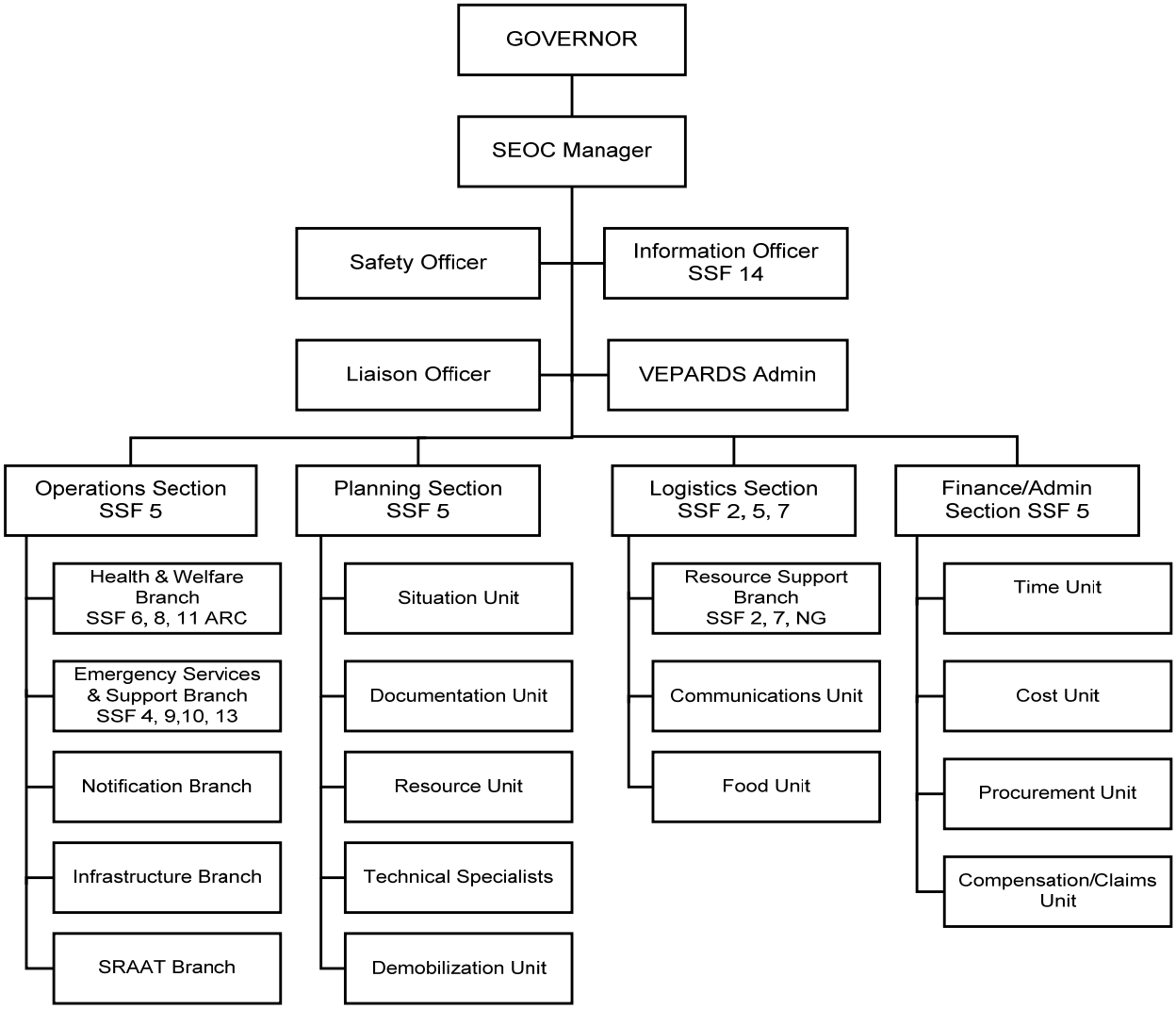

FIGURE 8-2
State of Vermont EOC Incident Coordination Team
ICS Organization

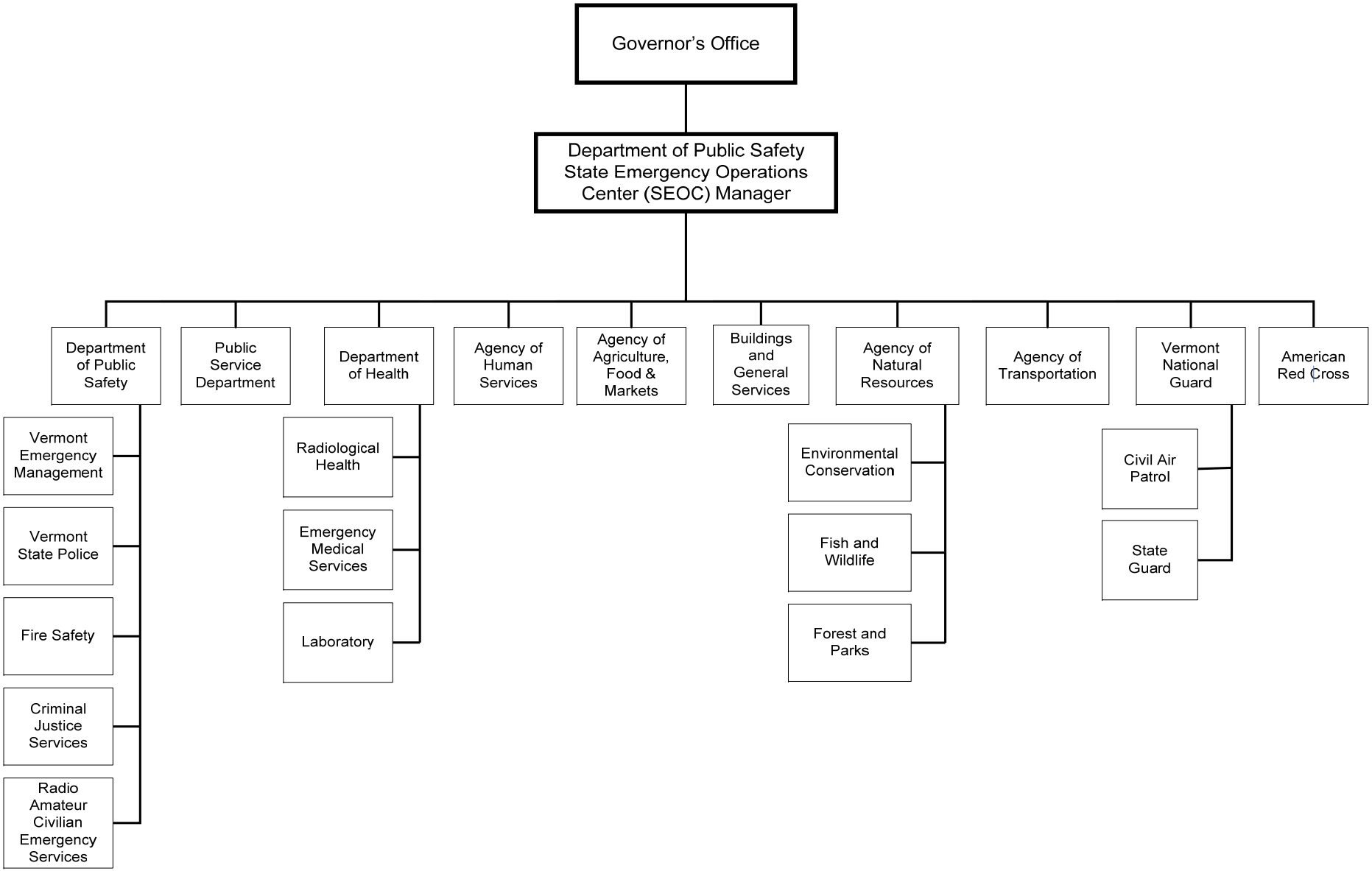

FIGURE 8-3

State Emergency Response Organization

(a) Governor's Office

i. Governor of Vermont - The Governor is responsible for:

a. Ensuring that all available state governmental resources are available and utilized in response to a radiological emergency.

b. Declaring a State of Emergency if conditions warrant.

c. Authorizing protective actions for the public based on recommendations from the decision-makers group at the State EOC.

d. Approving information released to the public

e. Coordination with other states and the Federal Government at an executive level.

f. Protective actions will be authorized by the Governor's Office based on recommendations from the decision-makers group at the State EOC. Farmers and food processing facilities within the Ingestion Pathway Zone will be advised by Emergency Alert System (EAS) messages and/or news advisories of protective actions concerning the prevention or mitigation of radioactive contamination to food products.

ii. Lieutenant Governor - As the first interim successor to the Governor, the Lieutenant Governor is responsible for assuming the duties of the Governor when the Governor is not available, or as directed by the Governor.

iii. Commissioner of Public Safety - The Commissioner, Department of Public Safety, may serve as an advisor to the Governor during emergency response operations.

(b) SSF 5 (Emergency Management, Recovery & Mitigation)

i. The Commissioner of Public Safety, or designee, acts as the state coordinating officer for emergency and disaster assistance.

ii. Vermont Emergency Management

a. SEOC Manager - The Director of Vermont Emergency Management, or designee, assumes the duties of SEOC Manager unless otherwise specified by the Governor and is responsible for:

1) Directing all state operational activities under the delegated authority of the Governor.

2) Activating the emergency response organization and facilities.

3) Coordinating the local, state, and federal response at an operational level.

4) Ensuring the continuity of emergency operations and resources on a 24-hour basis throughout the incident period.

5) Determining and recommending protective actions to the Governor in conjunction with the Health Services Coordinator and Public Service Coordinator.

6) Issuing protective actions to local officials upon the order of the Governor.

7) Coordinating with the Commonwealth of Massachusetts and the State of New Hampshire on response activities, including Public Notification System activation and protective action recommendations and implementation.

8) Ensuring notification of the public through the Public Notification System.

9) Managing relocation, re-entry, and return activities.

b. EOC Staff - the SEOC Manager is supported by an EOC Staff based on the Incident Command System (ICS) and multi-agency coordination system guidelines. This staff consists of full-time Department of Public Safety employees and personnel from various state agencies and organizations who are trained to respond to any type of hazard. The primary members of this staff are shown in Figure 8-2.

This staff provides the following support:

1) Providing primary support to the SEOC Manager in conducting EOC operations.

2) Assisting the SEOC Manager in coordinating Federal, State, local and private resources in responding to the situation in the most effective way.

3) Ensuring that adequate communications, displays, supplies, and space are available for state agency personnel to carry out their emergency operations.

4) Overseeing all administrative functions including assignment and 24-hour staffing of Department of Public Safety personnel.

5) Coordinating with other state agencies regarding 24-hour staffing of the State EOC.

6) Assisting in the development of news releases.

7) Providing support to the Information Officer.

8) Preparing EAS messages for release to the public.

9) Reviewing requests from EPZ towns for EAS messages.

10) Planning and implementing protective actions and recovery operations including:

a) Restricted zone(s) management

b) Relocation

c) Re-entry

d) Return

c. Primary Staff Positions

1) Liaison Officer - The Liaison Officer is responsible for:

a) Ensuring that State Agency Representatives report to the State EOC and assisting them in getting oriented.

b) Developing and maintaining contact with Federal response agencies and assisting them in getting established in Vermont so they may provide resources for the emergency response effort.

2) Information Officer - The Information Officer is responsible for:

a) Directing the preparation and release of accurate information to the news media and the public through various means in a timely manner.

b) Informing the Governor’s Press Secretary of the situation

and proposed releases of information.

c) Preparing EAS messages for release to the public.

d) Reviewing requests from the EPZ towns for EAS messages.

e) Coordinating with state personnel at the Joint Information Center regarding the release of information to the news media and the public.

f) Coordinating Vermont incident information with other involved states, responding Federal agencies, and the utility. This is assisted by the assignment of a Vermont Joint Information Center (JIC) Team to the Vermont Yankee News Media Center at the **Alert** or higher emergency classification level. Two-way communications between the Information Officer staff and the JIC Team by telephone and fax is maintained.

3) Operations Section Chief - The Operations Section Chief is responsible for:

a) Providing primary support to the SEOC Manager in conducting EOC operations.

b) Ensures that notifications are made to Federal, State, Local and Private Organizations as needed.

c) Coordinates the actions of the state agencies in the EOC.

4) Planning Section Chief - The Planning Section Chief is responsible for:

a) Conducts the planning meetings as needed and develops a periodic Incident Action Plan.

b) Provides displays and reports summarizing information about the Emergency to the EOC staff and supporting state agencies, to include a periodic situation report.

c) Maintains a list of resources being used and available to the emergency.

d) Maintains a central log of major events.

e) Maintains documentation for the emergency.

f) Prepares a demobilization plan for the emergency.

5) Logistics Section Chief - The Logistics Section Chief is responsible for:

a) Provision of:
i) Food for the EOC Staff.
ii) Security for the Department Building.
iii) Communications Support.
iv) Other supplies and equipment.

b) Coordination with State agency Representatives on logistical issues.

6) Radiological Plume Tracking Teams Director (VT HAZMAT Team)

a) Receives tasking from the Radiological Health Advisor or designee.

b) Coordinates plume tracking activities with New Hampshire, Massachusetts, and Vermont Yankee at the Emergency Operations Facility (EOF).

c) Directs Vermont Plume Tracking Teams in accomplishing radiological tasks.

7) Radiological Sampling Teams Director

a) Receives tasking from the Radiological Health Advisor or designee.

b) Coordinates sampling team's activities with New Hampshire, Massachusetts, New York, and the Federal Radiological Monitoring and Assessment Center (FRMAC).

c) Directs Vermont Radiological Sampling Teams in accomplishing radiological tasks.

8) The Vermont Hazardous Materials Response Team.

a) Staff the Radiological Plume Tracking 56Team (see Special Teams).

b) Performs other duties as assigned.

iii. SSF 13 (Law Enforcement)

a. SSF 13 Qualified Representative – The SSF13 Qualified Representative is the Director of Vermont State Police or designated qualified representative responsible for:

1) Identifying State Access Control Points and Traffic Control Points (ACPs/TCPs).

2) Developing specific orders regarding the operation of ACPs/TCPs.

3) Ensuring the assignment of police and support personnel, including relief shifts.

4) Assigning Vermont State Police units to State borders in coordination with Massachusetts and New Hampshire.

5) Assisting local police organizations in the operation of local ACPs/TCPs.

6) Providing traffic flow information to the Reception Center.

7) Transporting emergency response personnel to duty stations.

8) Providing law enforcement support to suppress looting and other criminal activities following an evacuation.

9) Requesting assistance from the National Guard in coordination with the Military Coordinator.

10) Coordinating security issues.

11) Determining if there is a possible terrorist component to the incident.

12) Coordinating with State and Federal Homeland Security and other law enforcement agencies.

iv. Department of Public Safety - Criminal Justice Services

a. Communications Coordinator - The Communications Coordinator is the Department of Public Safety Communications Officer or designated qualified representative responsible for:

1) Establishing emergency radio dispatch.

2) Ensuring 24 hour per day staffing of communications links.

3) Monitoring and maintaining all state communications systems in operation.

4) Identifying equipment malfunctions and dispatching appropriate technicians and necessary repair parts to problem locations.

5) Assisting in requesting activation of the NOAA Weather Alert Radio System and EAS, Windham County, or other operational areas (unless performed by the SWP during a fast breaking GENERAL EMERGENCY).

(c) SSF 8 (Health and Medical Services)

i. The Vermont Department of Health provides for laboratory analysis of air, water, and other environmental samples for radionuclide content at the State of Vermont Department of Health or other relevant laboratory as necessary and appropriate.

ii. The Vermont Department of Health, as well as other state entities, provides trained personnel to serve on the Radiological Sampling Teams.

iii. SSF 8 Qualified Representative – The SSF 8 Qualified Representative is the Vermont Commissioner of Health or designated qualified representative responsible for:

a. Coordinating health related decisions including ingestion pathway decisions for Vermont with accident assessment personnel from state agencies, other affected states, federal agencies, and the utility. This coordination will ensure consistency of action among the states and will ensure effective utilization of federal and interstate assistance.

b. Formulating protective action recommendations in conjunction with the SEOC Manager, Radiological Health Advisor, and Public Service Coordinator (SSF 12 Lead) for approval by the Governor.

c. Authorizing the use and administration of potassium iodide (KI).

d. Coordinating with the Health Directors of Massachusetts and New Hampshire.

e. Providing for laboratory analysis of air, water, soil, vegetation, milk, and other samples as appropriate.

f. Authorizing emergency workers to exceed the protective action guides when appropriate.

g. Ensuring the provision of Emergency Medical Services.

h. Formulating protective actions for the ingestion pathway in conjunction with the Radiological Health Advisor.

iv. Radiological Health Advisor - The Radiological Health Advisor is the designated qualified representative responsible for:

a. Serving as the essential technical advisor to the Health Services Coordinator (SSF 8 Lead).

b. Provides tasking to Radiological Plume Tracking Teams and Radiological Sampling Teams.

c. Establishing and implementing radiation exposure control measures for emergency workers and the general public.

d. Providing guidance to monitoring and decontamination personnel at decontamination stations and the Reception Center.

e. Reviews the progress of field monitoring teams including the exposure level reports.

f. Develops a field monitoring and sampling plan with assistance from the Dose Assessment Team.

g. Develops a request for federal assistance for the Advance Party meeting.

v. Medical Services Coordinator - The Medical Services Coordinator is the Emergency Medical Services (EMS) Director or designated qualified representative responsible for:

a. Coordinating with local EMS agencies regarding the provision of emergency medical services.

b. Providing assistance in meeting the transportation and medical needs of special facilities in preparing for and implementing evacuation.

c. Developing a statewide resource pool of ambulances and vehicles to support specialized medical transportation needs.

d. Coordinating with local EMS agencies and medical facilities for the transportation and care of contaminated injured individuals.

e. Coordinating with the Patient Coordination Unit at the State Health Operation Center (HOC) to ensure that the provision of

ambulances for the evacuation of health care facilities is coordinated with the plan of host facilities.

vi. Dose Assessment Team - The Dose Assessment Team members are the qualified representatives responsible for:

a. Using computer or other appropriate models to estimate plume direction and deposition footprint.

b. Using relevant and appropriate meteorological, plant and environmental sample data to perform continual off-site dose projections for all phases of an incident.

c. Providing technical assistance to the Radiological Health Advisor and/or Health Services Coordinator or designee.

d. Assisting in the development of Radiological Plume Tracking Team and/or Radiological Sampling Team field sampling plans if requested.

e. Assisting in communications with the Radiological Tracking Team Director and Radiological Sampling Team Director If requested.

f. Interacting with GIS personnel in the development of electronic maps depicting estimated plume path, areas of deposition, identification of potential field team sample locations, locations of particular interest such as dairy farms and other relevant and appropriate information.

vii. Sample analysis will be performed at the Vermont Department of Health Laboratory in accordance with the laboratory procedures contained in Attachment 1 and other State and Federal laboratories as needed.

(d) SSF 12 (Energy)

i. SSF 12 Qualified Representative – The SSF 12 Qualified Representative is the Commissioner of Public Service or designated qualified representative responsible for:

a. Coordinating with plant personnel regarding plant conditions and the on-site response effort.

b. Advising the SEOC Manager and SSF 8 Qualified Representative of actual or projected plant conditions.

c. Participating in the protective action decision-making process with the SSF 8 Qualified Representative and SEOC Manager.

d. Providing contact and liaison with the Nuclear Regulatory Commission.

e. ERDS (Emergency Response Data System) analysis.

ii. Nuclear Engineer - The Nuclear Engineer is the Department of Public Service staff person with said title or designated qualified representative. Duties may be carried out at the licensee's Emergency Operations Facility (EOF) or the State EOC. The Nuclear Engineer is responsible for:

a. Monitoring and evaluating the physical conditions at Vermont Yankee.

b. In conjunction with the Radiological Health Advisor evaluating the nature, extent, and potential danger to the public resulting from the emergency.

c. Monitoring the efforts of plant personnel to return the facility to a stable and safe condition.

d. Communicating current status and significant changes in plant conditions to the Public Service Coordinator at the State EOC.

(e) SSF 6 (Mass Care, Housing, Emergency Assistance and Human Services)

i. Agency of Human Services – The SSF 6 Qualified Representative is the Secretary of Human Services or designated qualified representative responsible for:

a. Confirming activation of the Bellows Falls Union High School Reception Center.

b. Assigning state personnel to the reception center and congregate (mass) care shelter facilities as requested by the American Red Cross.

c. Relaying pertinent information from the State EOC to the Reception Center Director.

d. Receiving progress reports and requests for assistance from the Reception Center Director.

e. Consulting with the American Red Cross regarding additional relief services and state organizations that might be needed for the provision of meals, bedding, and basic sanitation articles for evacuees at congregate (mass) care facilities.

ii. American Red Cross (ARC)

a. The American Red Cross is responsible for providing food and shelter for persons who have evacuated. The Red Cross will mobilize and coordinate its local volunteers to provide these services at the shelters. All services provided by the Red Cross will be in accordance with the Statement of Understanding between the State of Vermont and the American Red Cross. Services provided by the Red Cross at the Receptions Center (shown below) will be under the control of the Bellows Falls Union High School (BFUHS) Reception Center Director, or Designee.

b. Mobilization by the American Red Cross is accomplished in two phases. Initially it will be from the Staging Area and the Reception Center. Subsequently it will be managed from the ARC Job Headquarters for this incident which will be established at the ARC Upper Valley Office in Hartford, Vermont. The diagrams below show the operation of this mobilization in each phase.

c. Services provided by the Red Cross at the Reception Center (shown below) will be under the control of the BFUHS Reception Center Director, or designee.

(1) Leadership of the Administrative Processing and Evacuee Services Branch at the Bellows Falls Union High School Reception Center.

(2) Congregate (Mass) Care Shelter Operations to which evacuees are referred or transported from the BFUHS Reception Center are managed, staffed, and operated by the ARC in accordance with ARC protocols for mass care. Services may include:

a) Congregate (mass) care center management and operations

b) Registration

c) Feeding

d) Housing

e) Counseling

f) Mental Health Services

g) Medical Services - referrals to the first aid station

(3) Coordination of services of other community support

organizations, e.g., Salvation Army, church groups, etc., to which evacuees are referred or transported to from the Reception Center, are managed, staffed and operated by the ARC in accordance with ARC protocols for mass care.

d. Additional information can be found in the ARC 3000 series regulations under Nuclear Power Plants.

(f) SSF 11 (Agriculture and Natural Resources)

i. Agency of Agriculture, Food and Markets (SSF 11 Co-Lead)

a. The Agency of Agriculture will implement control of harvesting, sale of crops, and if necessary, the condemnation of contaminated foods, such as meat, meat products, poultry, and poultry products.

b. The Agency of Agriculture provides trained personnel to serve on the Radiological Sampling Teams.

c. SSF 11 Agriculture Qualified Representative – The SSF 11 Agriculture Qualified Representative is the Secretary of Agriculture or designated qualified representative responsible for:

d. Maintaining a data base of all agricultural producers, dairy farms, food processors, feed suppliers, etc., in the ingestion pathway zone and providing that data in map and table form as needed.

e. Providing guidance to the Health Services Coordinator, Radiological Health Advisor, and SEOC Manager regarding protective actions.

f. Coordinating response activities with the U.S. Department of Agriculture and the University of Vermont Extension.

ii. Agency of Natural Resources (SSF 11 Co-Lead)

a. The Agency of Natural Resources provides trained personnel to serve on the Radiological Sampling Teams.

b. Natural Resources Coordinator - The Natural Resources Coordinator is the Secretary, Agency of Natural Resources or designated qualified representative responsible for:

(1) Advising the SEOC Manager, Health Services Coordinator and/or Radiological Health Advisor concerning actual or projected consequences which may affect the environment.

c. Environmental Coordinator- The Environmental Coordinator is the Commissioner, Department of Environmental Conservation or

designated qualified representative responsible for:

(1) Assisting with the determination of impact of the incident on the environment; water supplies; and air and water quality.

(2) Participating in decision-making to advise of the environmental consequences of proposed actions.

d. Fish and Wildlife Coordinator - The Chief Warden or designee is responsible for mobilizing and directing wardens to assist in notification and to advise on the impact to wildlife. The Fish and Wildlife Coordinator may also assume some or all of the duties of either the Natural Resources Coordinator or the Environmental Coordinator. Department personnel may be called on to provide samples of fish and game for environmental testing.

(g) SSF 1 (Transportation)

i. Agency of Transportation - The SSF1 Qualified Representative is the Secretary of Transportation or designated qualified representative responsible for:

a. Identifying appropriate evacuation routes based on road and traffic conditions in coordination with the Police Services Coordinator.

b. Maintaining and/or clearing evacuation routes with problems which could affect evacuation (e.g., emergency snow, ice, or impediment removal).

c. Assisting the Staging Area in providing traffic and access control devices (barricades, signs, etc.).

d. Providing transportation assistance to towns for transportation dependent individuals.

e. Assisting with specialized transportation needs for hospital and long-term care facility patients.

f. Coordinating National Guard transportation resources with the Military Coordinator.

(h) The Vermont Department of Labor

i. The Vermont Department of Labor provides trained personnel to serve on the Radiological Sampling Team.

ii. The Vermont Department of Labor provides a Safety Officer for the Incident Coordination Team (ICT) in the SEOC.

(i) Military Support

i. Military Coordinator - The Military Coordinator is the Director of Military Support, Vermont National Guard, or designated qualified representative responsible for:

a. Establishing and maintaining a direct link between the State EOC and the Adjutant General and Joint Operations Center (JOC) to relay incident information.

b. Expediting the "Calling Out" of the National Guard, if requested by the Governor.

c. Coordinating the delivery of military assistance (e.g., transportation, traffic and access control) upon activation of the National Guard.

d. Facilitating military support from all components of the armed forces to include the Army, Air Force, Naval and Marine Corps Reserves and the Civil Air Patrol (CAP).

(j) Special Teams

i. Radiological Plume Tracking Teams – Two or three 3-person Vermont teams will determine the edges of the plume as assigned. Teams from New Hampshire, Massachusetts, Vermont Yankee and Vermont will cooperate in determining the edges of the radiological plume or confirming the absence of deposition. The Vermont Hazardous Materials Response Team will provide a Director and team members as needed.

ii. Radiological Sampling Teams – Environmental sampling and surveys will be conducted in accordance with the Radiological Sampling Teams Procedures. The Radiological Sampling Team will collect samples for assessing the impact of the release. The Vermont Department of Health, the Vermont Agency of Agriculture, the Vermont Department of Labor, and the Agency of Natural Resources will provide members for the teams.

(3) Local Government

In response to an emergency, each town will mobilize and use available resources to mitigate the off-site consequences. The emergency organization of each EPZ Jurisdiction and its response to a radiological emergency is described in the Radiological Emergency Response Plan for each town. The State will coordinate with local organizations, relay information, and provide additional resources to support the local response.

(4) Federal Government

Emergency aid and disaster assistance to State and local governments is available from the federal government through the Nuclear/Radiological Incident Annex of the National Response Framework and the Federal Radiological Monitoring and Assessment Plan (FRMAP). The incident annex provides for both federal technical and non-technical support at the request of the State. The federal assistance available to the state is described in Section 18 of this plan.

(5) Special Organizations

(a) Radio Amateur Civilian Emergency Services (RACES)

The Radio Amateur Civilian Emergency Services (RACES) is a network of volunteer radio operators using privately owned amateur radio equipment. These volunteer radio operators are available to provide backup or supplementary radio communications where needed.

(6) Utility (Vermont Yankee Nuclear Power Station)

(a) The Vermont Yankee Nuclear Power Station has established Emergency Response Organizations. These organizations include on-shift personnel, corporate personnel, Yankee Nuclear Services Division personnel, local services support, and private organizations support.

(b) In the initial phase of an accident, the on-shift organization will be responsible for event assessment, classification, protective action decision making, notification, and completion of primary emergency actions. Subsequently, additional resources will be activated with the capability of continuous (24-hour per day) operations for a protracted period.

(c) The Vermont Yankee Nuclear Power Station, based on their licensing agreements with the NRC, and agreements with the affected states, have accepted responsibility for initiating the necessary immediate action required to:

i. Limit the consequences of an accident.

ii. Evaluate the conditions and determine the magnitude of an accident.

iii. Immediately notify appropriate state and federal agencies, with appropriate protective action recommendations as necessary (shelter-in-place or evacuation).

iv. Minimize public and plant personnel radiation exposure or injury.

v. Take immediate steps to limit or reduce the loss to property. The specific emergency responsibilities of the on-site Emergency Response Organizations are described in their respective emergency plans.

Note: The Yankee Rowe Nuclear Power Station is decommissioned. A dry cask fuel storage site has been constructed. An emergency at Yankee Rowe could only reach an Alert level and would require many fewer resources than an operating plant.

B. Emergency Response Facilities

(1) State-Operated Facilities

(a) State Emergency Operations Center

The State Emergency Operations Center (SEOC) is located at Vermont Emergency Management, in the Department of Public Safety Headquarters, 103 South Main Street, Waterbury, Vermont, 05671-2101. The interim SEOC is located in the basement of the Weeks Building next to the Public Safety Building.

This facility serves as the command and control center for off-site response efforts. It also serves as the central point for the receipt and analysis of field monitoring data used in accident assessment. The SEOC is activated at an Alert or higher classification. At the discretion of the SEOC Manager, essential DPS support staff may be requested to report to the EOC at an Unusual Event to standby and monitor the situation. The SEOC may be staffed on a 24-hour basis with qualified representatives from:

i. The Governor's Office

ii. SSF 1 (Transportation – Agency of Transportation

iii. SSF 2 (Communications) – Department of Information and Innovation and Department of Public Safety, Criminal Justice Services

iv. SSF 3 (Public Works and Engineering) – Agency of Transportation and Department of Public Safety, Division of Fire Safety

v. SSF 4 (Firefighting) – Department of Forests, Parks and Recreation, and Department of Public Safety, Division of Fire Safety

vi. SSF 5 (Emergency Management, Recovery and Mitigation) – Department of Public Safety, Division of Emergency Management

vii. SSF 6 (Mass Care, Housing, Emergency Assistance and Human Services) – Agency of Human Services with American Red Cross

viii. SSF 7 (Resource Support) – Department of Building and General Services and Commission on National and Community Services

ix. SSF 8 (Health and Medical Services) – Department of Health

x. SSF 9 (Search and Rescue) – Department of Public Service, Vermont State Police

xi. SSF 10 (Hazardous Materials) – Department of Public Safety, Division of Fire Safety

xii. SSF 11 (Agriculture and Natural Resources – Agency of Agriculture, Food and Markets and Agency of Natural Resources

xiii. SSF 12 (Energy) – Department of Public Service

xiv. SSF 13 (Law Enforcement) – Department of Public Safety, Vermont State Police

xv. SSF 14 (Public Information) – Department of Public Safety, Division of Emergency Management

xvi. Radio Amateur Civilian Emergency Services (RACES)

The State EOC is capable of continuous (24-hour) uninterrupted operations for a protracted period. Multiple shifts may be necessary to maintain uninterrupted coverage, the nature and extent of which will be incident dependent. The State EOC contains the communications equipment, maps, status boards, plans and procedures, and other resources necessary to support the response effort. In addition to the named EOC staff positions, sufficient support staff will be provided by the Department of Public Safety and other involved State agencies to ensure sufficient operation of the EOC. The SEOC Manager, through the EOC support staff, will ensure the continuity of the necessary technical, administrative, and material resources during response operations. Prior to a shift change, outgoing staff provides incoming staff with:

i. A briefing on the current emergency classification and the status of emergency response efforts.

ii. All relevant documentation (procedure, log forms, message forms).

(b) Staging Area

The Staging Area (SA) is located at the Agency of Transportation, District 2, Maintenance Division facility on U.S. Route 5 in Dummerston. The Staging Area serves primarily as a near-site point of contact between the State and affected local governments, and as a staging area for emergency response personnel, e.g., radiological monitoring, access and traffic control, operating in the field. Radiological monitoring and decontamination of emergency workers is also performed at the Staging Area. The Staging Area sets up and operates a transportation resources staging area in an appropriate location near the EPZ. The Staging Area provides traffic and access control devices to state traffic and access control points as needed.

The Staging Area Manager is the Agency of Transportation District 2 Administrator or designated qualified representative. The Staging Area Director is notified at all emergency classification levels and is responsible for notifying the Staging Area staff. The Staging Area is staffed at the Alert level with personnel from various state and local agencies which may include representation from the Department of Health, Vermont State Police, Agency of Transportation, Agency of Human Services, and the Windham County Sheriff's Department. The Staging Area is capable of 24-hour operations. For more detail, refer to the Staging Area Plan.

(c) Bellows Falls Union High School Reception Center (BFUHS)

The primary reception center for Vermont residents is the Bellows Falls Union High School in Westminster, Vermont, approximately 13 miles outside the plume exposure pathway EPZ. The functions of the Reception Center are further discussed in Section 15 of the VRERP and the Bellows Falls Union High School Reception Center Plan.

(d) State of Vermont Department of Health Laboratory

The State of Vermont maintains a complete radiological laboratory at 195 Colchester Avenue in Burlington, Vermont. This facility is the primary laboratory for radiological evaluation and analysis and is operated by the Department of Health.

(e) State Warning Point (SWP)

The State Warning Point (SWP), Vermont State Police Dispatch Center, Rockingham, serves as the initial notification point to off-site authorities from the Vermont Yankee Control Room. The SWP is staffed on a 24-hour basis and is prepared to send uniformed officers to any town that can not be contacted by pager or phone.

(f) Alternate State Warning Point (ASWP)

The alternate SWP located at the Vermont State Police Station in Derby, assists the SWP in notifications and performs notifications when the SWP is not able.

(g) Sample Transfer Point

One or more transfer points will be selected by the Radiological Plume Tracking Team Director and the Radiological Sampling Team Director in coordination with the Radiological Health Advisor at the State EOC. Samples will be transported by the Vermont HazMat Team or other designated organization from this location to the Vermont Department of Health Laboratory. A backup means of sample transport will be via the Vermont Civil Air Patrol and/or the Vermont National Guard.

(2) Utility-Operated Facilities

(a) Emergency Operations Facility

In the event of an emergency, the licensee is required to establish an off-site facility referred to as the Emergency Operations Facility (EOF). The EOF is located at Vermont Yankee Corporate Headquarters, Ferry Road, Brattleboro, Vermont.

The EOF serves as the near-site technical support center established to coordinate the activities of VY emergency response personnel, evaluate off-site accident conditions, and maintain coordination and communications with off-site response authorities. Direct links are established between the EOF, Vermont, Massachusetts, and New Hampshire EOCs, and the News Media Center/Joint Information Center for up-to-date emergency status reports. Vermont, Massachusetts, and New Hampshire state personnel are provided space and communications at the EOF and staff this facility at an Alert or higher classification. State personnel are capable of sustaining 24-hour operations.

(b) News Media Center/Joint Information Center

The News Media Center/Joint Information Center is located at Vermont Yankee Corporate Headquarters, Ferry Road, Brattleboro, Vermont. This center provides a centralized location for holding joint State, federal, and licensee emergency news briefings. The utility will also staff rumor control operations at this facility. A State Public Inquiry number will be staffed at the State EOC in Waterbury.

The State will dispatch a Joint Information Center Team to the News Media Center/Joint Information Center upon its activation. Staff representing the State of Vermont are assigned for sustained 24-hour operations at the News Media Center/Joint Information Center. The alternate News Media

Center/Joint Information Center is located at Landmark College in Putney, Vermont, in the event the Brattleboro News Media Center/Joint Information Center is evacuated.

C. Emergency Response Actions

In the event of an accident at Vermont Yankee, each organization would be notified in accordance with established state procedures. Notification and activation of these organizations is addressed in Section 7. The plant operators will notify the State Warning Point at the Vermont State Police Office in Rockingham, Vermont. The State Warning Point will then notify Vermont Emergency Management (VEM), the Governor's Office, and other designated contacts for each organization. A description of communications systems used is contained in Section 6, "Facilities and Equipment."

The State Emergency Operations Center (SEOC) is located within the offices of VEM in Waterbury, Vermont. Upon notification of an Unusual Event the State EOC will be activated to at least a Level 2. Upon notification of an Alert, the State EOC in Waterbury will be activated to level 3 and 4 and staffed with selected qualified agency personnel from various Vermont state agencies and state-wide organizations. Other RERP Facilities are also activated at Alert. Figure 8-4 represents those agencies performing ingestion pathway activities and depicts various responsibilities for each agency.

To ensure a timely and effective response, the licensee, State, and local organizations have identified specific actions that will be taken at each emergency classification. This section summarizes the licensee and State actions required in response to each emergency classification level. Once the classification has been received by the State from the licensee, each State agency responder will perform the specified actions in their implementing procedures. The specific actions of the utility emergency response organization are provided in the Vermont Yankee Nuclear Power Station Emergency Plan and Implementing Procedures. Local actions are described in the EPZ town-specific radiological emergency response plans.

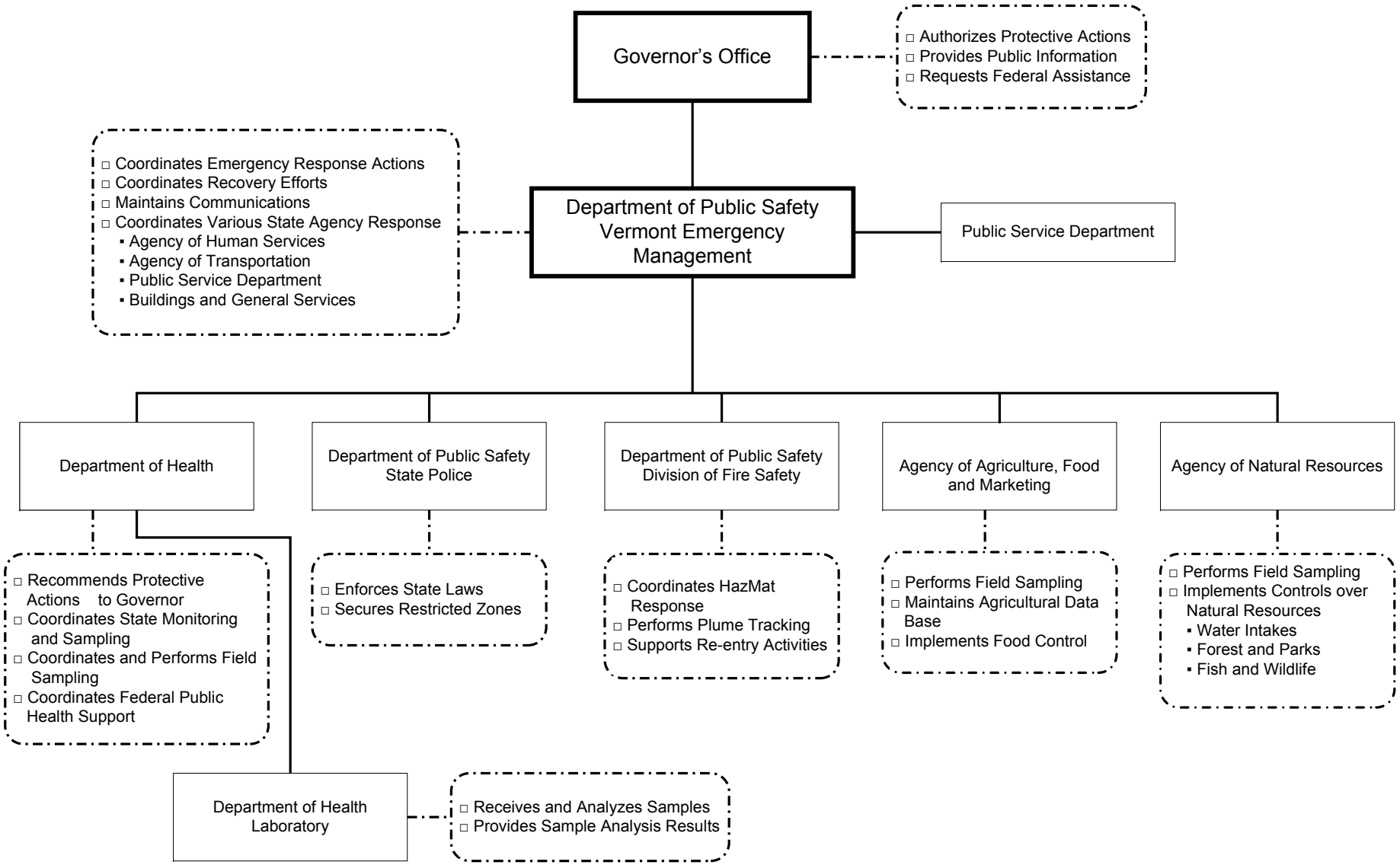

FIGURE 8-4

Ingestion Pathway Responsibility Diagram

UNUSUAL EVENT

Initiating Conditions

Description	Purpose
Unusual events are in process or have occurred that indicate a potential degradation in the level of plant safety. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.	1. Assure that the first step in any response later found to be necessary has been carried out. 2. Bring the plant operating staff to a state of readiness. 3. Provide systematic handling of information and decision making.

Licensee Actions
On-Site

1. Upon emergency classification, Vermont Yankee will immediately notify the Vermont State Warning Point (SWP), Vermont State Police Dispatch, Rockingham, or the Vermont State Alternate Warning Point (ASWP), Vermont State Police Dispatch, Derby.

2. Vermont Yankee personnel will respond and assess the situation.

3. On-shift resources will be augmented if necessary.

Note: If initial notification states that the unusual event is, or has been immediately terminated, no further action is required.

For a continuing event:

4. Periodic plant status reports will be provided to the SEOC Manager or Director, VEM at the State EOC in Waterbury.

5. The State Emergency Operations Center (EOC) will be notified when the event is over.

6. Provide written reports required by the Nuclear Regulatory Commission (NRC) to the SEOC Manager or Director, VEM.

OR

ESCALATE TO A MORE SERIOUS
EMERGENCY CLASSIFICATION LEVEL

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UNUSUAL EVENT

State Actions
Off-Site

1. The **State Warning Point (SWP)**, Vermont State Police Dispatch, Rockingham, or The State Alternate Warning Point (ASWP), Vermont State Police Dispatch, Derby, upon receipt of notification of an **UNUSUAL EVENT** from the Vermont Yankee Control Room will immediately notify:

   A. EPZ Towns and Essential Local Responders
      (1) Brattleboro
      (2) Dummerston
      (3) Guilford
      (4) Halifax
      (5) Marlboro
      (6) Vernon
      (7) Westminster (Bellows Falls Union High School) Reception Center
      (8) State EOF Liaison
      (9) Staging Area Manager
      (10) WTSA AM/FM (CPCS-1)
      (11) American Red Cross
      (12) Vermont JIC Team

   B. Essential State Agency Personnel

      Refer to the current "Standard Version" of the Notification Manual for more detail.

      Note: The personnel identified in Steps 1-A and B will be notified even if the unusual event was immediately terminated.

2. The State EOC will be activated on at least a partial basis.

3. The Nuclear Engineer and the Radiological Health Advisor will obtain additional information from the licensee.

4. Director, Vermont Emergency Management, may dispatch selected VEM personnel to the State EOC to standby and monitor the situation.

5. The State EOC will remain activated and local response personnel will remain on standby pending a closeout of the emergency.

OR

ESCALATE TO A MORE SERIOUS
EMERGENCY CLASSIFICATION LEVEL

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ALERT

Initiating Conditions

Description	Purpose
Events are in process or have occurred that involve an actual or potential substantial degradation in the level of plant safety. Releases are expected to be limited to small fractions of the U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAGs) exposure levels.	1. Assure that emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring, if required. 2. Provide off-site authorities with current status information. 3. Activate certain local and state facilities.

Licensee Actions
On-Site

1. Upon emergency classification, Vermont Yankee will immediately notify the Vermont State Warning Point (SWP), Vermont State Police Dispatch, Rockingham, or the Vermont State Alternate Warning Point (ASWP), Vermont State Police Dispatch, Derby.

2. Emergency facilities (including the Emergency Operations Facility) will be staffed and operated in accordance with the appropriate procedures.

3. The News Media Center/Joint Information Center will be activated and staffed by utility and State and federal personnel.

4. Plant conditions will be continuously assessed.

5. Periodic (minimum 30-minute intervals) plant status reports will be provided to the state.

6. State concurrence to closeout the emergency will be obtained and any written reports required by the Nuclear Regulatory Commission (NRC) will be provided to the SEOC Manager or Director, VEM.

OR

ESCALATE TO A MORE SERIOUS
EMERGENCY CLASSIFICATION LEVEL

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ALERT

State Actions
Off-Site

Note: Refer to the current version of the "Vermont Precautionary and Protective Actions" list for additional detail.

1. The **State Warning Point (SWP)**, Vermont State Police Dispatch, Rockingham, or the State Alternate Warning Point, Vermont State Police, Derby Station, upon receipt of notification of an **ALERT** will immediately notify the following:

   A. EPZ Towns and Essential Local Responders

      (1) Brattleboro
      (2) Dummerston
      (3) Guilford
      (4) Halifax
      (5) Marlboro
      (6) Vernon
      (7) Westminster (Bellows Falls Union High School) Reception Center
      (8) State EOF Liaison
      (9) Staging Area Manager
      (10) WTSA AM/FM (CPCS-1)
      (11) American Red Cross
      (12) Vermont JIC Team

   B. Essential State Agency Personnel

      Note: Refer to the current "Standard Version" of the Notification Manual for more detail.

2. The State EOC in Waterbury, Public Safety Headquarters, will be activated.

3. Town EOCs will be activated and staffed.

4. As a precaution, school buses may be mobilized and pre-staged at respective schools as early as the **Alert** level. Vermont Emergency Management, upon the advice of the Vermont Department of Health, may direct the transfer of school students (to include private schools and child care centers) to the Bellows Falls Union High School (BFUHS) Reception Center. Under these circumstances, the Reception Center at the BFUHS would be opened to receive school children. Key reception center staff may be asked to report to BFUHS for a Phase I activation.

5. The Staging Area in Dummerston will be activated and needed transportation resources mobilized as needed. The transportation resource staging area will be activated as needed.

6. The Nuclear Engineer and State Emergency Operations Facility (EOF) Liaison will be dispatched to the EOF.

7. Accident assessment will be initiated and the radiological monitoring teams will be dispatched to the Staging Area.

8. Communications with the local EOCs and Massachusetts and New Hampshire State EOCs will be established and maintained.

9. Information received from the utility will be continuously assessed.

10. The Federal Emergency Management Agency (FEMA), Region I, and other federal agencies will be contacted, as required.

11. Termination of the event will be performed as follows:

    A. The State of New Hampshire and Commonwealth of Massachusetts will be notified of the intent to closeout and requested to concur, as appropriate.

    B. All federal agencies contacted in relation to the incident will be notified of intent to closeout.

    C. The utility will be provided with State concurrence of the closeout.

    D. All State and local response personnel will be notified of the closeout.

OR

ESCALATE TO A MORE SERIOUS
EMERGENCY CLASSIFICATION LEVEL

SITE AREA EMERGENCY

Initiating Conditions

Description	Purpose
Events are in process or have occurred that involve actual or likely major failures in plant functions needed for protecting the public. Releases are not expected to exceed EPA PAG exposure levels, except near the site boundary.	1. Assure that response centers are staffed. 2. Assure that monitoring teams are dispatched. 3. Assure that personnel required for evacuation of near-site areas are at duty stations if the situation becomes more serious. 4. Provide consultation with off-site authorities. 5. Provide updates for the public through off-site authorities.

Licensee Actions
On-Site

1. Vermont Yankee will provide initial notification of a **SITE AREA EMERGENCY** to the Vermont State Warning Point, Vermont State Police Dispatch, Rockingham, or the Vermont Alternate State Warning Point, Vermont State Police Dispatch, Derby

OR

Vermont Yankee will escalate from a lower classification and notify (via the Site Recovery Manager) the State EOF Liaison and State EOC.

AND

2. All actions required under an **ALERT** classification will be initiated if not already performed.

3. Actual and/or projected dose estimates will be provided to the State EOC.

4. The intent to closeout the emergency will be coordinated with the State EOF Liaison and the State EOC in Waterbury.

5. State concurrence to closeout the emergency will be obtained and any written reports required by the Nuclear Regulatory Commission (NRC) will be provided to the SEOC Manager or Director, VEM.

OR

ESCALATE TO A GENERAL EMERGENCY

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SITE AREA EMERGENCY

State Actions
Off-Site

Note: Refer to the current version of the "Vermont Precautionary and Protective Actions" list for additional detail.

1. All actions required under an **ALERT** classification will be initiated, if not already performed.

2. Radiological Monitoring Teams will be dispatched to perform off-site monitoring.

3. State personnel assigned to the News Media Center/Joint Information Center, Vermont Yankee Corporate Office, Ferry Road, Brattleboro, Vermont will be dispatched.

4. Information from the utility concerning plant conditions and data from utility and state off-site monitoring teams will be continuously assessed to determine off-site consequences and the need for protective actions.

5. The precautionary action of sheltering and placing milk animals within ten miles of the plant (or greater distance if necessary) on stored feed and protected water supplies will be recommended.

6. Bellows Falls Union High School Reception Center will be activated to Phase II.

7. The Public Notification System (sirens, NOAA Weather Alert Radios, automated telephone notification, and EAS) may be activated in coordination with Massachusetts and New Hampshire to notify and provide instructions to the public.

8. State personnel may be dispatched to parks and recreation areas to notify the transient population of the emergency situation and to leave the area as instructed.

9. Termination of the event will be performed as follows:

   A. The State of New Hampshire and the Commonwealth of Massachusetts will be notified of the intent to closeout and requested to concur, as appropriate.

   B. All federal agencies contacted in relation to the incident will be notified of intent to closeout.

   C. The utility will be provided with State concurrence of the closeout.

   D. All State and local response personnel will be notified of the closeout.

OR

ESCALATE TO A GENERAL EMERGENCY

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GENERAL EMERGENCY

Initiating Conditions

Description	Purpose
Events are in process or have occurred that involve actual or imminent substantial core degradation or melting, with potential for loss of containment integrity. Releases can reasonably be expected to exceed EPA PAG exposure levels off-site, beyond the immediate site area.	1. Initiate predetermined protective actions for the public. 2. Provide continuous assessment of information from licensee and off-site organization measurements. 3. Initiate additional measures as indicated by actual or potential releases. 4. Provide updates for the public through off-site authorities.

Licensee Actions

On-Site

1. Vermont Yankee will provide initial notification of a **GENERAL EMERGENCY** to the Vermont State Warning Point, Vermont State Police Dispatch, Rockingham, or the Vermont Alternate State Warning Point, Vermont State Police Dispatch, Derby

   OR

   Vermont Yankee will escalate from a lower classification and notify (via the Site Recovery Manager) the State EOF Liaison and State EOC.

2. All actions required under a **SITE AREA EMERGENCY** classification will be initiated if not already performed.

3. The plant will make protective action recommendations to the State as necessary.

4. The plant will continue to provide information to the State regarding actual or potential release conditions, plant conditions, meteorological conditions, and dose estimates.

5. The intent to closeout the emergency will be coordinated with the State EOF Liaison and the State EOC in Waterbury.

6. State concurrence to closeout the emergency will be obtained and any written reports required by the Nuclear Regulatory Commission (NRC) will be provided to the SEOC Manager or Director, VEM

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GENERAL EMERGENCY

State Actions

Off-Site

Note: Refer to the current version of the "Vermont Precautionary and Protective Actions" list for additional detail.

1. All actions required under a **Site Area Emergency** classification will be initiated, if not already performed.

2. Plant data and off-site radiological data will be evaluated to determine the off-site consequences and formulate protective actions.

3. Protective actions for the public will be recommended and implemented upon approval of the Governor or designee.

4. Protective action recommendations will be coordinated with Massachusetts and New Hampshire.

5. Activation of the Public Notification System will be coordinated with Massachusetts and New Hampshire to alert and provide instructions to the public regarding the implementation of protective actions.

6. Emergency worker exposure rates will be monitored.

7. If appropriate, termination of the event will be performed as follows:

   A. The State of New Hampshire and Commonwealth of Massachusetts will be notified of the intent to closeout and requested to concur, as appropriate.

   B. All federal agencies contacted in relation to the incident will be notified of intent to closeout.

   C. The utility will be provided with State concurrence of the closeout.

   D. All State and local response personnel will be notified of the closeout.

8. If appropriate, a transition to Recovery will in initiated by the State EOC as follows:

   A. The Planning Section will start coordinating the development of a recovery plan with appropriate state support functions.

   B. Contact will be made with Federal agencies having responsibilities in a nuclear power plant accident.

   C. An Advance Party meeting will be conducted with key personnel responding from Federal agencies.

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9. METEOROLOGY

The release of radioactive materials from a nuclear power plant may create a broad range of effects. Airborne releases, which are the primary concern in Vermont, produce what is referred to as a **"Plume"**. Plume arrival times are shown in Table 9-1. The most general description of plume behavior is that it will travel downwind at slightly less than wind velocity, becoming wider as it moves outward from its source, while its radioactive intensity declines proportionately.

A plume may assume many shapes, spreading unevenly, vertically or horizontally, or even standing still for a time. The primary factors which affect plume behavior are wind speed and direction. Cloud formations and precipitation also contribute to the character of a plume to a lesser degree. Ambient temperature, air stability, and wind speed affect plume rise. Air stability can be determined through meteorology.

The rate at which temperature decreases with elevation is called the **VERTICAL TEMPERATURE GRADIENT** or **LAPSE RATE.** Within the troposphere, the area of the atmosphere within which virtually all weather phenomena occur, the temperature declines at an average rate of 3 degrees Fahrenheit per 1,000 feet of altitude.

The **LAPSE RATE** of air existing at a given time and place determines the degree of vertical stability. A parcel of air that resists upward or downward displacement because of a certain **LAPSE RATE** is considered to be **STABLE.** A layer of air which will rise or sink of its own accord, given an impulse, is said to be **UNSTABLE.**

Unstable air masses provide good **"mixing"** or diffusion characteristics for materials which might be injected, due to the susceptibility to vertical motion. Stable air produces the opposite effect with poor diffusion. The dispersion of radioactive materials is greatly affected by the degree of stability.

Three model plume profiles are shown in Figures 9-1, 9-2, and 9-3 and can be adapted to field operations and represent logical extremes for planning purposes. Theoretical plume widths are shown in Figure 9-4.

Meteorological information may be obtained from several sources including but not limited to the following:

A. Plant Weather Station(s): Weather data for the immediate area including temperature, precipitation, wind direction, wind speed and lapse rate for use in determining the air stability class.

B. National Weather Service: Full range of forecasting services.

C. Private Weather Consultants: Specific area forecasting.

Meteorological information from the Plant Weather Station(s) is the most representative in determining plume behavior. NWS and private weather services can be useful in providing **weather predictions**.

TABLE 9-1

Plume Arrival Time Estimator *

(Travel Time Shown in Hours and Minutes)

Distance From Plant	5 Miles	10 Miles	15 Miles	20 Miles
Wind Speed-MPH				
5	1:00	2:00	3:00	4:00
6	0:50	1:40	2:30	3:20
7	0:43	1:25	2:08	2:50
8	0:38	1:15	1:53	2:30
9	0:33	1:07	1:40	2:13
10	0:30	1:00	1:30	2:00
11	0:27	0:55	1:22	1:47
12	0:25	0:55	1:15	1:40
13	0:23	0:46	1:09	1:32
14	0:22	0:43	1:04	1:26
15	0:20	0:40	1:00	1:20
16	0:19	0:38	0:56	1:15
17	0:18	0:35	0:53	1:11
18	0:17	0:33	0:50	1:07
19	0:16	0:32	0:47	1:03
20	0:15	0:30	0:45	1:00
25	0:12	0:24	0:36	0:48
30	0:10	0:20	0:30	0:40
35	0:09	0:17	0:26	0:34

Time estimates shown are based on wind speed and distance only. Mitigating factors of weather and topography are not included. This chart intended as a quick-reference and planning guide only.

TABLE 9-2

Meteorological Tables

Classification of Atmospheric Stability					
Stability Classification	**Pasquill Categories**	**Temperature Change with Height (°C/100 m)**	**Stability Class As A Function of Lapse Rate (ΔT) Vermont Yankee**		
			Lower Primary Tower ΔT (°F/165 ft)	**Upper Primary Tower ΔT (°F/262 ft)**	**Back-Up Tower ΔT (°F/102 ft)**
Extremely Unstable	A	-1.9	ΔT ≤-1.72	ΔT ≤-2.74	ΔT ≤-1.06
Moderately Unstable	B	-1.9 to -1.7	-1.71 ≤ΔT ≤-1.54	-2.73 ≤ΔT ≤-2.45	-1.05 ≤ΔT ≤-0.95
Slightly Unstable	C	-1.7 to -1.9	-1.53 ≤ΔT ≤-1.36	-2.44 ≤ΔT ≤-2.16	-0.94 ≤ΔT ≤-0.84
Neutral	D	-1.5 to -0.5	-1.35 ≤ΔT ≤-0.46	-2.15 ≤ΔT ≤-0.72	-0.83 ≤ΔT ≤-0.28
Slightly Stable	E	-0.5 to 1.5	-0.45 ≤ΔT ≤+1.35	-0.71 ≤ΔT ≤+2.15	-0.27 ≤ΔT ≤+0.83
Moderately Stable	F	1.5 to 4.0	+1.36 ≤ΔT ≤+3.62	+2.16 ≤ΔT ≤+5.74	+0.84 ≤ΔT ≤+2.23
Extremely Stable	G	4.0	+3.63 ≤ΔT	+5.75 ≤ΔT	+2.24 ≤ΔT

TABLE 9-2

Meteorological Tables
(Continued)

Relation of Pasquill Turbulence Types to Weather Conditions					
Surface Wind Speed, mph	**Daytime Incoming Solar Radiation**			**Nighttime Cloud Cover**	
	Strong	**Moderate**	**Slight**	**Thin Overcast or ≥4/8 Cloudiness***	**≤3/8 Cloudiness**
<4.5	A	A-B	B		
4.5-6.7	A-B	B	C	E	F
6.8-11.1	B	B-C	C	D	E
11.2-13.4	C	C-D	D	D	D
>13.4	C	D	D	D	D

The degree of cloudiness is defined as that fraction of the sky above the local apparent horizon that is covered by clouds. The neutral class, D, should be assumed for overcast conditions during day or night, regardless of wind speed.

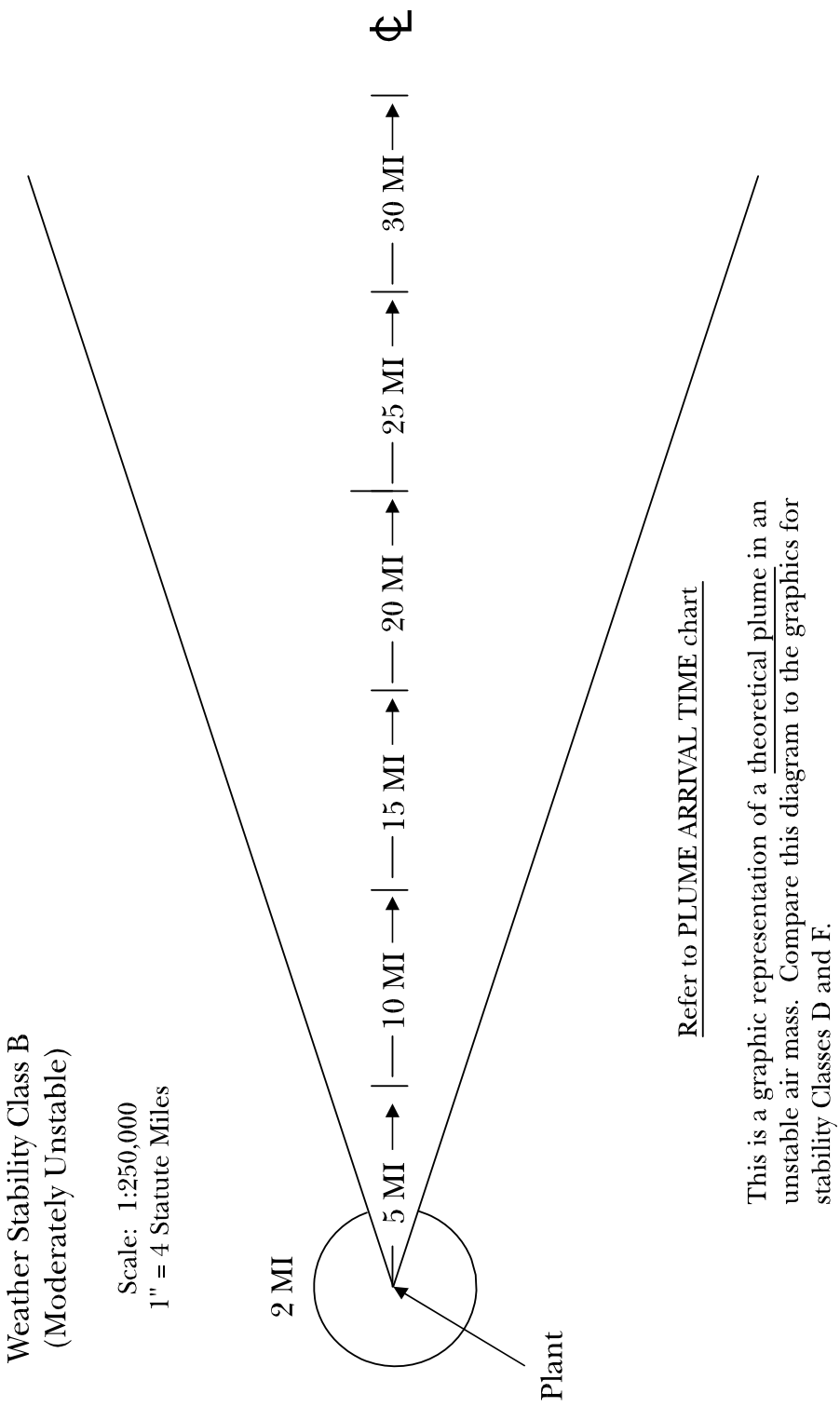


FIGURE 9-1

Plume Graphic, Weather Stability Class B

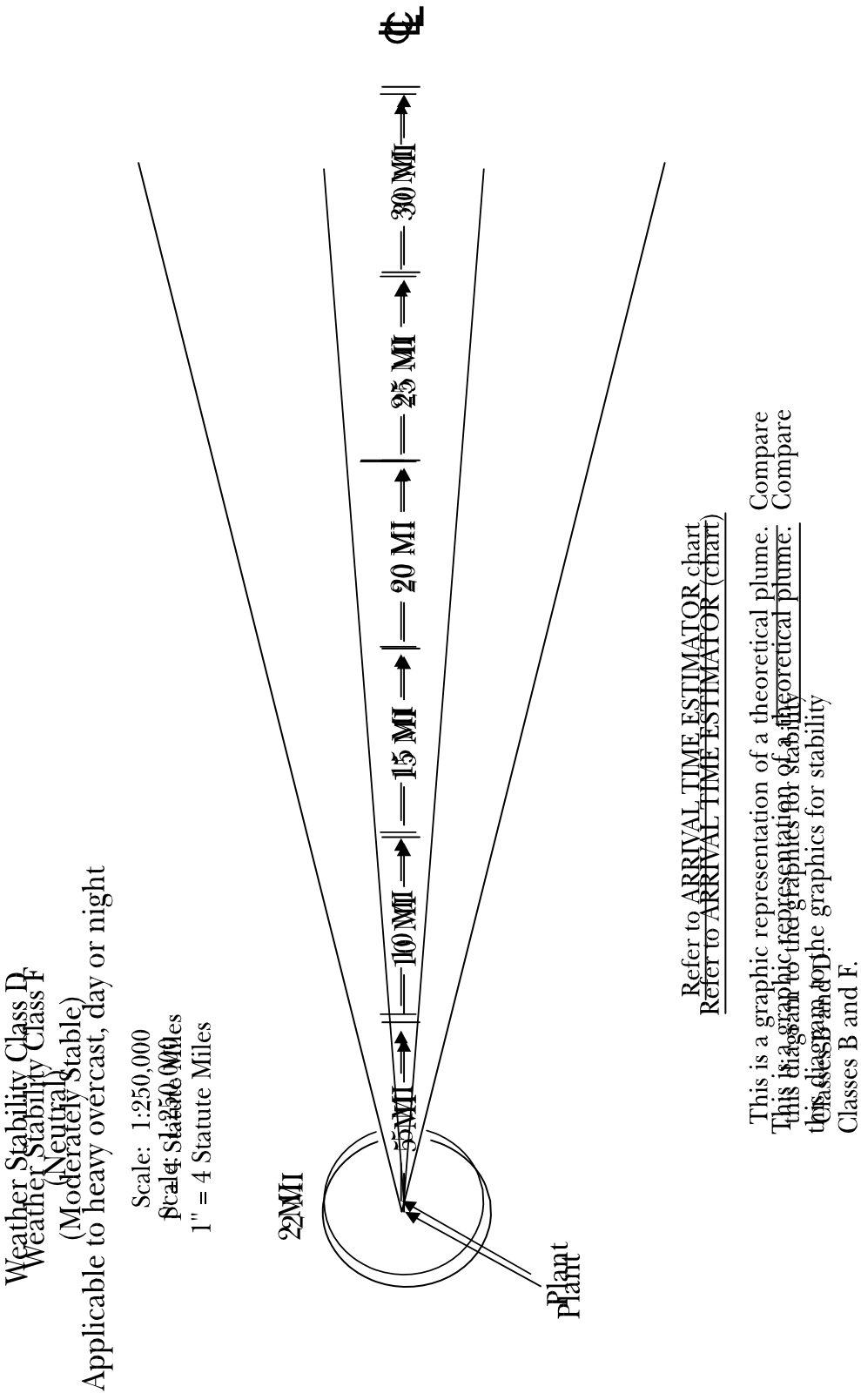
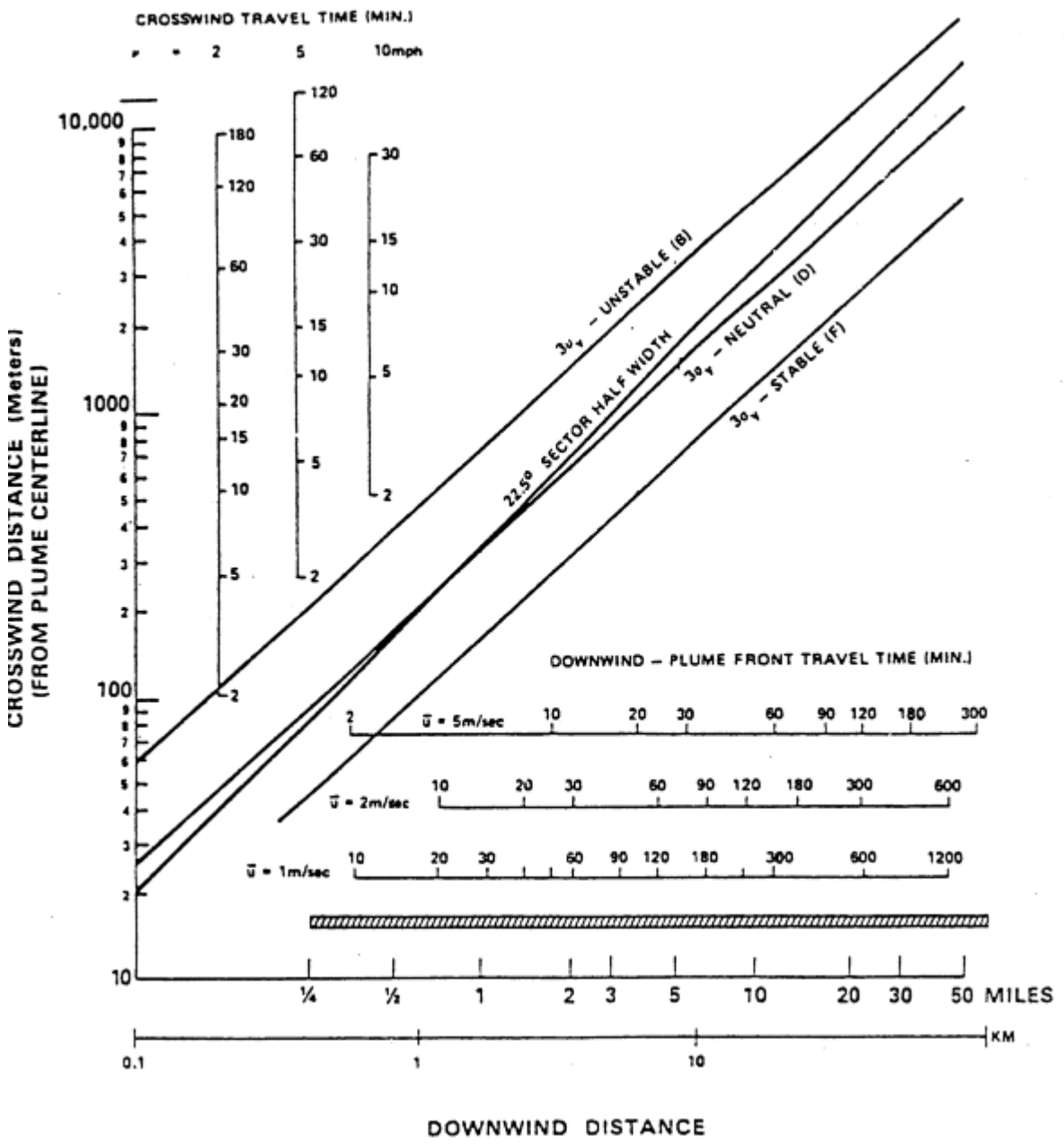


FIGURE 9-2

Plume Graphic, Weather Stability Class D

FIGURE 9-3

Plume Graphic, Weather Stability Class F



Three sigma half-widths of Gaussian shaped plumes vs. downwind distance, for Pasquill stability Classes B, D, and F. Also shown are travel times of plume fronts for wind speeds of 1, 2, and 5 m/sec, and crosswind travel times for travel speeds of 2, 5, and 10 mph.

FIGURE 9-4

Theoretical Plume Width

10. ACCIDENT ASSESSMENT

This section summarizes the responsibilities and actions of the State in evaluating the actual or potential consequences of a radiological incident at the Vermont Yankee Nuclear Power Station. Radiological assessment activities will be directed at the state Emergency Operations Center (EOC) by the Health Services Coordinator (SSF 8 Lead), Radiological Health Advisor, or designee.

Accident assessment includes determining the extent of actual or projected off-site radiological consequences. Assessments are based upon the collection and analysis of data originating from the utility's in-plant monitors, off-site radiological monitoring activities, Vermont Department of Health sampling stations (located around the plant), reported weather conditions and other relevant and appropriate resources. Assessment of environmental sample results will be made using the methods described in the Dose Assessment Team Implementing Procedure or other approach as directed by the Radiological Health Advisor.

A. Responsibilities and Support

(1) Utility

Vermont Yankee has initial responsibility for accident assessment. The plant operator is responsible for recognizing that abnormal events have occurred, classifying the incident in accordance with the Emergency Action Levels, and notifying designated off-site authorities. Throughout the emergency, the plant will provide plant parameters, plant conditions, meteorological data, field data, protective action recommendations, and other pertinent information to State officials. This information will assist the State in assessing the consequences of the accident.

(2) State

The Health Services Coordinator (SSF 8 Lead), assisted by the Radiological Health Advisor, has overall responsibility for accident assessment and determining the impact of the emergency on the health and safety of the public. The Health Services Coordinator is responsible for directing all State radiological monitoring, environmental sampling, and technical assessment activities.

The Public Service Coordinator (SSF 12 Lead) is responsible for monitoring plant conditions and coordinating with accident assessment personnel from the utility.

The Nuclear Engineer monitors and evaluates the physical conditions at the plant and relays plant-specific information to the Public Service Coordinator. Information on plant conditions is provided to the Health Services Coordinator, Radiological Health Advisor, or designee to be factored into the accident assessment.

Other state agencies provide information and data as necessary in support of accident assessment activities.

(3) New England Compact on Radiological Health Protection

Assistance in performing accident assessment activities is available through the New England Compact on Radiological Health Protection. The Compact was adopted by the six New England States by legislative action and provides the means for obtaining assistance (e.g., laboratory, personnel, equipment) from other states.

The New England Interstate Radiation Assistance Plan delineates the manner in which the New England Compact on Radiological Health Protection will be implemented.

Assistance available through the compact is further described in Section 19 of this Plan.

(4) Federal

Federal technical assistance in accident assessment will be provided as requested by the State through the Nuclear/Radiological Annex to the National Response Framework and the Federal Radiological Monitoring and Assessment Plan (FRMAP).

Examples of the federal support available include assistance from the Nuclear Regulatory Commission in interpreting and analyzing technical information used in protective action decision making; aerial surveys and field monitoring performed by the Department of Energy; and environmental sampling and analysis conducted by the Environmental Protection Agency.

Federal support in accident assessment is further described in Section 19 of this Plan.

B. Emergency Response Data System (ERDS)

The Emergency Response Data System (ERDS) is a direct near real-time electronic data link between the licensee's on-site computer system and the NRC Operations Center that provides for the automated transmission of timely and accurate updates of a limited set of parameters. For Vermont Yankee this selected set of parameters includes: Reactor Coolant System; Safety Injection; Containment; Radiation Monitoring System; and Meteorological Data.

It is intended for this same electronic data to be transmitted between the NRC Operations Center and the State EOC in Waterbury, Vermont. Representatives of Vermont's Public Service Department are responsible for program operation at the State EOC.

C. Radiological Monitoring

There are two types of field teams that collect data to assist in determining dose projections. The Radiological Plume Tracking Teams perform off-site radiological monitoring during the initial Plume Phase of an incident. Once the plume has settled or dissipated, the Radiological Sampling Teams perform off-site environmental sampling in support of Relocation and Ingestion Pathway assessment activities.

(1) Radiological Plume Tracking Teams

The Radiological Plume Tracking Teams operate under the direction of the Radiological Plume Tracking Teams' Director. Team members and the Director are all drawn from the Vermont Hazardous Materials Response Team (VHMRT).

When notified of declaration of an Unusual Event, the Radiological Plume Tracking Teams' Director will contact and place on Stand-by sufficient members of the VHMRT to staff a minimum of three, 3 person Radiological Plume Tracking Teams.

Upon declaration of an Alert, Radiological Plume Tracking Teams will be instructed by the Radiological Plume Tracking Teams' Director to pick up vehicles, equipment, and supplies and proceed to an identified staging area. Once assembled, the Radiological Plume Tracking Teams' Director will deploy Radiological Plume Tracking Teams to pre-designated sampling points or other locations based on accident conditions. Maps with pre-designated sampling locations may be provided with the monitoring kits and are also available at the State EOC and Staging Area.

The Radiological Plume Tracking Teams Director will be located at the Emergency Operation Facility (EOF). Radiological Plume Tracking Teams may be provided with portable satellite telephones and emergency management radios for communications capability. The Radiological Plume Tracking Teams communicate directly with the Radiological Plume Tracking Teams' Director. The Radiological Plume Tracking Teams' Director also communicates directly with the Department of Health personnel at the State EOC.

Plume Tracking Teams from Vermont Yankee will determine the center line of the plume.

Vermont Radiological Plume Tracking Teams will be directed to take radiological surveys based on anticipated plume travel in order to determine or verify plume boundaries. These include waist and ground level beta/gamma measurements and the collection of airborne radioiodine and particulate samples and soil samples for laboratory analysis. Off-site field

monitoring procedures are provided in the Radiological Plume Tracking Team's implementing procedures.

Results of the field surveys will be transmitted back to the Radiological Health Advisor at the State EOC for accident assessment and protective action decision making. Field monitoring data will be posted at the State EOC. Samples requiring further laboratory analysis will be transported to the State Health Laboratory in Burlington.

(2) Radiological Sampling Teams

Radiological Sampling Teams comprised of personnel from the Departments of Health and Labor and Agencies of Natural Resources and Agriculture, Food and Markets will be dispatched to collect environmental samples. The Radiological Sampling Teams' Director is from one of the participating entities. The Radiological Health Advisor is responsible for providing tasking for all environmental sampling and analysis activities. The Department of Health and Agencies of Natural Resources and Agriculture, Food and Markets will provide information regarding the identification and location of farms, food processors, and water sources that may be impacted.

Approximately six (6) Radiological Sampling Teams (minimum of two, preferably three, persons) per shift are available to perform sample collection. The Agency representatives will serve on teams with legal authority to access farms, food processors, food distributors, or public water systems. To the extent possible, teams will avoid taking samples during the hours of darkness for safety reasons.

Upon declaration of an Alert or higher emergency, Radiological Sampling Team personnel will be placed on standby by the Radiological Sampling Teams' Director.

The Radiological Health Advisor with assistance from the Dose Assessment Team will determine sampling strategies such as the locations where environmental samples are to be obtained, types of samples needed, and the prioritization of sample analyses. Sampling strategies will consider meteorological data, weather conditions, and field measurements. Upon determination of sampling locations, the Radiological Health Advisor will notify the Radiological Sampling Teams' Director who in turn will brief and deploy the teams. The Radiological Health Advisor will also notify the Vermont State Health Laboratory, and other laboratories providing sample analysis.

The samples which teams will collect during a radiological emergency will include any or all of the following and other media as appropriate:

- Cheese and Dairy Foods
- Drinking Water
- Eggs
- Fruits and Vegetables
- Hay/Silage
- Maple and Honey
- Meat and Meat Products Including Poultry
- Milk
- Sediment
- Snow
- Soil
- Surface Water
- Vegetation/Forage
- Wild Foods (Dandelion Greens, Fiddlehead Greens, Fungi)
- Fish

Sampling activities will be completed in accordance with the "Vermont Radiological Sampling Teams Procedures".

D. Laboratories

The Vermont Department of Health Laboratory will serve as the central point for receipt of most samples collected by the Vermont Radiological Sampling Teams until the Federal Radiological Monitoring and Assessment Center (FRMAC) is established. At that time Vermont Teams may be integrated with Federal Teams.

Analyses will be performed in accordance with the standard laboratory procedures used by the Vermont Department of Health Laboratory.

Tables 10-1 and 10-2 present the analytical equipment and capabilities of the Vermont Department of Health Laboratory.

Additional laboratory support may be obtained through activation of the Nuclear/Radiological Incident Annex to the National Response Framework (NRF), and through activation of the New England Interstate Radiation Assistance Plan. The Food and Drug Administration Laboratory in Winchester, MA, and Brookhaven National Laboratory in New York are two of the federal laboratories available through the activation of Nuclear/Radiological Incident Annex to the NRF. These laboratories can provide additional capabilities for the analyses of environmental samples. The Radiological Sampling Teams' Director and the Radiological Health Advisor will coordinate the sending of samples to federal laboratories, as needed, and the Vermont Department of Health Laboratory will be kept informed.

The New England Interstate Radiation Assistance Plan, which has been developed in accordance with Article III of the New England Compact on Radiological Health Protection outlines the manner in which interstate mutual aid and assistance will be acquired. It also includes the availability of equipment, capabilities, and load capacities of laboratories of the New England states and personnel resources.

The Health Services Coordinator will coordinate the activation of the New England Compact.

TABLE 10-1

Radiation Evaluation Equipment (Vermont Department of Health Laboratory)

Quantity	Type	Manufacturer	Model No.	Lab	Field	Radiation Evaluated					
						Alpha	Beta	Gamma	X-Ray	Neutron	Micro-wave
1	Survey Meter	Ludlum	3 Probe 44-9	X			X	X			
1	Survey Meter	Ludlum	3 Probe 44-7	X		X	X	X			
1	**Dual Channel Stabilized Analyzer	Ludlum	2218 Probe 44-23 Probe 43-2 Probe 44-7	X		X	X	X			
2	ReGe (25%)	Canberra		X				X			
~~1~~	~~GeLi (10%)~~	~~Canberra~~		~~X~~				~~X~~			
2	MCA	Canberra	Genie 2000	X							
1	4x4 NaI	**						X			
1	Alpha Spectrometer	Canberra **	7401			X					
1	Liquid Scintillation Counter	Packard	1900TR	X		X	X				
1	Alpha/Beta Proportional Counter	Canberra/ Tennelec	LB4110	X		X	X				
2	Alpha/Beta Proportional Counter	Canberra	2404F	X		X	X				
** Currently not in use											

TABLE 10-2
Laboratory Analysis Capability (State of Vermont)

Medium	Analysis	Analysis Time (hrs.)	State Involved in Emergency		State Not Involved in Emergency	
			8-hr day	24-hr day	8-hr day	24-hr day
Milk, Vegetation, Water, Foods, Charcoal Cartridges	Gamma Scan	7 - Normal			2	6
		0.08 - Emergency	24	72		
Water, Precipitation	Gross Alpha	8 - Normal			1	3
	Gross Beta	1 - Emergency	16	48		
Water, Precipitation	Tritium	4.2 - Normal			2	6
		1 - Emergency	8	24		
Air Filter	Gross Alpha	0.5 - Normal			16	48
	Gross Beta	0.08 - Emergency	24	72		

Note: Assumption is made that contaminated samples will not need as long a counting time as under normal, non-emergency conditions.

E. Radiological Exposure Control and Radiological Surveillance

Exposure limits for emergency workers set forth in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents", are presented in Table 10-3.

Radiological surveillance of emergency workers, equipment, and vehicles used in the Post Plume Phase is detailed in the Radiological Sampling Teams Procedures.

TABLE 10-3
Emergency Worker Exposure Limits

It is the State of Vermont's Policy to limit exposure to the same standards as routine occupational radiation exposure:

Not to exceed 5 REM whole body per year

In the event it becomes necessary to exceed these limits, the Commissioner or designee, Vermont Department of Health (acting as the Health Services Coordinator) may authorize the following Emergency Worker Exposure Limits on a case-by-case basis.

Dose limit [(a)] (rem)	Activity	Condition
5	all	
10	protecting valuable property	lower dose not practicable
25	life saving or protection of large populations	lower dose not practicable
>25	life saving or protection of large populations	only on a voluntary basis to persons fully aware of the risks involved

[(a)]Limits correspond to EPA limits set forth in EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (see Chapters 3 and 4). Sum of external effective dose equivalent and committed effective dose equivalent to non-pregnant adults from exposure and intake during an emergency situation. Workers performing services during emergencies should limit dose to the lens of the eye to three times the listed value and doses to any other organ (including skin and body extremities) to ten times the listed value. These limits apply to all doses from an incident, except those received in un restricted areas as members of the public during the intermediate phase of the incident

F. Dose Assessment

The Health Services Coordinator (SSF 8 Lead), assisted by the Radiological Health Advisor, will direct accident assessment activities.

(1) Plume Phase (Plume Exposure Pathway)

The Public Service Coordinator and Nuclear Engineer will provide information on plant conditions, including actual or potential release conditions.

The Dose Assessment Team will use this information, plus weather conditions, data available from the licensee and state field monitoring teams

or other relevant and appropriate information identified by the Radiological Health Advisor or designee to perform continual off-site dose projections as warranted for all phases of an incident.

A variety of tools and methods deemed appropriate by the Radiological Health Advisor including, but not limited to, computer-based programs such as VY METPAC, may be used by the Dose Assessment Team in the assessment of potential off-site dose consequences.

If available, field team results may be compared with dose projections generated by the Dose Assessment Team and/or licensee in order to ground truth modeled estimates.

Dose projections may be compared with relevant Protective Action Guides identified by the Radiological Health Advisor (such as those described in Section 11) in order to determine appropriate protective actions and evaluate potential off-site consequences.

If requested, under the supervision of the Radiological Health Advisor, the Dose Assessment Team may also compare projected results with those generated by a federal partner.

Dose Assessment Team work products will be provided to the Radiological Health Advisor and/or Health Services Coordinator or designee as warranted or requested.

The State will continuously evaluate plant conditions and dose assessment results to determine if additional protective actions are necessary.

(2) Ingestion Phase

(a) Relocation, Re-Entry, Return and Recovery

Dose assessment activities during Relocation, Re-Entry, Return and Recovery is described in Section 16 and detailed in the Implementing Procedure for the Dose Assessment Team.

(b) Ingestion Pathway

To facilitate rapid decision-making regarding contaminated human food, milk and water, radionuclide specific Derived Intervention Levels may be employed.

A Derived Intervention Level (DIL) corresponds to the concentration of a particular radionuclide or group of radionuclides in human food throughout the relevant period of time that could result in an individual receiving a dose equal to a predetermined level referred to as a

Protective Action Guide (PAG). DILs establish limits on the level of activity of radionuclides permitted in food for human consumption.

For example, FDA 1998 has recommended the following PAGs for use in the planning for protective actions related to ingestion of potentially contaminated human food:

0.5 rem Committed Effective Dose Equivalent (CEDE) **or** 5 rem Committed Dose Equivalent (CDE) to an individual tissue or organ, whichever is the more limiting.

FDA has calculated DILs that correspond to these specific dose limits for the five radionuclide groups expected to deliver the major portion of the radiation dose from ingestion during the first year following a nuclear reactor accident. For each group of radionuclides, DILs were derived for six age groups: 3months; 1 year; 5 years; 10 years; 15 years and adult (> 17 years). The most restrictive value calculated for each group of radionuclides became the recommended FDA DIL for that group. The DIL for each radionuclide (or group) is applied independently of the other. These FDA DILs are presented in Table 10-4 as well as in the Implementing Procedure for the Dose Assessment Team.

This FDA approach or other method and/or Protective Action Guides deemed relevant and appropriate by the Radiological Health Advisor will be employed by the State of Vermont in the assessment of human consumables such as milk, water and other foods.

G. Technical Assistance

Vermont is a small state geographically, in population, and in State resources. It is prudent to anticipate a situation where some of the limited number of dose assessment personnel, field monitoring team personnel, or other technical personnel might become sick or otherwise not be available. In this event, the State of Vermont would contact other states to get trained and experienced personnel to come to Vermont to fill in. In the dose assessment area Vermont could request that either New Hampshire or Massachusetts dose assessment teams provide processed and analyzed data to Vermont's State EOC as needed until sufficient dose assessment personnel from other states or a Federal Agency were able to arrive at the Vermont State EOC and bring the dose assessment team up to full capability. Vermont would use one or more of the following mechanisms to accomplish this:

(1) Emergency Management Assistance Compact (EMAC)

(2) New England Compact on Radiological Health Protection

(3) Special Memoranda of Understanding with nearby states

(4) Nuclear/Radiological Incident Annex to the National Response Plan

TABLE 10-4

FDA Recommended Derived Intervention Level (DIL) or Criterion for Each Radionuclide Group [(a) (b)]

All Components of the Diet			
Radionuclide Group	(Bq/kg)	(pCi/kg)	Based on most sensitive sub-population
Sr-90	160	4300	15 years
I-131	170	4600	1 year
Cs-134 + Cs-137	1200	32000	Adult
Pu-238 + Pu-239 + Am-241	2	54	3 months
Ru-103 + Ru-106 [(c)]	$\frac{C_3}{6800} + \frac{C_6}{450} < 1$ Bq/kg	$\frac{C_3}{180,000} + \frac{C_6}{12,000} < 1$ pCi/kg	3 months

Note: FDA Protective Action Guides for the Ingestion Pathway 0.5 rem committed effective dose equivalent **OR** 5 rem committed dose equivalent to an individual issue or organ, whichever is more limiting.

(a) The DIL for each radionuclide group (except for Ru-103 + Ru-106) is applied independently. Each DIL applies to the sum of the concentrations of the radionuclides in the group at the time of measurement.

(b) Applicable to foods as prepared for consumption. For dried or concentrated products such as powdered milk or concentrated juices, adjust by a factor appropriate to reconstitution, and assume the reconstitution water is not contaminated. For spices, which are consumed in very small quantities, use a dilution factor of 10.

(c) Due to the large difference in DILs for Ru-103 and Ru-106, the individual concentrations of Ru-103 and Ru-106 are divided by their respective DILs and then summed. The sum must be less than one. C_3 and C_6 are the concentrations, at the time of measurement, for Ru-103 and Ru-106, respectively.

Reference USFDA, Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendation for State & Local Agencies, August 18, 1998.

TABLE 10-5

Annual Dietary Intakes (kg/y) [a]

Food Class	Age Group (years)									
	<1	1	38480	38638	15-19	20-24	25-29	30-39	40-59	60 &up
Dairy	208	153	180	186	167	112	98.2	86.4	80.8	90.6
(Fresh Milk)[b]	-99	-123	-163	-167	-148	-97	-79	-67	-62	-70
Egg	1.8	7.2	6.2	7	9.1	10.3	10.2	11	11.4	10.5
Meat	17	34	46.9	58.4	69.2	71.2	72.6	73.4	70.7	56.3
Fish	0.3	2.5	4	4.9	6.1	6.8	7.6	7.1	8	6.3
Produce	57	60	82.3	96	97.1	91.4	99.1	102	115	121
Grain	20	58	79	90.6	89.4	77.3	78.4	73.7	70.2	67.1
Beverage	112	271	314	374	453	542	559	599	632	565
(Tap Water)	-62	-159	-190	-226	-243	-240	-226	-232	-268	
Miscellaneous	2	9.3	13.3	14.8	13.9	10.9	11.9	12.5	13.3	13
Total Annual Intake (kg/y)	418	594	726	832	905	922	937	965	1001	930

[a] Computed from daily intake values in grams per day provided in (EPA 1984b). The total annual intakes are rounded to nearest 1 kg/y.

[b] Fresh milk is included in the dairy entry, and tap water used for drinking is included in the beverage entry. The total annual intakes (kg/y) for fresh milk and tap water are also each given separately in parentheses.

11. PROTECTIVE ACTION GUIDES (PAGs)

Following a radiological incident involving a release of radioactive material to the environment, there may be a need for actions to protect the general public from radiation exposure. The Environmental Protection Agency (EPA) has developed Protective Action Guides (PAGs) for radiological emergency response planning. The guides, as well as the scientific basis for selecting them, are published in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," revised 1992. The PAGs are numerical projected doses that act as trigger points to initiate protective actions.

Table 11-1 provides a summary of the EPA PAGs that may be used to initiate protective actions within the Plume Exposure Pathway (10-mile EPZ). Other factors that may be considered to initiate protective actions include but are not limited to: plant conditions, utility protective action recommendations, dose assessment results, sampling results, and other off-site-specific conditions (e.g., presence of severe weather, competing disaster and local physical factors). The EPA PAGs presented are expressed in terms of Total Effective Dose Equivalent (TEDE) resulting from exposure to external sources and the committed effective dose equivalent from internal exposures. Supplemental guidance is also provided in terms of Committed Dose Equivalent (CDE) to the thyroid. This guidance updates and replaces previous values that were expressed as whole body and thyroid dose.

In summary, these guidelines establish the basis upon which protective action(s) may be taken after evaluation of any radiological incident by the Health Services Coordinator. Protective actions will be directed only after all factors (benefits derived versus risks) involved have been evaluated. The Health Services Coordinator along with the Radiological Health Advisor, Public Service Coordinator, and the SEOC Manager will determine if protective actions are necessary. Any recommended protective actions will be provided to the Governor for approval. Protective actions will be based on the following considerations: plant conditions, utility protective action recommendations, dose assessment results, sampling results, off-site-specific conditions, and a comparison of the projected doses with the Environmental Protection Agency Protective Action Guides or other values deemed relevant and appropriate by the Radiological Health Advisor.

The Food and Drug Administration has developed Protective Action Guides related to indirect exposure via the Ingestion Exposure Pathway. These values are noted in Section 10 and detailed in the Implementing Procedure for the Dose Assessment Team.

The authorities and responsibilities for recommending and implementing protective actions, as well as a list of various potential protective actions, are described in Section 12.

TABLE 11-1

EPA Recommended Protective Action Guides (PAGs) for Plume Exposure Pathway

PAG (Projected Dose to the Population)

Limits

Total Effective Dose Equivalent (TEDE) **<1 rem**
Committed Dose Equivalent (CDE) to the Thyroid **<5 rem**

Recommended Actions

No planned protective action. State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels.

Comments

No specific minimum level is established for initiation of sheltering. Sheltering should be considered at projected doses below PAGs (1 rem TEDE); however, implementing sheltering at very low levels may not be reasonable (e.g., <0.1 rem TEDE).

PAG (Projected Dose to the Population)

Total Effective Dose Equivalent (TEDE) **≥ 1 rem**
Committed Dose Equivalent (CDE) to the Thyroid **≥ 5 rem**

Recommended Actions

Conduct evacuation (or, some situations, sheltering) of populations in the predetermined area. Monitor environmental radiation levels and adjust area for evacuation or sheltering based on these levels. Control access.

Comments

Sheltering would be an alternative if evacuation is not immediately possible. Sheltering also may be the preferred protective action when it will provide protection equal to or greater than evacuation due to the nature of release composition from plant or other off-site-specific conditions (e.g., presence of severe weather, competing disaster and local physical factors which impede evacuation).

Source: EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, Revised 1992, Section 2.3, Page 2-4.

12. PROTECTIVE AND PRECAUTIONARY ACTIONS

Vermont has taken the position that there are too many variables in a potential nuclear power plant accident to pre-plan all actions prior to the accident. A host of likely actions have been thought out and procedures developed to implement them. Except for two specific scenarios noted below, the decision about which action(s) to implement will be made after the EOC's have been staffed and activated and initial accident data has been reviewed.

To assist decision-makers, various potential actions have been listed in the appropriate emergency classification levels in the Vermont Precautionary and Protective Actions list. To be effective, this list has to be flexible, and may be revised as conditions change. The version current at the time of printing this plan is shown as Table12-1. This list is used in conjunction with individual procedures.

The first scenario that is an exception to the above is the Unusual Event that either has a security action level or for which the cause has not yet ruled out sabotage or security issues. In this scenario a local law enforcement Command Post (CP) will be established. One location at the VY Corporate Office has been established but other locations may be considered depending upon circumstance. The local Law Enforcement CP may have law enforcement personnel from various utility, local, state, and federal agencies. The local Law Enforcement CP will coordinate decisions with the State EOC who will keep local EOCs informed of those decisions. This information will be transmitted through a more secure means. EOCs will be staffed to a level consistent with the threat. A security event could escalate to a higher emergency classification and the Law Enforcement CP would continue to operate and keep the State EOC informed.

The second scenario that is an exception to the above is the General Emergency Fast-Breaker. The three states with portions of the Vermont Yankee ten-mile Emergency Planning Zone (EPZ), Massachusetts, New Hampshire, and Vermont have a long-standing agreement that in a General Emergency Fast-Breaker that each state will immediately implement plant recommendations and once the various emergency facilities are staffed and activated and accident data has been received additional protective actions may be implemented. Some of the more common precautionary or protective actions are described in more detail below. It should be noted that whether a particular action is called "precautionary" or "protective" has to do with the likelihood of a particular plant condition occurring. For example, if a General Emergency has been declared and a release is anticipated, an evacuation might be ordered as a "protective action". On the other hand if a Site Area Emergency had been declared and it was unclear whether the situation might escalate, certain segments of the population might be "transferred" out of the ten-mile EPZ as a "precautionary" action. Precautionary actions are typically taken when the future situation is unclear and decision-makers are concerned that there will not be enough time to take action once the situation is clarified with additional data or escalating events.

TABLE 12 - 1
Vermont Precautionary and Protective Actions

UNUSUAL EVENT
1. If security EAL or unknown cause establish law enforcement CP
A. Activate local EOCs?
B. Limited shelter or evacuation
C. Law enforcement actions decided locally
D. Public information provided at law enforcement CP
E. Assistance provided as requested
2. If known cause?
A. Gather information
B. Provide public information jointly with VY, New Hampshire and Massachusetts
ALERT
1. Complete activation of all facilities to include full or partial staffing.
2. Phase I activation of BFUHS Reception Center (prepare to receive precautionary transfer of 3500 +/- school children and 1000 +/- children from childcare facilities and private schools)
3. Early Assembly of School Buses at all Emergency Planning Zone (EPZ) schools and licensed childcare facilities [1] (give priority to Vernon
4. Staging Area planning in the event of a precautionary transfer or evacuation
5. Transportation planning and staging of buses, vans and ambulances in the event of a precautionary transfer of health care facilities [1] (give priority to Vernon)
6. Health care facility patient transfer planning in the event of a precautionary transfer or evacuation
7. Early Traffic and Access Control planning in the event of an evacuation.
8. Supporting EAS Message(s) (to facilitate NH and/or MA issue an EAS message if requested)
9. Consider having the Governor declare a State of Emergency and issue a special news advisory
10. Discuss activities listed below for Site Area Emergency and General Emergency

TABLE 12 - 1
Vermont Precautionary and Protective Actions

[1]**Reception Center notified of Early Assembly of School Buses & Precautionary Transfer of School Children from all EPZ Schools.**
SITE AREA EMERGENCY (Ensure that previous actions have been implemented if appropriate)
1. Initial SITE AREA EMERGENCY EAS message A. Precautionary Transfer of school children from all EPZ schools and childcare facilities[1] *Note: The decision to move the children is predicated upon having the buses in place at the schools* (the EAS message should be sent only after the decision has been transmitted to the towns and schools) B. Advise farmers to shelter milk producing animals and place them on stored feed and water C. Requesting visitors in State Parks and recreation areas within the EPZ to leave D. Advising boaters to get off waterways in the EPZ E. Advise transients to leave the EPZ
2. Healthcare Facility Precautionary Transfer EAS message: Issued when transportation resources have patients on board and are moving toward host facilities
3. Special News Advisory: The Governor of Vermont declares a State of Emergency (if not done above)(needed to activate and deploy the VT National Guard)
4. Subsequent SAE Protective Actions EAS messages: A. Whether to shelter some or all towns in the EPZ based upon plant status and weather conditions B. Whether to evacuate some or all towns in the EPZ based upon plant status and weather conditions
5. Phase II activation of the BFUHS Reception Centers (prepare to receive parents of children in precautionary transfer and 5000 + evacuees if there is an evacuation)
6. Contingency planning continued: A. Transportation planning in the event of an evacuation B. Healthcare facility patient transfer planning in the event of an evacuation if not previously transferred C. Traffic and Access Control planning in the event of an evacuation D. Staging Area planning in the event of an evacuation if not already activated E. Assistance that may be required from other States or the Federal Government F. Potassium Iodide for emergency workers and the general public
7. Supporting EAS message(s) (to facilitate NH and/or MA to issue an EAS message)

TABLE 12 - 1
Vermont Precautionary and Protective Actions

8. Locally requested protective actions EAS message (if approved)
9. Discuss activities listed below for General Emergency
[1]Reception Center notified of Early Assembly of School Buses & Precautionary Transfer of School Children from all EPZ Schools.
GENERAL EMERGENCY (GE) Ensure the previous actions have been implemented
1. Initial GE EAS message: Implement Vermont Yankee (VY) recommendations immediately if not already in place
2. Potassium Iodide for emergency workers and the general public
3. Subsequent GE protective actions EAS message: Whether to shelter or evacuate some or all towns in the EPZ beyond plant recommendations
4. Activate traffic and access control plans as required
5. Supporting EAS message(s) (to facilitate NH and/or MA to issue an EAS message)
6. Locally requested protective actions EAS message (if approved)
7. Assist families and individuals in re-unification (coordination between all three reception centers, Westminster, VT, Keene, NH, and Greenfield, MA)
8. Establish and operate Emergency Worker Monitoring and Decontamination Station(s)
POST PLUME (Relocation and Ingestion Pathway – Ensure that previous actions have been implemented)
1. Establishing a restricted zone A. Establish a temporary restricted zone as soon as a town is sheltered or evacuated. B. Establish a more permanent restricted zone as radiological data is developed
2. Authorizing “re-entry” for permitted purposes for limited periods of time
3. Authorizing “return” for towns or portions of towns that are deemed safe to reoccupy on a permanent basis
4. Authorizing “relocation” of persons living in an area that was not “evacuated” and may not even be in the ten-mile EPZ
5. Assist in the provision of compensation and reimbursement to: A. Individuals B. Businesses

TABLE 12 - 1
Vermont Precautionary and Protective Actions

C. Government (local and state)
6. Request Federal resources. A. Request a FRMAC B. Request a Joint Field Office (JFO) (may be a tri-state JFO) C. Prepare for the FRMAC Advance Party Meeting (1) Complete state portion of the Advance Party Check List (2) Coordinate and negotiate with New Hampshire and Massachusetts D. Send representatives to the FRMAC Advance Party Meeting E. Send representatives to the FRMAC F. Assist the FRMAC establishing itself and in providing resources to Vermont
7. Determining proper disposition of food, water, crops, and animals
8. Planning the restoration of vital facilities and services such as: A. Medical facilities B. Utilities C. Roads and streets D. Schools E. Intermediate term housing for relocated persons
9. Planning the long term recovery of contaminated areas
10. Issuing news releases and conducting press conferences on the above and other relevant issues

A. Protective Actions for Direct Exposure in the Plume Exposure Pathway Emergency Planning Zone

The following section describes the protective actions that may be implemented by the State of Vermont in the event of an emergency at Vermont Yankee Nuclear Power Station.

(1) Precautionary Actions Concerning School Children

Under certain circumstances, the state may decide to implement precautionary actions at the **Alert** or **Site Area Emergency** levels. Children may be significantly more vulnerable to adverse radiation as compared to adults. Therefore where children are in groups such as in public schools, private schools, childcare facilities, it may be appropriate and feasible to transfer them out of the EPZ.

The decision whether or not to implement precautionary actions and at what level shall be based upon considerations such as the nature of the emergency (plant conditions, i.e., safety systems related event) and the number and location of people impacted.

(a) Early Assembly of School Buses

As a precaution, school buses may be mobilized and pre-staged at respective schools as early as the Alert level. This precaution taken early in the emergency would provide additional time for implementation and would ease road congestion if an evacuation of residents is needed later in the emergency.

(b) Precautionary Transfer of School Children

As a precaution, Vermont Emergency Management, upon the advice of the Vermont Department of Health, may direct the transfer of school children to include public schools, private schools and child care centers to the Bellows Falls Union High School Reception Center, or other previously identified location, as appropriate. This precautionary action, if directed by the Governor, may occur as early as the Alert level, depending on the nature of the event. Should this occur, EAS messages or news advisories would inform parents that the precautionary action was being implemented. Because there could be as many as 3,800 children from infants to high school age, there will not be enough room at the Reception Center. Therefore if transfer of all schools and child care centers is implemented, many children will be sent to congregate care facilities in nearby towns. Refer to the current Reception Center Plan for further detail.

(2) Precautionary Actions Concerning Health Care Facilities

There are two (2) hospitals, Five (5) nursing homes and assisted living facilities in the Emergency Planning Zone (EPZ) with approximately 450 patients. Four (4) of these are in Brattleboro and one (1) in Vernon. It has been determined that it may take several hours to ascertain the number of transportation resources required, get these resources to a staging area, and the time required to find appropriate facilities to which patients may be sent, Therefore, if the best course of action is to move some or all of the patients, it should be initiated early on in the emergency. Sheltering-in-place may be the best action for most of the patients but there can be significant staffing issues.

(3) Sheltering

Sheltering refers to the use of readily available nearby structures for protection against exposure to an airborne plume. The determination to shelter is based on an evaluation of projected doses, estimated plume

arrival times, plus factors such as release duration and hazardous weather conditions. Sheltering involves remaining inside, closing all doors and windows, turning off ventilation systems that draw in outside air and sealing, to the extent possible, all other access to the outdoor air. Sheltering can be implemented rapidly with no inherent risks such as road travel and is the preferred protective action to evacuation when it provides equal or greater protection. Sheltering may be an alternative if evacuation is not immediately possible.

Travel conditions that would present an extreme hazard may prompt off-site officials to initially shelter rather than evacuate the nearby population until conditions improve. Shelter may also be the appropriate initial protective action for transit-dependent persons, who should be advised to remain indoors until transportation resources arrive, if possible. In addition, shelter may be the appropriate protective action for controlled releases of radioactive material from the containment if there is assurance that the release is short term (puff release) and the area near the plant cannot be evacuated before the plume arrives.

The composition and thickness of the wall materials, size of the structure, and number of stories overhead all contribute towards reduced exposure to radiation. Therefore, shelter should be sought in a central location within the structure that affords the most protection. Representative shielding factors are shown in Tables 12-2 and 12-3.

TABLE 12 - 2

Representative Shielding Factors from a 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 interior dose to the exterior dose.
(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 reduction factor depends on where the personnel are located within the building, e.g., the basement or an inside room.

Source: NUREG-1062, Table 11.b, Page 28, and EGG-1183-1670, December 1975.

TABLE 12 – 3

Representative Shielding Factors for Surface Deposition

Structure or Location	Representative Shielding Factor[a]
Cars on Fully Contaminated Road	.50
Cars on Fully Decontaminated 50 ft. Road	.25
Trains	.40
One- and Two-Story Wood-Frame House (No Basement)	.40[b]
One- and Two-Story Block and Brick House (No Basement)	.20[b]
House Basement, One or Two Walls Fully Exposed	.10[b]
One Story, Less Than 2 Feet of Basement, Walls Exposed	.05[b]
Two Stories, Less Than 2 Feet of Basement, Walls Exposed	.03[b]
Three- or Four-Story Structures, 5,000 to 10,000 sq. ft. per Floor:	
First and Second Floors	.05[b]
Basement	.01[b]
Multi-Story Structures, >10,000 sq. ft. per Floor:	
Upper Floors	.01[b]
Basement	.005[b]

(a) The ratio of the interior dose to the exterior dose.
(b) Away from doors and windows.

Source: NUREG-1062 Table 11.a, Page 26, and EGG-1183-1670, December 1975

Upon the order of the Governor to shelter, instructions will be provided to the public over the EAS.

(4) Ingestion of Potassium Iodide (KI)

Vermont has adopted guidance developed by the U.S. Food and Drug Administration and presented in their document “Guidance - Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies, November 2001". Future guidance by FDA may be adopted as it is issued.

Potassium iodide (KI) has been determined by the FDA to be a safe and effective means by which to prevent radioactive iodine uptake by the thyroid gland and reduce the risk of thyroid disease in the event of a radiation emergency. The non-radioactive KI saturates (fills up) the thyroid gland. For

as long as the thyroid gland is saturated with non-radioactive KI, it will not take up (incorporate) any radioactive iodine to which an individual may be exposed.

It is important to note that KI provides protection to only one gland (thyroid) from only one type of radiation exposure (radioactive iodine). Other emergency actions such as evacuation, sheltering, or restricting the use of certain foodstuffs, milk, water, and animal feeds are designed to minimize exposure from all radiation sources and should be complied with as instructed by appropriate officials.

The State of Vermont purchased 65 milligram dose pills and liquid KI, and distributed them to schools and childcare facilities that accepted them.

Vermont has received a supply of potassium iodide from the Nuclear Regulatory Commission (NRC) for pre-emergency distribution to the general public. KI is being distributed in the Vermont area of the 10-mile EPZ around the Entergy Nuclear Vermont Yankee Power Plant in Vernon, Vermont, to those individuals who voluntarily request it. Concurrent with such pre-emergency distribution, individuals will receive full information on the risk and benefits, proper dosage, medical contraindications, and the importance of following emergency preparedness directives. The major emphasis is to distribute KI to most of the general public prior to any emergency.

A summary of FDA's recommended dosage chart (see Table 12-4) is shown below. As a practical matter, it may not be possible to quantify the thyroid exposure from inhaled radioiodines at the time of the emergency. The Health Services Coordinator (SSF 8 Lead) at the State EOC may, lacking specific predicted thyroid exposure, recommend the use of KI by individuals possibly exposed to a released plume presumed to contain radioiodines.

The Health Services Coordinator (SSF 8 Lead) and the Radiological Health Advisor who will be advising the Health Services Coordinator may use information from sources such as the Emergency Response Data System (ERDS) and/or dose projections from the Dose Assessment Team or other relevant and appropriate source identified by the Radiological Health Advisor to determine whether to advise emergency workers, institutionalized individuals and members of the general public who have received pre-emergency distribution of KI near or down wind from the plant to ingest KI. Emergency workers and institutionalized individuals will be notified through the RERP communications system. The general public will be informed by either EAS message or news advisory. Town EOCs will be informed of the decision in a timely manner.

TABLE 12- 4

Recommended Doses of Potassium Iodide

Risk Group	KI Dose (milligrams)	# of 130 mg Tablets	# of 65 mg Tablets
Adults over 18 years	130	1	2
Pregnant or lactating women	130	1	2
Children over 3 through 18 years *	65	1/2	1
Children over 1 month through 3 years	32	1/4	1/2
Birth through 1 month	16	1/8	1/4

***** *Adolescents approaching adult size (equal or greater than 154 pounds) should receive the full adult dose of 130 mg.*

Note: *The protective effect of KI lasts approximately 24 hours. For optimal prophylaxis one should therefore be dosed daily until a risk of significant exposure to radioiodines from inhalation or ingestion no longer exists.*

(5) Evacuation

The preferred initial action to protect the public from a severe reactor accident is to evacuate immediately about 2 miles in all directions from the plant and about 5 miles downwind from the plant, unless other conditions make evacuation dangerous.

The primary objective of evacuation is to avoid exposure to airborne radioactive materials by moving individuals away from the path of the plume. The effectiveness of evacuation depends on various factors such as the time required to initiate, implement, and complete the actions, and the nature of the incident. Advanced planning is essential to identify potential problems that may occur in an evacuation.

Evacuation will be implemented on a town-by-town basis. Upon the order of the Governor to evacuate, instructions will be provided to the public over the EAS. The primary means of evacuation will be by private vehicle. Local emergency response organizations will provide assistance with supplementary transportation. Each EPZ town has provisions for evacuating residents, including special needs individuals, institutions, and transportation-dependent individuals. Evacuation of school children is addressed in school-specific plans. The state and EPZ towns have designated routes to be used during an evacuation. These routes are described in Section 13.

(6) Access Control

Access control is implemented in conjunction with sheltering and evacuation. Access control restricts individuals from entering an area where they could be exposed to radiation. Access control clears traffic from roads in designated areas and provides security in evacuated areas. Once an area is evacuated, all individuals with the exception of emergency workers and authorized individuals will be prohibited from entering into the area until off-site radiological assessments confirm the levels of radioactivity.

Access control is both a state and local responsibility. Access control is discussed further in Section 14.

B. Protective Actions for Exposure to Deposited Material (Relocation, Re-Entry and Return)

Protective actions for limiting the long-term exposure of the public to deposited radioactive materials have been developed. These protective actions may be implemented as may be necessary after the release of radioactive material has been brought under control. Actions to be considered at this time include Relocation, Re-entry, and Return. These actions are described in Section 16.

C. Protective Actions for Indirect Exposure in the Ingestion Exposure Pathway Emergency Planning Zone

(1) Precautionary Actions

At a Site Area Emergency or General Emergency, the Health Services Coordinator (SSF 8 Lead), or Radiological Health Advisor, may recommend the precautionary protective action of sheltering and placing milk producing animals within a 10-mile radius of the plant on stored feed and protected water supplies. This precautionary protective action may be extended to the full ingestion pathway zone if necessary based on projected deposition levels, plant conditions, and other relevant information.

(2) Food, Milk, and Water Control

Protective actions for indirect exposure through the ingestion pathway are implemented to reduce the potential for the ingestion of accidentally contaminated foodstuffs and milk. Water may also be a consideration. Potential protective actions for the ingestion pathway include:

(a) Milk

The most critical exposure pathway after a release from a nuclear

power plant is assumed to be the ingestion of milk (pasture to lactating animal to milk to processor to distributor to consumer). This assumption is based on the potential effects of radionuclides on infants, the most critical segment of the population for iodine-131. Preventing contamination of milk is an important element of ingestion pathway protective actions. Protective actions exist for controlling the consumption of contaminated milk.

Protective actions involve protecting animal feed and ordering dairy farmers to use only stored feed rather than letting the herd graze on contaminated pasture. Table 12-5 presents the potential efficacy of various protective actions applicable to the pasture to milk to human pathway. However, if the milk activity exceeds a level of activity estimated to correspond to a predetermined dose limit identified by the Radiological Health Advisor, such as the FDA DILs described in Section 10.F.b. the milk may be destroyed.

As recommended by the Vermont Department of Health, control of milk will be implemented by the Vermont Agency of Agriculture, Food and Markets. A list of dairy farm owners/operators is maintained by this Agency.

(b) Water Control

Water sources of immediate concern include water supplies, reservoirs and water treatment plants.

Water supplies that receive a major portion of their water from the surrounding watershed will be the focus of protective actions for water control. Reservoirs filled by pumping from flowing streams can be protected by prohibiting pumping when runoff causes an increase in contamination.

As necessary, the Vermont Department of Health and the Agency of Natural Resources will direct the control and use of water from contaminated public surface water supplies within the ingestion pathway and arrange for alternate water supplies.

Wells and groundwater supplies are not likely to be contaminated but will be tested if they are muddy or otherwise suspected of having received runoff from contaminated soils.

Neither FDA nor EPA has released a unique methodology for the evaluation of drinking water. The Vermont Department of Health may employ the FDA DIL method previously described or other method

deemed appropriate by the Radiological Health Advisor in the evaluation of potentially contaminated drinking water.

TABLE 12-5

Actions Applicable to the Pasture to Milk to Human Pathway

Action	Radionuclide(s) for Which Protective Action is Applicable	Effectiveness	Safety	Practicality (Effort Required)	
Applicable to Cattle					
Provide Alternate Source of Uncontaminated Animal Feed	131_I, 90_{Sr}, 89_{Sr}, 137_{Cs}	(+)[a]	(+)	(+)	Good
Add Stable Iodine to Cattle Ration	131_I	Marginal[b]	Some Hazard	(+)	
Add Stable Calcium to Cattle Ration	89_{Sr}, 90_{Sr}	Marginal	Some Hazard	(+)	
Add Binders to Cattle Ration	137_{Cs}, 89_{Sr}, 90_{Sr}	Marginal	Questionable	(+)	
Substitute Sources of Uncontaminated Water	137_{Cs}, 89_{Sr}, 90_{Sr}	(+)	(+)	(+)[c]	
Applicable to Milk					
Condemnation of Milk	131_I, 89_{Sr}, 90_{Sr}, 137_{Cs}	(+)	(+)	(+)[d]	Good
Divert Fresh Milk to Processed Milk Products	131_I, 89_{Sr}	(+)	(+)	(+)	Good
Process Fresh - Store	90_{Sr}, 137_{Cs}	Marginal	Questionable	(+)	
Process Fresh - Store	131_I,	(+)	(+)	(+)	Good

(a) (+): 90% effective
(b) Marginal: Less than 90% effective
(c) Depends on availability
(d) Somewhat dependent on volume

(Reference: HHS Publication FDA 82-8196)

TABLE 12-6

Actions Applicable to Soil

Action (Applicable to Soil)	Radionuclide(s) for Which Protective Action is Applicable	Effectiveness	Safety	Practically (Effort Required) [a]
Soil Management – Minimum Tillage	90_{Sr} [b]	Poor to Fair	Not Applicable	Good
Deep Plowing with Root Inhibition	90_{Sr}	Good to Fair	Not Applicable	Poor
Irrigation & Leaching	90_{Sr}	Poor	Not Applicable	Good
Liming & Fertilizing	90_{Sr}	Poor to Fair	Not Applicable	Good
Removing Contaminated Surface Crops	90_{Sr}	Most Poor	Not Applicable	Poor to Fair
Removal of Soil Surface Contamination				
Warm Weather with Vegetation Cover	90_{Sr}	Good to Fair	Not Applicable	Poor
Cold Weather No Cover	90_{Sr}	Good to Poor	Not Applicable	Good to Poor

[a] Rating for reducing Sr-90: Good - 95% reduction
Fair - 75-95% reduction
Poor - 75% reduction

[b] Rating for effort required: Good - Not significantly more than normal field practice
Fair - Extra equipment or labor required
Poor - Requirement of equipment, materials, and labor

(Reference: HHS Publication FDA 82-8196)

(c) Other Food

This pathway involves the ingestion of fruits, vegetables and crops grown within the affected area, as well as the transporters, processors, and distributor of these products. Typically, this may involve small independent family farms that produce for themselves and distribute to the local market only, and large commercial farms, whose production is processed in many locations and delivered to consumers out of state. As the situation dictates, the Radiological Health Advisor may determine that it is appropriate to store nonperishable crops until the radioactivity has decayed or has been removed. Techniques such as canning and processing may be viable options for storing perishable crops until the radioactivity has decayed to within allowable limits. Table 12-7 presents some of this information. In the event that crops have been so heavily contaminated that preventive measures are determined to be ineffective, actions may be taken to prevent food from entering the market place.

The Agency of Agriculture will advise the Health Services Coordinator on the control of harvesting, sale of crops, and, if necessary, condemnation of contaminated foods, such as meat, meat products, poultry, and poultry products.

Lists of the commercial agricultural processing and distribution facilities in the ingestion pathway are maintained at the state EOC.

Maps for recording ingestion pathway data, including locations of key land use, agricultural facilities, water supply locations, and related information are maintained by the appropriate state agencies. These maps are used to identify areas where protective actions may be necessary and for recording general survey and environmental monitoring data.

Protective actions for indirect exposure in the ingestion pathway EPZ should remain in effect until concentrations are expected to remain less than the FDA 1998 recommended guidance values or other reasonable and appropriate comparison value(s) identified for use by the Radiological Health Advisor.

TABLE 12-7

Percent Reduction in Radioactive Contamination of Fruits and Vegetables by Processing

	STUDY 1 (60) - Normal Food Preparation for Freezing, Canning, or Dehydration				Study 2 (61)	Study 3 (62)
	Internal 90_{Sr}	Contamination[a] 137_{Cs}	External 90_{Sr}	Contamination[a] 137_{Cs}	Canning 90_{Sr}	Home Preparation 90_{Sr}
Spinach	64	88	92	95	22	--
Snap Beans	--	--	--	--	62	--
Carrots	--	--	--	--	19	19
Tomatoes	65	--	--	--	21	28
Broccoli	72	89	94	92	--	--
Peaches	~100	~100	~100	~100	50	--
Onions	--	--	--	--	--	37
Potatoes	--	--	--	--	--	24
Cabbage	--	--	--	--	--	55
Green Beans	--	--	--	--	--	36

[a] Contamination on surface is referred to as external contamination.
Internal contamination is contamination of fleshy portion of product from surface deposition of radionuclide.

(Reference: HHS Publication FDA 82-8196)

D. Protective Action Decision Process for the Ingestion Pathway

The following discussion describes the decision process for ingestion pathway protective actions. To facilitate understanding, Figure 12-1, "Decision Criteria for Recommended Ingestion Pathway Protective Actions," the process is described by means of a flow chart.

Decision No. 1 - If a Site Area Emergency or General Emergency has been declared at Vermont Yankee, implement precautionary actions. Precautionary actions are limited to sheltering milk producing animals within 10 miles and putting them on stored feed. The decision to implement this precautionary action out to 50 miles will be based upon projected deposition levels or upon assessment of the

magnitude of the release, the status of plant conditions, and/or the accident prognosis.

Decision No. 2 - Determine if a radioactive release has occurred or is underway. If yes, proceed to Decision No. 3. IF NO, CONTINUE TO MONITOR THE SITUATION.

Decision No. 3 - Determine whether any PAG has been exceeded. This entails determining if any derived level listed in Table 12-7 has been exceeded. If so, the Governor will be advised by the Health Services Coordinator to order protective actions. If the derived intervention levels have not been exceeded, continue to monitor the need for protective actions.

E. Protective Action Decision Making and Implementation

The Health Services Coordinator (SSF 8 Lead), Public Service Coordinator (SSF 12 Lead), and the SEOC Manager are responsible for determining the need for protective actions (see Section 11). Protective actions will be based on the following considerations: plant conditions, utility protective action recommendations, dose assessment results, sampling results, off-site specific conditions, and a comparison of the projected doses with the Environmental Protection Agency Protective Action Guidelines and/or other information deemed relevant and appropriate by the Radiological Health Advisor. Any recommended protective actions will be provided to the Governor for approval. The State of Vermont will coordinate with the Commonwealth of Massachusetts and State of New Hampshire regarding the protective actions and to establish times for activation of the Public Notification System (i.e., weather alert radios, sirens, EAS). A protective action will not be considered final until tri-state coordination regarding activation of the Public Notification System is completed.

The local towns will be notified of the Governor's approved protective actions and the time established for activation of the Public Notification System. The public will then be notified at the established times.

The SEOC Manager is responsible for coordinating the implementation of protective actions. The local towns will implement the directed protective actions in accordance with their plans and procedures. State resources are available to support the local response.

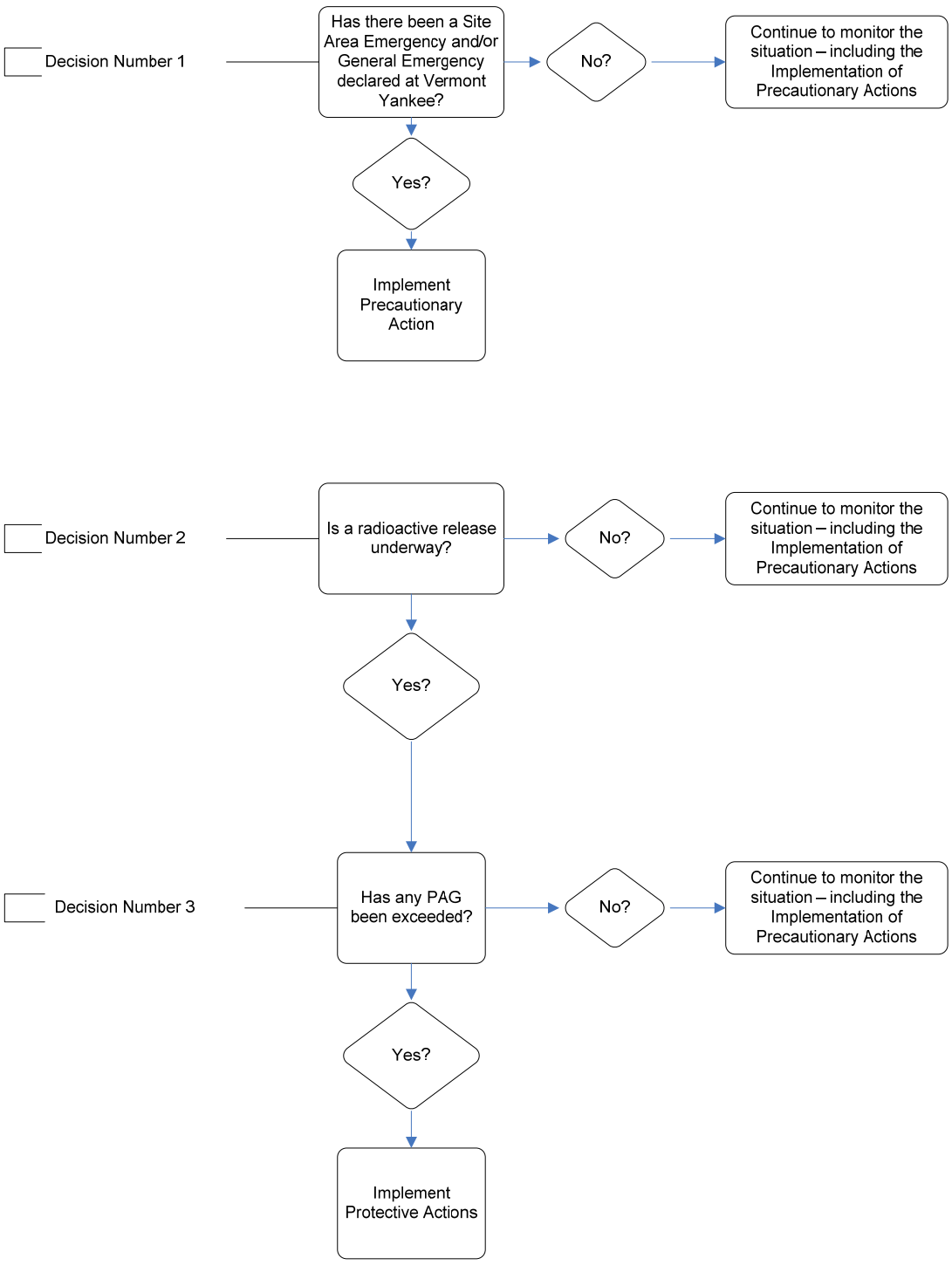


Figure 12-1
Decision Criteria for Recommended Ingestion Pathway Protective Actions

TABLE 12-8

FDA Recommended Derived Intervention Level (DIL) or Criterion for Each Radionuclide Group [(a) (b)]

All Components of the Diet

Radionuclide Group	(Bq/kg)	(pCi/kg)	Based on most sensitive sub-population
Sr-90	160	4300	15 years
I-131	170	4600	1 year
Cs-134 + Cs-137	1200	32000	Adult
Pu-238 + Pu-239 + Am-241	2	54	3 months
Ru-103 + Ru-106 [(c)]	$\frac{C_3}{6800} + \frac{C_6}{450} < 1$ Bq/kg	$\frac{C_3}{180{,}000} + \frac{C_6}{12{,}000} < 1$ pCi/kg	3 months

Note: FDA Protective Action Guides for the Ingestion Pathway 0.5 rem committed effective dose equivalent **OR** 5 rem committed dose equivalent to an individual issue or organ, whichever is more limiting.

(a) The DIL for each radionuclide group (except for Ru-103 + Ru-106) is applied independently. Each DIL applies to the sum of the concentrations of the radionuclides in the group at the time of measurement.

(b) Applicable to foods as prepared for consumption. For dried or concentrated products such as powdered milk or concentrated juices, adjust by a factor appropriate to reconstitution, and assume the reconstitution water is not contaminated. For spices, which are consumed in very small quantities, use a dilution factor of 10.

(c) Due to the large difference in DILs for Ru-103 and Ru-106, the individual concentrations of Ru-103 and Ru-106, the individual concentrations of Ru-103 and Ru-106 are divided by their respective DILs and then summed. The sum must be less than one. C_3 and C_6 are the concentrations, at the time of measurement, for Ru-103 and Ru-106, respectively.

Reference USFDA, Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendation for State & Local Agencies, August 18, 1998.