SURVIVING A NUCLEAR EVENT

By James C. Jones, CHCM/EMT (former radiological monitor)

Introduction

Back when I first got into survival and preparedness the threat of nuclear war was virtually the only driving factor for preparedness. Today we face a much more complex "threat matrix" in which exposure to radioactive contamination can be a direct or secondary effect of a number of man-made or natural disasters. Military intelligence sources now report that Russia considers tactical nuclear weapons as conventional weapons that can be used without fear of escalation. Additionally, Russia has just begun to deploy new Satan II missiles with warheads capable of obliterating areas the size of Texas. There is now a higher possibility of Russia using tactical nukes while shielded by their potential for massive retaliation.

We will not explore the blast effects of nuclear detonation or the complexities of shelter building here. While massive nuclear war still remains a possibility more limited nuclear events and conflicts have become far more probable. This article is intended to provide some basic guidelines and information for coping with limited nuclear events. The most probable sources of public exposure to radiation today are listed below.

- Single or multiple nuclear power plant meltdowns such as we have seen at Fukushima and Chernobyl. Such events could result from cyber-attacks, earthquakes or other major disruptions. The safety systems and backup systems are designed to cope with limited and short term disruptions. There is no such thing as "fail-proof". Such events could result in regional contamination in major population areas.
- Terrorist initiation of a limited nuclear detonation, dirty-bomb, or covert spreading of radioactive material in public places. Such events would limit exposure to a limited number of people in a limited area.
- Limited nuclear wars overseas. India vs Pakistan, Israel vs Iran, China vs Russia all are potential scenarios where a few or even dozens of nuclear weapons could be detonated. Fallout would travel westward to the United States. During the 1960s nuclear testing by the USSR in Siberia, and France, Great Britain and the USA in the pacific was a regular occurrence. Radiation sickness did not affect American's, but cancer and other illness rates were increased. Limiting any exposure, particularly in the first weeks and months after such an event would definitely be prudent.

Radioactivity Exposer and its Effects

The table below provides the estimated effects of radiation exposure. Note that even without the benefit of knowing the dosage in Roentgens, how soon the symptoms appear and how many people in the same area are affected is a good indication of developing disability and fatality rates. Be aware that disability and death rates may vary widely depending on the health and age of the exposed personnel. The lower exposures (50-120 roentgens) might be anticipated from distant events such as overseas nuclear exchanges or nuclear power plant accidents. Being close to or downwind of a nuclear detonation or power plant meltdown could result in exposures from 100 to 300 Roentgens depending on distance and how long you spent in the contaminated area. Higher exposures would be limited to those directly in or near to a nuclear detonation or detonations. Of course any exposure can increase your potential for cancer, leukemia and a host of other medical issues in the future. It is particularly important to protect children and adolcence from any level of exposure because it is more likely to cause illness as and birth defects years and decades later.

Expected Effects of Short Term Gamma Radiation Exposure

Acute Dose (Roentgens)	**Anticipated Effects of Radiation Exposure**
0-50	No obvious symptoms. Possible minor blood changes
60-120	Vomiting, nausea will affect about **5 to 10 percent** of exposed personnel within 24-hours of exposure. **Some fatigue may occur, but no disability or deaths anticipated**
130-170	Vomiting, nausea will affect about **25 percent of exposed personnel** within about one day. This may be followed with other symptoms of radiation sickness**, but no deaths can be anticipated**
180-220	Vomiting, nausea will affect about **50 percent of exposed personnel** within about one day. This will be followed with other symptoms of radiation sickness, **but no deaths can be anticipated**
270-330	Vomiting, nausea will affect nearly **all of exposed personnel on the first day**. This will be followed with other symptoms of radiation

	sickness, Prolonged recovery time and **20 percent deaths within 2-6 weeks** can be anticipated
400-500	Vomiting and nausea will affect **all exposed personnel within the first day after exposure.** Severe symptoms of radiation sickness will last months and **50 percent of exposed personnel will die.**
550-750	Vomiting and nausea will affect all exposed personnel **within 4-hours after exposure**. Severe symptoms of radiation sickness. Few survivors and prolonged convalescents time for those who survive.
1,000 >	Vomiting and nausea will affect all exposed personnel **within a few hours of exposure. Few or no survivors from radiation sickness**
5,000 >	All exposed personnel **incapacitated almost immediately, 100 percent fatalities** within one-week

Rule of Thumb for Estimation of Total Dosage Accumulated

D= Dosage in Roentgens

I= Intensity of Roentgens per hour

T= Time of exposure in hours

D = I x T

For example: If the dosage rate is found to be 70 Roentgens per hour and you have been exposed for 3 hours it is 70 x 3 = 210 Roentgens accumulated dosage

Nuclear detonations or accidents will result in the production of radioactive fallout. Fallout is simply radioactive particulates and fine dust thrown upwards by the blast. Since the heavier particles fall first they start falling down wind closest and soonest after the blast. This makes these particle the most dangerous. The finer dust will fall further down wind over days and weeks following the initial blast. All radioactive fallout is subject to decay in radiation so it is most dangerous within the first hours and days after it is created, but continues to radiate at a declining rate for years and decades.

In the event of a so-called dirty bomb or the covert spreading of radioactive materials by terrorists the radiation levels may vary widely and the exposure areas will be limited to a few buildings or a few blocks. Those who may have aspirated radioactive particulates or unknowingly spent extended time in contaminated areas may develop varying levels of radiation sickness

What is Radiation?

Fallout particles can range from sand like particle falling close to the source of a nuclear event to very fine dust that travels hundreds of miles from the source. There are three sources of radiation exposure from fallout.

- **Alpha particles** cannot penetrate unbroken skin, but if ingested on contaminated food or drinks or inhaled on fallout in the air where they can reach unprotected internal organs and have serious effects.

- **Beta particles** can cause beta-burns if left on the unprotected skin and can cause more serious damage if ingested or inhaled.
- Both Alpha and Beta exposure hazards can be reduced by washing or dusting off particulates and wearing an effective dust mask
- **Gamma rays** are like x-rays in that they can penetrate most materials with ease. These rays pass through the body damaging cells and vital organs. The more intense the gamma radiation is and the longer the time of exposure the more severe the damage is. In addition to keeping particulates out of and off of our body, you must act to get out of the contaminated area as quickly as possible and thoroughly decontaminate yourself once out of the area. All clothing and equipment exposed to fallout must be abandoned or decontaminated. Clothing probably will be difficult to clean of all fallout.

Fallout shelters use massive amounts of soil, concrete and other materials to reduce the amount of gamma radiation from outside that penetrates into the shelter. Additional, filtering of air reduces the amount of gamma radiating material that enters the shelter. The more time you spend in such a shelter or even within a massive building or basement the less your exposure will be. However: if the area of contamination is limited such as downwind of a nuclear power plant prompt evacuation and decontamination if practical would be far more effective than remaining in the contaminated area in any kind of shelter.

Signs and Symptoms of Radiation Sickness

Radiation sickness results from the damage that gamma rays do to the cells and organs of the body. How soon the signs and symptoms appear and how severe they are is a good indication of exposer rates and potential mortality. Initial symptoms include: nausea, irritability, vomiting, diarrhea and general fatigue. These symptoms may disappear after a few days, but reappear within 1 to 2 weeks with more serious symptoms of hair loss, hemorrhaging, and bleeding under the skin. Compromised immune systems will result in fever, infections and disability. Vomiting, diarrhea and internal hemorrhaging results in severe dehydration. The sooner that these symptoms appear after exposure the lower the survival rate will be. Radiation sickness is not contagious. Decontaminated victims cannot “infect” family members or caregivers.

What to do if you know or think you are being exposed to radioactive fallout

- Get out of the contaminated area as fast as you can to reduce total exposure rates
- Put on a dust mask or improvised a respirator from dampened cloth immediately to keep particles out of the body
- Dust off any contamination on your clothing
- If possible don rain ponchos, rain suit, plastic bags or other waterproof and dust proof clothing. Be sure to have your head coved to keep particles out of your hair.
- Once out of the contaminated area carefully remove contaminated outer garments. Dust and wash (spray or shower) skin, hair, feet/shoes etc. as thoroughly as possible. Remove the mask last. Leave contaminated clothing and material well away from shelter.

- Decontaminate any food cans, utensils and equipment before use.
- If available take potassium iodide pills or liquid per dosage instructions. Note: overdosing on potassium iodide can be harmful so follow instructions.

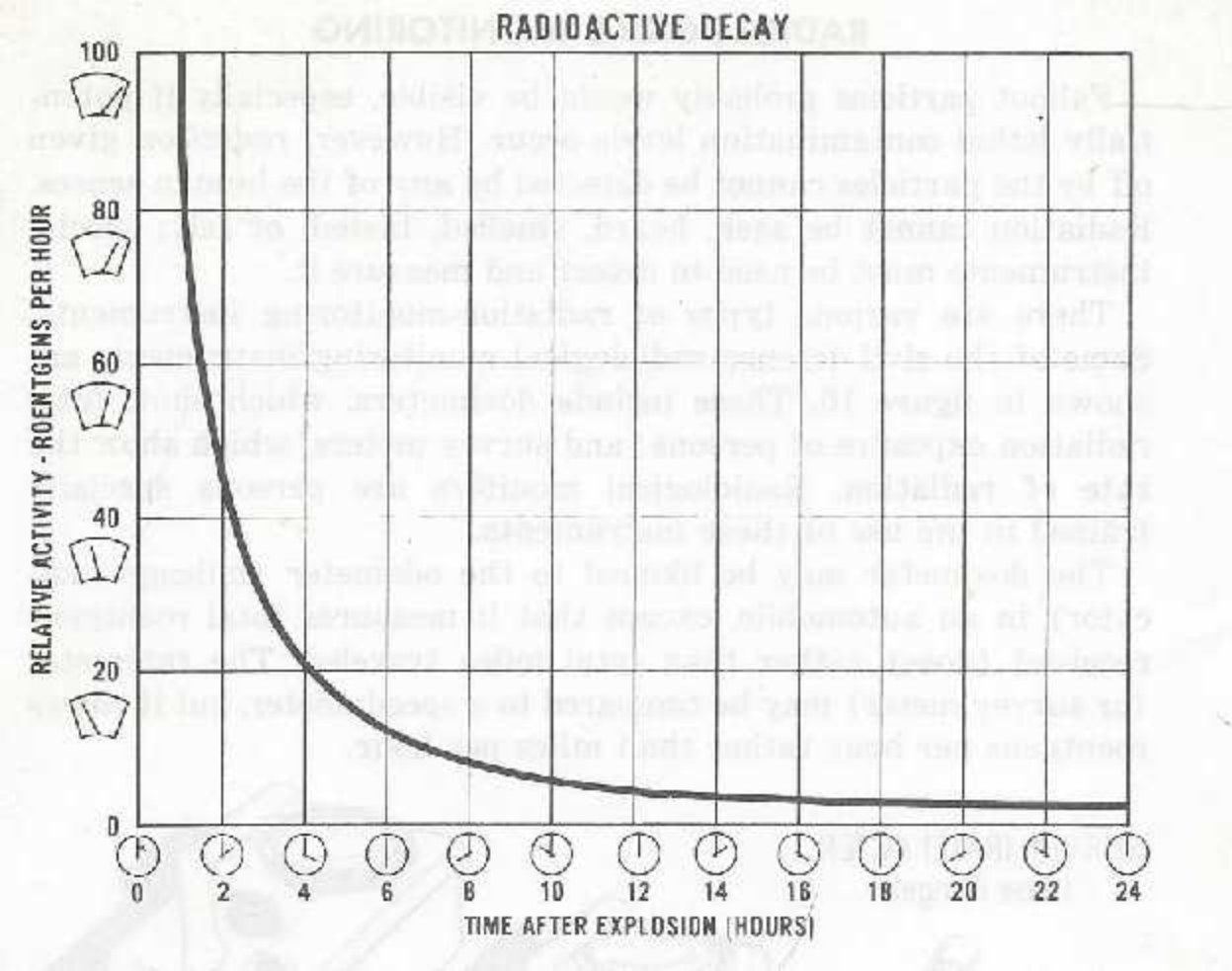
Treating Radiation Poisoning

In addition to preventive use of potassium iodine tablets there are other measures you can take to improve your survival chances and shorten recovery time.

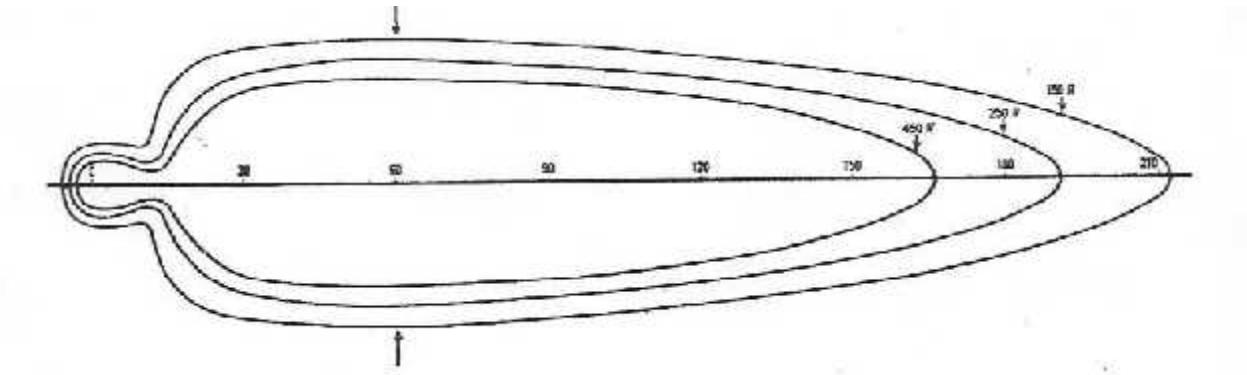
- Maintain hydration with vitamin and electrolyte fortified water. When and if oral hydration cannot be tolerated the use of intravenous fluids or fluid enemas may be necessary
- Strong iron supplements should be given to combat severe anemia and weakness
- Antibiotics should be given at the first signs of fever or infection as the immune system may not be able to fend off even minor illness or wound infections.
- Burns and wounds must be treated with special care to avoid any kind of contamination.
- Since internal bleeding often occurs in radiation poisoning, aspirin should be avoided
- Milk of Magnesia or Pepto-Bismol may be used to reduce diarrhea and vomiting

. **Radioactive Decay and the Rule of Sevens**

Although heavily radiated areas such as near Chernobyl can be unsafe for decades or even centuries most contaminated area will become safer and safer as time passes. This is because of radioactive decay. Simply put: radioactivity declines by a factor of ten for every sevenfold increase in time after the initial event. This is known as the "rule of sevens". So after 7 hours, the residual fission radioactivity declines 90%, to one-tenth its level of 1 hour. After 7*7 hours (49 hours, approx. 2 days), the level drops again by 90%. So now it’s just 1% of the lethal dosage it was after 1-houre. After 7*2 days (2 weeks) it drops a further 90%; and so on. After 14 weeks the rate drops even faster.



The chart below illustrates a typical fallout footprint. The size of the fallout area footprint depends on the size and altitude of the initial dust plume and the strength and direction of the wind. If you know what happened and where you can make a pretty good guess as to what direction to evacuate in. Obviously if radiation levels are going up you are moving towards the source or into the downwind footprint. Lowering levels indicate the best way to go, but if you are moving downwind your exposure time will still be higher than if you move at right angles to the wind direction

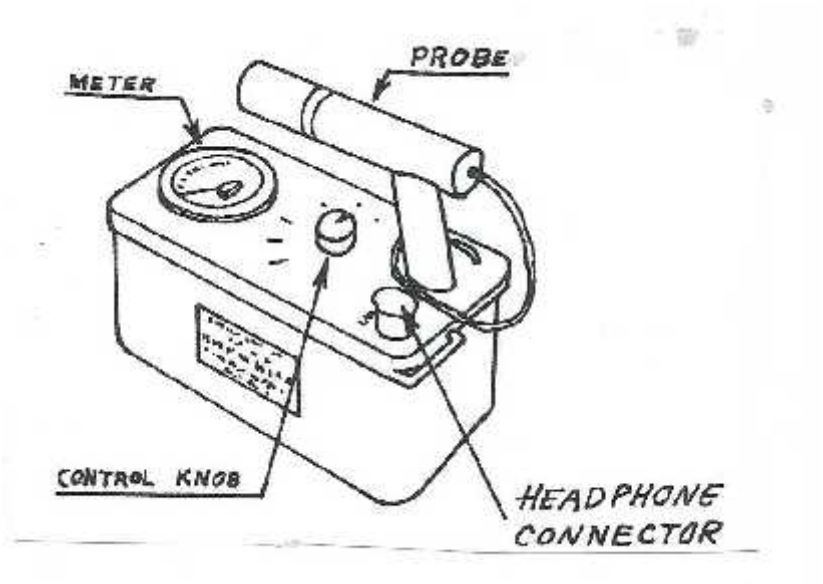


Radiation Detection Instruments

Back in the 60s through the 80s the “Civil Defense Department” (now FEMA) trained a lot of us in radiological monitoring. We had a lot of CD V-742 and 750 dosimeters and CD V-700 survey meters. There were complicated nomograms’ to calculate how long we could be outside and we had to search building for hidden radiation sources planted for us by our instructors. The Nuclear Regulatory Commission has long since retrieved these low level sources. There are a lot of reasonably priced older dosimeters and survey meters on sale at preparedness shows and on the internet. Uncalibrated radiation detectors sell for about $20.00 because the calibration radiation sources used for this procedure are so strictly regulated, but there are sources to have them calibrated. Calibrated survey meters sell for about $80.00 and new ones sell for about $150.00. Go to www.sportsmansguide.com or www.colmans.com for these items.

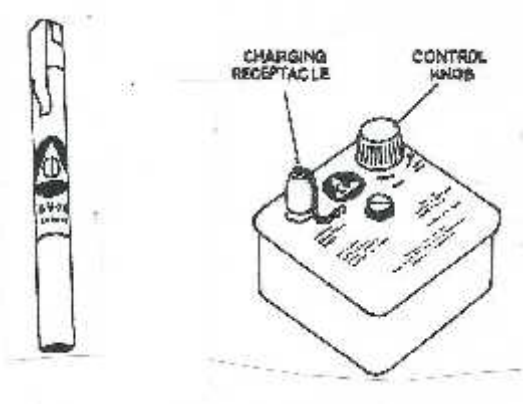
There are also more modern nuclear radiation detectors and monitors on the market. These range in price from $180.00 to over $300.00

Regardless of calibration any detected exposure levels ranges or area radiation above normal is cause for concern and precautions



Surplus civil defense survey meters such as the CV-700, 751, 720 etc. can be purchased at preparedness shows and on the internet at reasonable costs. Some are calibrated and others are not but calibration services are also available.

These CD V-742 pocket dosimeters and CD-V750 chargers are also still available. These are used to register personal exposure rather than area radiation



Dosimeters are intended to be worn in the pocket and checked frequently to determine how much radiation the wearer has been exposed to. They come with a charger and instructions. A charger and two dosimeters sell for about $40.00

Potassium-Iodide is a specific blocker of thyroid radio-iodine uptake. Taking potassium-iodide effectively prevents the thyroid gland from being saturated with harmful radio-iodide from fallout contamination that can lead to cancer. Fourteen, 130 mg. potassium Iodide pills sells for about $20.00. The government has stockpiles of these pills for distribution, but having your own supply is highly advisable.