

## **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**

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**TAB 1 (PLANNING SUPPORT INFORMATION) TO APPENDIX A**

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News Release Guide and Template

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Gamma Shielding

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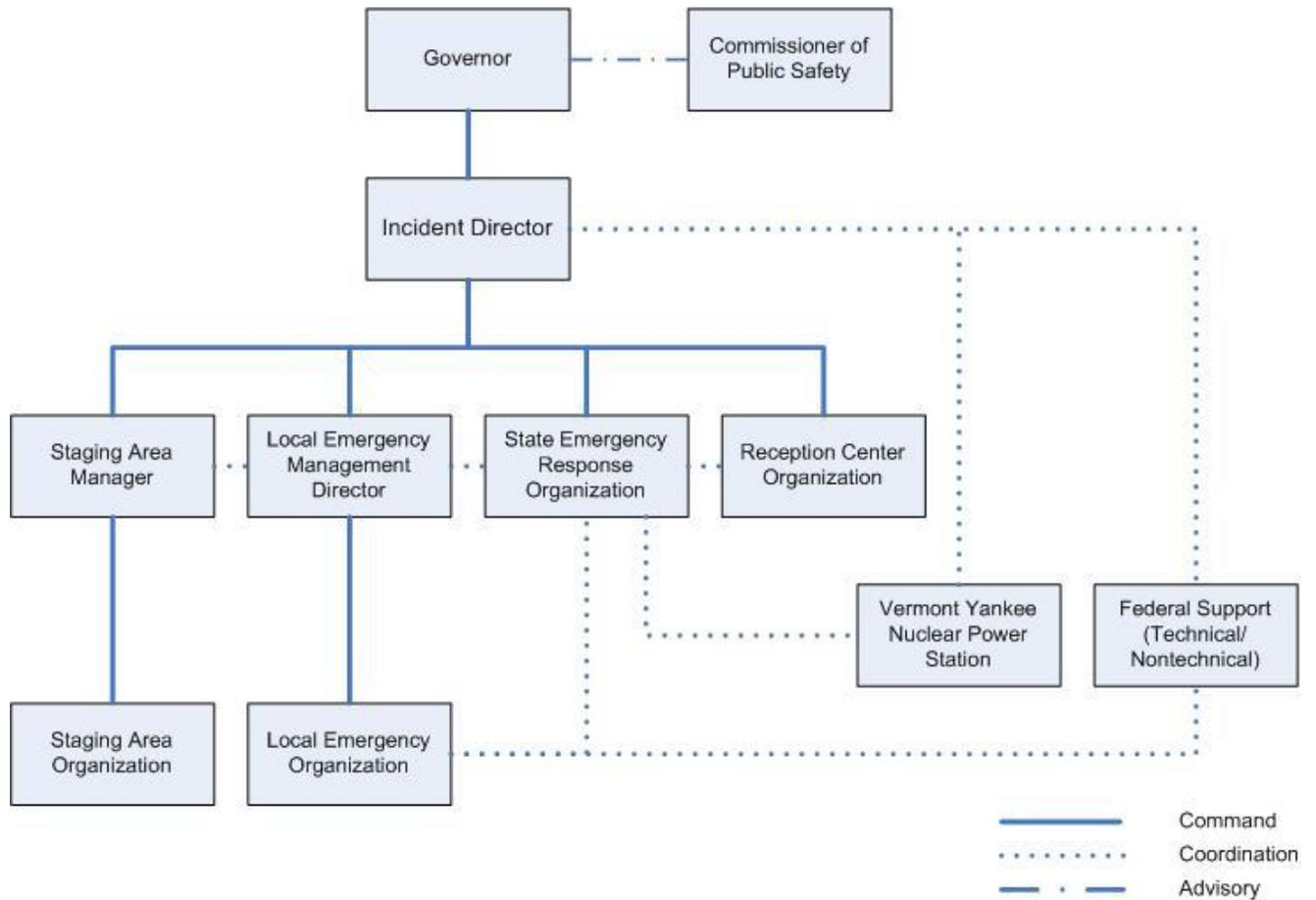
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## News Release Guide and Template

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 News Media Center / Joint Information Center (JIC) at the Vermont Yankee Corporate Headquarters, Brattleboro, Vermont  
802-258-4181

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.*

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*(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. Reception Centers are open at the (Bellows Falls Union High School and Greenfield Community College) for people who want to be screened for contamination or who will need shelter 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 ( **$\geq 1$  Rem**)

Committed Dose Equivalent (CDE) to the Thyroid greater than or equal to 5 Rem ( **$\geq 5$  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 <sup>c</sup>
Masonry House (No Basement)	0.6 <sup>c</sup>
Basement of Masonry House	0.04 <sup>c</sup>
Large Office or Industrial Building	0.02 <sup>c,d</sup>
<p><sup>a</sup> The ratio of interior dose to exterior dose.</p> <p><sup>b</sup> A wood frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.</p> <p><sup>c</sup> There is variation in the shielding factor due to different wall materials and different geometries.</p> <p><sup>d</sup> The shielding factor depends on where personnel are located within a building, e.g., the basement or an inside room.</p>	

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 <sup>a</sup>
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 <sup>b</sup>
One and Two Story Block and Brick House (No Basement)	0.2 <sup>b</sup>
House Basement, One or Two Walls Fully Exposed	0.1 <sup>b</sup>
One Story, Less Than 2 Feet of Basement Walls Exposed	0.05 <sup>b</sup>
Two Stories, Less Than 2 Feet of Basement Walls Exposed	0.03 <sup>b</sup>
Three or Four Story Structures - 5,000 to 10,000 Square Feet per Floor	
• First and Second Floors	0.05 <sup>b</sup>
• Basement	0.01 <sup>b</sup>
Multi-story Structures Greater Than 10,000 Square Feet per Floor	
• Upper Floors	0.01 <sup>b</sup>
• Basement	0.005 <sup>b</sup>
<sup>a</sup> The ratio of the interior dose to the exterior dose	
<sup>b</sup> Away from doors and windows	

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

### Potassium Iodide (KI) Dosage

#### Recommended Doses of Potassium Iodide

<b>Risk Group</b>	<b>Potassium Iodide Dose (milligrams)</b>	<b>Number of 130 mg Tablets</b>	<b>Number of 65 mg Tablets</b>
Adults over 18 years	130	1	2
Pregnant or lactating women	130	1	2
Children over 13 through 18 years*	65	1/2	1
Children over 3 through 12 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 (greater than or equal to 154 pounds) should receive the full adult dose of 130 milligrams (mg).			

The protective effect of potassium iodide (KI) lasts approximately 24 hours. For optimal prophylaxis one should take one dose daily until a risk of significant exposure to radioiodines from inhalation or ingestion no longer exists. Pregnant or lactating women should not have a repeat dose. Pregnant women, lactating women, and newborns up to one month old who have taken potassium iodide should have medical follow-up.

### Dose Limits

Recommended Guidance on Dose Limits for Emergency Team Workers:

<b>Dose Limit<sup>1</sup></b>	<b>Work Activity</b>	<b>Comments</b>
5 Rem Total Effective Dose Equivalent (TEDE)	All	Maintain ALARA <sup>2</sup> 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.
<sup>1</sup> 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. <sup>2</sup> 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 the Plume Exposure Pathway.

**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

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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.

**CONTAINMENT BUILDING:** The reinforced concrete, gas tight shell or other enclosure around a nuclear reactor and essential plant systems to confine fission products that otherwise might be released to the atmosphere in the event of an accident.

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**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.

**CONTROL ROD:** A rod, plate, or tube containing a material such as hafnium or boron used to control the power of a nuclear reactor. By absorbing neutrons, a control rod prevents the neutrons from causing further fissions.

**CONTROL DOSIMETRY:** Device used to measure background radiation during a storage period.

**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.

**CORE:** The central portion of a nuclear reactor which contains the fuel assemblies, moderator, control rods, and support structures. The reactor core is where fission takes place.

**CORE MELT ACCIDENT:** An event or sequence of events that result in the melting of part of the fuel in the reactor core.

**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

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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 dosimetry, a potassium iodide information card, and forms for measuring and documenting the workers 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
- GENERAL EMERGENCY

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**EMERGENCY CORE COOLING SYSTEM (ECCS):** Reactor system components (pumps, valves, heat exchangers, tanks, and piping) that are specifically designed to remove residual heat from the reactor fuel rods should the normal core cooling system (reactor coolant system) fail.

**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 OPERATIONS FACILITY (EOF):** A licensee controlled and operated offsite support center with facilities for management of overall licensee emergency response, coordination of radiological and environmental assessment, determination of recommended public protective actions, and coordination of emergency response activities with Federal, State, and local agencies.

**EMERGENCY PLANNING ZONE (EPZ):** Either the 10 mile radius plume exposure EPZ around a nuclear power plant where people could be exposed to radiation from a radioactive plume if it is released from a plant during an emergency; or, the 50 mile radius ingestion pathway EPZ where it would be possible for radiological contamination of crops, agricultural products, land, and surface water to occur after an emergency.

**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 away from the plume exposure pathway Emergency Planning Zone 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.

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**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):** An emergency classification which 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 OR hostile action that results in an actual loss of physical control of the facility. Releases can reasonably be expected to exceed Environmental Protection Agency Protective Action Guidelines exposure levels off-site beyond the immediate site area.

**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.

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**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.

**MELT DOWN:** A term that is neither recognized by the International Atomic Energy Agency nor by the U.S. Nuclear Regulatory Commission, but is used in certain circles to describe a severe nuclear reactor incident that results in core damage. This can occur when a severe, compounded failure of a nuclear power plant system or components causes the reactor core to cease being properly cooled to the extent that the sealed nuclear fuel assemblies begin to overheat and melt. A meltdown is considered very serious because of the possibility that the reactor containment could be defeated, thus releasing the core's radioactive and toxic elements into the atmosphere and environment.

**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.

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**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.

**NOTIFICATION 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.

**PERMANENT RESIDENT POPULATION:** All members of the public who reside in the ten mile Emergency Planning Zone.

**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.

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**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

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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. Bellows Falls Union High School (BFUHS) located in the town of Westminster, VT has been designated as the Vermont Reception Center.

**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.

## State Emergency Operations Plan

**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.

**SCRAM:** The sudden shutting down of a nuclear reactor by the reactor operator, usually by rapid insertion of control rods, either automatically or manually. Also known as a reactor trip, SCRAM is actually an acronym for "Safety Control Rod Axe Man," the worker assigned to insert the emergency rod on the first reactor (the Chicago Pile) in the United States.

**SITE:** The property owned by a utility in the immediate area of a nuclear power plant.

**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 that involve actual or likely major failure in plant functions needed for protecting the public OR hostile action that results in intentional damage or malicious acts; toward site personnel or equipment that could lead to likely failure or would prevent effective access to equipment needed for the protection of the public. Releases are not expected to exceed Environmental Protection Agency Protective Action Guidelines exposure levels, except near the site boundary.

**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

## State Emergency Operations Plan

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.

## State Emergency Operations Plan

**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.

**TURBINE:** A rotary engine made with a series of curved vanes on a rotating shaft, usually turned by water or steam. Turbines are considered the most economical means to turn large electrical generators.

**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

## State Emergency Operations Plan

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

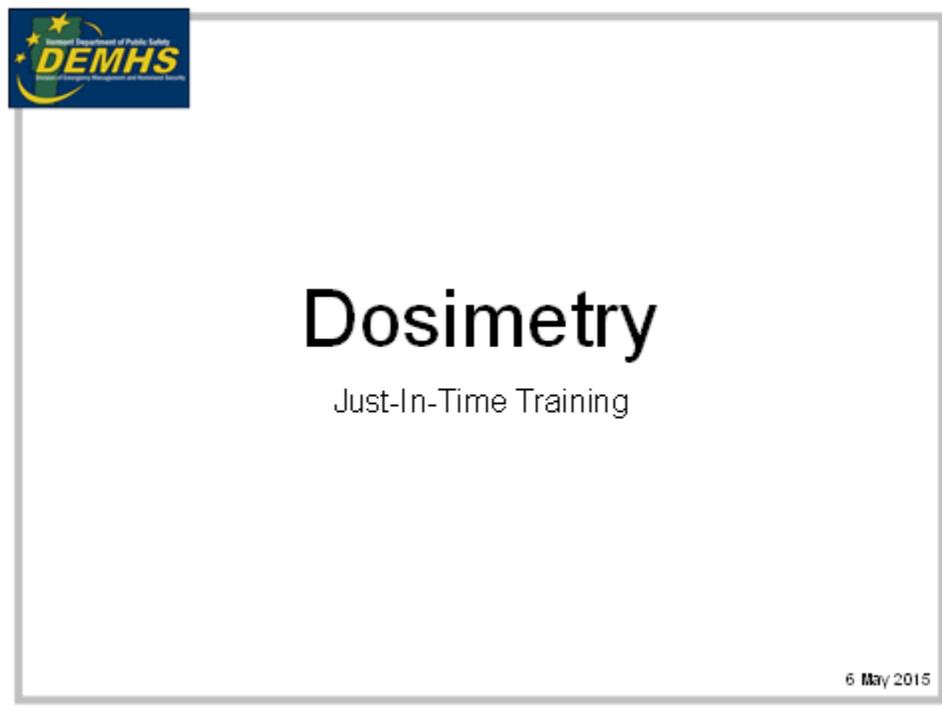
Emergency Worker Information Sheet and Radiation Exposure Record

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

 **DEMHS**  
Department of Emergency Management and Homeland Security

## Dosimetry

- Dosimeters are small devices that measure an individual's exposure to radiation
- There are two types of dosimeters:
  - Direct Reading Dosimeter
    - Measures gamma exposure
  - Dosimeter of Legal Record
    - Measures gamma and beta exposure


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.

 Direct Reading Dosimeter (DRD)



- Indicates Emergency Worker external exposure to gamma radiation
- Can be read in the field
- Reading may be changed by dropping

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.

 **Reading a Dosimeter**

1. Direct the dosimeter toward a light source
2. Rotate until the scale is horizontal
3. Note the range
4. Read the crosshair location

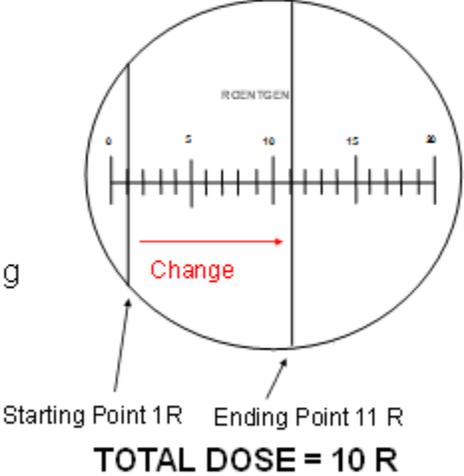


To read your DRD, point it towards a light source and look in the end with the clip. The point where the fiber intersects with the scale is the current reading. Be careful not to point it directly at the sun.



## Reading a Dosimeter

- Dosimeter should be zeroed when issued
- If not, note starting position
- TOTAL Dose = Final Reading – Initial Reading



Starting Point 1R    Ending Point 11 R  
**TOTAL DOSE = 10 R**

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.



## Readings

- You'll be asked to Read, Record and Report every 15-30 minutes

OR

- At any other time you get a 1R or more reading
- Try not to drop it
- Do not point it at the sun when you read it
- Compare readings with those around you

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.

 **DEMHS**  
Michigan Department of Public Safety

## Dosimeter of Legal Record

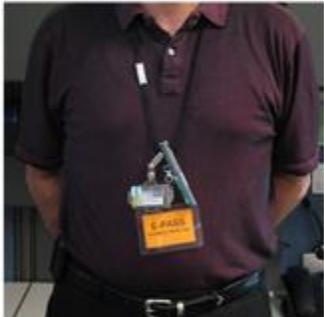
- Records both beta and gamma radiation
- Labs read after incident is over
- You will receive a copy of the final reading



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.



## Dosimetry Placement



- **Dosimetry should be worn**
  - On the outermost layer of clothing
  - In the central chest region
  - Between the waist and shoulders

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.



## Dose Limits

- **Dose Limits**
  - 1 Roentgen – Report into your supervisor
  - 5 Roentgen – General Work for entire incident
  - 10 Roentgen – Protect Valuable Property
  - 25 Roentgen – Protect Life
- **Only the Vermont Department of Health can authorize continuing exposure for any dose greater than 5 Roentgen**

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.



## Pregnancy

- **Pregnancy**
  - If you believe you are pregnant, tell your supervisor and you will be reassigned
- **All female emergency workers must receive a copy of NRC Regulatory Guide 8.13:  
INSTRUCTION CONCERNING PRENATAL  
RADIATION EXPOSURE**

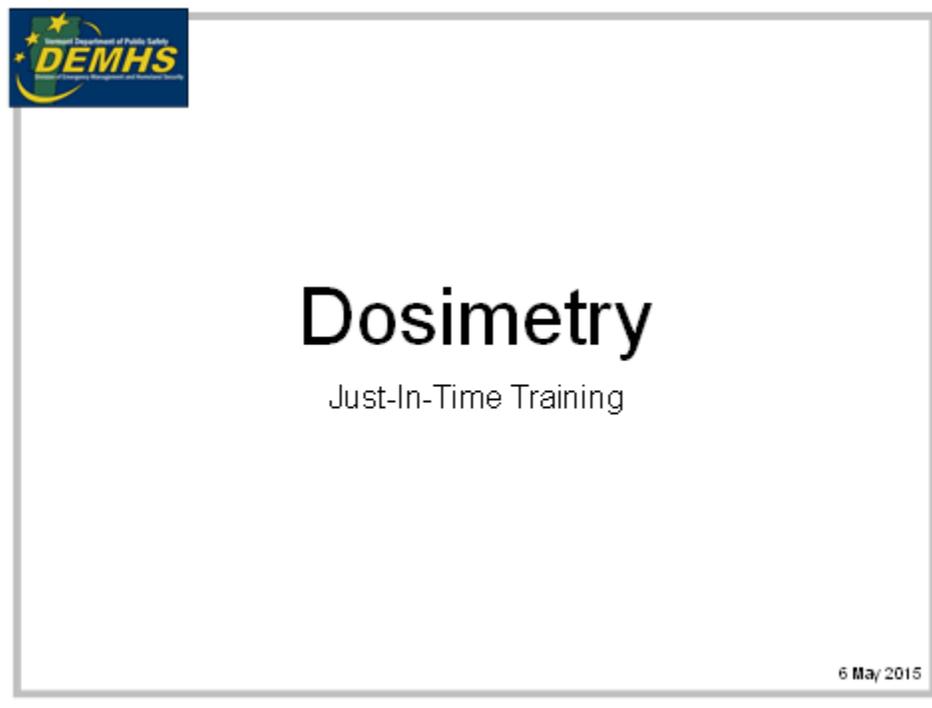
If you are pregnant or believe you may be pregnant, please see your supervisor or radiological officer. A fetus is more susceptible to the effects of ionizing radiation than an adult and if pregnant you should probably avoid exposure.



## Questions

- See your Radiological Officer
- Talk to your supervisor

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.



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.

<p>State of Vermont</p>  <p>Emergency Worker Information Sheet And Radiation Exposure Record</p> <p>Card _____ of _____</p> <p style="font-size: small;">Emergency Worker Information Sheet and Exposure Record      Revised 2013</p>	<p>Name: _____</p> <p>Address: _____ _____</p> <p>SSN: _____</p> <p>Date of Birth: _____</p> <p>Assignment: _____</p> <p>Supervisor: _____</p> <p>Contact Number: _____</p> <p style="text-align: center;"><u>KI Information</u></p> <p>Dose Taken: _____ 130mg _____</p> <p>Start Date: _____ Time: _____</p> <p>End Date: _____ Time: _____</p>
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<p style="text-align: center;"><b><u>Dose Limits</u></b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Dose Limit</th> <th style="width: 15%;">Work</th> <th style="width: 70%;">Comments</th> </tr> </thead> <tbody> <tr> <td>5 REM</td> <td>All</td> <td>Maintain ALARA and exposure control</td> </tr> <tr> <td>10 REM</td> <td>Protect critical infrastructure</td> <td>Knowledgeable volunteer will be used when possible</td> </tr> <tr> <td>25 REM</td> <td>Lifesaving</td> <td>Knowledgeable volunteer will be used when possible</td> </tr> <tr> <td>&gt;25 REM</td> <td>Lifesaving</td> <td>Voluntary Basis ONLY</td> </tr> </tbody> </table> <p><b>Turn Back Dose:</b> 1.5R (1500 mR) on Dosimeter  <b>Turn Back Dose Rate:</b> 1.0 R/Hr (1000mR/Hr) on Meter</p> <p><b>ALARA (As Low As Reasonable Achievable):</b> The radiation protection principal of minimizing radiation exposure to the lowest practical level using:</p> <p><b>Time:</b> Minimize time in a radiation area</p> <p><b>Distance:</b> Increase distance to the maximum possible level between yourself and a source of exposure</p> <p><b>Shielding:</b> Incorporate shielding to block radiation exposure to your body</p>	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	<p style="text-align: center;"><b><u>Potassium Iodide (KI)</u></b></p> <p>KI is taken to prevent radioactive iodine from accumulating in the thyroid gland. It does not provide any other protection against radiation.</p> <p>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.</p> <p style="text-align: center;"><b>Daily KI Doses for Adults over 18: 130mg</b></p> <p>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.</p> <p>If side effects occur stop taking KI, report to your supervisor or radiological officer. <b>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.</b></p>
Dose Limit	Work	Comments														
5 REM	All	Maintain ALARA and exposure control														
10 REM	Protect critical infrastructure	Knowledgeable volunteer will be used when possible														
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**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 an individual monitoring device, it is likely that the declared pregnant woman will receive, from 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 dose 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 times 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.

## State Emergency Operations Plan

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 than 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 same 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 of 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.<sup>1</sup> (Electronically available at [www.nrc.gov/NCR/RG/index.html](http://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.<sup>2</sup>

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<sup>1</sup> 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.

<sup>2</sup> 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.

## State Emergency Operations Plan

- 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: \_\_\_\_\_  
 \_\_\_\_\_

<b>Inside Location:</b>  _____	Date	Time	<u>Counts per minute</u>
<b>Outside Location:</b>  _____	Date	Time	<u>Counts per minute</u>





**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:**    Unusual Event     Alert     Site Area Emergency     General Emergency  
Vermont Yankee has declared a/an:     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

<b>A. <input type="checkbox"/> EVACUATE Towns of:</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>B. <input type="checkbox"/> SHELTER-IN-PLACE:</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>C. <input type="checkbox"/> Early Assembly of Buses</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>D. <input type="checkbox"/> Transfer Schools &amp; Childcares</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>E. <input type="checkbox"/> Transfer of Health Care</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>F. <input type="checkbox"/> Shelter Livestock</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>G. <input type="checkbox"/> Clear Parks, Rec, Waterways</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>H. <input type="checkbox"/> Transients Advised to Leave</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>Potassium Iodide</b>							
<b>I. <input type="checkbox"/> KI for Emergency Workers</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>J. <input type="checkbox"/> KI for Persons under care</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon
<b>K. <input type="checkbox"/> KI for General Public</b>	<input type="checkbox"/> All Towns	<input type="checkbox"/> Brattleboro	<input type="checkbox"/> Dummerston	<input type="checkbox"/> Gullford	<input type="checkbox"/> Halifax	<input type="checkbox"/> Marlboro	<input type="checkbox"/> Vernon

**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

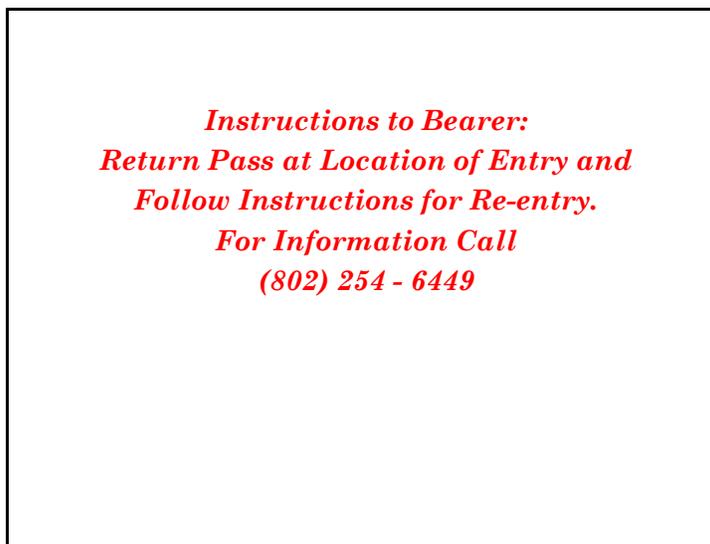
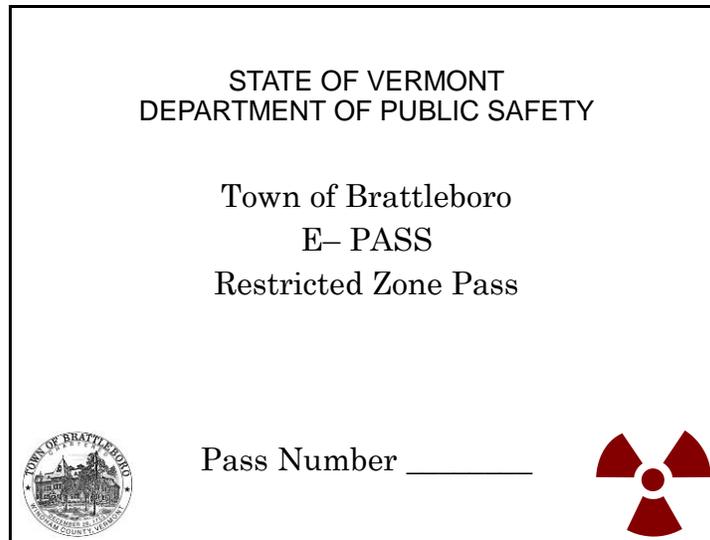
Exit Date / Time: \_\_\_\_\_ DRD Reading: \_\_\_\_\_ R Dose: \_\_\_\_\_ R

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:



*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.*





**Operations Log**

Position: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

Name: \_\_\_\_\_

Start Date / Time: \_\_\_\_\_

TIME (when)	INCIDENT, EVENT, or ACTION (who what where why)	STATUS	
		in progress	complete
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
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