INCIDENT ANNEX 9A

VERMONT RADIOLOGICAL EMERGENCY RESPONSE PLAN

Fixed Facility

VTSEOP
April 19, 2016

LEAD: Department of Public Safety, Division of Emergency Management and Homeland Security

SUPPORT:

Due to the decommissioning of Vermont Yankee, as of April 15, 2016, the Nuclear Regulatory Commission (NRC), Federal Emergency Management Agency (FEMA), and Entergy Vermont Yankee Nuclear Power Station (VYNPS) consider the Emergency Planning Zone (EPZ) to cover only the plant site itself. As such, much of the material contained within this response plan, unless otherwise indicated, is for historical reference purposes or for use in an unmitigated long term event without an appropriate response.

The State of Vermont provides guidance to state agencies, local municipalities, and other supporting agencies and organizations that might be called upon to respond to a radiological emergency at a nuclear power plant in the form of a Radiological Emergency Response Plan.

This plan is primarily written to address incidents and/or accidents at Vermont Yankee Nuclear Power Station in Vernon, Vermont. Vermont Yankee stopped operating in December 2014.

This version of Incident Annex 9A **completely replaces** the December 2015 version. As such, it does not track individual changes throughout the document. See the following page for a summary of the changes.

This plan is approved for public release. While supporting plans and procedures may have restricted distribution or be classified, this base document does not contain sensitive or personal information.

Revised April 2016

CHANGE SUMMARY

This revision (April 2016) **completely replaces** the old versions of the plan based on changes in risks, potential consequences, and resources with the reactor shut down. An overview of these changes is listed below.

- Changed language throughout to reflect lower risk and change in Emergency Planning Zones (EPZs) without an operating reactor
- Updated response actions to reflect end of EMERGENCY classifications
- Updated response actions for sunset of facilities including the Emergency Operations Facility (EOF), Joint Information Center (JIC), and Reception Center (RC)
- Updated processes to reflect changes in prepositioned, calibrated equipment
- Updated language to reflect local Incident Command Posts in accordance with the use of the National Incident Management System
- Deleted NUREG-0654 Cross Reference

TABLE OF CONTENTS

1. INTRODUCTION

a. Purpose

(1) SPECIAL NOTE: As of April 15, 2016, the Nuclear Regulatory Commission (NRC), Federal Emergency Management Agency (FEMA), and Entergy Vermont Yankee Nuclear Power Station (VYNPS) consider the Emergency Planning Zone (EPZ) to cover only the plant site itself. However, if there is an emergency on the site, the response will affect the surrounding communities, so Vermont continues to plan with the towns of Vernon, Brattleboro, Guilford, Dummerston, Marlboro, and Halifax (formerly known as EPZ towns).

(2) This plan has been developed to provide assistance to State and local officials in responding to a radiological incident at the Vermont Yankee Nuclear Power Station. The Radiological Emergency Response Plan is part of the Vermont State Emergency Operations Plan. This annex is published and distributed to users as a complete plan.

(3) This plan places the services of the Vermont State Government in a role of coordination with respect to all local, state, interstate, and federal response. It provides for timely warning of an emergency, an organized manner in which to protect the population at risk, and the use of State resources to assist in response and recovery efforts. The ability of State and local governments and supporting organizations to respond to an emergency occurring at a nuclear power plant in an expeditious and effective manner is critical to ensuring the protection of the health and safety of the public.

(4) The purpose of the plan is to delineate responsibilities and identify the necessary actions to prevent or minimize the health effects from direct long term exposure to deposited radioactive materials and ingesting contaminated foods such as milk, fresh fruits and vegetables, or other food stuffs.

(5) In this Plan the terms "Post Plume" and "Ingestion Pathway" are considered to be synonymous. Determining the need for "Relocation" is one of the major tasks in this plan. For brevity's sake all three terms are not always included in various titles.

(6) Until the permanently shut down Yankee Nuclear Power Station in Rowe, Massachusetts is completely decommissioned and all spent fuel removed, the State will be notified and will have a limited response as necessary in the event of an emergency at their facility. The State's actions are described in Section 3 of this plan.

b. Authorities and References

(1) Authorities

(a) Radiological Emergency Response Planning is authorized under Title 20, Vermont Statutes Annotated, Section 38.

(b) The Commissioner of Public Safety has designated the Vermont DEMHS Division (Planning Section) as the State/Local Planning Authority for the development of the Vermont Radiological Emergency Response Plan. Planning and interface functions have been assigned to the Director of Emergency Management. Assistance is provided by the Department of Public Safety Planning Division, the Vermont DEMHS staff, and personnel from various participating Vermont State Government agencies. State agency planning authority and personnel designations are at the discretion of the agency heads.

(c) The Commissioner of the Vermont Department of Health coordinates ingestion pathway decisions with assistance from accident assessment personnel from various state agencies, federal agencies, and the Vermont Yankee Nuclear Power Station.

(d) Local (town) planning authority and personnel designations are local responsibilities.

(2) State References

(a) Title 3, Vermont Statutes Annotated, (VSA) Chapter 51, Creation of Agency of Natural Resources and Supporting Department.

(b) Title 6, VSA, Chapter 102, Section 1159, Authority to Condemn and Destroy an Animal.

(c) Title 6, Vermont Statutes Annotated (VSA), Section 491, Authority to condemn and Destroy Adulterated Maple Syrup

(d) Title 10, VSA, Chapters 41, 56 and 61, Detailed Authority for Fish and Wildlife, Forest and Parks, and Department of Environmental Conservation

(e) Title 18, VSA, Sections 1218 and 1282, Water Pollution and Public Drinking Water

(f) Title 18, VSA, Sections 4055 and 4059, Authority to Condemn and Destroy Contaminated Food Products

(g) Title 18, VSA, Chapter 31, New England Compact on Radiological Health Protection.

(h) Title 18, VSA, Chapter 32, Ionizing and Non-ionizing Radiation Control

(j) Title 20, VSA:

- Section 2(7), "Radiological Incidents" - natural disasters defined as any mishap or occurrence involving radiological activity which may pose a threat to persons or property.
- Section 3(e), Authority for direction and control - Division of Emergency Management and Homeland Security
- Section 3(c)(f), Delegation of civil defense responsibilities to other agencies of state government and coordination with other states
- Section 8, General Powers of the Governor
- Section 8(b)(c)(g), Delegation to the Director
- Section 9, Emergency powers of the Governor (also see 20 VSA 2)
- Section 10, Requests to the Governor by municipal authority
- Section 20, Immunities and defenses
- Section 38, State Response Plan Authority. Special funds radiological emergency response
- Section 601, Call out of the National Guard
- Chapter 3, Interstate Civil Defense Compact

(3) Federal References. The following is a list of documents published by federal agencies that would be used in a radiological response and in some cases may form the basis of various parts of plans and procedures.

(a) EPA-400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," May 1992

(b) FDA, 1998 Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies.

(c) FRMAC Operations Manual, (DOE/NV/25946-980) Dated May 2010

(d) FRMAC Health and Safety Manual (DOE/NV/11718-440) Dated May 2001

(e) FRMAC Monitoring Division Manual, Volume 1, (DOE/NV/11718-853 Vol 1) Dated December 2005

(f) FRMAC Monitoring and Analysis Manual, Radiation Monitoring and Sampling, Volume 2, (DOE/NV/11718-181 Vol 2) Dated December 2005

(g) FRMAC Laboratory Analysis Manual, (DOE/NV/11718-852) Dated December 2005

(h) FRMAC Assessment Manual, Volume 1 - Overview and Methods, (SAND 2010-1405P) Dated April 2010

(i) FRMAC Assessment Manual, Volume 2 - Pre-assessed Default Scenarios, (SAND 2010-2575P) Dated February 2010

(4) State and Local Plans. Appendix E, Supporting Plans, contains a list of plans which have been developed to respond to a possible incident or accident at either Vermont Yankee or Yankee Rowe.

c. Emergency Response Planning

(1) The Commissioner of Public Safety has designated the Vermont Division of Emergency Management and Homeland Security (DEMHS) as the state/local planning authority for the development of the Vermont Radiological Emergency Response Plan.

(2) The Director of Division of Emergency Management and Homeland Security is responsible for all emergency preparedness in Vermont. Planning and interface functions have also been assigned to the Director of Vermont DEMHS. Assistance is provided by the DEMHS staff and personnel from various Vermont state government organizations.

(3) Radiological Emergency Response Planning is authorized under Title 20, Vermont Statutes Annotated, Section 38.

(4) Local (town) planning authority and personnel designations are local responsibilities. The State of Vermont will provide planning assistance to local governments and organizations as resources allow.

(5) State agency planning authority and personnel designations are made at the discretion of the agency heads. All participating State organizations will develop operational procedures in support of the VRERP. Vermont DEMHS is responsible for ensuring that all plans and procedures are compatible with one another and that there is inter-operability between them all.

(6) The acceptance of each town, institutional and State organization plan by authorized representatives and designated state officials will constitute an operational agreement between the parties, eliminating the need for separate letters of agreement for each participant.

2. PLANNING CONSIDERATIONS

a. Facts and Assumptions

(1) The probability of an emergency at VYNPS with a release of radioactive material to the environment which requires public protective actions is almost vanishingly small, since the reactor has shut down and the spent fuel has been cooling for at least a year. However, plans and procedures to ensure public safety remain in place in order to be prepared if an emergency was to occur. Utility, state, local, and federal response personnel are available to support the response efforts.

(2) The basis for emergency planning for nuclear power plants is found in Title 10, Code of Federal Regulations, Part 50, and in the criteria presented in NUREG-0654, FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." These documents provide guidance relative to the activities, personnel, facilities, and equipment which should be in place in order to establish an effective emergency response capability. NUREG-0396 defines and describes the basis for the 10-mile plume exposure pathway emergency planning zone and the 50-mile ingestion exposure pathway emergency planning zone.

(3) Basis for Evaluation of Contamination of Human Food and Animal Feed

(a) Guidance and recommendations put forth by the federal Food and Drug Administration (FDA) or other relevant approaches, tools and/or recommendations, (including but not limited to dose limits) deemed appropriate by the Radiological Health Advisor may be used by the State of Vermont in the evaluation of potentially contaminated human food and animal feed and considered in the development of protective action recommendations for the Ingestion Pathway.

(b) For example, to help prevent or reduce potential internal exposure to radiation due to ingestion of accidentally contaminated human food, it may be deemed appropriate to use the following 1998 FDA Protective Action Guides (PAGs):

- 0.5 rem Committed Effective Dose Equivalent (CEDE) or
- 5 rem Committed Dose Equivalent (CDE) whichever is more limiting.

(Reference: Federal Register, Volume 63, No. 156, dated August 13, 1998)

(c) The State of Vermont may use the Protective Actions recommended by FDA or other actions deemed appropriate by the Radiological Health Advisor. Necessary protective measures and public concern may require modification of the collection, production, processing, and marketing cycle of potentially contaminated products within the affected areas.

(d) The State of Vermont has the responsibility and authority to initiate protective actions in the event that a radiological incident results in radioactive contamination of food, water or milk.

(e) Protective actions would be ordered by the Governor as advised by the Health Services Coordinator, the Secretary of the Agency of Agriculture, Food and Markets, and the Secretary of the Agency of Natural Resources. The Commissioner of the Vermont Department of Health or designee will assume the role of the Health Services Coordinator.

(f) The decision to recommend protective actions is based on known releases to the environment, radiological measurements, laboratory analyses, and integrated dose projections. With the exception of precautionary sheltering of milk animals, actions should not be taken without consideration for the health, economic, and social impacts.

b. Radiation

(1) Radiation is energy moving through matter and space as waves or particles. Ionizing radiation is energy which disrupts some of the atoms in its path as it moves through matter, separating them into electrically charged (+ or -) pieces called ions. This ability to break or split atoms distinguishes ionizing radiation from other types and makes it harmful to living tissue.

(2) Radioactive materials emit radiation. Radioactive materials in places they should not be are considered contamination. People near contamination can be exposed to the radiation; people who have been exposed but who are not themselves contaminated cannot expose others.

(3) Radiation is literally everywhere. Americans receive, on average, a dose of 620 millirems every year. Roughly half of the exposure comes from natural sources, such as Radon gas and cosmic rays, and half comes from manmade sources, such as medical procedures and fallout from nuclear weapons tests.

(4) Federal guides call for evacuating an area if people there will be exposed to a dose of 1,000 millirem or more. People start to suffer the first detectable changes from radiation after acute exposure to 25,000-50,000 millirem; death becomes near certain as exposure approaches 1,000,000 millirem (1,000 rem).

(5) A more detailed introduction to radiation is at Appendix B.

c. Meteorology

(1) The release of radioactive materials from a nuclear power plant may create a broad range of effects. Airborne releases, which are extremely unlikely to come from the spent fuel pool, produce what is referred to as a PLUME. 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.

(2) Plume Arrival Time. The time for a plume to travel any given distance can be estimated by dividing the distance by the wind speed. For example: with a wind speed of 4 mph, a plume might arrive at a point 8 miles from the plant in 8 / 4 = 2 hours. Such an estimate does not account for mitigating factors of weather and topography.

(3) 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.

(4) While there are models and computer programs for projecting plume behavior, only physically measuring contamination is the only ultimately accurate method.

d. Emergency Planning Zones (EPZs)

(1) EPZs are designated as areas for which plans are prepared to ensure that prompt and effective actions can be taken to protect the public in the event of an emergency. Protective action guides, accident considerations, and planning needs are factors central to the EPZ concept and development. The EPZs are considered essential for responding to any accident that would produce off-site doses in excess of the protective action guides. For operating commercial reactors, a radius of about 10 miles is the default Plume Exposure EPZ and a radius of about 50 miles is the default Ingestion Pathway EPZ. After a reactor shuts down and the spent fuel has cooled down for approximately a year, the NRC reduces the formal EPZ to the boundaries of the plant site.

(2) Former Plume Exposure Pathway Zone.

(a) While VY was operating, towns within the Plume Exposure Pathway EPZ maintained detailed plans to protect the public from receiving radiation exposure from an airborne plume in excess of allowable federal limits. Those towns still maintain radiological emergency plans.

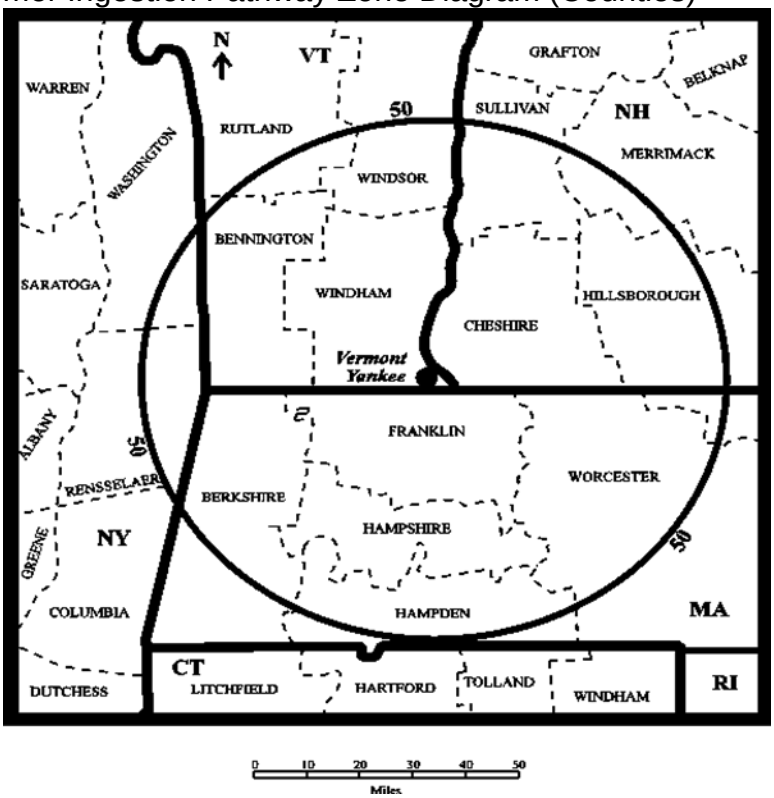
(b) Former Plume Exposure Pathway Zone Towns in Vermont include Brattleboro, Dummerston, Guilford, Halifax, Marlboro, and Vernon.

(c) Principal exposure pathways in the Plume Exposure Pathway EPZ are whole body external exposure to gamma radiation from the plume and from deposited materials, and inhalation exposure from the passing radioactive plume. The time of potential exposure could range in length from hours to days.

(3) Former Ingestion Pathway Zone

(a) An Ingestion Pathway Zone is the area where protective action plans are required relative to the food chain. While VY was operating, this zone encompassed an area with not less than a 50-mile radius around Vermont Yankee. Ingestion planning includes consideration of protective actions to prevent or mitigate radioactive contamination of water, milk or food which is consumed directly or indirectly. Thus, animal feed for farm animals whose milk or meat is consumed is also of concern. The response emphasis within any ingestion pathway zone is on preventing contamination of food.

(b) Former Ingestion Pathway Zone Diagram (Counties)



e. Emergency Classifications

(1) Emergency Classification Level Scheme

(a) **Without an operating reactor, VY no longer plans for EMERGENCY level events because these events would be highly unlikely and do not require the same level of planning efforts. However, the following section in this plan retains information about them for reference in case an event ever does rise to that level.**

(b) The wide spectrum of component or system failures, or other occurrences that could potentially reduce plant safety margins, are categorized into a classification

system according to severity. The four emergency classification levels in ascending order of severity are: UNUSUAL EVENT, ALERT, SITE AREA EMERGENCY, and GENERAL EMERGENCY.

(c) The classification of an event may change as conditions change. The incidents leading to the four emergency classifications are further identified by certain measurable and observable indicators of plant conditions known as Emergency Action Levels (EALs). The Emergency Action Levels are provided in the Vermont Yankee Nuclear Power Station Emergency Plan.

(2) Emergency Classification Levels (ECLs)

(a) UNUSUAL EVENT: 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. Off-site officials are notified to: 1) assure that the first step in any response later found to be necessary has been carried out; 2) bring the operating staff to a state of readiness; and 3) provide systematic handling of information and decision making.

(b) ALERT: Alert indicates that 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. The purpose of the Alert declaration is to: 1) ensure that on-site emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring, if required; 2) ensure that off-site response centers are staffed; and 3) provide off-site authorities with current status information.

(c) SITE AREA EMERGENCY (NO LONGER PART OF EAL PLAN): Site Area Emergency indicates that 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. The purpose of the Site Area Emergency declaration is to: 1) ensure that off-site authorities are prepared to initiate precautionary actions, if required; 2) ensure 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; and 5) provide updates for the public through off-site authorities.

(d) GENERAL EMERGENCY (NO LONGER PART OF EAL PLAN): General Emergency indicates that 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. The purpose of the General Emergency declaration is to: 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 consultation with off-site authorities; and 5) provide updates for the public through off-site authorities.

(3) Termination of an Emergency Classification

(a) A declared emergency classification is canceled because the underlying conditions have been fixed or neutralized and the plant is considered safe. Emergency classifications do not de-escalate. Once declared, all of the underlying conditions must be corrected before the condition is canceled. The act of canceling that condition is called "termination".

(b) FOR EXAMPLE: If the plant declares an Alert, it doesn't fix one problem and de-escalate to an Unusual Event. They take actions to resolve all of the safety issues and then "terminate" the Alert.

f. Legal Liability

(1) The legal liability for damages resulting from an incident at any nuclear power plant is established at the time of the issuance of a license to operate. The Nuclear Regulatory Commission requires each licensee to have and maintain financial protection in the form of liability insurance. The owners and operators of Vermont Yankee Nuclear Power Station in Vernon, Vermont, have liability insurance with the American Nuclear Insurers (ANI) of Hartford, Connecticut.

(2) In the event a nuclear incident at Vermont Yankee results in damages greater than the amount covered by their private insurance carrier, additional liability will be assumed by the government of the United States of America under the Price-Anderson Act, Public Law 85-256. The Price-Anderson Act is an amendment to the Atomic Energy Act of 1954 and provides for indemnification up to seven billion dollars, including reasonable costs for the investigation and settlement of claims.

(3) Damage claims following a nuclear incident will be handled first by the insurance carrier, and if the damages exceed the amount of coverage, by the United States government. If damages from a single nuclear incident appear to exceed the total of available resources for public liability, the licensee may apply to the appropriate district court of the United States for orders to enforce the provisions of the Price-Anderson Act. Such enforcement will include an order limiting the liability of the licensee and additional orders designed for equitable distribution of settlement funds as may be required.

g. Radiological Emergency Resources

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

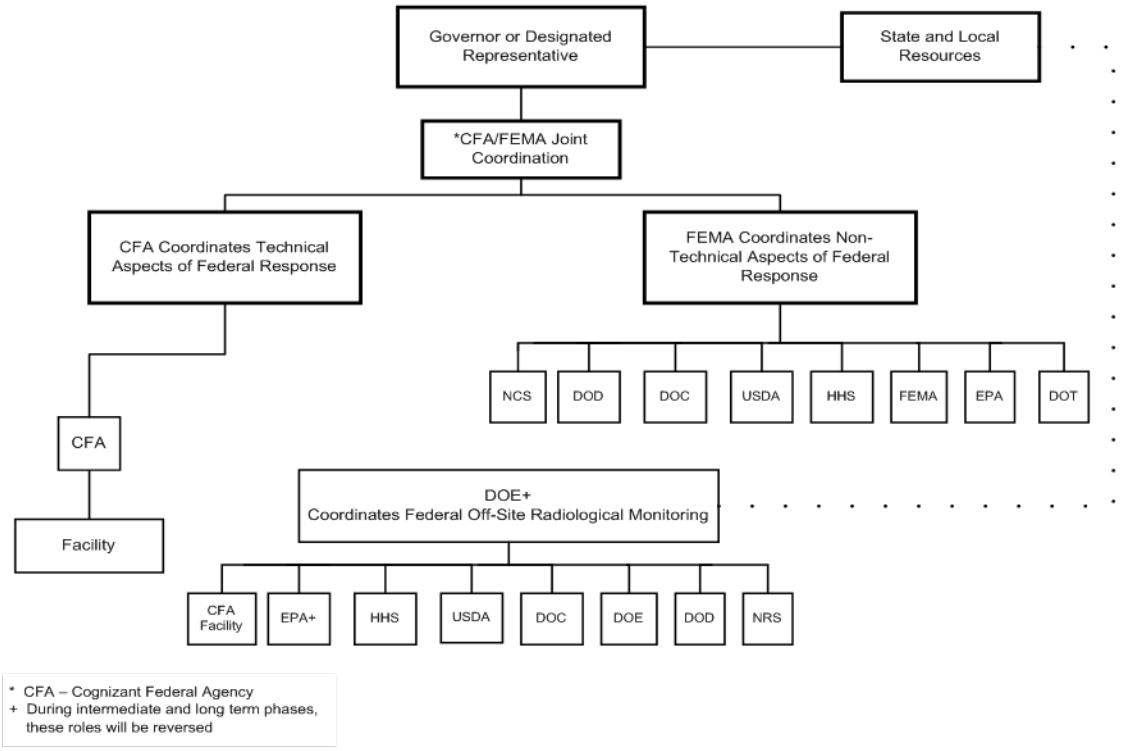
(a) Both technical and non-technical assistance is available from the federal government at the request of the state. The assistance available is outlined in the Nuclear/Radiological Incident Annex to the NRP and the Federal Radiological Monitoring and Assessment Plan (FRMAP). Federal non-technical assistance includes interagency coordination, communications, and logistics. Technical assistance includes radiological monitoring, accident assessment, protective action decision making, and radiological exposure control.

(b) The EOC Manager at the State EOC or designee will determine the needed federal non-technical assistance and recommend to the Governor that support be requested. The assistance will be requested by the EOC Manager through FEMA, Region I in Boston. The Health Services Coordinator or designee can request federal technical assistance directly from the Department of Energy's (DOE) Brookhaven National Laboratory in New York. The EOC Manager will request a Federal Radiological Monitoring and Assessment Center (FRMAC). All requested federal assistance will be coordinated through the EOC Manager.

(c) Upon activation of the Nuclear/Radiological Incident Annex to the NRP, a federal operations center will be established to serve as the focal point for federal response team interactions with the State. The DOE will establish the Federal Radiological Monitoring and Assessment Center (FRMAC). From the FRMAC, DOE coordinates the monitoring and assessment efforts of all federal agencies. The FRMAC is usually established near the site of the accident. The size and complexity of the FRMAC will depend on the incident. The FRMAC can provide the most extensive monitoring and assessment capabilities available in the U.S. It will require from 24 to 72 hours for a fully operational FRMAC to be established. DOE has delegated the responsibility for establishing the FRMAC to the DOE Nevada Operations Office. EPA assumes long-term environmental leadership of the FRMAC including planning for the long-term environmental monitoring program. EPA provides monitoring, laboratories, and support for the FRMAC.

(d) The State will support the federal response as resources allow. There is space available for NRC and FEMA representatives at the State EOC. Air travel and freight shipments will be directed to major airports in the State. Expected times of arrival will be dependent on several factors, including locations of federal personnel and materials. It is anticipated that the time of the initial arrivals will range from 6-24 hours.

(e) Federal Response Management for a Radiological Emergency. The following sections identify the essential federal agencies that will provide support (see chart below), and a description of their primary responsibilities.



i. Department of Commerce (DOC) - National Oceanic and Atmospheric Administration (NOAA)

- Provides current and forecast meteorological information about wind direction and speed, low level stability, precipitation, and any other meteorological and hydrological factors affecting the transport or dispersion of radioactive materials.
- Prepares and disseminates forecasts and warnings for severe weather such as hurricanes, tornadoes, severe thunderstorms, floods, and extreme winter weather to local officials and the general public.
- Broadcasts watches and warnings of natural disasters (prepared by NOAA) and radiological emergency warnings approved by the States, over NOAA Weather Radio.

ii. Department of Defense (DOD)

- Provides military assistance, in the form of manpower, technical support, and logistical support, including airlift services and telecommunications support, as requested by FEMA.

iii. Department of Energy (DOE)

- Coordinates the off-site radiological monitoring assessment, evaluation, and reporting activities of all federal agencies during the initial phases of an accident, and maintains a technical liaison with state and local agencies with similar responsibilities.

- Ensures the orderly transfer of responsibility for coordinating the intermediate and long-term radiological monitoring function to the Environmental Protection Agency (EPA) after the initial phases of the emergency.
- Provides the personnel and equipment required to coordinate and perform off-site radiological monitoring and evaluation activities.
- Assists the appropriate agencies in assessing the accident potential and in developing technical recommendations on protective measures.
- Maintains a common set of all off-site radiological monitoring data and provides these data and interpretation to the NRC and to appropriate state and local agencies requiring direct knowledge of radiological conditions.
- Provides consultation and support services to all other entities (e.g., private contractors) having radiological monitoring functions and capabilities.
- Assists Health and Human Services (HHS) and other federal, state, and local agencies by providing technical and medical advice on the methods of handling radiological contamination.
- Provides telecommunications support to federal agencies assisting in off-site radiological monitoring.
- Requests supplemental radiological monitoring assistance from other Federal agencies when needed.
- Requests meteorological, hydrological, and geographical data needed for monitoring and assessment efforts.
- Maintains the Aerial Measuring System (AMS) and the National Atmospheric Release Advisory Capability (NARAC) to assist states in identifying the boundaries of a contaminated area.

iv. Department of Health and Human Services (HHS)

- Provides assistance to state and local government officials on the use of radio-protective substances.
- Provides advice and guidance to state and local officials in assessing the impact of the effects of radiological incidents on the health of persons in the affected areas.
- Provides guidance to State and local health officials with jurisdiction when requested on disease control measures and epidemiological surveillance of exposed populations.
- Assists, in coordination with the U.S. Department of Agriculture, in developing technical recommendations for state and local officials regarding protective measures related to food and animal feed.
- Provides resources, in coordination with the U.S. Department of Agriculture, to ensure that food and animal feeds are safe for consumption.

v. Department of Housing and Urban Development (HUD)

- Reviews and reports on available housing for disaster victims and displaced persons.
- Assists in planning for and placing homeless victims in available housing.
- Provides emergency housing support staff within available resources.
- Provides technical housing assistance and advisory personnel to State and local authorities with jurisdiction.

vi. Department of the Interior (DOI)

- Provides advice and assistance in assessing and minimizing off-site consequences on natural resources including fish and wildlife.

vii. Department of Transportation (DOT)

- Provides civil transportation assistance and support.
- Coordinates the federal civil transportation response in support of emergency transportation plans and actions of state and local governments.
- Provides, through Regional Emergency Transportation Coordinators, representation and assistance to state and local transportation authorities.

viii. Environmental Protection Agency (EPA)

- Provides resources including personnel, equipment, and laboratory support to assist DOE in monitoring radioactivity levels in the environment.
- Assists the NRC in developing technical recommendations regarding measures to protect the public health and safety.
- Assumes responsibility from DOE for coordinating the federal intermediate and long-term radiological monitoring function after the initial phases of the emergency at a mutually agreeable time.
- Provides guidance to federal agencies and state and local governments with jurisdiction on acceptable emergency levels of radioactivity and radiation in the environment.
- Assesses the nature and extent of the environmental radiation hazard.

ix. Homeland Security Department

- Created by the Department of Homeland Security Act of 2002, the Department combines the major federal agencies that contribute to the internal security of the United States. The Federal Emergency Management Agency (FEMA) is one of the many component agencies. Three (3) recent developments are the National Response Plan, the National Incident Management system and the National Response Center. The Department is standardizing and coordinating a more collaborative incident management approach.

x. Federal Emergency Management Agency (FEMA)

- Serves as the primary point of contact and coordination for requests for various federal assistance, except those pertaining to the FRMAP, from state officials.
- Provides a lead official to coordinate and ensure the provision of appropriate non-technical assistance requested by federal and state agencies.
- Serves as the primary point of contact and coordination between the NRC and other federal agencies for non-technical response activities.
- Coordinates the dissemination of all public information concerning federal non-technical emergency response activities, and ensures that public information releases are coordinated with state authorities and the NRC. Establishes an interagency public affairs group.
- Reviews and integrates all federal agency implementation plans to ensure that all required actions and interfaces are adequately addressed.

xi. National Communications System (NCS)

- Provides and coordinates, in response to a FEMA request, the necessary communications for the federal government response in accordance with the National Plan for Communications Support in Emergencies and Major Disasters. This support may be provided prior to a formal declaration of an emergency or major disaster.
- Provides technical representation to appropriate state agencies to assist in meeting their communications requirements.

xii. Nuclear Regulatory Commission (NRC)

- Assesses the nature and extent of the radiological emergency and the potential off-site consequences on the health and safety of the public.
- Coordinates the technical response activities between the licensee, DOE and other federal agencies.
- Provides technical advice to licensee and state agencies.
- Assesses recommended protective actions and develops, for state and local agencies if necessary, a federal technical recommendation on protective measures which reflects the views of other federal agencies.
- Coordinates the release of public information concerning the federal technical response, including the status of the reactor, radiological monitoring activities, and other federal technical support and ensures that such releases are coordinated with the state(s), FEMA, and the licensee.

xiii. United States Department of Agriculture (USDA)

- Assists the NRC, in coordination with HHS, in developing technical recommendations for state and local officials regarding protective measures related to food and animal feed.

- Assists state and local officials, in coordination with HHS and EPA, in the implementation of protective measures to minimize contamination through food ingestion.
- Estimates and provides advice to state and local officials on minimizing losses to agriculture resources from radiation effects.
- Monitors emergency production, processing, and distribution of food resources during a radiological accident.
- Assists in the provision of animal feed to replace contaminated feed and pasture.
- Provides advice to state and local officials regarding the disposition of food animals contaminated by radiation.
- Provides emergency food coupon assistance in officially designated disaster areas whenever a predetermined threshold of need is reached and the commercial system is sufficiently viable to accommodate the use of food coupons.
- Provides information and assistance to farmers, food processors, and distributors to aid them in returning to normal after a radiological emergency.
- Assists in reallocation of USDA donated food supplies from Commodity Credit Corporation stocks stored in ware houses, local schools, and other outlets to emergency care centers.
- Provides a liaison to state agricultural agencies to keep state and local officials informed of federal efforts.

(2) The New England Compact on Radiological Health Protection

(a) 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 from other states.

(b) The New England Interstate Radiation Assistance Plan outlines the manner in which interstate mutual aid and assistance will be provided. It includes specific information on channels of communication among states, availability of equipment, laboratory capabilities, procedures for requesting assistance, and notification of party states of a radiological incident. It also provides clarification for the loan of personnel and equipment, and for coverage of financial obligations resulting from the provision of assistance. The services of the Winchester (Massachusetts) Engineering and Analytical Center are also available through the Compact.

(c) Authority to seek assistance by means of The Compact has been delegated to the Health Services Coordinator or designee. Coordination of needed resources will be performed at the State EOC.

(3) Emergency Management Assistance Compact (EMAC). In the 2001 Session, the Vermont Legislature passed Act 138 which revised Title 20 and adopted the Emergency Management Assistance Compact. A majority of the States and territories of

the United States have also adopted EMAC. Division of Emergency Management and Homeland Security will request resources to include personnel as needed through EMAC. Division of Emergency Management and Homeland Security will be pro-active in identifying likely sources of certain critical resources and develop prior understandings with other states. One means of being pro-active is to utilize EMAC during drills and exercises.

(4) Special Memoranda Of Understanding (MOU). Vermont may negotiate Memoranda of Understanding (MOU) with nearby states or other organizations with staff with technical skills and training to provide assistance during emergencies. This may include personnel coming to Vermont and/or providing data or analysis and sending the information to Vermont in a timely and accurate fashion.

(5) Emergency Medical Services. Emergency Medical Services (EMS) are provided by ambulance and first responder services operated by local government and private organizations. During an emergency at Vermont Yankee, the Medical Services Coordinator at the Health Operations Center (HOC) will coordinate with local EMS agencies to ensure that adequate ambulance and hospital resources are available. The Medical Services Coordinator will also coordinate with special facilities in the EPZ regarding transportation, medical needs, and receiving facilities. The Medical Services Coordinator will utilize a statewide resource pool to augment the local EMS capability as necessary.

(6) Medical Facilities

(a) The Joint Commission on Accreditation of Hospitals (JCAH) requires that emergency patient care be guided by written policies and procedures. Among the required written procedures is one concerning the emergency management of individuals who are contaminated and injured or overexposed to radiation. Care of these individuals may involve radiological monitoring or measurement, special preparation of space for patient evaluation, decontamination of the patient through appropriate cleansing, and containment, labeling, and disposal of contaminated material.

(b) A list of all licensed hospitals is maintained by the state EMS Division. The primary hospital for the treatment of contaminated, injured individuals in Vermont is Brattleboro Memorial Hospital. The hospital has the necessary trained personnel and procedures, equipment, and supplies to treat contaminated, injured individuals. Franklin Medical Center in Greenfield, Massachusetts, and Cheshire Medical Center in Keene, New Hampshire, are backup facilities. Transportation of contaminated, injured individuals will be provided by ambulance and first responder services serving the area. For the Vermont Yankee area Rescue, Inc. is the primary ambulance provider.

3. CONCEPT OF OPERATIONS

a. General

(1) 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).

(2) The State Emergency Operations Center (SEOC) Manager, acting directly under the Governor, coordinates the off-site response. The SEOC Manager will be supported at the EOC by qualified representatives from State Support Functions (SSFs)/agencies.

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

(4) State EOC Emergency Response Organization Responsibilities Matrix. (P = Primary Responsibility, S = Support Responsibility)

	Command and Control	Alerting and Notification	Communications	Public Information	Accident Assessment	Public Health and Sanitation	Social Services	Fire and Rescue[1]	Traffic & Access Control	EMS	Radiation Exposure	Law Enforcement	Transportation	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 Officer		S		P										S
PIO Deputy Officer		S		S										S
EAS Writer		S		P										S
SSF 12 (Energy)					P	S								P
Nuclear Engineer					P	S								S
Military Support								S	P			S	P	S
SSF 11 Natural Resources					S	S						S		P

	Command and Control	Alerting and Notification	Communications	Public Information	Accident Assessment	Public Health and Sanitation	Social Services	Fire and Rescue[1]	Traffic & Access Control	EMS	Radiation Exposure	Law Enforcement	Transportation	Protective Response
SSF 8 Health and Medical				S	P	P		S		P	P			P
Radiological Health Advisor				S	P	P					P			P
Medical Service Coordinator						S		S		P				S
Dose Assessment					P									
SSF 13 Law Enforcement		S	S					S	P			P	S	P
SSF 1 Transportation		S						S	S				P	S
Communications Unit Leader		S	P											S
SSF 6 Mass Care, Emergency Assistance, Housing and Human Services						S	P			S				S
SSF 11 Agriculture				S	S	S								P
Civil Air Wing Military Support			S										S	S
American Red Cross						S	P							S
RACES Coordinator			P											

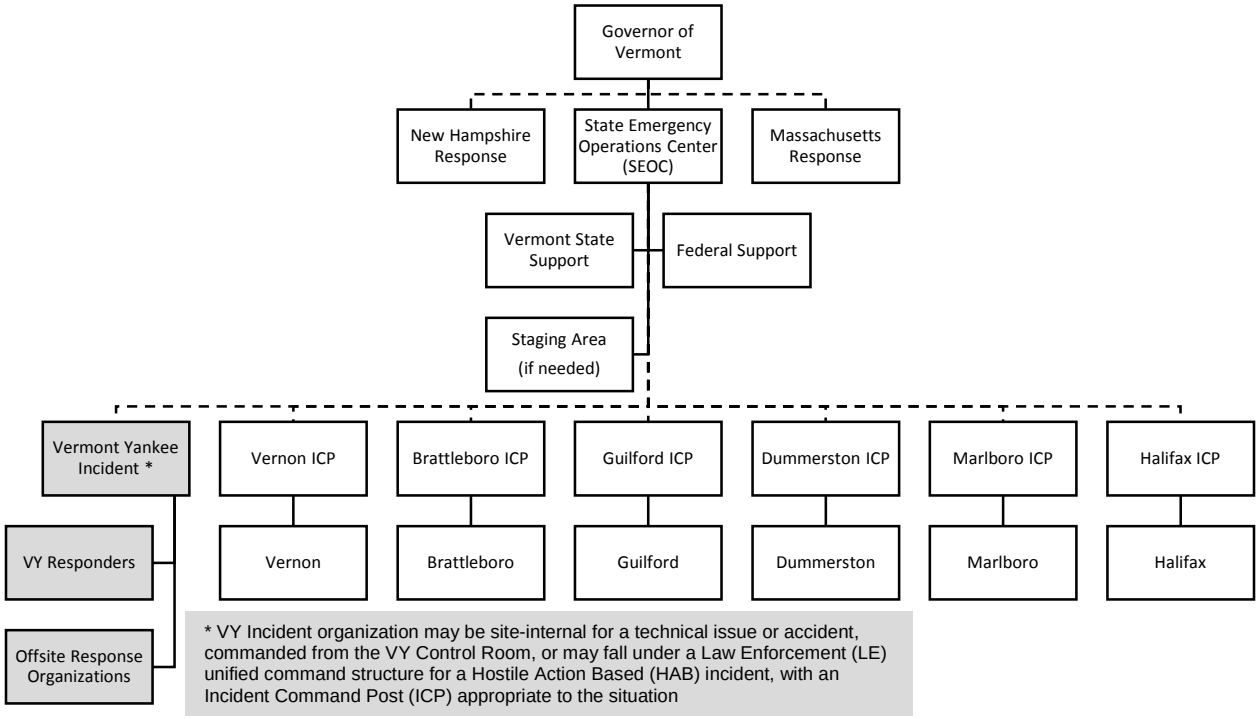
[1] Fire and rescue is primarily a local function; supplemental resources, if needed, are coordinated through mutual aid networks, the Staging Area, and State EOC
[2] The Governor is responsible for ensuring that all state resources are available and utilized in the response
[3] The Commissioner of Public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

(5) 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.

b. Organization

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. The State organization will interface with the utility and local organizations as shown below.



c. Response Actions

(1) 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 8. 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 Division of Emergency Management and Homeland Security (EMHS), the Governor's Office, and other designated contacts for each organization. A description of communications systems used is also contained in Section 8.

(2) The State Emergency Operations Center (SEOC) is located within the offices of EMHS in Waterbury, Vermont. Upon notification of an Unusual Event the State EOC will be upgraded to Partial Activation. Upon notification of an Alert, the State EOC in Waterbury will upgrade to Full Activation and staff with qualified agency personnel from various Vermont state agencies and state-wide organizations. Other RERP facilities, such as the Transportation Staging Area or Law Enforcement Incident Command Post, will activate as the situation dictates.

(3) 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 town-specific radiological emergency response plans.

(4) Hostile Action Based (HAB) events may have both security and radiological components, requiring close coordination between the Law Enforcement Incident Command Post and State EOC.

(a) In a HAB scenario local and state law enforcement will establish a joint Law Enforcement Incident Command Post (LEICP) with VY Security personnel near the site. Specific tactical response actions and locations are Law Enforcement Sensitive (LES). The ICP may have law enforcement personnel from various utility, local, state, and federal agencies and may operate with a single Incident Commander (IC) or a Unified Command. This paragraph refers to either as the IC.

(b) Unless a HAB incident is large (e.g. an organized attack on the plant), the IC will operate largely autonomously. The State EOC will support the IC and provide appropriate situational awareness information to local town ICPs. Towns will staff their ICPs to a level consistent with the threat. If the security event escalates to a higher emergency classification the ICP would continue to operate and keep the State EOC informed.

(c) If a HAB incident has resulted or is likely to result in a radiological release the Incident Commander and the SEOC Manager will closely coordinate offsite response actions. The ICP and State EOC will stay in constant communications with the SSF 13 representative acting as the primary liaison between the two. If possible, the SEOC will also provide a liaison at the ICP. The IC will maintain complete tactical control, with other decisions, such as Protective Action Recommendation planning, being made jointly between the ICP and SEOC. The ICP will have a representative in any SEOC decision-maker meetings (typically via telephone). The State EOC will keep local town ICPs informed of decisions and appraised of the situation, as appropriate, through secure means.

(d) Sheltering nearby populations is usually appropriate during Hostile Action Based (HAB) events, regardless of whether there has been a release. Unless the situation and IC dictate otherwise, the SEOC initial default reaction to a HAB Alert is to immediately recommend the Town of Vernon shelter in place. Having the public take shelter gives them cover from any hostile actions and keeps them out of the way of law enforcement responders. It also helps prepare them for any potential radiological release from the event if it escalates. This default Protective Action Recommendation applies only when at the Alert classification or higher when a Security Emergency

Action Level is declared. State EOC and LEICP leadership will coordinate as initial scene developments occur and will adjust this recommendation as necessary.

(5) Details for response actions are in the following sections and summaries for Vermont Yankee and state response actions are in Appendix C.

d. Yankee Rowe

(1) The Yankee Plant in Rowe, Massachusetts is in a permanently shut down and defueled status. This facility is storing the spent fuel in dry casks until the federal government provides permanent fuel storage facilities. This paragraph describes the actions the State of Vermont will take in response to an emergency at the Yankee Plant.

(2) Emergency Classification

(a) Emergency conditions at the Yankee Plant could result in the declaration of an Unusual Event. An Unusual Event generally characterizes abnormal plant conditions which alone do not constitute a hazard to plant personnel. Any release of radioactive material is below the EPA Protective Action Guideline Exposure Limits.

(b) The Yankee Emergency Plan Implementing Procedures establishes Emergency Action Levels (EALs) to determine which emergency classification level is appropriate for a given situation that affects the plant.

(3) Upon declaration of an Unusual Event or Unusual Event Terminated, the plant Shift Supervisor/Incident Director will notify the State Warning Point (SWP), as soon as possible but within one hour of classifying the emergency, via the commercial phone. The SWP will notify State Agency personnel as specified in the Notification Manual. Local town notification is not required, but may occur in some circumstances.

(4) Response Actions

(a) Upon notification of an Unusual Event, the State EOC may partially activate.

(b) The plant will provide periodic information updates to the state. The state will monitor the situation and assess plant conditions based on information provided by the plant. The plant will terminate the Unusual Event when the plant is restored to a safe and stable condition. The state will be notified of the termination and any on-site recovery/re-entry measures required.

(5) Public Information. During an emergency, the Yankee Public Affairs Director will prepare and release news announcements as required. Yankee will not release information to the public until 1) the State of Vermont and Commonwealth of Massachusetts are notified of the emergency, and 2) Yankee and public safety officials exchange and coordinate information for release to the public.

(6) For detailed procedures, refer to the current Yankee Rowe Notification Guide.

4. ROLES AND RESPONSIBILITIES

a. State Government Command and Control

(1) This section identifies the State agencies that comprise the State Multi-Agency Coordination System and the major responsibilities of their essential personnel staffing the State Emergency Operations Center (SEOC). Local jurisdictions maintain authority command and control as in all hazards that occur. An incident such as a radiological release at Vermont Yankee has the potential to impact multiple jurisdictions and impart long-term consequences. Therefore it is necessary for state level coordination of response support and decision-making to occur so that local jurisdictions may respond in the most efficient and effective manner possible. The State EOC issues recommendations based on analysis of all factors of the event (radiological, security, meteorological, etc.) to local jurisdictions for implementation. Many of those recommendations are made at the state level in coordination 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 section 3.

(2) Governor's Office

(a) Governor of Vermont.

i. The Governor is responsible for:

- Ensuring that all available state governmental resources are available and utilized in response to a radiological emergency.
- Declaring a State of Emergency if conditions warrant.
- Authorizing protective actions for the public based on recommendations from the decision-makers group at the State EOC.
- Approving information released to the public
- Coordination with other states and the Federal Government at an executive level.

ii. 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.

(b) 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.

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

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

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

(b) The Vermont Division of Emergency Management and Homeland Security (DEMHS) activates and provides the general staff for the State Emergency Operations Center (SEOC).

- Directs all state operational activities under the delegated authority of the Governor.
- Activates the Multi-Agency Coordination System and applicable facilities.
- Coordinates the local, state, and federal response.
- Ensures that adequate communications, displays, supplies, and space are available for state agency personnel to carry out their emergency operations.
- Ensures the continuity of emergency operations and resources on a 24-hour basis throughout the incident period.
- Determines and recommends protective actions to the Governor in conjunction with the appropriate agency representatives.
- Issues protective action recommendations to local officials upon the order of the Governor.
- Coordinates 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.
- Ensures notification of the public through the Public Notification System.
- Coordinates the release of information to the news media and the public.
- Coordinates plume tracking activities with New Hampshire, Massachusetts, and Vermont Yankee at the Emergency Operations Facility (EOF).
- Coordinates sampling team activities with New Hampshire, Massachusetts, New York, and the Federal Radiological Monitoring and Assessment Center (FRMAC).
- Plans and manages relocation, re-entry, and return activities.

(4) SSF 13 (Law Enforcement)

(a) The SSF13 Representative is the Director of Vermont State Police or designated representative.

- Identifies State Access Control Points and Traffic Control Points (ACPs/TCPs)

- Develops specific orders regarding the operation of ACPs/TCPs.
- Ensures the assignment of police and support personnel, including relief shifts.
- Assigns Vermont State Police units to state borders in coordination with Massachusetts and New Hampshire.
- Coordinates assistance to local police organizations in the operation of local ACPs/TCPs.
- Coordinates transportation of emergency response personnel to duty stations.
- Provides law enforcement support to suppress looting and other criminal activities following an evacuation.
- Requests assistance from the National Guard in coordination with the Military Support representative.
- Coordinates security issues.
- Determines if there is a possible terrorist component to the incident.
- Coordinates with State and Federal Homeland Security and other law enforcement agencies at the Incident Command Post in HAB incidents.

(b) Communications Unit Leader is the Department of Public Safety Communications Officer or designated qualified representative.

- Establishes emergency radio dispatch.
- Ensures 24 hour per day staffing of communications links.
- Monitors and maintains all state communications systems in operation.
- Identifies equipment malfunctions and dispatches appropriate technicians and necessary repair parts to problem locations.
- Assists 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).

(5) SSF 8 (Health and Medical Services)

(a) 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.

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

(c) The SSF 8 Representative is the Vermont Commissioner of Health or designated qualified representative.

- Coordinates 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.
- Formulates protective action recommendations in conjunction with the SEOC Manager, Radiological Health Advisor, and Public Service Coordinator (SSF 12 Lead) for approval by the Governor.
- Authorizes any use and administration of potassium iodide (KI).
- Coordinates with the Health Directors of Massachusetts and New Hampshire.
- Provides for laboratory analysis of air, water, soil, vegetation, milk, and other samples as appropriate.
- Authorizes emergency workers to exceed the protective action guides when appropriate.
- Ensures the provision of Emergency Medical Services.
- Formulates protective actions for the ingestion pathway in conjunction with the Radiological Health Advisor.

(d) Radiological Health Advisor. The Radiological Health Advisor is the designated qualified representative responsible for:
- Serves as the essential technical advisor to the Health Services Coordinator (SSF 8 Lead).
- Provides tasking to Radiological Plume Tracking Teams and Radiological Sampling Teams.
- Establishes and implements radiation exposure control measures for emergency workers and the general public.
- Provides guidance to monitoring and decontamination personnel at decontamination stations and the Reception Center.
- Reviews the progress of field monitoring teams including the exposure level reports.
- Develops a field monitoring and sampling plan with assistance from the Dose Assessment Team.
- Develops a request for federal assistance for the Advance Party meeting.

(e) Medical Services Coordinator - The Medical Services Coordinator is the Emergency Medical Services (EMS) Director or designated qualified representative.
- Coordinates with local EMS agencies regarding the provision of emergency medical services.
- Provides assistance in meeting the transportation and medical needs of special facilities in preparing for and implementing evacuation.
- Develops a statewide resource pool of ambulances and vehicles to support specialized medical transportation needs.
- Coordinates with local EMS agencies and medical facilities for the transportation and care of contaminated injured individuals.
- Coordinates 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.

(f) Dose Assessment Team - The Dose Assessment Team members are the qualified representatives responsible for:

- Using computer or other appropriate models to estimate plume direction and deposition footprint.
- Using relevant and appropriate meteorological, plant and environmental sample data to perform continual off-site dose projections for all phases of an incident.
- Providing technical assistance to the Radiological Health Advisor and/or Health Services Coordinator or designee.
- Assisting in the development of Radiological Plume Tracking Team and/or Radiological Sampling Team field sampling plans if requested.
- Assisting in communications with the Radiological Tracking Team Director and Radiological Sampling Team Director If requested.
- 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.

(g) Sample analysis will be performed at the Vermont Department of Health Laboratory, in accordance with the laboratory procedures, and other State and Federal laboratories as needed.

(6) SSF 12 (Energy)

(a) The SSF 12 Representative is the Commissioner of Public Service or designated qualified representative.

- Coordinates with plant personnel regarding plant conditions and the on-site response effort.
- Advises the SEOC Manager and SSF 8 Qualified Representative of actual or projected plant conditions.
- Participates in the protective action decision-making process with the SSF 8 Qualified Representative and SEOC Manager.
- Provides contact and liaison with the Nuclear Regulatory Commission.
- Provides ERDS (Emergency Response Data System) analysis.

(b) 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 Center or the State EOC.

- Monitors and evaluates the physical conditions at Vermont Yankee.
- Evaluates the nature, extent, and potential danger to the public resulting from the emergency, in conjunction with the Radiological Health Advisor.

- Monitors the efforts of plant personnel to return the facility to a stable and safe condition.
- Communicates current status and significant changes in plant conditions to the Public Service Coordinator at the State EOC.

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

(a) SSF 6 Representative is the Secretary of Human Services or designated qualified representative.

- Assigns state personnel to congregate (mass) care shelter facilities as requested by the American Red Cross.
- Consults 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.

(b) American Red Cross (ARC). 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. Additional information can be found in the ARC 3000 series regulations under Nuclear Power Plants.

(8) SSF 11 (Agriculture and Natural Resources)

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

i. 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.

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

iii. SSF 11 Agriculture Representative is the Secretary of Agriculture or designated qualified representative.

- Maintains a data base of all agricultural producers, dairy farms, food processors, feed suppliers, etc., in the ingestion pathway zone and provides that data in map and table form as needed.
- Provides guidance to the Health Services Coordinator, Radiological Health Advisor, and SEOC Manager regarding protective actions.
- Coordinates response activities with the U.S. Department of Agriculture and the University of Vermont Extension.

(b) Agency of Natural Resources (SSF 11 Co-Lead)

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

ii. Natural Resources Coordinator. The Natural Resources Coordinator is the Secretary, Agency of Natural Resources or designated qualified representative.

- Advises the SEOC Manager, Health Services Coordinator and/or Radiological Health Advisor concerning actual or projected consequences which may affect the environment.

iii. Environmental Coordinator. The Environmental Coordinator is the Commissioner, Department of Environmental Conservation or designated qualified representative.

- Assists with the determination of impact of the incident on the environment, water supplies, and air and water quality.
- Participates in decision-making to advise of environmental consequences of proposed actions.

iv. Fish and Wildlife Coordinator. The Fish and Wildlife Coordinator is the Chief Warden or designee.

- Mobilizes and directs wardens to assist in notification and advise on the impact to wildlife. Department personnel may be called on to provide samples of fish and game for environmental testing.
- May also assume some or all of the duties of either the Natural Resources Coordinator or the Environmental Coordinator.

(9) SSF1 Representative is the Secretary of Transportation or designated qualified representative.

- Identifies appropriate evacuation routes based on road and traffic conditions in coordination with the Police Services Coordinator.
- Maintains and/or clears of evacuation routes with problems which could affect evacuation (e.g., emergency snow, ice, or impediment removal).
- Assists in the Staging Area in providing traffic and access control devices (barricades, signs, etc.).
- Provides transportation assistance to towns for transportation dependent individuals.
- Assists with specialized transportation needs for hospital and long-term care facility patients.
- Coordinates National Guard transportation resources with the Military Coordinator.

(10) The Vermont Department of Labor

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

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

(11) Military Support- the Director of Military Support, Vermont National Guard, or designated qualified representative.

- Establishes and maintains a direct link between the State EOC and the Adjutant General and Joint Operations Center (JOC) to relay incident information.
- Expedites activation of the National Guard, if requested by the Governor.
- Coordinates the delivery of military assistance (e.g., transportation, traffic and access control) upon activation of the National Guard.
- Facilitates 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).
- Coordinates activation of the Vermont State Guard

(12) Special Teams, if needed and requested:

(a) Radiological Plume Tracking Teams. If needed, the SEOC will create a plume tracking team based on the Vermont Hazardous Materials Response Team to determine the edges of the plume as assigned. Teams from New Hampshire, Massachusetts, and Vermont will cooperate in determining the edges of any radiological plume or confirming the absence of deposition.

(b) Radiological Sampling Teams. If needed, the SEOC will create a sampling team with personnel from the Vermont Department of Health (VDH), the Vermont Agency of Agriculture, Farms, and Markets (VAAFM), the Vermont Department of Labor (VDOL), and the Agency of Natural Resources (ANR). The sampling team will collect samples for assessing the impact of any release.

b. Local Government

In response to an emergency, each affected town will mobilize and use available resources to mitigate the off-site consequences in accordance with their own Radiological Emergency Response Plans. The State will coordinate with local organizations, relay information, and provide additional resources to support the local response.

c. 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 2 of this plan.

d. Special Organizations

(1) 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.

(2) Community Emergency Response Teams (CERT). Vermont may mobilize CERTs from around the state to support response and recovery operations.

e. Utility (Vermont Yankee Nuclear Power Station)

(1) 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.

(2) 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.

(3) 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:

(a) Limit the consequences of an accident.

(b) Evaluate the conditions and determine the magnitude of an accident.

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

(d) Minimize public and plant personnel radiation exposure or injury.

(e) 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.

5. ACCIDENT ASSESSMENT

a. General

(1) 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.

(2) 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.

b. 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.

(a) 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.

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

(c) 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.

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

(3) New England Compact on Radiological Health Protection

(a) 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.

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

(c) Assistance available through the compact is further described in Section 2 of this Plan.

(4) Federal

(a) 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).

(b) 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.

(c) Federal support in accident assessment is further described in Section 2 of this plan.

c. Emergency Response Data System (ERDS)

(1) 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.

(2) 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.

d. Radiological Monitoring

(1) There are two types of field teams that can collect data to assist in determining dose projections. A Radiological Plume Tracking Team performs off-site radiological monitoring during the initial Plume Phase of an incident. Once the plume has settled or dissipated, a Radiological Sampling Team performs off-site environmental sampling in support of Relocation and Ingestion Pathway assessment activities. See section 6 of this plan for radiological exposure control measures, including emergency workers.

(2) Radiological Plume Tracking Team. If needed, the state will create a plume tracking team or teams from the Vermont Hazardous Materials Response Team (VHMRT). The team(s) will determine sampling locations based on the situation and transmit results of the field surveys to the Radiological Health Advisor at the State EOC for accident assessment and protective action decision making.

(3) Radiological Sampling Team. If needed, the state will create a sampling team with personnel from the Departments of Health (VDH) and Labor (VDOL) and Agencies of Natural Resources (ANR) and Agriculture, Food, and Markets (VAAFM). The Radiological Health Advisor will determine sampling strategies and provide 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.

e. Laboratories

(1) 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.

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

(3) 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.

(4) 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.

f. Dose Assessment

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

(2) Plume Phase (Plume Exposure Pathway)

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

(b) 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.

(c) Dose projections may be compared with relevant Protective Action Guides identified by the Radiological Health Advisor (such as those described in Section 6) in order to determine appropriate protective actions and evaluate potential off-site consequences.

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

(3) Ingestion Phase

(a) Relocation, Re-Entry, Return and Recovery. Dose assessment activities during Relocation, Re-Entry, Return and Recovery is described in Section 9 and detailed in the Implementing Procedure for the Dose Assessment Team.

(b) Ingestion Pathway

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

ii. 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.

iii. 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.

iv. 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 below as well as in the Implementing Procedure for the Dose Assessment Team.

v. FDA Recommended Derived Intervention Level (DIL) or Criterion for Each Radionuclide Group.

All Components of the Diet[ab]			
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]	$C_3/6800 + C_6/450 < 1$ Bq/kg	$C_3/180{,}000 + C_6/12{,}000 < 1$ 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.

vi. Annual Dietary Intakes (kg/year)

Food Class	Age Group (years)									
	<1	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-39**	**40-59**	**60+**
Dairy	208	153	180	186	167	112	98.2	86.4	80.8	90.6
(Fresh Milk)[a]	-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

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

[a] 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.

vii. 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

(1) 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.

(2) 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.

- Emergency Management Assistance Compact (EMAC)
- New England Compact on Radiological Health Protection
- Special Memoranda of Understanding with nearby states
- Nuclear/Radiological Incident Annex to the National Response Plan

6. PROTECTIVE AND PRECAUTIONARY ACTIONS

a. Protective Action Guides (PAGs)

(1) 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.

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

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).

(3) The table above 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.

(4) 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.

(5) 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 5 (Accident Assessment) and detailed in the Implementing Procedure for the Dose Assessment Team.

b. Protective Action Recommendations (PARs)

(1) There are too many variables and the likelihood of any given scenario resulting in a radiation release is too low to plan all actions prior to an incident at Vermont Yankee. A host of likely actions have been thought out and procedures developed to implement them. Except for a Hostile Action Based (HAB) event, the decision about which action(s) to implement will be made after the EOCs have been staffed and activated and initial accident data has been reviewed.

(2) To assist decision-makers, the Vermont Precautionary and Protective Actions List has potential actions for Alerts and if the situation escalates beyond an Alert. The list is intended to be flexible and may be revised as conditions change.

(3) Vermont Precautionary and Protective Actions List.

(a) Alert

Response Activities Occurring	Decisions to Consider for Implementation
Complete activation of all facilities to include full or partial staffing - Local ICPs, VYEC, SEOC, 211 Call Center, SWP/ASWP	If the situation is a major Hostile Action Based incident, immediately recommend that the Town of Vernon shelter-in-place
Issue public information about ongoing situation.	Precautionary transfer or early closing of Vernon Elementary School (local decision)
Coordinate any external support required	Early assembly of school buses at affected schools and licensed childcare facilities for transfer to host schools. (Priority to Vernon)
Identify dosimetry requirements for emergency workers	Activate Staging Area for buses, vans and ambulances in the event of a precautionary transfer or evacuation
	Governor declaration of a State of Emergency and special news advisory.
Contingencies for Future Implementation: - Supporting EAS message(s) (to facilitate NH and/or MA issue an EAS message if requested) - Early traffic and access control planning in the event of an evacuation - Precautionary transfer of schools, child care facilities, and health care facilities- based on mitigating factors effecting expediency of transfer. - Consider requests for supplemental assistance (federal, regional, mutual aid)	

(b) Escalation Beyond Alert.

Response Activities Occurring	Decisions to Consider for Implementation
Track completion of precautionary transfers (schools and other special facilities) at host schools and receiving health care facilities (as implemented)	Precautionary transfer of school children from affected schools and childcare facilities to host schools. Note: The decision to move the children is predicated upon having the buses in place at the schools and the EAS message should be sent only after the decision has been transmitted to the towns and schools.
Acquire and issue dosimetry for emergency workers	Request visitors in State Parks and recreation areas within the affected area to leave
Issue EAS Messages to the affected area with Protective Action Recommendations from State of Vermont.	Advise farmers to shelter milk-producing animals and place them on stored feed and water
Issue public information about ongoing situation.	Advise transients in the area to leave.
Coordinate opening of congregate care shelters	Advise boaters in the area to get off waterways
Activate staging area for responding resources	Governor declaration of a State of Emergency (if not already completed)
	Shelter-in-place parts or all of some towns
	Deploy Plume Tracking team(s)
	Activate traffic and access control plans as required
	Evacuate parts or all of some towns
	Establish and operate Emergency Worker Monitoring and Decontamination Station(s)
Contingencies for Future Implementation: - Transportation and staging area planning in the event of an evacuation. - Monitor plant conditions and adjust protective actions based on updated information on releases. Where are protective measures necessary? - Establish restricted zones in which to control access. - Establish protocols for access and control. - Mobilize and deploy Radiological Sampling Team for post-plume sampling. - Consider requests for supplemental assistance (federal, regional, mutual aid).	

(c) Post Plume (Relocation and Ingestion Pathway)

Recovery Activities Occurring	Decisions to Consider for Implementation
Authorizing reentry for permitted purposes for limited periods of time	Establish a temporary restricted zone as soon as a town is sheltered or evacuated
Authorizing return for towns or portions of towns that are deemed safe to reoccupy on a permanent basis	Establish a more permanent restricted zone as radiological data is developed
Authorizing relocation of persons living in contaminated areas	Request Federal resources A. 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 B. Send representatives to the FRMAC Advance Party Meeting C. Send representatives to the FRMAC D. Assist the FRMAC establishing itself and in providing resources to Vermont
Determining proper disposition of food, water, crops, and animals.	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
Issuing news releases and conducting press conferences on the above and other relevant issues.	Assist in the provision of compensation and reimbursement to: A. Individuals B. Businesses C. Government (local and state)
	Planning the long term recovery of contaminated areas

c. Protective Actions for Direct Exposure.

(1) Precautionary Actions Concerning School Children

(a) Under certain circumstances, the state may decide to implement precautionary actions at the Alert level. 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 area.

(b) 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.

(c) Early Assembly of School Buses. As a precaution, school buses may be mobilized and pre-staged at respective schools. 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.

(d) Precautionary Transfer of School Children. The Windham Southeast Supervisory Union (WSESU) assigns each school within the former EPZ a host school where students would go in case of emergency. As a precaution, Vermont Division of Emergency Management and Homeland Security, 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 their Host Schools, or other previously identified locations, as appropriate. This precautionary action, if directed by the Governor, will depend on the nature of the event. EAS messages or news advisories will inform parents that the precautionary action is being implemented. If a release has already occurred, children will be evacuated to the host schools and parents will be directed to pick them up there and continue evacuating the area.

(2) Precautionary Actions Concerning Health Care Facilities. Sheltering-in-place will almost always be the best action for most patients during any emergency. Evacuation of facilities in the area would require a large number of resources and a very long time and in many cases moving a patient/resident represents a considerably larger risk than any potential exposure.

(3) Sheltering

(a) 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.

(b) 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.

(c) 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.

(d) 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.

(e) 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

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

(4) Ingestion of Potassium Iodide (KI).

(a) KI can provide protection against radioactive iodine and had been a key preventative measure while Vermont Yankee's reactor was operating. However, with the reactor shut down for over a year, there is essentially no remaining radioactive iodine and it is hard to conceive of a scenario related to a Vermont Yankee accident where the state would recommend ingestion of KI.

(b) The State of Vermont purchased 130 milligram dose pills and liquid KI and distributed them to responders, residents, schools, and childcare facilities that accepted them within the former plume Emergency Planning Zone. Those supplies may remain in place; they have an expiration date of December 2019.

(c) 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.*			

(d) 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 or other relevant and appropriate sources to determine whether to acquire, issue, and advise emergency workers and members of the general public to ngest KI.

(5) Evacuation

(a) 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.

(b) 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 area 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 towns in the former EPZ have designated routes to be used during an evacuation.

(6) Access Control. Access control is both a state and local responsibility. It 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.

d. 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 9 (Recovery).

e. Protective Actions for Indirect Exposure in the Ingestion Exposure Pathway

(1) Precautionary Actions. If there is a radiological release, the Health Services Coordinator (SSF 8 Lead) or Radiological Health Advisor may recommend the precautionary protective action of sheltering and placing milk producing animals in an area on stored feed and protected water supplies. This precautionary protective action may be extended as necessary based on the situation.

(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

i. 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.

ii. Protective actions involve protecting animal feed and ordering dairy farmers to use only stored feed rather than letting the herd graze on contaminated pasture. 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.

iii. 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}IN ^{90}SrN ^{89}SrN ^{137}Cs	(+)[a]	(+)	(+)	Good
Add Stable Iodine to Cattle Ration	^{131}I	Marginal[b]	Some Hazard	(+)	
Add Stable Calcium to Cattle Ration	^{89}SrN ^{90}Sr	Marginal	Some Hazard	(+)	
Add Binders to Cattle Ration	^{137}CsN ^{89}SrN ^{90}Sr	Marginal	Questionable	(+)	
Substitute Sources of Uncontaminated Water	^{137}CsN ^{89}SrN ^{90}Sr	(+)	(+)	(+)[c]	
Applicable to Milk					
Condemnation of Milk	^{131}IN ^{89}SrN ^{90}SrN ^{137}Cs	(+)	(+)	(+)[d]	Good
Divert Fresh Milk to Processed Milk Products	^{131}IN ^{89}Sr	(+)	(+)	(+)	Good
Process Fresh - Store	^{90}SrN ^{137}Cs	Marginal	Questionable	(+)	
Process Fresh - Store	^{131}IN	(+)	(+)	(+)	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)

iv. 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

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

ii. 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.

iii. 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.

iv. 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.

v. 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.

(c) Other Food

i. 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. 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.

ii. Actions Applicable to Soil

Action (Applicable to Soil)	**Radionuclide(s) for Which Protective Action is Applicable**	**Effectiveness**	**Safety**	**Practicality (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)

iii. 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)

iv. 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.

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

vi. 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.

vii. Protective actions for indirect exposure in the ingestion pathway 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.

f. Protective Action Decision Process for the Ingestion Pathway

As long as there has not been a radioactive release, monitor the situation. If there has been a release, consider issuing a recommendation to shelter milk producing animals along any plume pathway and determine whether any PAG has been exceeded. This entails determining if any derived level 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.

g. Protective Action Decision Making and Implementation

(1) 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. 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.

(2) The State EOC will notify local towns 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.

(3) 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.

h. Evacuation Routes

(1) Primary evacuation routes have been pre-designated for each town in the former EPZ town to facilitate the orderly and safe movement of people. Private vehicles are the primary means of evacuation for both the permanent and transient populations. To be effective, evacuation routes must be able to accommodate abnormal traffic flow leaving an affected area. The evacuation routes were selected based on road conditions, road capacities, and the prevailing meteorological conditions.

(2) The State Police (VSP) and Agency of Transportation (AOT) are the two essential state agencies responsible for route selection and road maintenance. The

evacuation routes and specific local procedures relating to evacuation (e.g., dealing with road impediments) are detailed in the local town plans and procedures. If an evacuation ever becomes necessary, VSP and AOT will coordinate routes with towns and publish them using public notification systems.

i. Traffic and Access Control

(1) Traffic Control Points (TCPs) will be established to facilitate the flow of traffic in an outbound direction and discourage it in an inbound direction during an evacuation. Access Control Points (ACPs) will be established by using roadblocks, road barriers, or other means to control unauthorized public entry into designated areas. TCPs and ACPs also direct evacuees to the operating reception centers and prioritize inbound law enforcement related traffic during a Hostile Action Based (HAB) incident.

(2) Traffic and access control may be required throughout southern Vermont as a result of an incident at Vermont Yankee. State traffic and access control points (within 0-50 miles of the plant) located at the first twelve (12) exits on Interstate 91 and on other numbered highways have been identified by consecutive numbers and are listed in the following tables. These points are also shown on the Emergency Control Point map. Copies of the map are available at the State EOC, Staging Area, and the State Police. Additional TCPs/ACPs will be established as conditions warrant. Local TCPs and ACPs, staffed by local response personnel, assist in channeling the evacuation traffic to numbered highways. These points are identified in this plan, the Traffic and Access Control Manual, and the local plans.

(3) The Police Services Coordinator at the State EOC will coordinate with the qualified representative of the Agency of Transportation and will ensure that the State Police Liaison has arrived at the Staging Area. The Police Services Coordinator at the State EOC will provide personnel and equipment support to the State Police Liaison at the Staging Area as needed.

(4) Because this is a complex topic that is participated in by a variety of agencies at different levels, a Traffic and Access Control Manual has been developed and published. This manual is reviewed annually and revised as needed.

(5) The Vermont State Police Liaison at the Staging Area, is responsible for assigning State Police to staff the TCPs/ACPs and establishing specific operational criteria for each TCP and ACP when activated. The Vermont State Police Liaison at the Staging Area in conjunction with the Windham County Sheriffs Liaison, and the Staging Area Director will arrange for delivery of equipment, e.g., barricades, cones, etc., to the State TCPs/ACPs when needed. Each affected municipality is responsible for ensuring that equipment is delivered to their TCPs/ACPs and for staffing these points. Local municipalities will request assistance through the Staging Area as needed. Staffing of the state borders will be conducted in conjunction with the Commonwealth of Massachusetts and State of New Hampshire.

(6) Both the State and local Traffic and Access Control Points should be considered as a flexible list. These are the points that traffic and access control will probably require. However the situation will cause some of these points not to be staffed and for others to be created. It is vitally important for all involved agencies to coordinate with one another if changes are made.

(7) State Traffic and Access Control Points

TCP/ACP	Town/State	Highway Location
1	Brattleboro, VT	I-91, Exit 1 southbound
2	Brattleboro, VT	I-91, Exit 2 southbound
3	Brattleboro, VT	I-91, Exit 3 southbound
4	Brattleboro, VT	I-91, Exit 4 southbound
5	Brattleboro, VT	I-91, Exit 5 southbound
6	Rockingham, VT	I-91, Exit 6
7*	Guilford, VT	I-91 Northbound lane at Massachusetts state line
8**	Vernon, VT	VT Route 142 (Fort Bridgman Road) at Massachusetts state line
9	Guilford, VT	US Route 5 at Massachusetts state line
10	Town line between Dummerston and Newfane, VT	VT Route 30 at junction with Depot Rd
11	Putney, VT	US Route 5 at Carol Brown Way
12	Townshend, VT	Junction of Route 30 and Route 35
13	Westminster, VT	US Route 5 at Westminster Road
14	Westminster, VT	US Route 5 at VT Route 123
15	Wilmington, VT	VT Route 9 at junction with VT Route 100 south
16	Wilmington, VT	VT Route 9 west of Wilmington Village
* Established by the Massachusetts State Police. ** Established by the Bernardston, Massachusetts Police Department.		

(8) Local Traffic and Access Control Points.

(a) Dummerston

Dummerston	TCP/ACP	Highway/Road Location
D1	TCP	Intersection of School House Rd and East West Rd
D2	TCP	Intersection of Middle Rd and East West Rd
D3	TCP	Intersection of VT Rt 30 (Covered Bridge) and East West Rd
D4	TCP	Intersection of US Rt 5 and School House Rd to direct traffic north

(b) Guilford

Guilford	TCP/ACP	Highway/Road Location
G1	TCP	Intersection of U.S. Rt 5 and TH #1 (Guilford Center Rd) (traffic flow north)
G2	TCP	Intersection of U.S. Rt 5 and Vernon TH #7 (Franklin Rd) (traffic flow north)
G3	TCP	Intersection of U.S. Rt 5 and Vernon TH #1 (Tyler Hill Rd)
G4	TCP	Intersection of TH #1 (Guilford Center Rd) and TH #4 (Weatherhead Hollow Rd) (traffic flow north, east and west)

G5	TCP	Intersection of TH #1 (Guilford Center Rd) and TH #14 (Bonnyvale Rd) (traffic flow north, east, and west)
G6	TCP	Intersection of TH #4 (Weatherhead Hollow Rd) and TH #6 (Sweets Pond Rd) (traffic flow south and west)

(c) Brattleboro

Brattleboro	TCP/ACP	Highway/Road Location
B1	TCP/ACP	Intersection of VT Rt 142 (Vernon St), US Rt 5 (Main St, Canal St [Plaza]) and VT Rt 119 (Bridge St) to re-route traffic north
B2	TCP/ACP	Intersection of VT Rt 142 (Vernon St) and Cotton Mill Hill to re-route traffic north. (Directional signage at So Main and top of Cotton Mill Hill)
B3	TCP/ACP	Intersection of Fairground Rd and US Rt 5 (Canal St) to re-route traffic to I-91 north
B4	TCP/ACP	Intersection of Fairview St and US Rt 5 (Canal St) to re-route traffic to I-91 north
B5	TCP/ACP	I-91, Exit 1 and US Rt 5 (Canal St) to re-route traffic north on I-91
B6	TCP/ACP	Intersection of VT Rt 9 (Western Ave) and Orchard St to re-route traffic north or west
B7	TCP/ACP	Intersection of VT Rt 9 (Western Ave) and Bonnyvale Rd to re-route traffic north or west
B8	TCP/ACP	Intersection of VT Rt 9 (Western Ave) and Greenleaf St to re-route traffic north or west
B9	TCP/ACP	Intersection of US Rt 5 (Putney Rd) and VT Rt 30 (Park Place)
B10	TCP/ACP	I-91, Exit 2 on VT Rt 9 (Western Ave) to re-route traffic onto I-91 north
B11	TCP/ACP	Intersections of US Rt 5 (Putney Rd), VT Rt 9, and I-91, Exit 3
B12	TCP/ACP	Loader Standby - Western Avenue
B13	TCP/ACP	Loader Standby - Plaza
B14	TCP/ACP	Loader Standby - Route 5, 9 & I-91, Exit 3 - Roundabout
B15	TCP/ACP	Sign placement - Fairview and Canal Street
B16	TCP/ACP	Sign placement - Western Ave and Orchard Street
B17	TCP/ACP	Sign placement - Western Ave and Bonnyvale Rd.
B18	TCP/ACP	Sign placement - Western Ave and Greenleaf St.
B19	TCP/ACP	Sign placement - Route 5 and Route 30 (Putney Rd and Linden St)
B20	TCP/ACP	Sign placement - Park Place and Linden Street
B21	TCP/ACP	Sign placement - Linden Street and Cedar Street

(d) Halifax

Halifax	TCP/ACP	Highway/Road Location
H1	ACP	Intersection of Green River Rd and Guilford town line
H2	ACP	Intersection of Jacksonville Stage Rd and Guilford town line

(e) Vernon

Vernon	TCP/ACP	Highway/Road Location
V1	TCP/ACP	Intersection of VT Rt 142 (Ft Bridgman Rd) and TH #6 (Broad Brook Rd)
V2	TCP/ACP	Intersection of TH #1 (Tyler Hill Rd) and TH #7 (Franklin Rd)
V3	TCP/ACP	Intersection of TH #23 (Depot Rd) and VT Rt 142 (Ft Bridgman Rd)
V4	TCP/ACP	Intersection of Huckle Hill Rd and Pond Rd
V5	TCP/ACP	Intersection of Scott Rd and Pond Rd

j. Radiological Exposure Control

(1) Responsibilities. The Health Services Coordinator is responsible for all decisions regarding the radiological health of State and local emergency workers and the general public. The Health Services Coordinator establishes guidelines and procedures to limit exposure and to decontaminate personnel and equipment. The Health Services Coordinator is also responsible for authorizing exposures to emergency workers in excess of specified limits.

(2) Personnel Exposure Control

(a) Dosimetry. Typically, emergency workers would carry a Direct-Reading Dosimeter (DRD) and a Dosimeter of Legal Record (DLR) to measure their whole body exposure to gamma radiation at all times. Due to the changes in regulations and planning, Vermont no longer has DLRs and maintains caches of calibrated DRDs in Brattleboro and Dummerston. In the event of an incident at Vermont Yankee, Incident Commanders will identify dosimetry requirements and forward them to the State Emergency Operations Center (SEOC), where the Radiological Health Advisor will coordinate procurement and organize issue of dosimetry packets.

(b) Record Keeping. Typically, issuing organizations would maintain a log of the dosimetry issued. Before leaving on a mission, local Radiological Officers would provide each emergency worker with instructions on dosimetry use, including when to report exposure levels, and the allowed exposure limits. Each emergency worker would also receive an individual "Radiation Exposure Record" card. After receiving a DRD, the emergency worker would record the initial readings and the exposure received from each mission on the card. Upon return from a mission, the local Radiological Officer would record the worker's exposure on the log. After the emergency has been terminated, the records would be forwarded to the Department of Health for permanent record maintenance.

(c) Exposure Limits. The State of Vermont's policy is 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

(d) Mission Exposure Limits. Personnel in general, and Radiological Plume Tracking and Radiological Sampling teams in particular, may be assigned mission turn-back limits to limit exposure. The tracking and sampling teams have a mission turn-back limit of 1.5R unless otherwise specified by the Radiological Health Advisor. Other Emergency Workers may be assigned a mission turn-back limit as needed.

k. Personnel Monitoring

(1) Emergency workers, equipment, vehicles, and supplies used in emergency response, and evacuees and their possessions and vehicles may become contaminated if there has been a release of radioactive material. Monitoring will be performed to determine the presence of contamination and the need for subsequent actions such as decontamination. Monitoring is performed in accordance with established procedures.

(2) Monitoring Locations

(a) State and local emergency workers and vehicles will be monitored at the Staging Area or other locations as needed. The field monitoring teams have the capability to monitor themselves. There is no long a plan for monitoring the general public as it is implausible that contamination could spread before an evacuation could take place.

(b) An emergency worker Radiological Monitoring and Decontamination (RM&D) Unit may set up a station to monitor and decontaminate emergency workers. Exposure limits for emergency workers set forth in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents".

(c) The Radiological Sampling Teams Procedures details radiological surveillance of emergency workers, equipment, and vehicles used in the Post Plume Phase.

l. Decontamination

As a default value, if radiological monitoring indicates a level of contamination of 100 cpm, or greater, above local background, decontamination measures are required. Other contamination levels may be chosen for this discrimination should the Radiological Health Officer deem it advisable. State and local emergency workers, vehicles, and equipment are decontaminated at or near the Staging Area or other locations as appropriate. Individuals who are contaminated and injured will be referred

to a designated hospital (refer to Section 2) for treatment. The disposal of contaminated waste will be coordinated by the Department of Health.

7. FACILITIES

a. State Emergency Operations Center

(1) The State Emergency Operations Center (SEOC) is located at Vermont Division Emergency Management and Homeland Security, in the Department of Public Safety Headquarters, 45 State Drive, Waterbury, Vermont, 05671-1300. The alternate SEOC location is on Camp Johnson in Colchester, Vermont.

(2) This facility serves as the coordination 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.

(3) 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 a briefing on the current emergency classification and the status of emergency response efforts and all relevant documentation (procedure, log forms, message forms).

b. Staging Area

If necessary, the State EOC will appoint a Staging Area Manager and establish 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 may be performed at the Staging Area. The Staging Area provides traffic and access control devices to state traffic and access control points as needed. The Vermont State Guard can provide personnel to staff the Staging Area.

c. Congregate Care Facilities

Because the possibility of a large evacuation is so remote, and there is almost no possibility for public contamination, the state no longer has plans to establish a Reception Center in a fixed location. If there is an emergency requiring possible monitoring and decontamination of the general public, the State EOC will have to coordinate for the resources, personnel, and a facility. The ARC is responsible for providing congregate care in accordance with standard ARC emergency shelter

procedures. The American National Red Cross and FEMA maintain an agreement (see Appendix D) for the "sheltering and feeding" of evacuees in the event of an emergency at a fixed nuclear facility.

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 Points

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 cannot be contacted by pager or phone. The Alternate SWP (ASWP), located at the Vermont State Police Station in Williston, assists the SWP in notifications and performs notifications when the SWP is not available.

f. Emergency Center

(1) In the event of an emergency, Vermont Yankee operates an Emergency Center in the Admin Building on site.

(2) The Vermont Yankee Emergency Center (VYEC) 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 VYEC and the Vermont, Massachusetts, and New Hampshire EOCs for up-to-date emergency status reports.

g. Joint Information Center

The State will operate a virtual Joint Information Center upon any activation under the State EOC Public Information Officer (PIO). If an incident is Hostile Action Based (HAB) and there is a Law Enforcement Incident Command Post (LEICP), the JIC will coordinate public information releases with the LEICP. The JIC will provide Public Information Officer (PIO) support to the Incident Commander by developing public information messages; SSF13 will vet all messages and the SEOC manager will approve them before release.

8. COMMUNICATIONS

Dependable and prompt notification capabilities and an extensive primary and redundant communications network are essential to effective response operations. This section describes some of the various means of notification and communication that may be used. Other means may be used as deemed necessary and appropriate.

a. Notification

This section describes the responsibilities and means of rapidly notifying state and local officials and the public about an incident at the Vermont Yankee Nuclear Power Station. Additional details can be found in the Standard Version of the Notification Manual.

(1) Notification to State and Local Emergency Response Personnel

(a) The Vermont State Police at the State Warning Point (SWP), Rockingham PSAP, and the Alternate State Warning Point (ASWP) Williston PSAP will receive initial notification of an emergency from the Vermont Yankee Control Room via the Nuclear Alert System (NAS). Commercial telephone is used as backup. The Yankee Rowe Independent Spent Fuel Storage Installation (ISFSI) will use commercial telephone with Satellite phone as backup. Notification is verified in both cases.

i. VT-Alert is the primary notification system. If it fails, the manual system will be used.

ii. If the VT-Alert system is used:

- Either the SWP or the ASWP will sent out a notification message.
- Responders will respond to the system.

iii. If the manual system is used:

- The SWP and ASWP will work collaboratively according to the Notification Manual to notify both state and local primary responders.
- Pagers will be activated initially and then phone calls made manually to the most likely places for those organizations from whom no one responds.
- The responders will respond to a dispatcher at the indicated warning point.

iv. Both the SWP and the ASWP operate on a 24-hour basis.

(b) If a local community does not respond to the page or notification by commercial telephone, the SWP in Rockingham will dispatch uniformed law enforcement officers to the community to notify local officials.

(c) State and local agencies utilize specific procedures, including telephone call out lists and local paging frequencies, to notify additional response personnel who are not notified by the SWP.

(d) After full activation (Alert or higher classification) of the State EOC and the VY Emergency Center (VYEC), notification of changes in the emergency classification will come from the VYEC to the State EOC over the NAS. The State Liaison at the VYEC will be notified by direct contact. Affected towns will be notified by RERP radio from the State EOC.

(2) Notification to the Public

(a) The Public Notification System consists of weather alert radios, automated phone alerting systems, and the Emergency Alert System (EAS). Weather alert radios and the VT-Alert automated system are used to alert and notify the public to tune their radios to local EAS stations for emergency guidance and instructions.

(b) Activation of the Public Notification System will be coordinated by the Emergency Management Agencies of Vermont, Massachusetts, and New Hampshire. After the coordination activities are completed, the following will occur:

i. Vermont state officials will request the National Weather Service in Albany, New York to activate the weather alert radio transmitter on Ames Hill in Marlboro, VT which will activate tone alert radios in all EPZ towns in Vermont, New Hampshire, and Massachusetts.

ii. The Vermont State EOC will activate the VT-Alert system to pass on public messages using phone, text, pager, and email notifications.

(c) The National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), maintains and operates a weather radio (tone alert) system throughout the United States. In Vermont, weather broadcasts are controlled through the Burlington, Vermont, NWS office and the Albany, NY, NWS office. Weather alert radios have been distributed to EPZ residents unable to receive notification by other means. Through the NWS transmitter on Ames Hill in Marlboro, VT., the NWS in Albany, NY, can activate the weather alert radios.

(d) When EMHS contacts the NOAA weather control station in Albany, NY, and requests activation of the weather alert radios a tone will sound and a message instructing listeners to tune to their EAS station will be broadcast. WTSA AM/FM (CPSC-1) in Brattleboro also has the capability to activate the Ames Hill transmitter in the event the NWS System network between Albany and Ames Hill is inoperable.

(e) The Federal Communications Commission has approved the use of the EAS for radiological emergency response. Procedures for "Vermont Radiological Response" from the primary EAS station (CPCS-1) radio station WTSA-AM/FM in

Brattleboro, Vermont have been developed by the Windham County, Vermont EAS Operational Area. WKVT-AM/FM in Brattleboro monitors and serves as backup to WTSA. Additionally, WVAY-FM, with a transmitter on Mount Snow, monitors and re-broadcasts EAS messages from WTSA.

(f) Utilizing the SAGE "ENDEC" Encoder at the State EOC, the Information Officer will create and record EAS messages and transmit them over the dedicated EAS circuitry to the primary EAS station (WTSA AM/FM, Brattleboro, VT) in the incident area and remotely activate the EAS stations in the Windham County Operational Area. As a courtesy, when time allows, the Information Officer will contact the primary EAS station to warn them that a message is about to be transmitted. The Backup method for activation is to use the state microwave channel telephone circuit or commercial telephone line to contact WTSA and have them record and activate the message from their studio. WTSA AM/FM will broadcast public notification and guidance information authorized by the State EOC or during a fast breaking emergency, by the State Warning Point. Both the State EOC and the State Warning Point have the ENDEC encoder. Local requests for activation of the EAS must be approved and processed through the State EOC. WTSA AM/FM operates on a 24-hour, 7 days a week, basis. Despite the fact that the station is not always attended, the State EOC can activate an EAS message on a 24-hour, 7 days a week, basis.

(g) State and local personnel will be dispatched to parks and recreation areas to notify transient populations. Provisions for notifying "special needs" individuals and special institutions are addressed in the local plans.

b. Communication Systems

(1) Nuclear Alert System. The Nuclear Alert System (NAS) is a party selectable, limited access system from AT&T and Verizon used for initial notification from the Control Room to the States (Vermont, New Hampshire and Massachusetts) via the State Warning Points. This dedicated communications system also links essential emergency response facilities, including the three state EOCs and the Vermont Yankee EOF and is used for interstate coordination and administrative exchange of information. In Vermont there are additional NAS telephones at the State Warning Point (Rockingham), the Alternate State Warning Point (Williston), and at the Staging Area Office in Dummerston.

(2) Commercial Telephone. Commercial telephone is the primary communications system for State response personnel. Both the State EOC and the Staging Area have been wired with additional lines to provide response agencies with private lines and numbers to communicate with field operations and other response organizations.

(3) Emergency Management Radio, "45.52 MHZ". Emergency Management Radio provides the State EOC with radio communications with emergency management bases located at the Staging Area, the Vermont Yankee EOF, and the primary (CPCS-

1) Windham County Operational Area EAS station, WTSA AM/FM. Mobile units are provided for Emergency Management (State and local) vehicles. Base stations have been installed in all former EPZ town EOCs, the Staging Area, the Vermont liaison at the VY Emergency Operations Facility (EOF).

(4) Vermont National Guard Radio. The Vermont National Guard base radio will be made available at the State EOC and Staging Area. This radio provides National Guard personnel with dedicated radio communications with units in the field. A permanent antenna has been installed at the State EOC.

(5) Civil Air Patrol Radio. Civil Air Patrol (CAP) radio communications are available at the State EOC. Mobile and portable units are available to provide additional net locations that can operate interstate, intrastate, and ground/air.

(6) Radio Amateur Civilian Emergency Services (RACES): RACES volunteer radio operators provide a statewide backup communications network. RACES will provide equipment and operators at various locations. Primary assignments include any affected towns, the Staging Area Office, and other field locations as requested. Additional RACES sites include all Vermont hospitals, Vermont Department of Health locations and Vermont National Guard Joint Operations Center (JOC).

(7) Emergency Medical Service Radio System, "150 MHZ". The Emergency Medical Service (EMS) Radio System provides communications between hospitals and mobile units in ambulances.

(8) Vermont State Police Radio Net "450 MHZ". The Vermont State Police radio net provides backup radio capability between the State EOC and the Staging Area, as well as interface with all police services.

(9) Agency of Transportation (AOT) Radio Net, "150 MHZ". Transportation Radio provides backup radio communications between the State EOC, Staging Area, and the Agency of Transportation (Capitol District, Montpelier, Vermont) dispatcher and all agency facilities and mobiles.

c. Communication with Local Governments

(1) The RERP Radio System "45.52 MHZ" is the primary means of communications between affected towns and the State EOC. Local governments can also use the system to communicate with each other.

(2) Commercial telephone is the primary backup system for local governments. Local Law Enforcement radio communications provide a backup radio link with the state where available. Emergency Management Radio provides an additional radio link in Vernon and Brattleboro.

(3) Vermont uses the online disaster management information system "DisasterLAN" to share information and pass messages on the Internet.

d. Communication with Other States

(1) Response activities require substantial coordination with the Commonwealth of Massachusetts and State of New Hampshire. The primary means of communication among the three states is the Nuclear Alert System (NAS). Commercial telephone is also utilized.

(2) Additionally the States of New Hampshire and Vermont and the National Weather Service Offices in Albany, NY and Burlington, VT can communicate on low band radio (45.520).

e. Communications with the Federal Government

The primary means of communication with federal agencies is through FEMA. The following is a description of the various federal communication systems that can be used in the response effort.

(1) Federal National Message System. The Federal National Message System (FNAMS) is a dial up dedicated message system capable of sending and receiving messages between all state emergency management agencies and FEMA.

(2) Federal National Alert Radio System. The Federal National Radio System (FNARS) provides high frequency voice and data communications with FEMA.

(3) National Warning System. The National Warning System (NAWAS) is dedicated nationwide early warning system. It is used to broadcast information to each of the 50 states, U.S. territories and possessions, and selected military bases. The NAWAS uses land lines as well as microwave channels. It provides a redundant link for the State with the National Weather Service.

(4) Secure Telephone Equipment (STE). The STE is a secure voice telephone that can be used to communicate encrypted traffic classified up to the SECRET level. This system is available at the State EOCs, the FEMA Federal Regional Centers, and the Vermont Fusion Center.

(5) Video conferencing in either a secure or non-secure mode is available in the Public Safety Department conference room.

(6) The Federal Emergency Management Agency facility in Maynard, MA. has been provided a low band radio which will allow them another means of communication with the State of Vermont.

f. Communications with Field Personnel

(1) Radiological Plume Tracking Teams Personnel. HAZMAT Team personnel working in the field may utilize satellite telephone units for communications capability. They are also provided with mobile radios on UHF and cell phones. Other relevant methods of communication may be employed if deemed necessary and appropriate.

(2) Radiological Post Plume Sampling Teams are provided mobile telephones and radios which enable them to communicate with the State EOC and the Environmental Sampling Team Director. Other relevant methods of communication may be employed if deemed necessary and appropriate.

(3) The Vermont Department of Health Laboratory in Burlington, VT, will communicate with the State EOC via commercial telephone or other relevant method if deemed necessary and appropriate.

(4) Police. The Vermont State Police serving in the field utilize the Law Enforcement Radio System as a primary link with State Police stations, the State EOC, and the Staging Area. The system also provides radio communications throughout Vermont with County Sheriff and local police organizations. The radio system is also used between the Police Services Coordinators at the State EOC and Staging Area and the Windham County Sheriff mobile emergency management units. The Windham County Sheriff Radio System provides an additional frequency.

(5) Police personnel also utilize the State Police Intercom System between station-to-station and other State agency locations. Commercial telephone provides additional land-line links. Other relevant methods of communication may be employed if deemed necessary and appropriate.

(6) Transportation. Agency of Transportation units assisting in evacuation operations utilize the Transportation Radio System as a primary means of communications. Transportation Agency field personnel supporting traffic and access control functions utilize agency mobiles to communicate with the State EOC and the Staging Area, and monitor progress of other transportation units. Other relevant methods of communication may be employed if deemed necessary and appropriate.

(7) The Department of Fish and Wildlife Radio Net, 150 MHZ. Fish and Wildlife wardens have an active role in alerting people in the EPZ that are on waterways and remote areas. Additionally, the Radiological Sampling Teams may also use the radio net when deployed.

(8) Local radio communications are used among field personnel supporting reception center operations (i.e., traffic personnel, radiological monitoring and decontamination personnel, and security personnel). This equipment includes various base station, mobile, and portable radios available through the Westminster Fire and Highway Departments.

(9) Fixed and Mobile Medical Communications. The Emergency Medical Service Radio System is utilized for communications between ambulance and hospital personnel.

g. System Testing

(1) The various systems used for notification and communications must be tested on a regular basis to identify problem areas and minimize the possibility of malfunctions during an emergency.

(2)The various components are tested as follows:

System Components	Frequency of Test
Nuclear Alert System, WESCOM SS-4A	Monthly as scheduled by Vermont Yankee
Notification System	Statewide monthly test
RERP Radio Local Interface	Monthly, initiated by towns
NAWAS	Daily at 1200
FNARS	Thursday mornings at 0910
RACES	Quarterly in conjunction with statewide hospital communications drill
Commercial telephone and other standard communications systems	Daily usage

h. Public Information

The preparation and dissemination of accurate and timely information and instructions to the public is critical during an emergency. This section describes the various means of keeping the public informed during an emergency.

(1) Emergency Alert System (EAS) Messaging

(a) Weather alert radios and sirens will be activated to alert the public to tune to their EAS station for information and instructions. Activation of the Public Notification System requires the coordination of the three states of Vermont, Massachusetts, and New Hampshire due to the overlap of the radio stations and weather alert radios across state lines.

(b) The Information Officer is responsible for issuing the request for EAS activation and message broadcast. This is done after the decision to implement protective actions is authorized by the Governor, or designee, including the declaration of a State of Emergency, and activation of all components of the Public Notification

System is coordinated with the Commonwealth of Massachusetts and State of New Hampshire. Local requests for activation of the EAS must be approved and processed through the State EOC.

(c) EAS messages will contain clear, understandable, and accurate information and instructions. Information in the EAS messages will include, but is not limited to: a description of the current emergency classification level and plant conditions; sheltering instructions; location of reception centers; reference to previously distributed informational material and instructions for transients, special population and transportation dependent individuals, and parents of school children. DEMHS maintains pre-scripted EAS messages in the State Emergency Operations Plan (EOP), State Support Function (SSF) 14 Annex, Tab B.

(d) The EAS System consists of designated Common Program Control Stations (CPCS). These are utilized in order to provide an effective and reliable means to issue emergency instructions to the public.

(e) Vermont State EAS Common Program Control Stations

City of License	Call Sign	Frequency	Telephone	Fax
Vermont DEMHS, Waterbury			244-8721	241-5556
National Weather Service, Burlington			862-9883	660-0705
Brattleboro	WTSA-AM WTSA- FM	1450 96.7	254-4577	257-4644
Colchester	WVMT-AM	620	655-1320	655-6593
Newport	WIKE-AM	1490	766-4485	766-8067
Rutland	WZRT-FM	97.1	755-5597	775-6637
St. Johnsbury	WSTJ-AM	1340	748-2361	748-2361
Waterbury	WDEV-AM	550	244-7361	244-5266
Coordinate with National Weather Service, Albany, NY, for activation of NOAA weather alert radios in EPZ Warning Coordinator 518-435-9568; Menu 518-435-9571; (F) 518-435-9587 Forecasters (unlisted) 518-435-9574				
Primary stations are stations that broadcast or re-broadcasts a common emergency program for direct public reception, as well as inter-station programming for the duration of the EAS activation. Source: "State of Vermont EAS Operational Plan" - Draft 12/98				

(2) News Releases and Media Briefings

(a) Briefings of the news media will be conducted jointly by utility, state, and federal representatives at the Joint Information Center (JIC) in the State EOC.

(b) Briefings will be held on a timely basis and as pertinent information becomes available. Information will be shared and coordinated among the designated spokespersons from the various organizations and states prior to release.

(c) News releases will be generated at the State EOC. DEMHS maintains pre-scripted news releases in the State Emergency Operations Plan (EOP), State Support Function (SSF) 14 Annex, Tab B.

(3) Public Inquiry Hotline

(a) A toll-free public inquiry telephone number (currently 800-736-5530) will be made public in order to respond to public concerns and provide information and emergency instructions.

(b) State Public Inquiry (rumor control) operations will be conducted at the United Way "211" center in South Burlington, Vt., or the State EOC. The state-wide toll free Public Inquiry number will be provided in news releases issued during the emergency.

9. RECOVERY

The capability of the State of Vermont to make decisions on the relocation, re-entry and return of the general public is essential for the protection of the public from direct long-term exposure to deposited radioactive materials.

a. Relocation

(1) At the beginning of a Post Plume Phase, any release has been terminated and a new set of guidelines is used to determine if relocation is warranted. Relocation refers to a protective action through which individuals not evacuated during the Plume Phase are asked to vacate a contaminated area to avoid chronic exposure from deposited radioactive material.

(2) Temporary Restricted Zone

(a) The State of Vermont may identify a Temporary Restricted Zone (TRZ). For example, the TRZ boundary might be defined using a combination of the boundary of areas that were evacuated during the Plume Phase, Traffic Control Points (TCP) and/or radiological conditions. The boundary of the TRZ may be updated as data becomes available or as warranted.

(b) Individuals within the Temporary Restricted Zone may be asked to vacate (relocate from) the area until further notice.

(c) An Environmental Sampling Strategy may be developed in support of Relocation activities. For example, appropriate soil sample locations for the Radiological Sampling Team may be identified.

(d) In addition, soil samples from the projected plume boundary may have been collected by the Radiological Plume Tracking Team and submitted for laboratory analysis.

(e) A Restricted Zone may subsequently be determined based on actual soil sample analytical results or other data deemed appropriate for consideration by the Radiological Health Advisor.

(3) Restricted Zone

(a) The Restricted Zone boundary defines an area where it is estimated that an individual's projected dose may exceed a specified combined projected internal and external dose.

(b) For example, the Radiological Health Advisor may determine that it is appropriate to employ one of the following EPA guidelines in the establishment of the Restricted Zone boundary:

- 2 rem TEDE (or 100 rem DE skin beta) in the first year following the incident (also referred to as the EPA first year Relocation PAG),
- 0.5 rem TEDE in the second or any subsequent year post incident, or,
- 5 rem TEDE over 50 years post incident.

(c) Details of the procedure used to determine the Restricted Zone are provided in Implementing Procedures for the Radiological Health Advisor and the Dose Assessment Team.

(d) The process of determining the actual physical boundaries of the Restricted Zone is a collaborative one. The SEOC Manager and staff will facilitate and coordinate this process. Some of the entities involved and their respective roles are as follows:

i. As described above, the Department of Health, in cooperation with the Agency of Natural Resources and the Agency of Agriculture, determines where the appropriate guidance value(s) is (are) exceeded.

ii. The Vermont State Police and the affected town(s) (for example, the Windham County Sheriff's office provides law enforcement services to some towns under existing contract) recommend actual physical boundaries and control points at the edge of or outside the area that exceeds appropriate guidance value(s) that are conducive to control (the actual boundaries are established using easy to distinguish and control land marks).

iii. The Agency of Transportation and the Vermont National Guard assist by providing resources.

iv. The Information Officer ensures that a comprehensive press release is issued before Restricted Zone boundaries are established.

v. There will be consultation with the States of New Hampshire, Massachusetts, and New York at various levels.

vi. The Governor or designee approves the Restricted Zone boundaries.

vii. Other local, state and federal resources are consulted as needed.

b. Re-Entry

(1) After the Restricted Zone has been established, persons may need to re-enter this area for a variety of reasons, including recovery activities, retrieval of proper, security patrol, operation of vital services, and in some cases, care and feeding of farm and other animals.

(2) Re-entry into the Restricted Zone will be under controlled conditions and in accordance with dose limitations proscribed by the Vermont Department of Health.

(3) Individuals who re-enter the Restricted Zone will be issued appropriate dosimetry and passes by the town or towns located within the zone.

c. Return

(1) Actual measured levels of contamination will be converted into projected doses and compared with the appropriate guidance values identified by the Radiological Health Advisor as described above. This process is detailed in the Implementing Procedures for the Radiological Health Advisor and Dose Assessment Team.

(2) The results of these comparisons will allow the State to determine if:

(a) Some evacuees may be allowed to return and re-occupy their homes and businesses on an unrestricted basis (if monitoring data confirms the location of areas not significantly contaminated by the plume),

(b) Those who were evacuated from areas found to be only slightly contaminated by the plume may be able to return (after careful monitoring and data analyses are performed to determine whether the projected dose will exceed the appropriate guidance value), and

(c) Those who were evacuated from areas found to be contaminated will not be able to return for occupancy until the area is decontaminated (these evacuees are converted to a relocation status).

(3) Recovery actions may be taken to reduce radiation levels to permit unrestricted, long-term use of property.

(4) Long -term decisions on recovery of areas restricted from occupancy due to contamination will be made by the Health Services Coordinator and Radiological Health Advisor in conjunction with qualified representatives from various state agencies and consultation with Federal Agencies.

10. PREPAREDNESS

a. Emergency Response Planning

(1) The Commissioner of Public Safety has designated Division of Emergency Management and Homeland Security as the state/local planning authority for the development of the Vermont Radiological Emergency Response Plan.

(2) The Director of Vermont Division of Emergency Management and Homeland Security is responsible for all emergency preparedness in Vermont. Planning and interface functions have also been assigned to the Director of Vermont Division of Emergency Management and Homeland Security. Assistance is provided by the Vermont Division of Emergency Management and Homeland Security staff and personnel from various Vermont state government organizations.

(3) Radiological Emergency Response Planning is authorized under Title 20, Vermont Statutes Annotated, Section 38.

(4) Local (town) planning authority and personnel designations are local responsibilities. The State of Vermont will provide assistance, as resources allow, to any community which could be affected by a radiological emergency to ensure the development of adequate local plans which interface with the State plan.

(5) State agency planning authority and personnel designations are made at the discretion of the agency heads. Vermont Division of Emergency Management and Homeland Security is responsible for ensuring that all plans and procedures are compatible with one another and that there is inter-operability between them all.

(6) The acceptance of each town, institutional and State organization plan by authorized representatives and designated state officials will constitute an operational agreement between the parties, eliminating the need for separate letters of agreement for each participant.

b. Training

The Vermont Division of Emergency Management and Homeland Security (DEMHS) coordinates training of state and local emergency response organizations and the public. Radiological emergency response training is available to state and local response personnel as well as communities and schools around Vermont Yankee. The purpose of training is to ensure personnel are knowledgeable of their assigned roles and responsibilities in the event of an emergency. With the shutdown of Vermont Yankee and changes in preparedness requirements, DEMHS no longer maintains a core training program but instead will provide tailored training as requested.

c. Exercises

DEMHS no longer conducts regularly quarterly or annual drills or exercises for Vermont Yankee incidents. Instead, DEMHS will schedule VY exercises as part of its annual training plan.

d. Maintenance of Monitoring Equipment and Supplies

(1) The Division of Emergency Management and Homeland Security or the Vermont Department of Health, as appropriate, is responsible for the maintenance and calibration of equipment.

(2) Direct-reading dosimeters will be tested initially for accuracy. DRDs that read in Roentgens will be inspected for electrical leakage annually and recharged or replaced if necessary.

(3) Survey instruments will be calibrated annually. Dosimetry and meters will be operationally checked quarterly. DLRs will be collected for readout and replaced annually by Division of Emergency Management and Homeland Security.

11. PLAN MAINTENANCE

a. Plan Revisions

(1) Vermont Division of Emergency Management and Homeland Security (DEMHS), Department of Public Safety, specifically the Planning Section Chief, has the overall authority and responsibility for the maintenance of the Vermont Radiological Emergency Response Plan (VRERP).

(2) In 2018 and 2020, or as necessary, DEMHS will review and coordinate any updates to this plan, memorandums of understanding, and letters of agreement to ensure that they remain current and accurate.

(3) By 2022 Vermont Yankee should have shifted spent fuel from the spent fuel pool to dry storage in concrete casks. That will represent an enormous reduction in potential risk and should lead DEMHS to reissue this plan accordingly.

b. State Agencies

Each State agency having a response role is required to maintain appropriate procedures, reference information, and materials to support execution of this plan.

APPENDIX A RADIOLOGICAL EMERGENCY COMMON REFERENCE

This common reference contains information, forms, and other products that many organizations across Vermont use in their radiological emergency plans. These standard products are generally the same across different organizations and do not change frequently. While the Division of Emergency Management and Homeland Security (DEMHS) offers these as standards, organizations are free to create and use their own versions of these products.

Tab 1 - Planning Support Information

Tab 2 - Radiological Emergency Worker Information and Forms

Tab 3 - Radiological Officer Information and Forms

Tab 4 - General Forms

TAB 1 (PLANNING SUPPORT INFORMATION) TO APPENDIX A

State Response Organization

News Release Guide and Template

Recommended Protective Action Guidelines (PAGs)

Gamma Shielding

Deposition Shielding

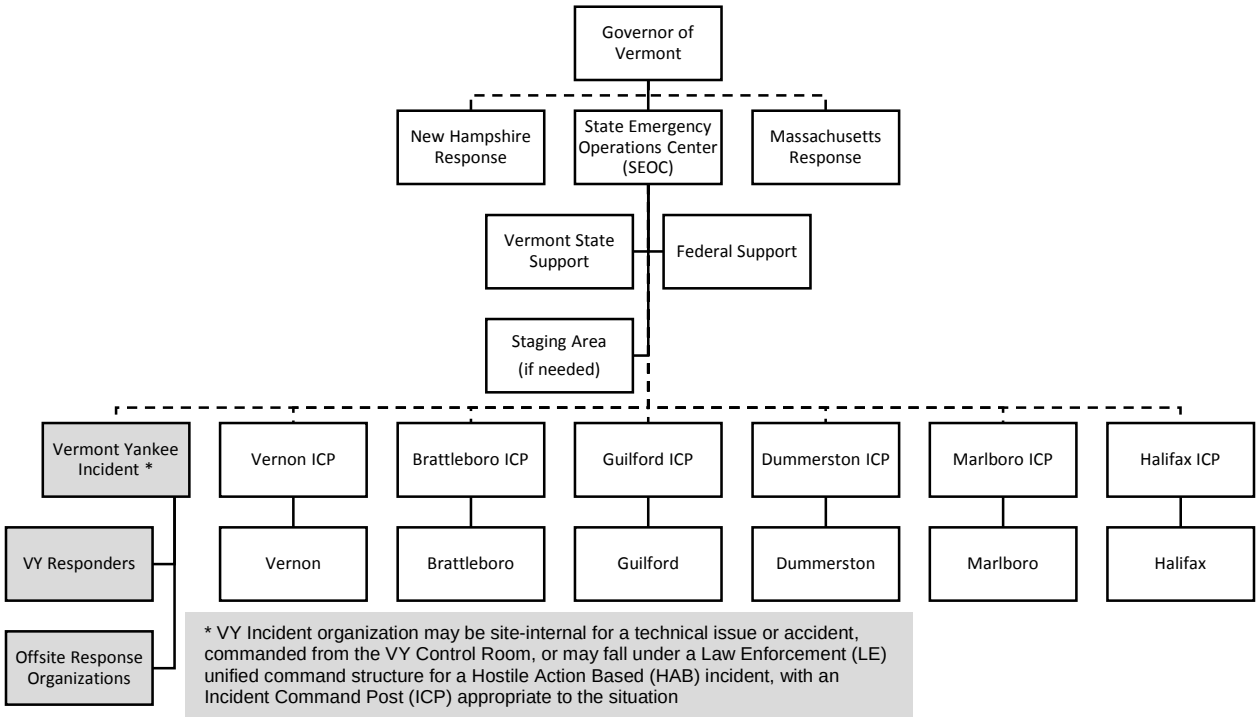
Potassium Iodide (KI) Dosage

Dose Limits

Glossary

Acronyms

State Response Organization



News Release Guide and Template

The following template is a guide for preparing releases of information to the news media. The news release should be periodically updated as activities within your community change.

ONLY PROVIDE INFORMATION CONCERNING YOUR OWN ACTIVITIES.

REFER ALL INQUIRIES REGARDING OTHER LOCAL ACTIVITIES, STATE ACTIVITIES, AND/OR PLANT STATUS TO:
The Joint Information Center (JIC) at the State Emergency Operations Center
802-XXX-XXXX

1. Identify yourself and your town/activity.

John Doe, Selectboard Member and Public Information Officer, Town of Vernon

2. Briefly indicate what happened and where.

The Town of Vernon was notified at (TIME) of a (EMERGENCY CLASSIFICATION) at the Vermont Yankee Nuclear Power Station located in Vernon, Vermont.

3. Give a status of local emergency response workers.

Our Incident Command Post (ICP) was activated at (TIME). All emergency response services have been activated. We have established communications with the State Emergency Operations Center and Staging Area.

4. Give a status of schools, hospitals, and other institutions:

The Superintendent of Schools has been notified of the emergency at the Vermont Yankee Nuclear Power Station. The school will (give its status). (Provide similar information concerning other institutions within your town.)

5. If the Emergency Alert System (EAS) or other notification systems has been activated, give a status.

The state of Vermont has sent out a notice through VT-Alert and local radio stations. The ICP is also contacting people with special access and functional needs and checking local parks and waterways.

6. Provide information on the latest precautionary or protective action recommended for the public.

(Nothing) At this time there is no indication of any risk to the public and the only thing we are asking the public to do is stay alert for future information.

(Shelter) Residents of Vernon should shelter in place - take shelter in their homes or public buildings and take precautionary measures such as placing a handkerchief or towel folded several times over their mouths and nose to filter the air should they be required to go outdoors.

(Evacuation) The town is directing an evacuation. Emergency workers have set up traffic control points and residents should proceed out of the area immediately. The American Red Cross is opening shelters in XXXXXX for people who need a place to stay outside the area.

7. Give direction on whether members of the public should take potassium iodide (KI).

There has not been any release of radioactive iodine, so members of the public should not take potassium iodide (KI).

8. Provide any other guidance on the emergency situation.

The state has recommended the following protective actions for the care of livestock, status of drinking water, and vegetation samples. (List protective actions.)

9. Tell people how to get more information.

Stay tuned to any local radio station for further emergency notifications and information. We will continue to send information through VT-Alert for those who are signed up with mobile phones or e-mails, even if they are out of the area. We will also be posting information on local activities on the town website.

REMINDER: **Only provide information concerning your own activities.** Other response organizations will be issuing their own news releases and if you comment on their actions you risk giving outdated or inaccurate information that may cause confusion.

Recommended Protective Action Guidelines (PAGs)

Recommended Protective Action Guidelines (PAGs) for the Plume Exposure Pathway:

Projected Dose to the Population:
Total Effective Dose Equivalent (TEDE) less than 1 Rem **(<1 Rem**)
Committed Dose Equivalent (CDE) to the Thyroid less than 5 Rem **(<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., less than 0.1 Rem [<0.1 Rem] TEDE).

Projected Dose to the Population:
Total Effective Dose Equivalent (TEDE) greater than or equal to 1 Rem **(≥1 Rem**)
Committed Dose Equivalent (CDE) to the Thyroid greater than or equal to 5 Rem **(≥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 1991, Section 2.3, Pages 2- 4.

Gamma Shielding

Representative shielding factors from a gamma cloud source:

Structure or Location	Shielding Factor
Outside	1.0
Vehicles	1.0
Wood-Frame House b (No Basement)	0.9
Basement of Wood House	0.6 [c]
Masonry House (No Basement)	0.6 [c]
Basement of Masonry House	0.04 [c]
Large Office or Industrial Building	0.02 [c,d]

[a] The ratio of interior dose to exterior dose.
[b] A wood frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.
[c] There is variation in the shielding factor due to different wall materials and different geometries.
[d] The shielding factor depends on where personnel are located within a building, e.g., the basement or an inside room.

SOURCE: FRMAC Assessment Manual, Vol. 2, Table 3.6, dated September 1996

Radiation shielding is the primary concern of any radioactive plume. Shielding is accomplished by placing mass between people and the radioactive plume. Nuclear radiation is attenuated or weakened by the ionization process. Each time an alpha particle, beta particle, or gamma photon comes in contact with an atom, the radiation causes an electron to leave the atom's orbit, either through attraction, repulsion or propulsion. Each time this electron interaction process occurs, the radiation loses a little of its energy. This happens whenever radiation comes in contact with, and attempts to pass through, any type of mass. The amount of radiation attenuation that occurs depends on the type and thickness of the material and the particular type of radiation that is attempting to penetrate the mass.

Deposition Shielding

Representative Shielding Factors for Surface Deposition:

Structure or Location	Representative Shielding Factor[a]
Cars on Fully Contaminated Road	0.5
Cars on Fully Contaminated 50 Foot Road	0.25
Trains	0.4
One and Two Story Wood-frame House (No Basement)	0.4[b]
One and Two Story Block and Brick House (No Basement)	0.2[b]
House Basement, One or Two Walls Fully Exposed	0.1[b]
One Story, Less Than 2 Feet of Basement Walls Exposed	0.05[b]
Two Stories, Less Than 2 Feet of Basement Walls Exposed	0.03[b]
Three or Four Story Structures - 5,000 to 10,000 Square Feet per Floor	
• First and Second Floors	0.05[b]
• Basement	0.01[b]
Multi-story Structures Greater Than 10,000 Square Feet per Floor	
• Upper Floors	0.01[b]
• Basement	0.005[b]

[a] The ratio of the interior dose to the exterior dose
[b] Away from doors and windows

Source: FRMAC Assessment Manual, Vol. 2, Table 3.7, dated September 1996

Dose Limits

Recommended Guidance on Dose Limits for Emergency Team Workers:

Dose Limit[1]	Work Activity	Comments
5 Rem Total Effective Dose Equivalent (TEDE)	All	Maintain ALARA[2] and control exposure of team members to extent practicable to these levels. (Appropriate controls for emergency workers will include time limitations, respirators, and stable iodine.)
10 Rem Total Effective Dose Equivalent (TEDE)	Protecting Valuable/Essential Property	Lower dose not practicable. (Appropriate controls for emergency workers will include time limitations, respirators, and stable iodine.) Knowledgeable volunteers will be used whenever possible.
25 Rem Total Effective Dose Equivalent (TEDE)	Lifesaving or Protection of Large Population	Control exposure of emergency team members performing lifesaving missions to this level. (Control of time of exposure will be most effective.) Knowledgeable volunteers will be used whenever possible.
Greater than 25 Rem Total Effective Dose Equivalent (TEDE)	Lifesaving or Protection of Large Population	Only on a voluntary basis to persons fully aware of the risks involved. This includes the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects.

[1] Emergency dose limits for the lens of the eye and for any organ (including skin and extremities) are three and ten times the listed values, respectively.
[2] As Low As Reasonably Achievable (ALARA). The radiation protection philosophy of minimizing radiation exposure to the lowest practical level.

Source: EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, Revised 1991, Section 2.5, Page 2-9.

Glossary

ACCESS CONTROL: The establishment of roadblocks, road barriers, or other means to control public entry into designated areas.

ACCESS CONTROL POINT (ACP): A key intersection or area of road designated to restrict traffic into and within a Restricted Zone.

AGRICULTURAL FACILITY: Any building or tract of land used for producing crops and/or raising livestock and in varying degrees the preparation and marketing of these commodities.

ALARA: As defined in Title 10, Section 20.1003, of the Code of Federal Regulations (10 CFR 20.1003), ALARA is an acronym for "as low as (is) reasonably achievable," which means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

ALERT: An emergency classification which indicates events are in progress or have occurred that involve an actual or potential substantial degradation in the level of plant safety OR a security event that involves probable life-threatening risk to site personnel or damage to site equipment due to hostile action. Releases are expected to be limited to small fractions of the U.S. Environmental Protection Agency (EPA) Protective Action Guidelines (PAG's) exposure levels.

ALTERNATE STATE WARNING POINT: A place that can receive and transmit emergency notification messages should communications at the State Warning Point fail.

ALPHA PARTICLE: A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus that has a mass number of 4 and an electrostatic charge of +2. It has low penetrating power and a short range of a few centimeters in air. The most energetic alpha particle will generally fail to penetrate the dead layers of cells covering the skin, and can be easily stopped by a sheet of paper. Alpha particles are hazardous when an alpha-emitting isotope is inside the body.

BACKGROUND RADIATION: The natural radiation that is always present in the environment. It includes cosmic radiation which comes from the sun and stars, terrestrial radiation which comes from the Earth, and internal radiation which exists in all living things. The amount of background radiation a person receives is dependent upon a variety of factors such as geographical location and the altitude of the city in which the

individual lives. On average, a person living in the United States receives about 620mrem per year from exposure to background radiation.

BETA PARTICLE: A charged particle with a mass equal to 1/1837 that of a proton that is emitted from the nucleus of a radioactive element during radioactive decay or disintegration of an unstable atom. A negatively charged beta particle is identical to an electron, while a positively charged beta particle is called a positron. Beta particles may be stopped by thin sheets of metal or plastic.

BOILING WATER REACTOR (BWR): A common nuclear power reactor design in which water flows upward through the core where it is heated by fission and allowed to boil in the reactor vessel. The resulting steam then drives turbines which activate generators to produce electrical power. BWRs operate similarly to electrical plants using fossil fuel, except that the BWRs are powered by 370–800 nuclear fuel assemblies in the reactor core.

BUFFER ZONE: An area adjacent to a restricted zone that residents may enter, but requires protective measures to minimize exposure to radiation.

CANCELLATION: Cessation of school activities until further notice.

CLADDING: The thin-walled metal tube that forms the outer jacket of a nuclear fuel rod. It prevents corrosion of the fuel by the coolant and the release of fission products into the coolant. Aluminum, stainless steel, and zirconium alloys are common cladding materials.

COLD SHUTDOWN: The term used to define a reactor coolant system at atmospheric pressure and at a temperature below 200 degrees Fahrenheit following a reactor cool down.

CONDENSER: A large heat exchanger designed to cool exhaust steam from a turbine below the boiling point so that it can be returned to the heat source as water. In a boiling-water reactor, it returns to the reactor core. The heat removed from the steam by the condenser is transferred to a circulating water system and is exhausted to the environment either through a cooling tower or directly into a body of water.

CONGREGATE CARE: The support function that provides shelter, food, and other essential services for evacuees.

CONGREGATE CARE CENTER (CCC): A facility for temporary housing, care, and feeding of evacuees.

CONTAMINATION: Undesirable radiological, chemical, or biological material with a potentially harmful effect that is airborne, deposited in, or on the surface of structures, objects, soil, water, or living organisms in a concentration that makes the medium unfit for its next intended use.

COOLANT: A substance circulated through a nuclear reactor to remove or transfer heat. The most commonly used coolant in the United States is water. Other coolants include heavy water, air, carbon dioxide, helium, liquid sodium, and a sodium-potassium alloy.

DECAY HEAT: The heat produced by the decay of radioactive fission products after a reactor has been shut down.

DECONTAMINATION: A process used to reduce, remove, or neutralize radiological, chemical, or biological contamination to reduce the risk of exposure. Decontamination may be accomplished by cleaning or treating surfaces to reduce or remove the contamination, filtering contaminated air or water, subjecting contamination to evaporation and precipitation, or covering the contamination to shield or absorb the radiation. The process can also simply allow adequate time for natural radioactive decay to decrease the radioactivity.

DERIVED RESPONSE LEVEL: A calculated radionuclide concentration in foodstuffs, milk, and water, which if ingested without any protective actions, would result in a projected dose commitment equivalent to the preventive or emergency Protective Action Guidelines.

DIRECT READING DOSIMETER (DRD): A pen-like device that measures the cumulative dose of ionizing radiation received by the device. It is usually clipped to a person's clothing and worn to measure one's actual exposure to radiation.

DOSE: A general term, which may be used to refer to the amount of energy absorbed by an object or person per unit mass. Known as the "absorbed dose," this reflects the amount of energy that ionizing radiation sources deposit in materials through which they pass, and is measured in units of radiation-absorbed dose (rad). The related international system unit is the gray (Gy), where 1 Gy is equivalent to 100 rad. By contrast, the biological dose or dose equivalent, given in rems or sieverts (Sv), is a measure of the biological damage to living tissue as a result of radiation exposure.

DOSE RATE: The dose of ionizing radiation delivered per unit time. For example, rems or sieverts (Sv) per hour.

DOSIMETER CHARGER: A device used to zero direct reading dosimeters prior to issuance.

DOSIMETER OF LEGAL RECORD (DLR): A small device used to measure individual radiation exposure. It is a permanent record dosimeter. DLRs are not readable by the emergency worker and must be processed in a laboratory.

DOSIMETRY: Devices used to calculate the absorbed dose in matter and tissue resulting from indirect and direct exposure to ionizing radiation.

DOSIMETRY PACKET: A package that contains dosimeters, information, and forms for measuring and documenting a worker's exposure to radiation.

DRILL: A supervised instruction period aimed at developing and maintaining skills in emergency response.

EMERGENCY ACTION LEVELS (EALs): A pre-determined, site-specific, observable threshold for a plant condition that places the plant in an emergency class. The thresholds are based upon specific instrument readings, system abnormalities, event observation, or radiological levels.

EMERGENCY ALERT SYSTEM (EAS): A national warning system in the United States put into place in 1997 superseding the Emergency Broadcast System (EBS) and the CONELRAD System. It is jointly coordinated by the Federal Communications Commission (FCC), Federal Emergency Management Agency (FEMA), and National Weather Service (NWS).

EMERGENCY CLASSIFICATION LEVEL (ECL): Sets of plant conditions that indicate various levels of risk to the public and which might require response by an offsite emergency response organization to protect citizens near the site. Each level triggers a set of predetermined actions by the off-site Emergency Response Organization. The four levels in ascending severity are:

NOTIFICATION OF UNUSUAL EVENT
ALERT
SITE AREA EMERGENCY (no longer a Vermont Yankee ECL)
GENERAL EMERGENCY (no longer a Vermont Yankee ECL)

EMERGENCY OPERATIONS CENTER (EOC): The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction.

EMERGENCY PLANNING ZONES (EPZ): The areas required to have standing Radiological Emergency Response Plans. A Plume Exposure Pathway EPZ accommodates practical planning considerations and is based on the area within 10 miles of an operating nuclear reactor. An Ingestion Exposure Pathway EPZ is the area within a 50-mile radius of an operating nuclear reactor and includes the Plume Exposure Pathway EPZ. For a shutdown nuclear plant such as Vermont Yankee, the EPZ is the site boundary.

EMERGENCY RESPONSE ORGANIZATION: A combination of local, state, federal, and private agencies that implement emergency response procedures.

EXCLUSION AREA: The area established to control access to a previously evacuated area. It is established to control the spread of contamination and provide security.

EVACUATION: The act of moving individuals and animals away from the path of the plume to avoid exposure to airborne radioactive material.

EVACUATION ROUTES: Those roadways identified in state and local plans as the principal routes leading out of an area for use by vehicles in the event of an accident requiring evacuation.

EXERCISE: An evaluated event involving response to a simulated emergency. The purpose of an exercise is to evaluate integrated responses of all or a portion of the components in an emergency response organization. Exercises also help to clarify roles and responsibilities, improve interagency coordination, find resource gaps, develop individual performance, and identify opportunities for improvement.

EXPOSURE LIMIT: An upper limit on the acceptable amount of radiation dose an individual may receive.

FUEL ASSEMBLIES: A structured group of fuel rods. Depending on the design, a reactor vessel may have dozens of fuel assemblies (also known as fuel bundles) which may contain 200 or more fuel rods.

FUEL RODS: A long, slender, zirconium metal tube containing pellets of fissionable material which provide fuel for nuclear reactors. Fuel rods are assembled into bundles called fuel assemblies which are loaded individually into the reactor core.

GAMMA RADIATION: High energy, short wavelength, electromagnetic radiation emitted from the nucleus of an atom. Gamma radiation frequently accompanies alpha and beta emissions and is always present during the fission process. Gamma rays are very penetrating and are best stopped or shielded by dense materials such as lead or depleted uranium. Gamma rays are similar to x-rays.

GENERAL EMERGENCY (GE): A GENERAL EMERGENCY is an emergency classification which indicates that events are in process or have occurred which involve actual or imminent substantial degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels beyond the immediate site area. It is the most severe of the four emergency classifications. With the reactor shut down for over a year, Vermont Yankee no longer plans for a General Emergency.

HALF-LIFE: The time in which one half of the atoms of a particular radioactive substance disintegrate into another nuclear form. Measured half-lives vary from millionths of a second to billions of years.

HOST FACILITY: Any facility outside of the Emergency Planning Zone to which individuals in special facilities or residents are evacuated.

INCIDENT COMMAND POST (ICP): The field location at which the primary tactical-level, on-scene incident command functions are performed. The ICP may be collocated with the incident base or other incident facilities.

INGESTION PATHWAY EMERGENCY PLANNING ZONE: The area with a 50 mile radius where it would be possible for radiological contamination of crops, agricultural products, land, and surface water to occur.

INITIAL NOTIFICATION: The first communication from the Vermont Yankee Nuclear Power Station Control Room to the off-site Emergency Response Organization that an incident has occurred.

IONIZING RADIATION: A form of radiation which includes alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. When ionizing radiation passes through material such as air, water, or living tissue, it deposits enough energy to produce ions by breaking molecular bonds and displacing or removing electrons from atoms or molecules. This electron displacement may lead to changes in living cells.

ISOTOPE: Two or more forms of a given element that have the same number of protons in their nucleus and the same or very similar chemical properties, but a different number of neutrons in their nucleus and distinct physical properties.

LOSS OF COOLANT ACCIDENT (LOCA): Those postulated accidents that result in a loss of reactor coolant at a rate in excess of the capability of the reactor makeup system resulting from breaks in the reactor coolant pressure boundary up to and including a break equivalent in size to the double-ended rupture of the largest pipe of the reactor coolant system.

MILLIREM (mR or mr): A radiation measurement equivalent to one-thousandth of a REM.

MONITORING: Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination in an area.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA): A scientific agency within the United States Department of Commerce focused on the conditions of the oceans and atmosphere. It is the parent agency for the National Weather Service which activates weather alert radios.

NATIONAL WARNING SYSTEM (NAWAS): A system used to convey warnings to United States-based federal, state and local governments as well as the military and civilian population. The original mission of NAWAS was to warn of an imminent enemy attack or an actual accidental missile launch upon the United States. NAWAS still supports this mission but the emphasis is on natural and technological disasters.

NATIONAL WEATHER SERVICE (NWS): The National Weather Service is a subordinate agency of NOAA. The office located in Albany, New York is responsible for the activation of the NOAA weather alert radios in the event of an emergency at Vermont Yankee Nuclear Power Station and providing weather services for the two southern counties in Vermont. The office located at the Burlington International Airport provides service to the remainder of Vermont.

NEWS MEDIA / JOINT INFORMATION CENTER (JIC): A co-located group of representatives from local, state, federal, and private organizations designated to handle public information needs during an event. An area has been designated at the Vermont Yankee corporate headquarters to perform this function.

NOTICATION OF AN UNUSUAL EVENT: An emergency classification which indicates that events are in process or have occurred that indicate a potential degradation in the level of plant safety or a security threat to facility protection. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

NUCLEAR ALERT SYSTEM (NAS): A dedicated microwave system utilized as the primary means of communication between the state and Vermont Yankee Nuclear Power Station during an emergency.

NUCLEAR REACTOR: The heart of a nuclear power plant in which nuclear fission may be initiated and controlled in a self-sustaining chain reaction to generate energy or produce useful radiation. Although there are many types of nuclear reactors, they all incorporate certain essential features including the use of fissionable material as fuel, a moderator such as water to increase the likelihood of fission unless reactor operation relies on fast neutrons, a reflector to conserve escaping neutrons, coolant provisions for heat removal, instruments for monitoring and controlling reactor operation, and protective devices such as control rods and shielding.

NUCLIDE: A general term referring to all known isotopes of the chemical elements both stable (279) and unstable (about 2,700).

OFF-SITE: The area outside the authority of the nuclear facility licensee.

ON-SITE: The area under the authority of a nuclear facility licensee.

PLANNING BASIS: Guidance in terms of size of the planning area (distance), time dependence of a release, and radiological characteristics of releases.

PLUME: A visible or measurable discharge of a contaminant from a given point of origin. In the case of a nuclear power plant, the contaminant consists of radioactive particles and gases.

PLUME EXPOSURE PATHWAY: An area 10 miles in radius from a nuclear power plant where the principal dose is received from external whole body exposure to gamma radiation from the plume and from deposited materials as well as inhalation exposure from the passing radioactive material.

POTASSIUM IODIDE (KI): A thyroid blocking agent that prevents the accumulation of radioiodine in the thyroid gland by blocking its absorption using stable (nonradioactive) iodine. KI is the chemical formula, not an abbreviation.

PRECAUTIONARY ACTION: An action taken in advance to protect against plant conditions or other hazards that may escalate faster than the public's ability to react. This action is designed to protect people, animals, and the environment.

PRECAUTIONARY TRANSFER: The movement of one or more segments of the population to a reception center or host facility prior to an evacuation of the general public. Likely population segments include children in schools, child care centers, and patients in health care facilities.

PREVENTATIVE PROTECTIVE ACTIONS: Things done to prevent or reduce contamination of milk, water, and/or food products. The FDA Protective Action Guides (PAGs) are 1.5 REM to the thyroid and 0.5 REM to the whole body.

PROJECTED DOSE: An estimate of the radiation dose which affected population groups could potentially receive through direct exposure to the plume if protective actions are not taken.

PROTECTIVE ACTIONS: Things done to reduce or eliminate the public's exposure to radiation or other hazards.

PROTECTIVE ACTION GUIDELINE (PAG): The projected dose to reference man, or other defined individual, from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended.

PROTECTIVE ACTION RECOMMENDATION (PAR): Those actions to protect the health and safety of the general public in the event of an emergency that are recommended to the state by Vermont Yankee Nuclear Power Station.

QUALIFIED REPRESENTATIVE: Designated, trained state agency representative with the authority to respond and act in the name of the agency in lieu of or until replaced by an agency head.

RADIATION: Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions.

RADIO AMATEUR CIVIL EMERGENCY SERVICE (RACES): Licensed volunteer amateur radio (HAM) communications personnel equipped by and affiliated with the state and local Emergency Management Agencies.

RADIOACTIVITY: The property possessed by some elements such as uranium to spontaneously emit energy in the form of radiation as a result of the decay or disintegration of an unstable atom. Radioactivity is also the term used to describe the rate at which radioactive material emits radiation. Radioactivity is measured in curies (Ci), Becquerels (Bq), or disintegrations per second.

RADIOLOGICAL EMERGENCY RESPONSE PLAN (RERP): The State of Vermont emergency response plan to be implemented in the event of a radiological emergency at Vermont Yankee Nuclear Power Station.

RADIOLOGICAL OFFICER: A person who is responsible for radiological exposure control activities in a given community.

REACTOR VESSEL: A pressure vessel containing the coolant, control rods, and reactor core.

RECEPTION CENTER: A facility designated to provide evacuee and vehicle monitoring, decontamination, registration, assignment to congregate care facilities, and reunification assistance. With the shutdown of Vermont Yankee, Vermont no longer has any pre-designated Reception Centers.

RECOVERY: Refers to the process of reducing radiation exposure rates and concentrations of radioactive material in the environment to acceptable levels for return by the general public for unconditional occupancy or use after the emergency phase of a radiological event.

RE-ENTRY: The temporary entry into a restricted zone under controlled conditions (i.e., to allow a farmer care for livestock).

RELOCATION: A protective action that occurs in the post-emergency phase whereby individuals not already evacuated during the emergency phase are asked to vacate a contaminated area to avoid chronic radiation exposure from deposited radioactive material.

REM: One of the two standard units used to measure the dose equivalent which combines the amount of energy from any type of ionizing radiation that is deposited in human tissue, along with the medical effects of the given type of radiation. For beta and gamma radiation, the dose equivalent is the same as the absorbed dose. By contrast, the dose equivalent is larger than the absorbed dose for alpha and neutron radiation, because these types of radiation are more damaging to the human body. The acronym stands for Roentgen Equivalent Man.

RESTRICTED ZONE: An area of controlled access from which the population has been evacuated or relocated.

RETURN: The reoccupation of areas previously restricted to the public when the radiation risk has been reduced to acceptable levels.

ROENTGEN (R): A unit of exposure to ionizing radiation. It is the amount of gamma or x-rays required to produce ions resulting in a charge of 0.000258 coulombs / kilogram of air under standard conditions.

ROUTE ALERTING: A supplement to the public notification system (siren system and tone alert radios) which is implemented in the event of a public notification system failure. It is accomplished by municipal route alert teams traveling in vehicles along pre-planned routes delivering a predetermined message.

SAMPLING: The collection of material at specified field locations.

SHELTER: A protective action advising the at-risk populations to go inside, or remain indoors, as protection from a potential or actual radiological release.

SHELTER-IN-PLACE: A process for taking immediate shelter during and following the passage of a radioactive plume in a location readily accessible to the affected individual by sealing a single area such as a room from outside contaminants and shutting off all ventilation systems.

SHIELDING: Any material or obstruction that absorbs radiation and thus tends to protect personnel or materials from the effects of ionizing radiation.

SITE AREA EMERGENCY (SAE): An emergency classification which indicates events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except near the site boundary. It is the second highest of the four emergency classifications. With the reactor shut down for over a year, Vermont Yankee no longer plans for a Site Area Emergency.

SOURCE TERM: An estimate made by researchers of the amount and chemical form of a contaminant released to the environment from a specific source over a certain period of time. The phrase is used in risk assessment studies to refer to estimates of toxic chemicals and radioactive materials released from a source.

SPECIAL ALERTING: Special Alerting is a supplement to weather alert radios and is used to provide emergency notification to individuals with special access and functional needs, specific facilities, campgrounds, recreation areas, or geographic areas of concern.

SPECIAL FACILITIES: Public and private schools, day care centers, nurseries, hospitals, nursing homes, or other facilities responsible for, or occupied by, at risk individuals.

SPECIAL NEEDS POPULATION: Individuals in the general population who are unable to take protective actions on their own. These individuals may require transportation and/or assistance to move to a reception center or other facility located outside of the Emergency Planning Zone.

STAGING AREA: A location established at or near an incident where resources can be placed while awaiting assignment. There may be more than one staging area for an incident.

STANDBY STATUS: A term used to describe the level of readiness of emergency personnel. It indicates that personnel have been notified and are available to activate duty stations if called upon.

STATE WARNING POINT (SWP): The state designated point to receive initial notification of a radiological emergency from a nuclear power plant.

SUPPORT AGENCIES: State, local, and private agencies which provide personnel, equipment, facilities, or special knowledge to support the implementation of an emergency response.

SURVEY METER: Any portable radiation detection instrument especially adapted for inspecting an area or individual to establish the existence and amount of radioactive material present.

TERMINATION: The act of canceling a declared emergency classification because all of the underlying conditions have been fixed and the plant is considered safe. In a lower level condition, the plant may continue to generate power, while at a higher level it may not. It includes notifying everyone that was previously notified of the initial declaration that the emergency classification is no longer valid.

THERMOLUMINESCENT DOSIMETER (TLD): A small device used to measure radiation by measuring the amount of visible light emitted from a crystal in the detector when exposed to ionizing radiation. It is a permanent record dosimeter used to measure total beta/gamma exposure. TLDs are not readable by the emergency worker and must be processed in a laboratory.

THYROID BLOCKING: The use of potassium iodide (KI) or other suitable drug to saturate the thyroid gland with stable iodine and thereby prevent thyroid uptake of radioiodine.

TRAFFIC CONTROL POINTS (TCP): Any of a number of key route intersections within and around the plume exposure pathway Emergency Planning Zone designed to

facilitate the flow of traffic in a desired direction while discouraging the flow of traffic in other directions. Traffic Control Points may sometimes double as Access Control Points to restrict entry into the plume exposure pathway Emergency Planning Zone.

TRANSIENT POPULATION: That segment of the public residing outside the Emergency Planning Zone, but visiting or working at places inside it.

TRANSPORTATION RESOURCES: Vehicles such as ambulances, buses, and trucks used for evacuation of nursing home residents, school staff, students, and other population groups.

UNMET NEEDS: Resources required to support emergency operations that were neither provided nor available.

UNUSUAL EVENT (TERMINATED): A condition that warrants an Unusual Event declaration, but was immediately rectified such that the condition no longer existed by the time of the declaration. The event or condition did not affect personnel on-site, the public off-site, or result in radioactive releases requiring off-site monitoring.

VERIFICATION: The process of confirming the validity of a notification message or action to be taken.

WAYPOINT: An intermediate location where special needs individuals are directed to the facility that will accommodate them until they can return to their normal housing.

WTSA: The primary EAS radio station for the Vermont Yankee Emergency Planning Zone located in Brattleboro, Vermont.

Acronyms

ACP - Access Control Point
AHS - (Vermont) Agency of Human Services
ALARA - As Low As Reasonably Achievable
ANR - (Vermont) Agency of Natural Resources
AOT - (Vermont) Agency of Transportation
ARC - American Red Cross
BFUHS - Bellows Falls Union High School
CAP - Civil Air Patrol
CPCS-1 - Common Program Control Station - 1
CPM - Counts Per Minute
CD - Civil Defense
DEMHS - (Vermont) Division of Emergency Management and Homeland Security
DLR - Dosimeter of Legal Record
DOA - (Vermont) Department of Agriculture
DOC - (U.S.) Department of Commerce
DOD - (U.S.) Department of Defense
DOE - (U.S.) Department of Energy
DOT - (Vermont) Department of Transportation
DRD - Direct Reading Dosimeter
DRL - Derived Response Level
EAS - Emergency Alert System
EMS - Emergency Medical Services
ECL - Emergency Classification Levels
EOC - Emergency Operations Center
EOF - Emergency Operations Facility
EWMDS - Emergency Worker Monitoring and Decontamination Station
EPA - Environmental Protection Agency
EPZ - Emergency Planning Zone
FDA - Food and Drug Administration
FEMA - Federal Emergency Management Agency
FRERP - Federal Radiological Emergency Response Plan
FRMAC - Federal Radiological Monitoring and Assessment Center
FRMAP - Federal Radiological Monitoring and Assessment Plan
GE - General Emergency
HHS - (U.S. Department of) Health and Human Services
IC - Incident Commander
ICP - Incident Command Post
IEP - Ingestion Exposure Pathway
IPZ - Ingestion Pathway Zone
JIC - Joint Information Center
KI - Potassium Iodide
mR - milliRoentgen
NAS - Nuclear Alert System
NAWAS - National Warning System

NIAT - Nuclear Incident Advisory Team
NOAA - National Oceanic and Atmospheric Administration of the U.S. Department of Commerce
NPS - Nuclear Power Station
NRC - Nuclear Regulatory Commission
NWS - National Weather Service
PAG - Protective Action Guides
PIO - Public Information Officer
R - Roentgen
RACES - Radio Amateur Civil Emergency Service
RAD - Radiation Absorbed Dose
RC - Reception Center
REM - Roentgen Equivalent Man
RERP - Radiological Emergency Response Plan
RM&D - Radiological Monitoring and Decontamination
SAE - Site Area Emergency
TCP - Traffic Control Point
TDD - Telecommunications Device for the Deaf
TLD - Thermoluminescent Dosimeter
TSA - Transportation Staging Area
UE - Unusual Event
USAF - U.S. Air Force
USCG - U.S. Coast Guard
USDA - U.S. Department of Agriculture
VDH - Vermont Department of Health
VTNG - Vermont National Guard
VY - Vermont Yankee
VYNPS - Vermont Yankee Nuclear Power Station
WVFR - Westminster Volunteer Fire and Rescue
YAEC - Yankee Atomic Electric Company

TAB 2 (RADIOLOGICAL EMERGENCY WORKER INFORMATION AND FORMS) TO APPENDIX A

Dosimetry Just-In-Time Training

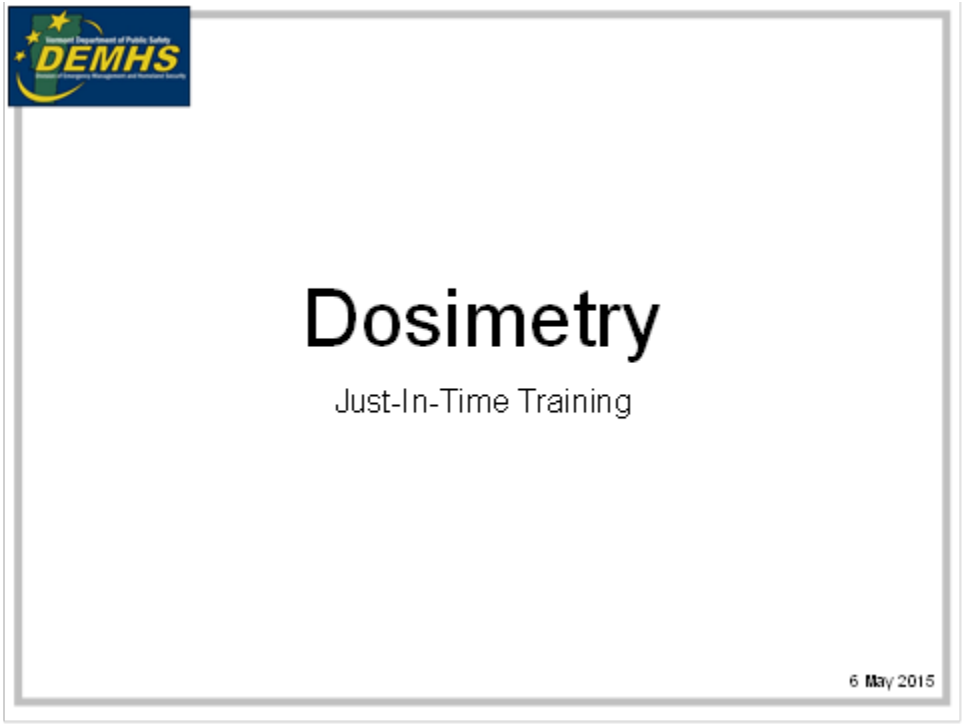
Emergency Worker Information Sheet and Radiation Exposure Record

Regulatory Guide 8.13 Instruction Concerning Prenatal Radiation Exposure

Regulatory Guide 8.13 Acknowledgment Form

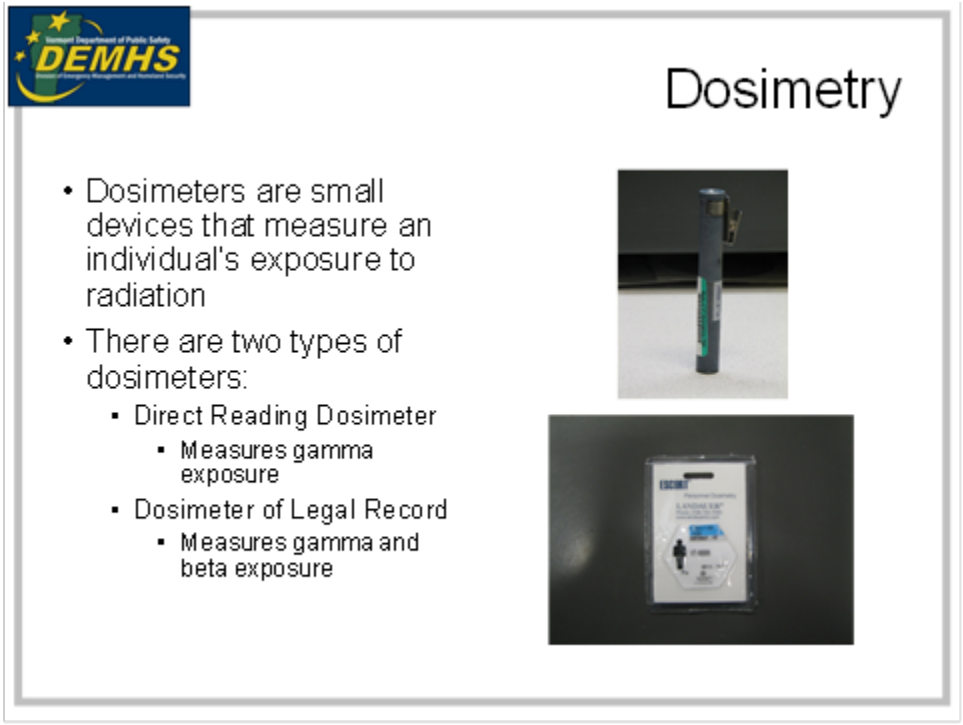
Regulatory Guide 8.13 Declaration of Pregnancy

Slide 1



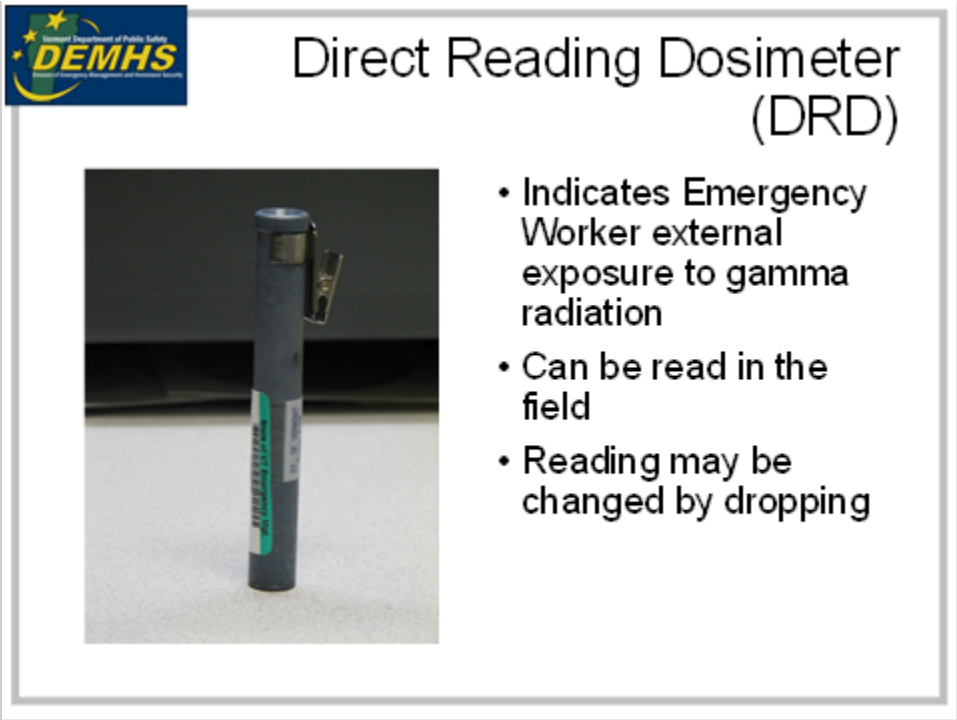
Welcome to the Vermont Division of Emergency Management and Homeland Security's Just in Time Training on Dosimetry.

Slide 2



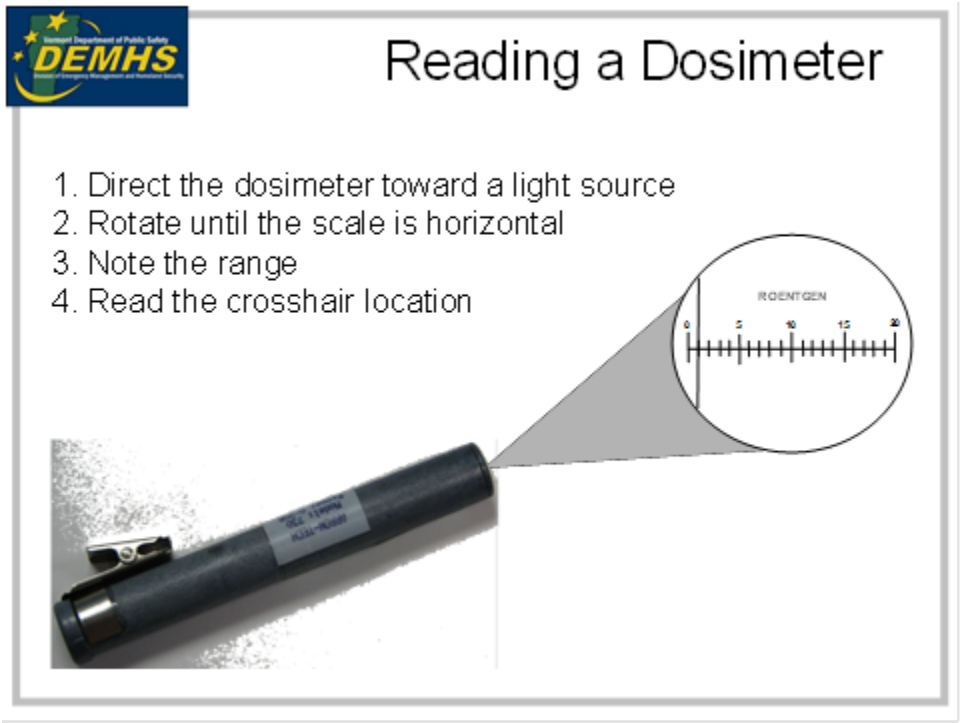
Dosimeters are small devices that measure your exposure to ionizing radiation. Emergency workers receive two dosimeters: a direct reading dosimeter, or DRD, that looks like a pen, and a dosimeter of legal record, or DLR, that is a badge about the size of a credit card.

Slide 3



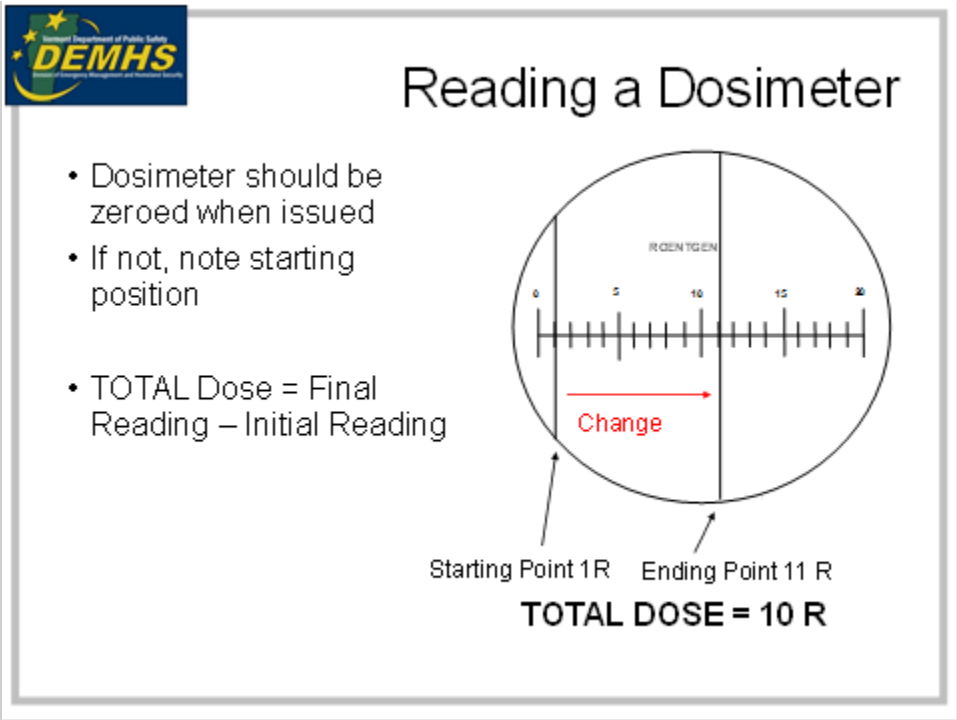
Your DRD measures your exposure to gamma radiation. You can check this dosimeter yourself which enables you to keep track of any dose you are receiving in real time. Unfortunately one disadvantage of your DRD is that the reading can change if it is dropped or bumped - the fiber may move up or down the scale and any dose registered will be lost.

Slide 4



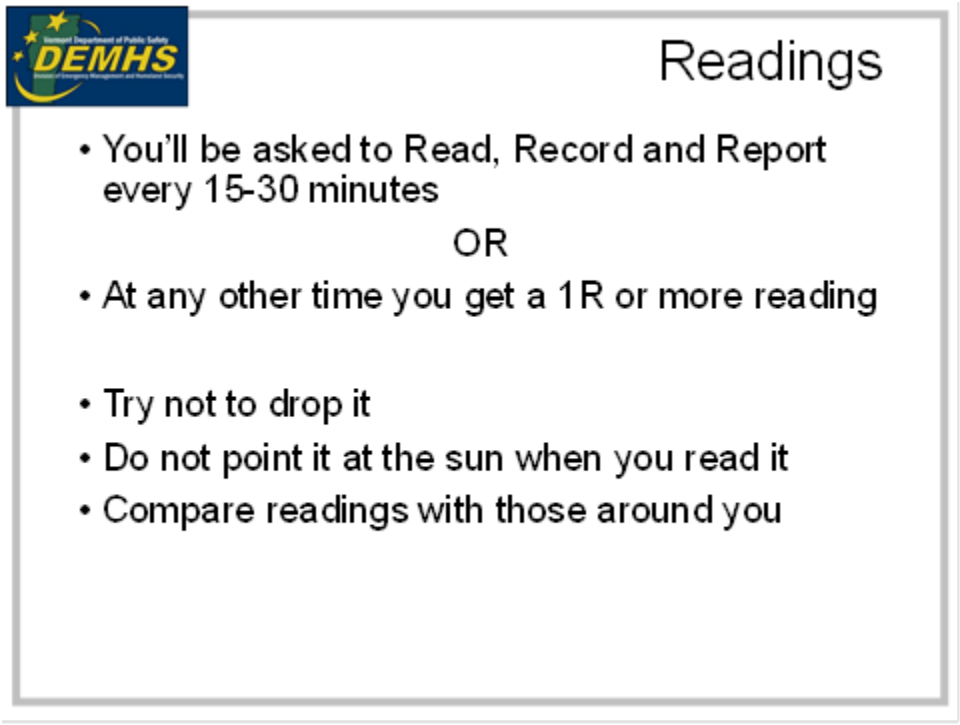
To read your DRD, point it towards a light source and look in the end with the clip. The point where the fiber intersects with the scale is the current reading. Be careful not to point it directly at the sun.

Slide 5



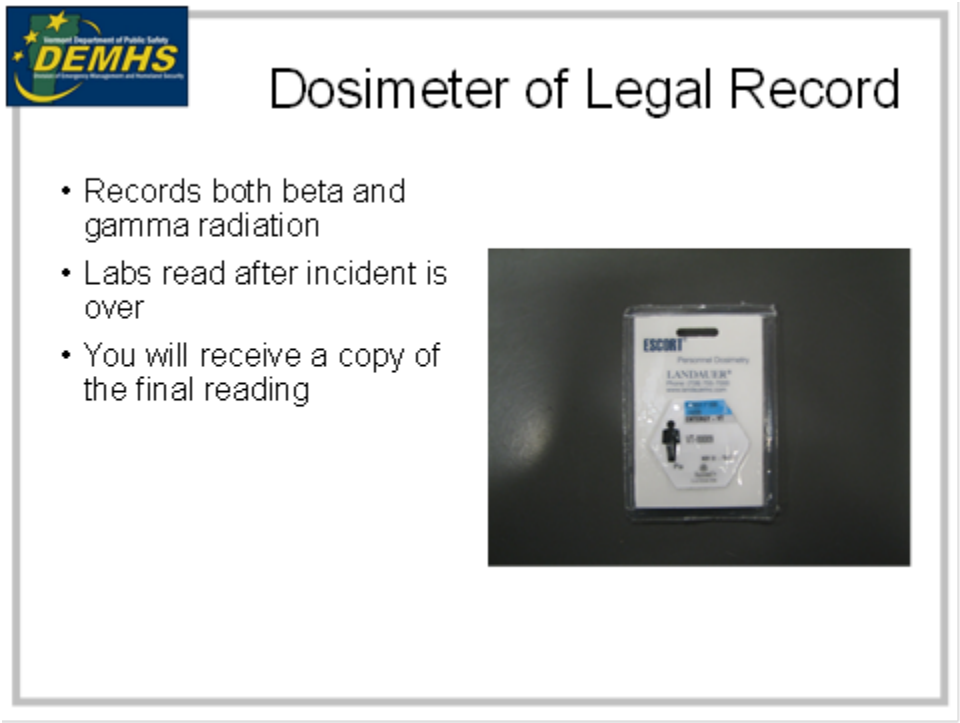
When you are first issued the DRD it should be on zero and any dose measured will be reflected on the scale. If your dosimeter is not on zero when you first receive it, note your starting reading - your total will then be the final reading minus the starting reading. For example, if you start with 1R and you end with 11R, your total dose is 10R.

Slide 6



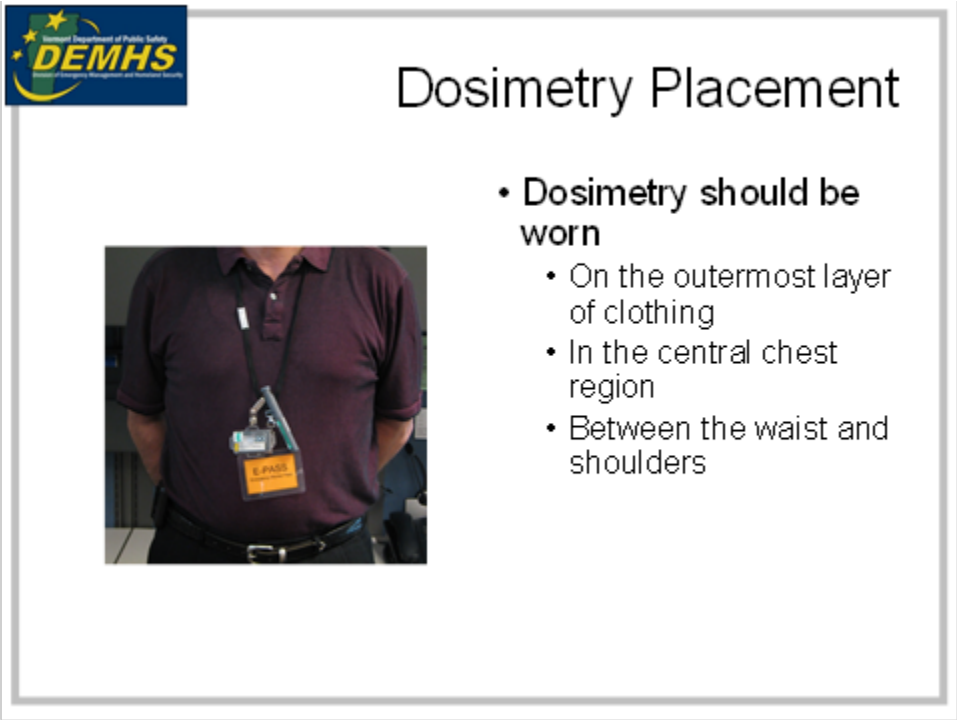
You will be asked to read your dosimeter every 30 minutes, or 15 minutes if there is a release or you have 1R of exposure. Record your readings in your white dosimetry record. Remember not to drop your dosimeter or point it at the sun. If a reading seems abnormal, compare it with those closest to you.

Slide 7



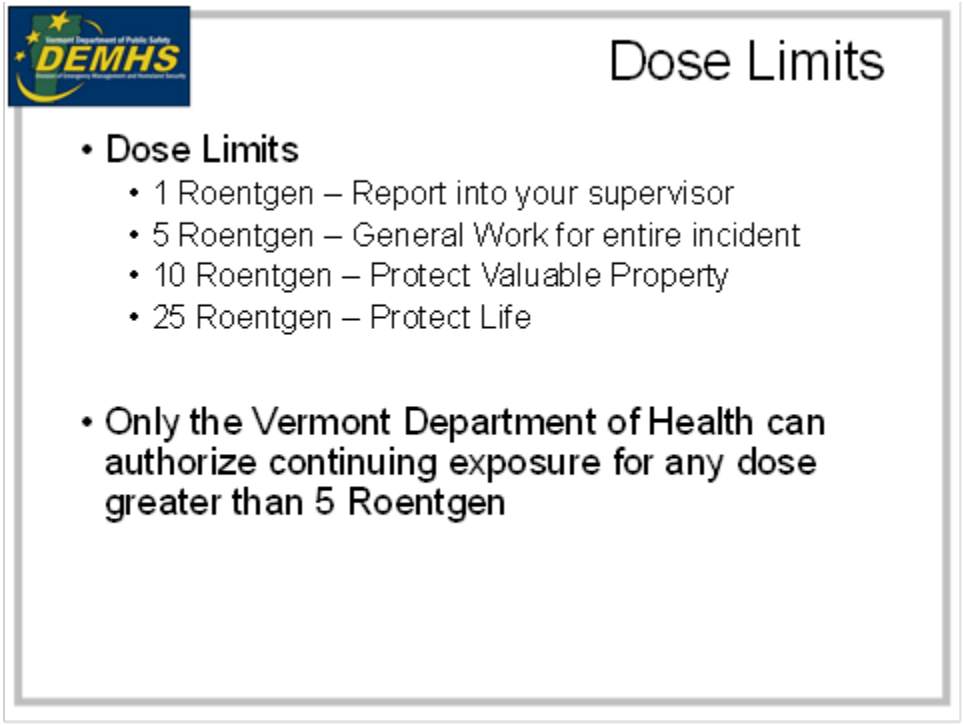
The Dosimeter of Legal Record, or DLR, reads both beta and gamma radiation. This dosimeter records your total dose for a given time. A laboratory will read your DLR when the incident is over and the final reading is reported as a legal record.

Slide 8



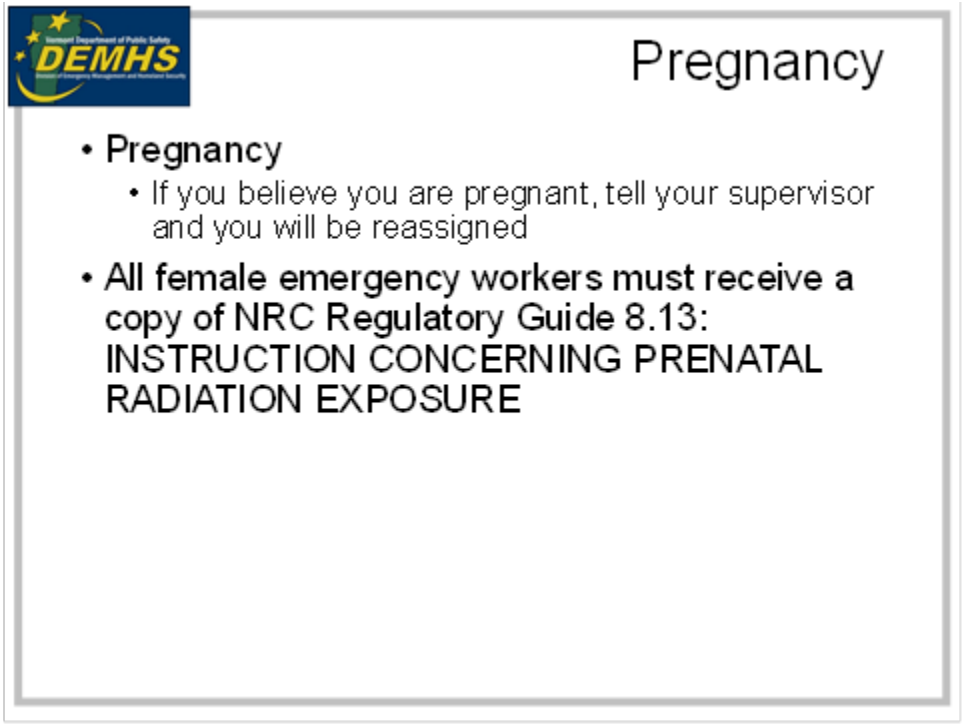
Wear dosimetry on the outermost layer of your clothing between your waist and shoulders on the lanyard provided. Dosimeter placement is important because wearing your dosimetry in the wrong location on your body may alter the readings and result in unnecessary exposure.

Slide 9



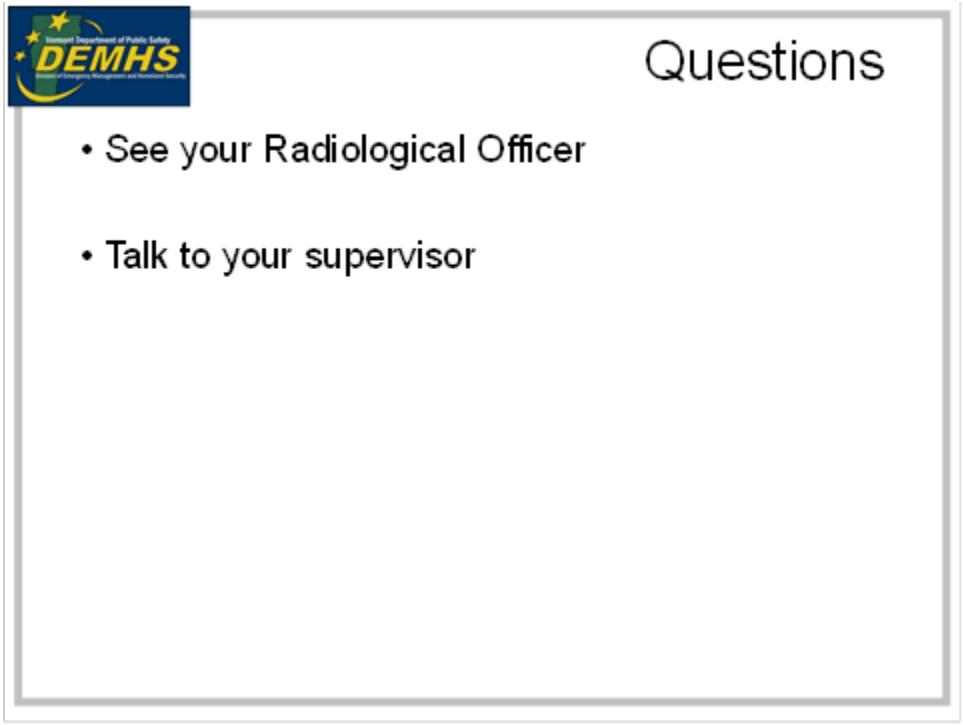
When your DRD reads 1R or more you need to report to your supervisor - you are allowed to receive no more than 5R during normal work. However, you may be authorized to receive larger doses in order to save critical infrastructure or lives. You may receive up to a 10R dose for protecting critical infrastructure and 25R for protection of populations. You can only do this if you volunteer to do so and the Vermont Department of Health has to approve the exposure ahead of time.

Slide 10



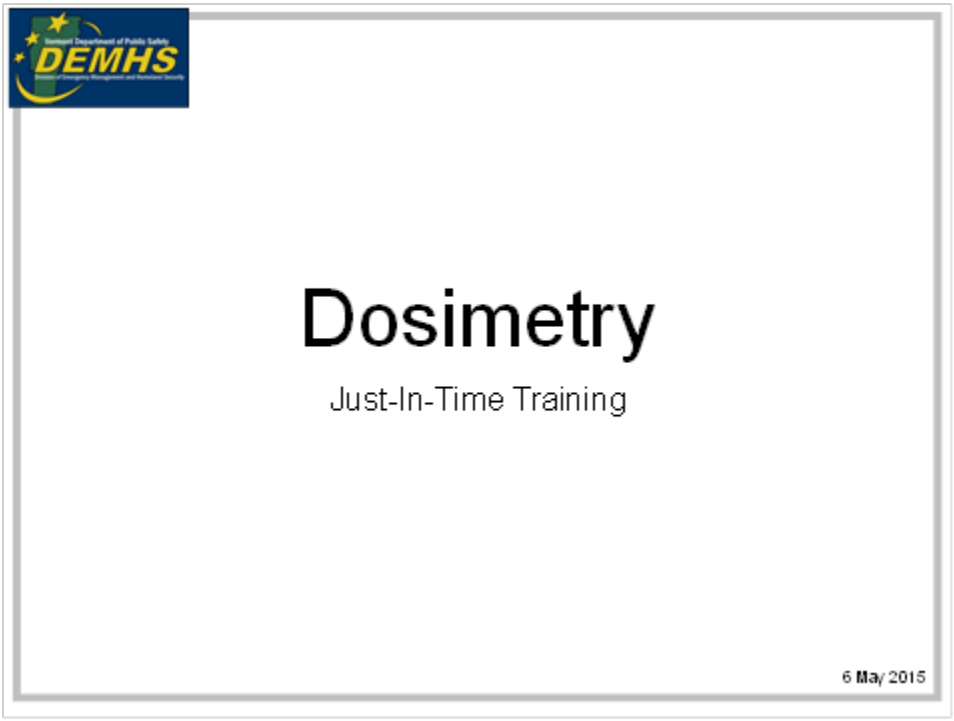
If you are pregnant or believe you may be pregnant, please see your supervisor or radiological officer. A fetus is more susceptible to the effects of ionizing radiation than an adult and if pregnant you should probably avoid exposure.

Slide 11



If you have any questions on your dosimetry please see your radiological officer or your supervisor. If you do not feel you can perform your duties please see your supervisor.

Slide 12



This concludes the Just in Time Training on Dosimetry. Remember that dosimetry is for your protection and is meant to keep you aware of the dose you receive during a Radiological Emergency.

State of Vermont

Emergency Worker Information Sheet
And
Radiation Exposure Record

Card _____ of _____

Emergency Worker Information Sheet and Exposure Record Revised 2013

Name: _____

Address: _____

_____

SSN: _____

Date of Birth: _____

Assignment: _____

Supervisor: _____

Contact Number: _____

KI Information

Dose Taken:_____ 130mg _____

Start Date: _____ Time: _____

End Date: _____ Time: _____

Dose Limits

Dose Limit	Work	Comments
5 REM	All	Maintain ALARA and exposure control
10 REM	Protect critical infrastructure	Knowledgeable volunteer will be used when possible
25 REM	Lifesaving	Knowledgeable volunteer will be used when possible
>25 REM	Lifesaving	Voluntary Basis ONLY

Turn Back Dose: 1.5R (1500 mR) on Dosimeter
Turn Back Dose Rate: 1.0 R/Hr (1000mR/Hr) on Meter

ALARA (As Low As Reasonable Achievable): The radiation protection principal of minimizing radiation exposure to the lowest practical level using:

Time: Minimize time in a radiation area

Distance: Increase distance to the maximum possible level between yourself and a source of exposure

Shielding: Incorporate shielding to block radiation exposure to your body

Potassium Iodide (KI)

KI is taken to prevent radioactive iodine from accumulating in the thyroid gland. It does not provide any other protection against radiation.

Take KI only when its use has been authorized by the Vermont Commissioner of Health. You will be advised of this from your radiological officer or supervisor.

Daily KI Doses for Adults over 18: 130mg

Short-term use of KI at the proper dosage is safe for most people. People should avoid KI if they are allergic to iodine, have dermatitis herpetiformis or hypocomplementemic vasculitis, or have nodular thyroid disease with heart disease, because these conditions may increase the chances of side effects to iodine. Possible side effects: swelling of the salivary glands, nausea, vomiting, diarrhea, stomach ache, fever, headache, metallic taste, and allergic reactions; including: skin rashes, swelling, fever with joint pain, trouble breathing, speaking, or swallowing, wheezing or shortness of breath.

If side effects occur stop taking KI, report to your supervisor or radiological officer. **Seek medical attention immediately if you have one of the following symptoms: trouble breathing, speaking, or swallowing, wheezing or shortness of breath, swelling of the lips, tongue, or throat, or irregular heartbeat or chest pain.**

Emergency Worker Information

Direct Read Dosimeters: DRDs are used to measure your exposure to gamma radiation and can be read in the field.

Dosimeters of Legal Record: DLRs provide a permanent record of exposure. DLRs cannot be read in the field.

Wearing Dosimetry: Wear dosimetry on the outer layer of your clothing between your waist and shoulders. Start wearing dosimetry when it is issued and until you are notified it is no longer necessary.

Reading and Reporting: Read your DRD every 30 minutes unless otherwise instructed. Report readings of 1 R or more to your supervisor or radiological officer. Thereafter, read your DRD every 15 minutes and report each additional 1R of exposure.

Pregnancy: If you are or believe you are pregnant, contact your Radiological Officer. They will brief you on NRC Regulatory Guide 8.13 and provide you with a copy.

Dose Limit: The dose limit is 5 REM of Total Effective Dose Equivalent (TEDE). Doses above the 5 REM limit are not allowed unless authorized by the Vermont Commissioner of Health. 5 REM TEDE is a limit and every attempt should be made to keep exposure As Low As Reasonable Achievable.

Completion of Assignment: When your assignment is complete or your shift is over, turn in your dosimetry where it was issued or at another location as directed. Remove, read, and record your DRD reading. Subtract the reading at time of issue from the final reading and record the results. Return your DRD, DLR, and other emergency worker packet materials to your supervisor or radiological officer when requested by your supervisor.

Radiation Exposure Record

DRD Serial Number: _____ DLR Serial Number: _____

Date	Time	Dose	Total to Date	Date	Time	Dose	Total to Date

U.S. Nuclear Regulatory Commission
REGULATORY GUIDE
Office of Nuclear Regulatory Research
REGULATORY GUIDE 8.13

(Draft was issued as DG-8014/Revision 3, JUNE 1999)

INSTRUCTION CONCERNING PRENATAL RADIATION EXPOSURE

A. INTRODUCTION

The Code of Federal Regulations in 10 CFR Part 19, "Notices Instructions and Reports to Workers: Inspection and Investigations," in Section 19.12, "Instructions to Workers," requires instruction in "the health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed." The instructions must be "commensurate with potential radiological health protection problems present in the work place."

The Nuclear Regulatory Commission's (NRC's) regulations on radiation protection are specified in 10 CFR Part 20, "Standards for Protection Against Radiation": and 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to "ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupation exposure of a declared pregnant woman, does not exceed 0.5 rem (5mSv). "Section 20.1208 also requires licensees to "make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman." A declared pregnant woman is defined in 10 CFR 20.1003 as a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

This regulatory guide is intended to provide information to pregnant women, and other personnel, to help them make decisions regarding radiation exposure during pregnancy. This Regulatory Guide 8.13 supplements Regulatory Guide 8.29, "Instruction Concerning Risks from Occupation Radiation Exposure" (Ref. 1), which contains a broad discussion of the risks from exposure to ionizing radiation.

Other sections of the NRC's regulations also specify requirements for monitoring external and internal occupational dose to a declared pregnant woman. In 10 CFR 20.1502, "Conditions Requiring Individual Monitoring of External and Internal Occupation Dose," licensees are required to monitor the occupational dose to a declared pregnant woman, using and individual monitoring device, it is likely that the declared pregnant woman will receive, form external sources, a deep dose equivalent in excess of 0.1 rem (1mSv). According to Paragraph (c) of 10 CFR 20.2106, "Records of Individual Monitoring Results," the licensee must maintain records of dose to an embryo/fetus if monitoring was required, and the records of dose to the embryo/fetus must be kept with the records of dose to the declared pregnant woman. The declaration of pregnancy must be kept on file, but may be maintained separately from the dose records. The licensee must retain the required form or record until the Commission terminates each pertinent license requiring the record.

The information collections in this regulatory guide are covered by the requirements of 10 CFR Parts 19 or 20, which were approved by the Office of Management and Budget, approval numbers 3150-0044 and 3150-0014, respectively. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB number.

B. DISCUSSION

As discussed in Regulatory Guide 8.29 (Ref. 1), exposure to any level of radiation is assumed to carry with it a certain amount of risk. In the absence of scientific certainty regarding the relationship between low dowse exposure and health effects, and as a conservative assumption for radiation protection purposes, the scientific community generally assumes that any exposure to ionizing radiation may cause undesirable biological effects and that the likelihood of these effects increases as the dose increases. At the occupational dose limit for the whole body of 5 rem (50 mSv) per year, the risk is believed to be very low.

The magnitude of risk of childhood cancer following in utero exposure is uncertain in that both negative and positive studies have been reported. The data from these studies "are consistent with a lifetime cancer risk resulting from exposure during gestation which is two to three ties that for the adult." (NCRP Report No. 116, Ref. 2). The NRC has reviewed the available scientific literature and has concluded that the 0.5 rem (5 mSv) limit specified in 10 CFR 20.1208 provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers associated with radiation exposure during pregnancy.

In order for a pregnant worker to take advantage of the lower exposure limit and dose monitoring provisions specified in 10 CFR Part 20, the woman must declare her pregnancy in writing to the licensee. A form letter for declaring pregnancy is provided in this guide or the licensee may use its own form letter for declaring pregnancy. A separate written declaration should be submitted for each pregnancy.

C. REGULATORY POSITION

1. Who Should Receive Instruction

Female workers who require training under 10 CFR 19.12 should be provided with the information contained in this guide. In addition to the information contained in Regulatory Guide 8.29 (Ref. 1), this information may be included as part of the training required under 10 CFR 19.12.

2. Providing Instruction

The occupational worker may be given a copy of this guide with its Appendix, an explanation of the contents of the guide, and an opportunity to ask questions and request additional information. The information in this guide and Appendix should also be provided to any worker or supervisor who may be affected by a declaration of pregnancy or who may have to take some action in response to such a declaration.

Classroom instruction may supplement the written information. If the licensee provides classroom instruction, the instructor should have some knowledge of the biological effects of radiation to be able to answer questions that may go beyond the information provided in this guide. Videotaped presentations may be used for classroom instruction. Regardless of whether the licensee provides classroom training, the licensee should give workers the opportunity to ask questions about information contained in this 'Regulatory Guide 8.13. The licensee may take credit for instruction that the worker has received within the past year at other licensed facilities or in other courses or training.

3. Licensee's Policy on Declared Pregnant Women

The instruction provided should describe the licensee's specific policy on declared pregnant women, including how those policies may affect a woman's work situation. In particular, the instruction should include a description of the licensee's policies, if any, that may affect the declared pregnant woman's work situation after she has filed a written declaration of pregnancy consistent with 10 CFR 20.1208.

The instruction should also identify who to contact for additional information as well as identify who should receive the written declaration of pregnancy. The recipient or the woman's declaration may be identified by name (e.g., John Smith), position (e.g., immediate supervisor, the radiation safety officer), or department (e.g., the personnel department).

The instruction should also identify who to contact for additional information as well as identify who should receive the written declaration of pregnancy. The recipient of the woman's declaration may be identified by name (e.g., John Smith), position (e.g., immediate supervisor, the radiation safety officer), or department (e.g., the personnel department).

4. Duration of Lower Dose Limits for the Embryo/Fetus

The lower dose limit for the embryo/fetus should remain in effect until the woman withdraws the declaration in writing or the woman is no longer pregnant. If a declaration of pregnancy is withdrawn, the dose limit for the embryo/fetus would apply only to the time from the estimated date of conception until the time the declaration is withdrawn. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

5. Substantial Variations Above a Uniform Monthly Dose Rate

According to 10 CFR 20.1208(b), "The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (a) of this section," that is, 0.5 rem (5 mSv) to the embryo/fetus. The National Council on Radiation Protection and Measurements (NCRP) recommends a monthly equivalent dose limit of 0.05 rem (0.5 mSv) to the embryo/fetus once the pregnancy is known (Ref. 2.) In view of the NCRP recommendation, any monthly dose of less that 0.1 rem (1 mSv) may be considered as not a substantial variation above a uniform monthly dose rate and as such will not require licensee justification. However, a monthly dose greater than 0.1 rem (1 mSv) should be justified by the licensee.

D. IMPLEMENTATION

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

Unless a licensee or an applicant proposes an acceptable alternative method for complying with the specific portions of the NRC's regulations, the methods described in this guide will be used by the NRC staff in the evaluation of instructions to workers on the radiation exposure of pregnant women.

REFERENCES

1. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure," Regulatory Guide 8.29, Revision 1, February 1996.
2. National Council on Radiation Protection and Measurements, *Limitation Exposure to Ionizing Radiation*, NCRP Report No. 116, Bethesda, MD, 1993.

QUESTIONS AND ANSWERS CONCERNING PRENATAL RADIATION EXPOSURE

1. Why am I receiving this information?

The NRC's regulations (in 10 CFR 19.12, "Instructions to Workers") require that licensees instruct individuals working with licensed radioactive materials in radiation protection as appropriate for the situation. The instruction below describes information that occupational workers and their supervisors should know about the radiation exposure of the embryo/fetus of pregnant women.

The regulations allow a pregnant woman to decide whether she wants to formally declare her pregnancy to take advantage of lower dose limits for the embryo/fetus. This instruction provides information to help women make an informed decision whether to declare a pregnancy.

2. If I become pregnant, am I required to declare my pregnancy?

No, the choice whether to declare your pregnancy is completely voluntary. If you choose to declare your pregnancy you must do so in writing and a lower dose limit will apply to your embryo/fetus. If you choose not to declare your pregnancy, you and your embryo/fetus will continue to be subject to the sane radiation dose limits that apply to other occupational workers.

3. If I declare my pregnancy in writing, what happens?

If you choose to declare your pregnancy in writing, the licensee must take measures to limit the dose to your embryo/fetus to 0.5 rem (5 millisievert) during the entire pregnancy. This is one-tenth of the dose that an occupational worker may receive in a year. If you have already received a dose exceeding 0.5 rem (5mSv) in the period between conception and the declaration or your pregnancy, an additional dose of 0.05 rem (0.5 mSv) is allowed during the remainder of the pregnancy. In addition, 10 CFR 20.1208, "Dose to an Embryo/Fetus," requires licensees to make efforts to avoid substantial variation above a uniform monthly dose rate so that all the 0.5 rem (5 mSv) allowed dose does not occur in a short period during the pregnancy.

This may mean that, if you declare your pregnancy, the licensee may not permit you to do some of your normal job functions, if those functions would have allowed you to receive more than 0.5 rem, and you may not be able to have some emergency response responsibilities.

4. Why do the regulations have a lower dose limit for the embryo/fetus of a declared pregnant woman than for a pregnant worker who has not declared?

A lower dose limit for the embryo/fetus of a declared pregnant woman is based on a consideration of greater sensitivity to radiation of the embryo/fetus and the involuntary nature of the exposure. Several scientific advisory groups have recommended (References 1 and 2) that the dose to the embryo/fetus be limited to a fraction of the occupational dose limit.

5. What are the potentially harmful effects of radiation exposure to my embryo/fetus?

The occurrence and severity of health effects caused by ionizing radiation are dependent upon the type and total dose or radiation received, as well as the time period over which the

exposure was received. See Regulatory Guide 8.29, “Instruction Concerning Risks from Occupational Exposure” (Ref. 3), for more information. The main concern is embryo/fetal susceptibility to the harmful effects of radiation such as cancer.

6. Are there any risks of genetic defects?

Although radiation injury has been induced experimentally in rodents and insects, and in the experiments was transmitted and became manifest as hereditary disorders in their offspring, radiation has not been identified as a cause of such effect in humans. Therefore, the risk of genetic effects attributable to radiation exposure is speculative. For example, no genetic effects have been documented in any of the Japanese atomic bomb survivors, their children or their grandchildren.

7. What if I decide that I do not want any radiation exposure at all during my pregnancy?

You may ask your employer for a job that does not involve any exposure at all to an occupational radiation dose, but your employer is not obligated to provide you with a job involving no radiation exposure. Even if you receive no occupational exposure at all, your embryo/fetus will receive some radiation dose (on average 75 mrem (0.75 mSv)) during your pregnancy from natural background radiation.

The NRC has reviewed the available scientific literature and concluded that the 0.5 rem (5 mSv) limit provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers. If this dose limit is exceeded, the total lifetime risk of cancer to the embryo/fetus may increase incrementally. However, the decision on what level of risk to accept is yours. More detailed information on potential risk to the embryo/fetus from radiation exposure can be found in References 2-10.

8. What effect will formally declaring my pregnancy have on my job status?

Only the licensee can tell you what effect a written declaration of pregnancy will have on your job status. As part of your radiation safety training, the licensee should tell you the company’s policies with respect to the job status of declared pregnant women. In addition, before you declare your pregnancy, you may want to talk to your supervisor or your radiation safety officer and ask what a declaration of pregnancy would mean specifically for you and your job status.

In many cases you can continue in your present job with no change and still meet the dose limit for the embryo/fetus. For example, most commercial power reactor workers (approximately 93%) receive, in 12 months, occupational radiation doses that are less than 0.5 rem (5mSv) (Ref. 11). The licensee may also consider the likelihood of increased radiation exposures from accidents and abnormal events before making a decision to allow you to continue in your present job.

If your current work might cause the dose to your embryo/fetus to exceed 0.5 rem (5mSv), the licensee has various options. It is possible that the licensee can and will make a reasonable accommodation that will allow you to continue performing your current job, for example, by

having another qualified employee do a small part of the job that accounts for some of your radiation exposure.

9. What information must I provide in my written declaration of pregnancy?

You should provide, in writing, your name, a declaration that you are pregnant, the estimated date of conception (only the month and year need be given), and the date that you give the letter to the licensee. A form letter that you can use is included at the end of these questions and answers. You may use that letter, use a form letter the licensee has provided to you, or write your own letter.

10. To declare my pregnancy, do I have to have documented medical proof that I am pregnant?

NRC regulations do not require that you provide medical proof of your pregnancy. However, NRC regulations do not preclude the licensee from requesting medical documentation of your pregnancy, especially if a change in your duties is necessary in order to comply with the 0.5 rem (5mSv).

11. Can I tell the licensee orally rather than in writing that I am pregnant?

No. The regulations require that the declaration must be in writing.

12. If I have not declared my pregnancy in writing, but the licensee suspects that I am pregnant, do the lower dose limits apply?

No, the lower dose limits for pregnant women apply only if you have declared your pregnancy in writing. The United States Supreme Court has ruled (in *United Automobile Workers International Union v Johnson Controls, Inc.,* 1991) that "Decisions about the welfare of future children must be left to the parents who conceive, bear, support, and raise them rather than to the employers who hire those parents" (Reference 7). The Supreme Court also ruled that your employer may not restrict you from a specific job "because of concerns about the next generation." Thus, the lower limit applies only if you choose to declare your pregnancy in writing.

13. If I am planning to become pregnant but are not yet pregnant and I inform the licensee of that in writing, do the lower dose limits apply?

No. The requirement for lower limits applies only if you declare in writing that you are already pregnant.

14. What if I have a miscarriage or find out that I am not pregnant?

If you have declared your pregnancy in writing, you should promptly inform the licensee in writing that you are no longer pregnant. However, if you have not formally declared your pregnancy in writing, you need not inform the licensee of your non-pregnant status.

15. How long is the lower dose limit in effect?

The dose to the embryo/fetus must be limited until you withdraw your declaration in writing or you inform the licensee in writing that you are no longer pregnant/. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

16. If I have declared my pregnancy in writing, can I revoke my declaration of pregnancy even if I am still pregnant?

Yes you may. The choice is entirely yours. If you revoke your declaration of pregnancy, the lower dose limit for the embryo/fetus no longer applies.

17. What if I work under contract at a licensed facility?

The regulations state that you should formally declare your pregnancy to the licensee in writing. The licensee has the responsibility to limit the dose to the embryo/fetus.

18. Where can I get additional Information?

The references to this Appendix contain helpful information, especially Reference 3, NCR's Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure", for general information on radiation risks. The licensee should be able to give this document to you.

For information on legal aspects, see Reference 7, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children-What Can the Employer Do?" which is an article in the journal of *Radiation Protection Management.*

You may telephone the NRC Headquarters at (301)415-7000. Legal questions should be directed to the Office of the General Council, and technical questions should be directed to the Division of Industrial and Medical Nuclear Safety.

You may also telephone the NRC Regional Offices at the following numbers: Region I, (610) 337-5000; Region II, (404)562-4400; Region III, (630) 829-9500; and Region IV, (817) 860-8100. Legal questions should be directed to the Regional Counsel, and technical questions should be directed to the Division of Nuclear Materials Safety.

REFERENCES FOR QUESTIONS AND ANSWERS

1. National Council on Radiation Protection and Measurements, Limitation of Exposure to Ionizing Radiation, NCRP Report No. 116, Bethesda, MD, 1993.
2. International Commission on Radiological Protection, 1990 Recommendations of the International Commission on Radiological Protection, ICRP Publications 60, Ann. ICRP 21: No.1-3, Pergamon Press, Oxford, UK, 1991.
3. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure, "Regulatory Guide 8.29, Revision 1, February 1996.[1] (Electronically available at www.nrc.gov/NCR/RG/index.html)
4. Committee on the Biological Effects of Ionizing Radiations, National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation* (BEIR V), National Academy Press, Washington, DC, 1990.
5. United Nations Scientific Committee on the Effects of the Atomic Radiation, *Sources and Effects of Ionizing Radiation,* United Nations, New York, 1993.
6. R. Doll and R. Wakeford, "Risk of Childhood Cancer from Fetal Irradiation," *The British Journal of Radiology,* 70, 130-139, 1997.
7. David Wiedis, Donald Jose, and Timm o. Phoebe, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children-What Can the Employer Do?" *Radiation Protection Management,* 11, 41-49, January/February 1994.
8. National Council on Radiation Protection and Measurements, *Considerations Regarding the Unintended Radiation Exposure of the embryo, Fetus, or Nursing Child,* NCRP Commentary No. 9, Bethesda, MD, 1994.
9. National Council on Radiation Protection and Measurements, *Risk Estimates for Radiation Protection,* NCRP Report No. 115, Bethesda, MD, 1993.
10. National Radiological Protection Board, *Advice on Exposure to Ionizing Radiation During Pregnancy*, National Radiological Protection Board, Chilton, Didcot, UK, 1998.
11. M.L. Thomas and D. Hagemeyer, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 1996", Twenty-Ninth Annual Report, NUREG-0713, Vol.18, USNRC, 1998.[2]

---

[1] Single copies of regulatory guides, both active and draft, and draft NUREG documents may be obtained free of charge by writing the Reproduction and Distribution Services Section, OCIO, USNRC< Washington, DC 20555-0001, or by fax to (301) 415-2289, or by email to <DISTRIBUTION@NRC.GOV>. Active guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161. Copies of active ad draft guides are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW, Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202) 634-3273; fax (202)634-3343.

[2] Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington DC 20402-9328 (telephone (202) 512-1800); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202) 634-3273; fax (202)634-3343.

Regulatory Guide 8.13
Instruction Concerning Prenatal Radiation Exposure Acknowledgment Form

I, _____ *(printed name)*, have read and/or been advised of the contents of Regulatory Guide 8.13. I understand that if I am pregnant, or suspect that I may be pregnant, I should notify my supervisor in writing. I understand that my decision to declare my pregnancy is completely voluntary on my part. I further understand that my emergency assignment or responsibilities may be changed to limit my radiation exposure from all sources to 500 mR during the entire term of the declared pregnancy.

Signature: _____

Date: _____

Regulatory Guide 8.13
Declaration of Pregnancy

In accordance with EPA 400-R-92-001, “Manual of Protective Action Guides and Protective Actions for Nuclear Incidents”, which references the requirements in 10 CFR 20.1208, “Dose Equivalent to an Embryo / Fetus”, I am declaring that I am pregnant.

I believe I became pregnant in _____.
month / year

I understand that the radiation dose to the embryo / fetus during my entire pregnancy will not be allowed to exceed 0.5 rem (500 millirem or 5 millisievert) unless that dose has already been exceeded between the time of conception and submitting this letter. I also understand that meeting the lower dose limit may require a change in emergency assignment or responsibilities during my pregnancy.

Signature: _____

Print Name: _____

Date: _____

TAB 3 (RADIOLOGICAL OFFICER INFORMATION AND FORMS) TO APPENDIX A

LM-26 Survey Meter Operation

Control Dosimetry Form

Background Radiation Reading Form

Dosimetry Packet Issuance Record

Exposure Log

Ludlum Model 26 (LM-26) Pancake Frisker Survey Meter Operation

Summary of Normal Use

1. Remove clear plastic storage cover from back
2. Turn on by pressing green button
3. Survey by holding back approximately 1/2" from scanned surface and reading cpm (counts per minute) on front
4. When done, turn off by holding green button for a few seconds and replace clear plastic storage cover

Instrument Use

With only two front-panel buttons, a green ON/ACK button on the left and a red MODE button on the right, the Ludlum Model 26 (LM-26) is simple and easy to use. It detects beta and gamma radiation (though it displays only the resulting cpm of contamination). It powers up in the default NORMAL mode, which displays the current count rate in cpm. Pressing the MODE button will switch it to MAX mode, which displays the highest count rate detected. Pressing the MODE button again will switch it to SCALER mode, which will display a timer for taking background radiation levels. Pressing MODE again returns it to NORMAL mode.

- Remove the clear plastic protective cover over the window before use. The storage cover interferes with accurate contamination monitoring.

- ON/ACK button: used to power the Model 26 ON and OFF.
  - Power On: Press and release (instrument beeps and display will show all LCD segments, then the firmware version, then begin reading cpm).
  - Power Off: Hold for approximately five seconds (countdown will display 3, 2, 1, and then LCD will clear when instrument is off).

- MODE button: used to advance between the three operating modes, NORMAL, MAX, and SCALER. An administrator or calibrator can disable the MAX and/or SCALER modes.
  - The LM-26 is used in the default NORMAL mode most of the time to provide a constant radiation reading. While in NORMAL mode, quickly pressing the green button turns the beeping on and off.
  - The MAX mode is used to identify a peak reading. While in MAX mode, pressing the green button twice resets the peak.
  - The SCALER mode is used to determine background radiation (see below). While in SCALER mode, pressing the green button starts or resets the timer.

- The Radiological Officer should be familiar with the operating manual for the Ludlum Model 26 and be able to assist users with questions. The Radiological Health Advisor at the State Emergency Operations Center (EOC) is available to assist the Radiological Officer if he or she has any concerns.

- Normally measurements of **100 cpm greater than background** are considered contaminated. The Department of Health will make any decision to use higher levels above background, and if so all responders will be notified. Stop when you see a reading that is greater than 100 cpm over background and verify whether or not the area is contaminated. With contamination, the count rate will remain elevated. If the count rate does not stay elevated, the reading was probably a false positive and there may be no contamination.

Determining Background Radiation Level

1. Ensure you are not near radioactive materials.

2. Use the red MODE button to switch to SCALER mode. The display will start at 1:00.

3. Press the green button and the display will count down from 60 to 0 seconds, after which you will see the background count rate in cpm.

4. Record the background CPM for reference as you scan for contamination.

5. Press the red MODE button to switch the mode back to NORMAL.

Operational Test

1. Turn the instrument ON by pressing the green ON/ACK button. The instrument should beep and activate all the LCD segments and then display the firmware version. It will then begin displaying the current count rate.

2. Check for a low-battery indicator. If the low-battery indicator is present, replace the two AA batteries in the instrument handle as soon as possible. Batteries should last 500-1000 hours; the warning indicator comes on when the batteries are down to 16 hours or less.

3. Check the meter by taking a check source out of its packaging and placing it on a flat surface, label side up. (Vermont provides sources with labeled ranges.) Remove the storage cover and place the meter directly over the source for at least five seconds. If the readings are not within the ranges shown on the labels on the sources and meters, turn the meter off and try again. If it still does not read within the ranges shown, turn the meter in to the Radiological Officer and request a replacement.

Notes: The LM-26 is designed to be durable and water resistant for outdoor use, but the detector window is delicate (and should be stored with the plastic protective cover). It is not designed to be submerged in water and users should try to keep water from getting into the detector window opening. It has no maximum altitude and a temperature range of -40 to 150 oF. Its range is 0 to 99,900 cpm (99.9 kcpm) with 1,000 cpm (1 kcpm) approximately equal to 0.3 mR/hour.

Control Dosimetry Form

In the event of an accident at Vermont Yankee Nuclear Power Station that requires the distribution of emergency worker dosimetry, it is useful to track reference exposure levels at a location for comparison with individual exposure readings. The radiological officer should select one Dosimeter of Legal Record (DLR) and set it aside as a control. The control dosimetry should be kept secure so that it is not lost but should not be subject to any special protections that people working in the area do not have (i.e. it does not have to be stored in a lead-lined box).

Complete this form and forward it along with the control dosimetry to the Vermont Department of Health representative at the State Emergency Operations Center after termination of local operations (e.g. when the incident ends, when the Incident Command Post relocates, etc.).

Facility: _____
(e.g. Town of Vernon EOC)

Site Address: _____

_____

The control dosimetry was stored at (include the exact location in the building):

_____

_____

Control Dosimetry serial number (accompanied by this form): _____

Dosimetry issued / set aside (date and time): _____

Dosimetry packed for turn-in (date and time): _____

Control Dosimetry submitted by:

Name: _____

Signature: _____

Background Radiation Reading Form

Use this form to record background radiation readings for specific areas. Use a separate form for each geographically separated facility as required. (For example, use two forms if a town is operating an Incident Command Post in one place and a Staging Area in another place.)

Take one reading immediately when the facility is activated. Take other readings as required or directed if there is a radiological release - generally every 24 hours if there is no expected contamination in the area, every 4 hours if the facility is well outside any plume, and every hour if the facility is within a likely plume of contaminants. Take readings in the same place each time. Do not risk significant exposure to take readings (e.g. if a facility is sheltering in place and background radiation levels are rising inside, do not take an outside reading).

Facility: _____
(e.g. Town of Vernon EOC)

Site Address: _____

_____

	Date	Time	Counts per minute
Inside Location: _____			
	Date	Time	Counts per minute
Outside Location: _____			

Dosimetry Packet Issuance Record

Issue Date	Issue Time	Name	DLR Serial Number	DRD Serial Number	DRD Total Dose	KI Issued (mg)	KI Taken (mg)	Turn-in Date	Turn-in Time

Exposure Log

Facility: _____ Date: _____

Use this form to record times when workers report reaching different exposure levels. Use one form for each day and record the time when a worker reports reaching each 1R increment (in 24 hour format, e.g. 1315). If a worker begins the day with exposure from earlier in the incident, list them first with an X in each block for their previous exposure level.

Name	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9 R	10 R	11 R	12 R	13 R	14 R	15 R	16 R	17 R	18 R	19 R	20 R	21 R	22 R	23 R	24 R	25 R

TAB 4 (GENERAL FORMS) TO APPENDIX A

Vermont Yankee Emergency Notification Form

Access Control Instructions

Restricted Zone Reentry Instructions

Reentry Processing Form

Restricted Zone Pass

Restricted Zone Log

Guide for Preparing News Releases for the News Media

Radio Log

Operations Log Form

Vermont Yankee Notification Form

This is a/an: ☐ **Actual Event** ☐ **Drill**

Vermont Yankee Notification Form

The Time is: _____ The Date is: _____ ☐ Lowband ☐ RACES

Message Number _____

1. Emergency Classification: Vermont Yankee has declared a/an: ☐ Unusual Event ☐ Alert ☐ Site Area Emergency ☐ General Emergency ☐ Unusual Event Terminated ☐ Entry to Recovery ☐ Termination

2. Declared at: Time _____ Date _____ Based on EAL ___ . ___

3. The Plant is ☐ Continuing Normal Operations ☐ Reducing Power ☐ Shut Down

4. Radiological Release ☐ Has not occurred ☐ Has occurred and is continuing ☐ Has occurred but has been terminated

5. Present Meteorological Conditions: Wind Speed (MPH) _____ Wind Direction from _____ degrees true north

6. State Protective Action Recommendations: ☐ None ☐ As Listed Below

		All Towns	Brattleboro	Dummerston	Guilford	Halifax	Marlboro	Vernon
A.	☐ **EVACUATE Towns of:**	☐	☐	☐	☐	☐	☐	☐
B.	☐ **SHELTER-IN-PLACE:**	☐	☐	☐	☐	☐	☐	☐
C.	☐ **Early Assembly of Buses**	☐	☐	☐	☐	☐	☐	☐
D.	☐ **Transfer Schools & Childcares**	☐	☐	☐	☐	☐	☐	☐
E.	☐ **Transfer of Health Care**	☐	☐	☐	☐	☐	☐	☐
F.	☐ **Shelter Livestock**	☐	☐	☐	☐	☐	☐	☐
G.	☐ **Clear Parks, Rec, Waterways**	☐	☐	☐	☐	☐	☐	☐
H.	☐ **Transients Advised to Leave**	☐	☐	☐	☐	☐	☐	☐
	Potassium Iodide							
I.	☐ **KI for Emergency Workers**	☐	☐	☐	☐	☐	☐	☐
J.	☐ **KI for Persons under care**	☐	☐	☐	☐	☐	☐	☐
K.	☐ **KI for General Public**	☐	☐	☐	☐	☐	☐	☐

7. Reception Centers Open: ☐ BFUHS ☐ Greenfield ☐ Keene ☐ None ☐ OTHER _____

8. Public Notifications: Decision Time _____ Sirens activated _____ EAS activated _____ RENTS activated _____

9. The Governor ☐ has declared a state of emergency ☐ has not declared a state of emergency

10. Remarks _____

11. **This is a/an:** ☐ **Actual Event** ☐ **Drill**

Local Use Only

Received By: _____

Time: _____ Date: _____

Reviewed By (EOC Manager or Designee): _____

Time: _____ Date: _____

Radio Message Acknowledgment

☐ Brattleboro ☐ Marlboro ☐ EOF
☐ Dummerston ☐ Vernon ☐ Staging Area
☐ Guilford ☐ BFUHS Reception Center
☐ Halifax

Distribution: White - Communications Unit Leader, Yellow - Planning Section Chief, Pink - PIO, Gold - Operations Section Chief

VY Notification Form 4/1/13

Access Control Instructions

Police service personnel, with assistance from county and state law enforcement personnel (as requested), fire department personnel, and town highway personnel are responsible for staffing access control points. Some points are manned while others only have barricades. The Police Branch Director will give instructions to all access control personnel - do not implement any access control measures without specific directions.

Location:

Access Control Point Instructions:

Upon arriving at the access control point, check in with the Incident Command Post and stand by unless directed otherwise. When access control is necessary, the Police Branch Director will contact the control point staff. At that time, set up a check point or put up barricades to prevent unauthorized entry to the town.

Allow entry of:

- Emergency response personnel with reasonable identification, i.e., federal, state, town employees, utility employees, etc.
- Emergency response vehicles with specific missions and destinations, i.e., buses, ambulances, wreckers, highway and fire vehicles.
- Members of the press with press credentials.
- Residents of Emergency Planning Zone towns re-entering the area for justifiable needs, e.g., livestock and poultry farmers, essential services workers, etc. (These individuals may be required to be escorted by an Emergency Worker with dosimetry.)

Note: When in doubt, check whether or not to allow entry with the local Incident Command Post or State Emergency Operations Center.

Do NOT allow entry of:

- Transients and commercial traffic
- Sightseers, rubberneckers, disaster tourists, looters, etc.

In response to requests for information from the public, the officers should refer them to one of the local Emergency Alert System Stations for news and instructions as follows.

WTSA	96.7 FM / 1450 AM	Brattleboro, VT
WKVT	92.7 FM / 1490 AM	Brattleboro, VT
WTHK	100.7 FM	West Dover, VT

Restricted Zone Reentry Instructions

Reentry Instructions

1. Use designated routes/directions to reach your destination.

2. Do not stay in the restricted zone longer than your stay time.

3. Conduct and complete your duties as soon as possible.

4. If unsure what to do, leave the area and return to the reentry point.

Dosimetry Instructions

Wearing the Dosimeters

- Wear the Direct Reading Dosimeter (DRD) and Dosimeter of Legal Record (DLR) on the upper torso area of the body. They may be clipped to a shirt, jacket, or coverall pocket. The Direct reading Dosimeter should always be worn next to the Dosimeter of Legal Record.
- ONLY if the area being entered is wet: wear the DRD inside the outer clothing (to protect it from getting contaminated or damaged).
- Handle the DRD gently - try not to drop it and do not submerge it in water.

Reading the DRD

- Read your DRD dosimeter at frequent intervals (approximately every 15 minutes).
- Point the DRD toward a light source and look through the eye piece.
- Locate the hairline and estimate the reading.
- Always read the dosimeter scale in the horizontal position to minimize the effects of gravity on the fiber.
- Return to the reentry point if you lose or break your DRD or if your DRD reads off-scale.

Exiting Instructions

1. Return to the same reentry point that you entered.

2. Follow instructions explained at reentry point.

Reentry Processing Form

Use this form to request and track reentry to the restricted zone. There should be one form for each entry, though agencies can make copies and list different dates to allow people to return regularly (e.g. farmers caring for livestock). Individuals request access, towns or other agencies approve the request and provide dosimetry, and control point officers collect the forms and dosimetry when individuals exit the zone.

Name: _____ Date: _____

Contact Information: _____

Destination: _____

Purpose of Entry: _____

Estimated Stay Time in Restricted Zone: _____

Approval for Reentry

Approved by:_____ Reentry Date: _____

Agency: _____ Pass Number: _____

Location of Access Control Point: _____

Dosimetry

Issued by: _____ Date / Time: _____

Direct Reading Dosimeter (DRD) Serial Number: _____

Dosimeter of Legal Record (DLR) Serial Number: _____

Control Point Officer

Entry Date / Time: _____ DRD Reading: _____ R

Exit Date / Time: _____ DRD Reading: _____ R Dose: _____ R

Dosimetry Turned In? Yes No (Individuals returning multiple times should keep their dosimetry)

ORIGINAL: Issuing agency periodically sends to Health Department representative at the Staging Area.
COPY: Individual carries into the restricted zone and gives to the Control Point Officer on exiting.

Restricted Zone Pass

Sample front and back views:

STATE OF VERMONT
DEPARTMENT OF PUBLIC SAFETY

Town of Brattleboro
E– PASS
Restricted Zone Pass

Pass Number _____

Instructions to Bearer:
Return Pass at Location of Entry and
Follow Instructions for Re-entry.
For Information Call
(802) 254 - 6449

Note: The E-PASS may vary in color in order to be used as a control device. For example, orange passes may be issued on even numbered days and green passes on odd numbered days; other colors may denote different towns. For a long duration emergency, a more rigid pass system is likely to replace this initial one.

Restricted Zone Log

Access Control Point: _____ Page ____ of ____

Agency: _____ Officer: _____

Name of Person Entering	Restricted Zone Pass No.	Reason For Entry	IN Date Time	OUT Date Time	Initials of Access Control Personnel

Radio Log

Name: _____ Date: _____

Message Number	In X	Out X	Time of Message	To	From	Summary

Operations Log

Position: _____ Page ____ of ____

Name: _____ Start Date / Time: _____

TIME (when)	INCIDENT, EVENT, or ACTION (who what where why)	STATUS	
		in progress	complete
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

APPENDIX B - INTRODUCTION TO RADIATION

"Radiation" is energy moving through matter and space as waves or particles. "Ionizing Radiation" is energy which disrupts some of the atoms in its path as it moves through matter, separating them into electrically charged (+ or -) pieces called "ions". This ability to break or split atoms distinguishes ionizing radiation from other types and makes it harmful to living tissue.

The human body is made of trillions of atoms, so when a few are ionized by small doses of ionizing radiation there is no noticeable physical effect. Conversely, large doses of ionizing radiation can ionize many atoms and result in sickness or even death to an individual.

There are several types of ionizing radiation to consider when discussing the effects of an accident at a fixed nuclear facility. ALPHA and BETA particles, GAMMA rays and NEUTRONS all have different characteristics, and consequently varied effects upon matter.

ALPHA particles are large particles and can travel only about an inch in air. They have almost no penetrating effects and can be stopped by a thin sheet of paper or the surface of skin tissue. ALPHA particles do not pose a serious threat to humans as long as they remain outside the body. They can become extremely dangerous if ingested or inhaled, damaging internal organs.

BETA particles are smaller particles and can travel several feet through air. An inch of wood or a thin sheet of aluminum will stop BETA particles, but they can penetrate and cause damage to skin tissue.

GAMMA rays can travel hundreds of feet in air and penetrate most materials. They can be stopped by lead shielding, or thick concrete. GAMMA rays can cause damage to the whole body.

NEUTRONS have characteristics similar to GAMMA rays in travel and penetration. Neutrons are shielded by hydrogenous materials like water.

Measuring ionizing radiation is complicated as different types have varying effects on different materials. Four basic terms are used to quantify these effects, each with its own specific purpose.

The ROENTGEN was the first unit used to measure radiation. A roentgen is a measure of the ionization of air by GAMMA rays or X-rays. One roentgen is the amount of GAMMA rays which will ionize 2,080,000,000 atoms in one cubic centimeter of air. A roentgen is not applicable in describing the effects of GAMMA rays on other materials. The RAD was developed to measure radiation effects upon other materials. The letters represent the phrase Radiation Absorbed Dose. A rad measures the energy per gram

absorbed by matter as a result of radiation. It can apply to any substance, affected by any type of radiation. The quantity of radiation necessary to deposit 100 ergs (a very small measure of energy) to one gram of absorbing material is one rad, and it differs with different types of radiation. Equal numbers of rads of different types of ionizing radiation have different biological effects on humans.

The REM was developed to measure biological effects of radiation. Rem is a simple way of expressing radiation in terms of its impact on people. The rem got its name from the phrase "Roentgen Equivalent Man." A rem is the amount of any type of radiation which produces the same biological effect as one roentgen of gamma rays or X-rays. The rem equalizes the differences in effects of the various types of radiation on people. One rem of alpha particles expresses the same biological effect as one rem of gamma rays. The rem is probably the most useful measure of radiation for general discussion. Because radiation is likely to occur in very small amounts, some measurements are made in millirems. A millirem is one/one-thousandth of a rem (.001 rem).

The CURIE is the unit used to measure radioactivity. It was named after Marie and Pierre Curie, research pioneers in the field. A curie is a measure of the number of atoms disintegrating per second in radioactive material. A curie is equal to 37 billion disintegrations per second. Measuring small amounts of radioactivity requires the use of picocuries which are only one-trillionth of a curie.

Because radioactive materials emit individual patterns of alpha and beta particles and gamma rays, there is no simple conversion of curies to rads or rems. Each substance has an individual character depending upon the combination and proportion of radiation types it emits. This requires a different formula to compute a relationship.

Human exposure to ionizing radiation is measured in millirems and rems which cumulatively become a dose. The greater the dose, the greater the biological effect. It is impossible to predict precisely how an individual will respond to a particular dose as it will vary from one person to another. A dose depends upon the amount of radiation being emitted, the distance from the source, the length of exposure time, and the total area of the body exposed.

Radiation is present in the environment. Natural radiation sources annually produce an average dose of approximately 0.31 rem (310 millirems) for each person in the United States. By far the largest dose of man-made radiation would be produced by medical procedures which could average about 300 millirems per year. Estimated dose rates for Americans from all sources averages 0.62 rem (620 millirem) a year.

Federal and international health agencies have studied the effects of radiation and recommend that exposure of the general population should not exceed 100 millirems or one-tenth a rem annually.

APPENDIX C - AGREEMENTS AND CONTRACTS

Dates and Signatures on originals are on file at the Vermont Division of Emergency Management and Homeland Security (DEMHS), 45 State Drive, Waterbury, Vermont 05671-1300.

1. Yankee Atomic Electric Company and Vermont and Massachusetts (Yankee Rowe). This Letter of Agreement establishes provisions with the Commonwealth of Massachusetts and State of Vermont regarding the Yankee Plant Defueled Emergency Plan.

2. Vermont Yankee Nuclear Power Station and the States of Vermont, Massachusetts, and New Hampshire. The original Letter of Agreement established provisions regarding emergency planning and notification and response activities in the event an emergency at the Vermont Yankee Nuclear Power Station.

3. WTSA - AM/FM - Brattleboro, VT and State of Vermont. The original agreement maintained 24-hour coverage of EAS in the Vermont Yankee Emergency Planning Zone.

4. New England Compact on Radiological Health Protection. Agreement among and between the states to provide radiological resources and support in the event of a radiological emergency in any state.

APPENDIX D - SUPPORTING PLANS

1. State Plans

Due to the decommissioning of Vermont Yankee, many of the below plans are only for historical reference purposes or an unmitigated long term event without an appropriate response.

A. Plans and Manuals
(1) Vermont State Emergency Operations Plan
(2) Vermont Radiological Emergency Response Plan
(3) Staging Area Emergency Response Plan
(4) Notification Manual (State Warning Points and Pager Carrier Plan and Procedures)
(a) Dispatch Edition
(b) Standard Edition
(5) Radiological Plume Tracking Team
(6) Radiological Sampling Team

2. Town Plan RERP Annexes

A. Brattleboro
B. Dummerston
C. Guilford
D. Halifax
E. Marlboro
F. Vernon

3. Utility References

A. Permanently Defueled Emergency Plan (PDEP), Entergy Vermont Yankee, Revision 0, April 19, 2016

B. EPAP-EAL-10106, Emergency Plan Classification and Action Level Scheme Emergency Preparedness Administrative Procedure, Vermont Yankee Nuclear Power Station, Revision 0, April 19, 2016