The Horrors of Nuclear War and How to Survive It!

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Pre-requisites

The only pre-requisites for understanding this presentation should only be high school chemistry, physics, and algebra. If you do not have these then maybe you might have trouble understanding some of the concepts but you should be able to understand the basics and get something out of the presentation anyway.

Purpose

The purpose of this presentation is to pass on information so you can make an informed decision in such an event and help you plan if you wish to. It is meant to pass all the ideas in one presentation and to be self-contained. In other words it is suppose to be thorough and accurate. It is not meant to be overwhelming and complicated but information on this type of event by its very nature is complicated. Take away what you can and if needed watch over and over if necessary. Hopefully it can be used to help you survive.

Purpose

This presentation does contain some of my opinions. Another purpose for this presentation is to try to take some of the fear and panic from you during such an event. Hopefully it gives you the confidence to deal with the known so you can deal with the unknown. It is my hope that it could be passed along to everybody in the United States without cost to help them prepare just in case. It is meant to be more than a outline but less than a book.

Section I: What is Radiation?
Section II: Fallout and Types of Blasts
Section III: Radiation Detectors
Section IV: Our Risks, Biological Effects, and Protection
Section V: Summation

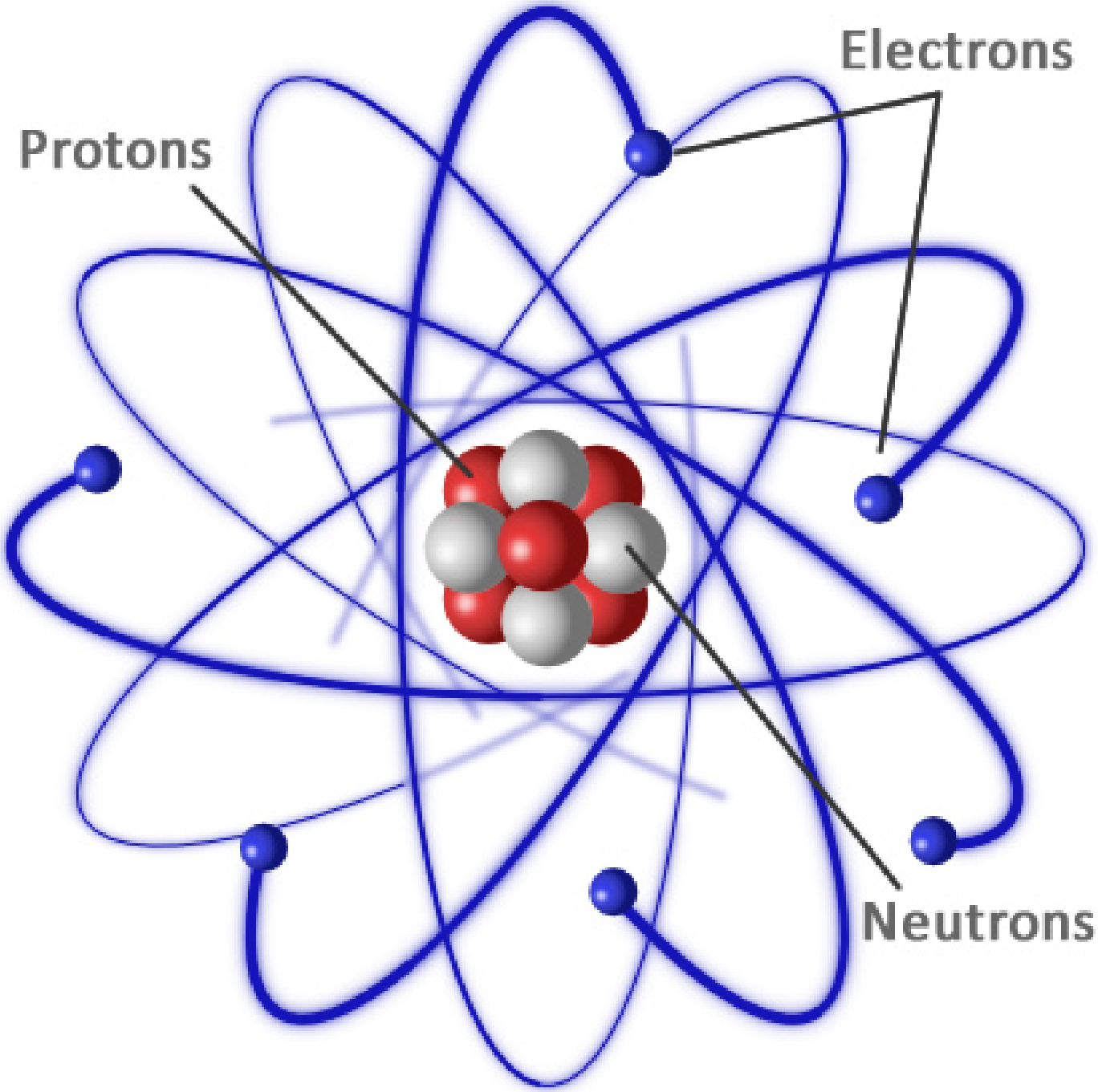
<u>Section I</u>

What is Radiation?

An Atom

An atom is made up of “essentially” three particles: electrons, protons, and neutrons. The electrons orbit a nucleus that is in the center and the nucleus contains the protons and neutrons.

For example a stable Carbon atom contains six orbiting electrons and a nucleus that contains six protons and six neutrons.



This is a simplified picture of a typical atom.

Stable Atom

The nucleus of a stable atom has the same number of protons and neutrons.

For example a Carbon-12 atom has six protons and six neutrons. This atom is at a stable energy state.

Unstable Atom

A unstable atom has a different number of protons and neutrons. An atom does not want to stay at this configuration because of being in a higher energy state so it goes through neutron decay.

For example a Carbon-14 atom has six protons and eight neutrons. The extra two neutrons is what makes an atom radioactive and is called an isotope of Carbon. Many elements on the periodic table have isotopes. Carbon-14 is just one of them.

Types of Energy Released During a Nuclear Explosion

- **Neutron Decay**-which gives off radiation.
- **X-Rays**-usually as soft x-rays.
- **Free Neutrons**-are neutrons that escape the cascading fission reaction which we will go into later.

During Neutron Decay

There are Three Types of Radiation Given Off.

- **α**-Alpha Radiation
- **β**-Beta Radiation
- **γ**-Gamma Radiation

α-Radiation

- Is a Helium Nucleus.
- Is Low Penetrating-a piece of paper or clothes can stop the helium nucleus.
- Not usually dangerous unless taken internally in the lungs or digestive system.

β-Radiation

- Is an Electron.
- Is Somewhat Penetrating-it can go through about a centimeter of tissue.
- It still can cause damage to the skin tissue and cause burns, etc.

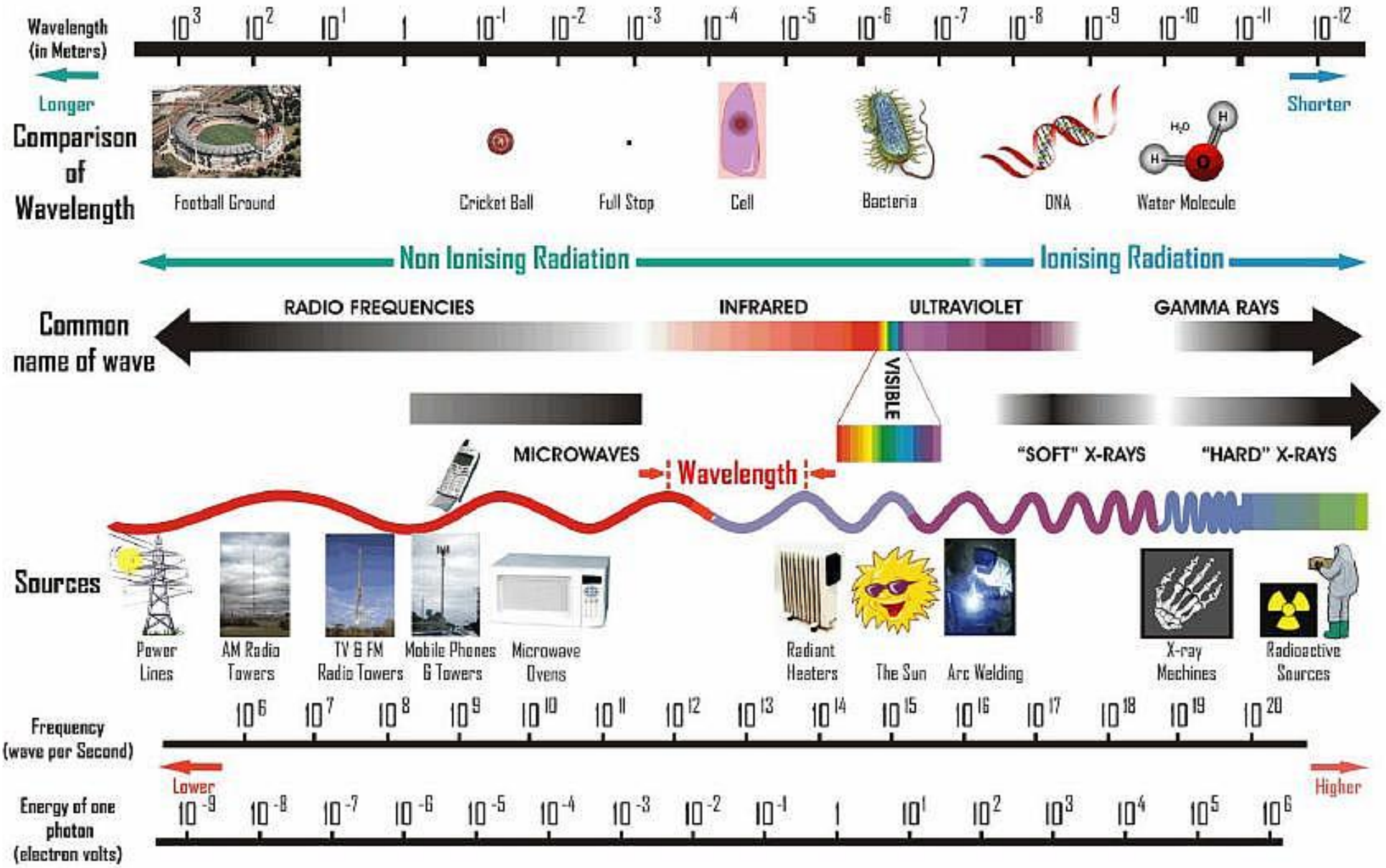
<u>γ-Radiation</u>

- Is a photon of Electromagnetic Energy.
- <u>Is Highly Penetrating</u>-it can go through the body and it takes something dense to protect you like concrete or a decent amount of earth to stop it.
- They can cause damage to genetic material inside of a cell, causing the cell to die or become cancerous.

X-Rays

- Is a photon of Electromagnetic Energy.
- Is Highly Penetrating-it can go through the body and it takes something dense to protect you like concrete or a decent amount of earth to stop it.
- They can cause damage to genetic material inside of a cell, causing the cell to die or become cancerous.

THE ELECTROMAGNETIC SPECTRUM



Free Neutrons

They are extra high energy neutrons that are produced in an cascading fission reaction in a nuclear explosion that are not used in producing the nuclear explosion because they exit and are no longer in the cascade. The extra neutrons can combine with the contents of the environment which can make that material radioactive.

Half-Life

Because a isotope is at a higher energy level it wants to get to a more stable state. It therefore gives off energy, neutrons, and particles that make it more stable. The Half-Life is the length of time for the amount of radiation, thru neutron decay, to be given off to decrease the amount of radiation by half. The radiation is continuous but will decrease by half by the time of the half life.

Half-Life

The half-life of Plutonium-239 is 24,110 years and the half-life of Uranium-235 is 700 million years. Other isotopes or fission products have shorter or longer half-life's depending on what is produced. There is a graphic later showing you about fission and fission products.

Uranium

Uranium-235 (U-235) is used in the making of a nuclear bomb. However, Uranium-238 makes up of over 99% of the uranium rock excavated. The most common way to get the Uranium-235 out of a large amount of the uranium rock requires many sophisticated centrifuges. It is not the only way to make U-235 but I believe it is the most common. Even the centrifuges require a certain degree of expertise to use because they are rotating very fast and if they are not calibrated correctly they will fly apart with great force.

Plutonium

Plutonium-239 (Pu-239) is not found naturally. It is a by-product of a nuclear reactor plus can be produced a number of other ways. The nuclear reactor can benefit others by producing electricity for homes and businesses. So, radioactivity can be used for peaceful purposes. The US, however, worries that a terrorist nation that has a nuclear reactor for peaceful purposes can use the plutonium created in a nuclear reactor to make weapons grade plutonium.

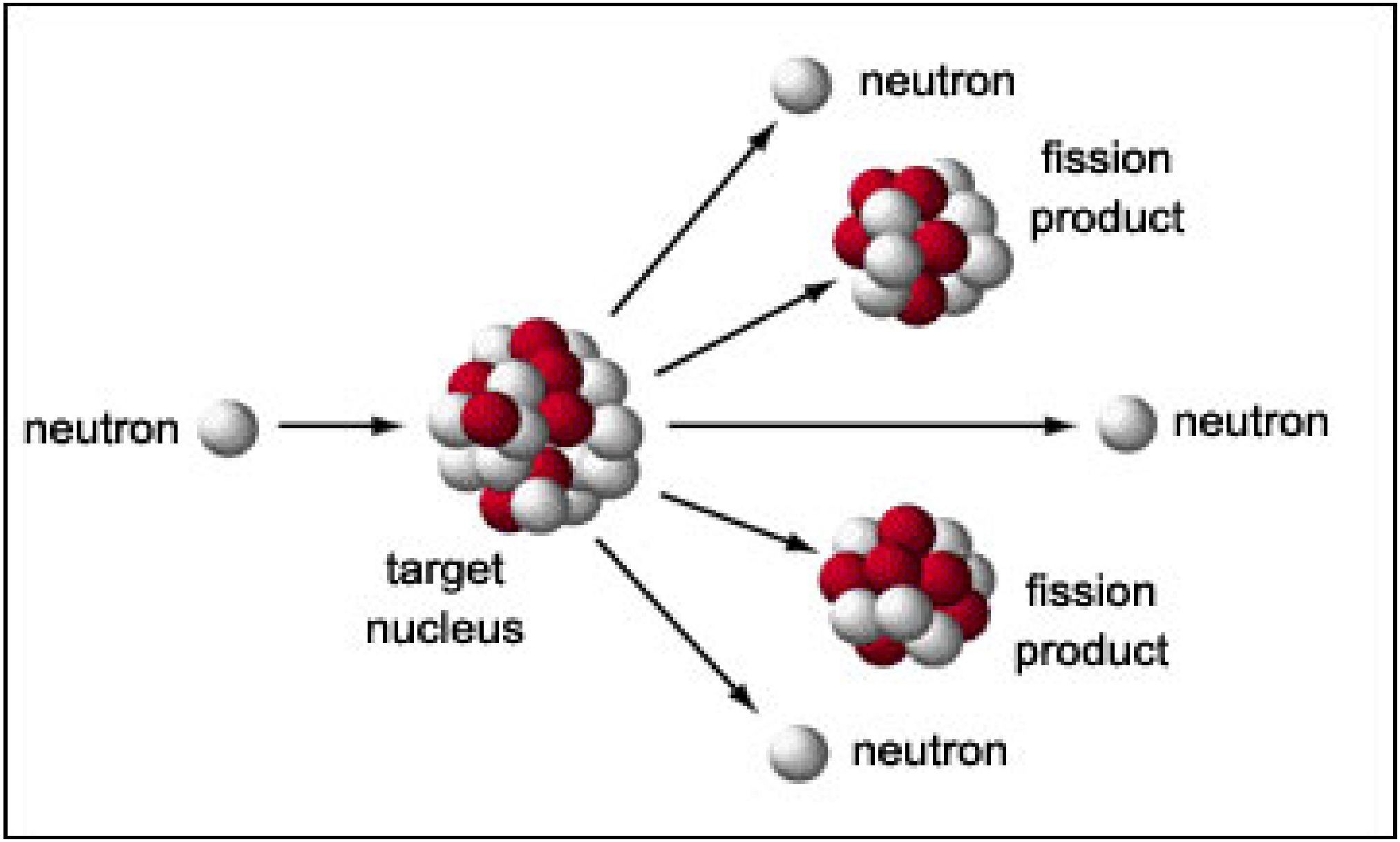
<u>Section II</u>

Fallout and Types of Blasts

This picture is of the characteristic mushroom cloud.

Fission Reaction

During fission when one neutron is knocked out of the nucleus of an isotope it can knock out 2 or 3 neutrons out of a isotope next to it. It really depends on the efficiency of the reaction. This can set up a self-sustaining cascade reaction and is what causes the release of energy in a nuclear explosion. A stored core produces less fissions to produce a sustained cascade reaction and this is how it is stored on a bomb or in storage. An “atomic bomb” uses a fission type reaction to cause the massive explosion.



This picture is of a fission reaction and its byproducts which are also radioactive until the number of protons equals the neutrons.

What You Can Find In A Bomb

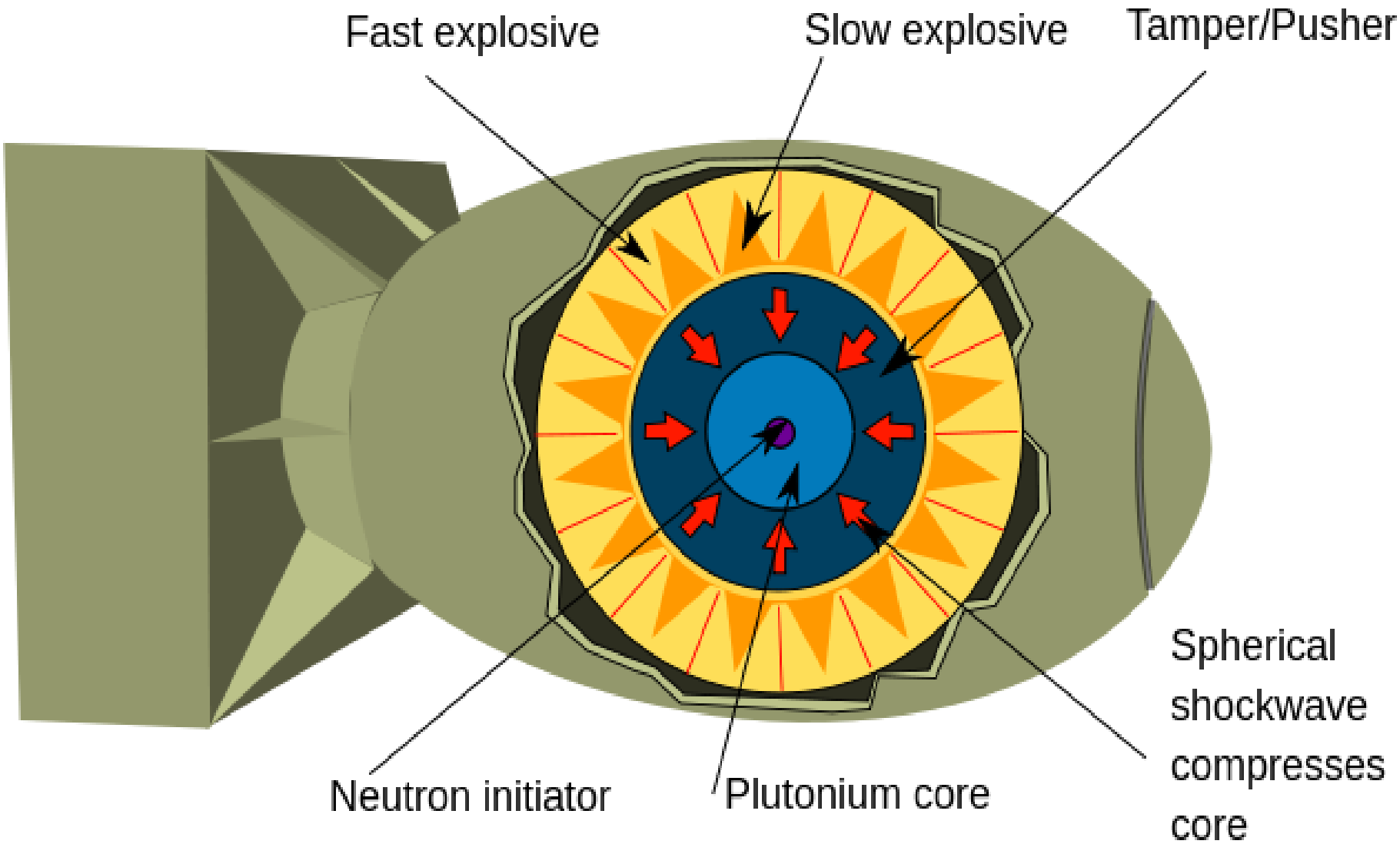
- There are two types of bombs. A gun type and an implosion type.
- In a implosion type bomb the high explosive covering a “pit” or hollow sphere is set up to go off at the same time and creates a spherical implosion.
- When a explosion occurs there are two forces at work. The implosion of the explosives and the explosion caused by the energy given off by the cascading reaction. If the bomb explodes outward faster than enough of the isotopes can go through the cascade then the bomb “fissiles” and you get a poor explosion.

What You Can Find In A Bomb

- A tamper is used to slow down the explosive reaction just enough so there are enough fissions to cause a nuclear explosion.
- A neutron initiator is used in a implosion explosion so that when the implosion occurs, the shockwaves, cause a beryllium and polonium core (or other variations) in the center of the pit to produce more neutrons. Helping the explosion.
- A neutron generator creates fast moving neutrons directed toward the isotope used in the bomb. Which is another way to help the cascading reaction.

What You Can Find In A Bomb

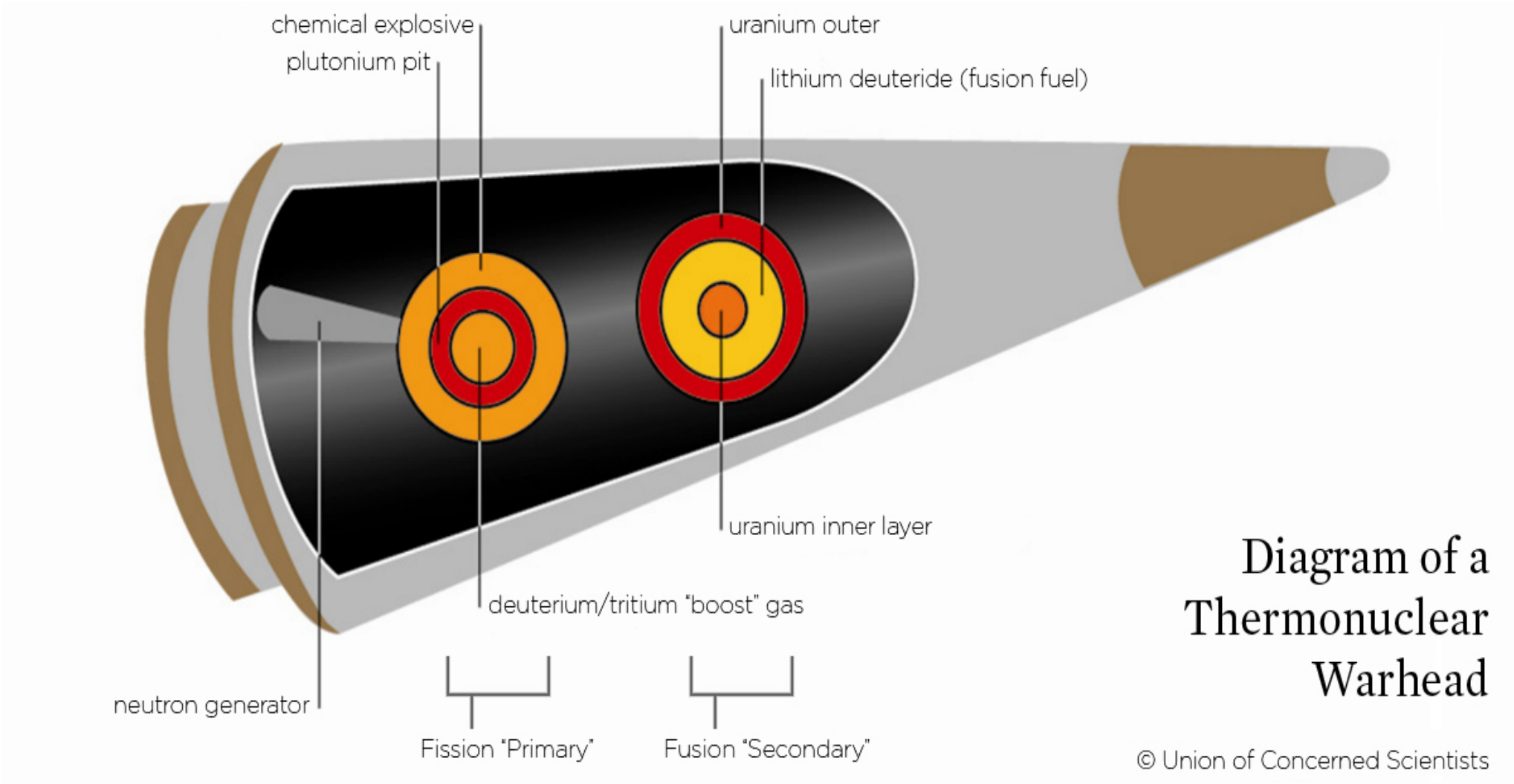
- Mirrors are also used. They are not mirrors in the sense that you see your reflection in but it reflects neutrons. Since this helps keep the neutrons available for the cascade reaction it increases the efficiency of the bomb.

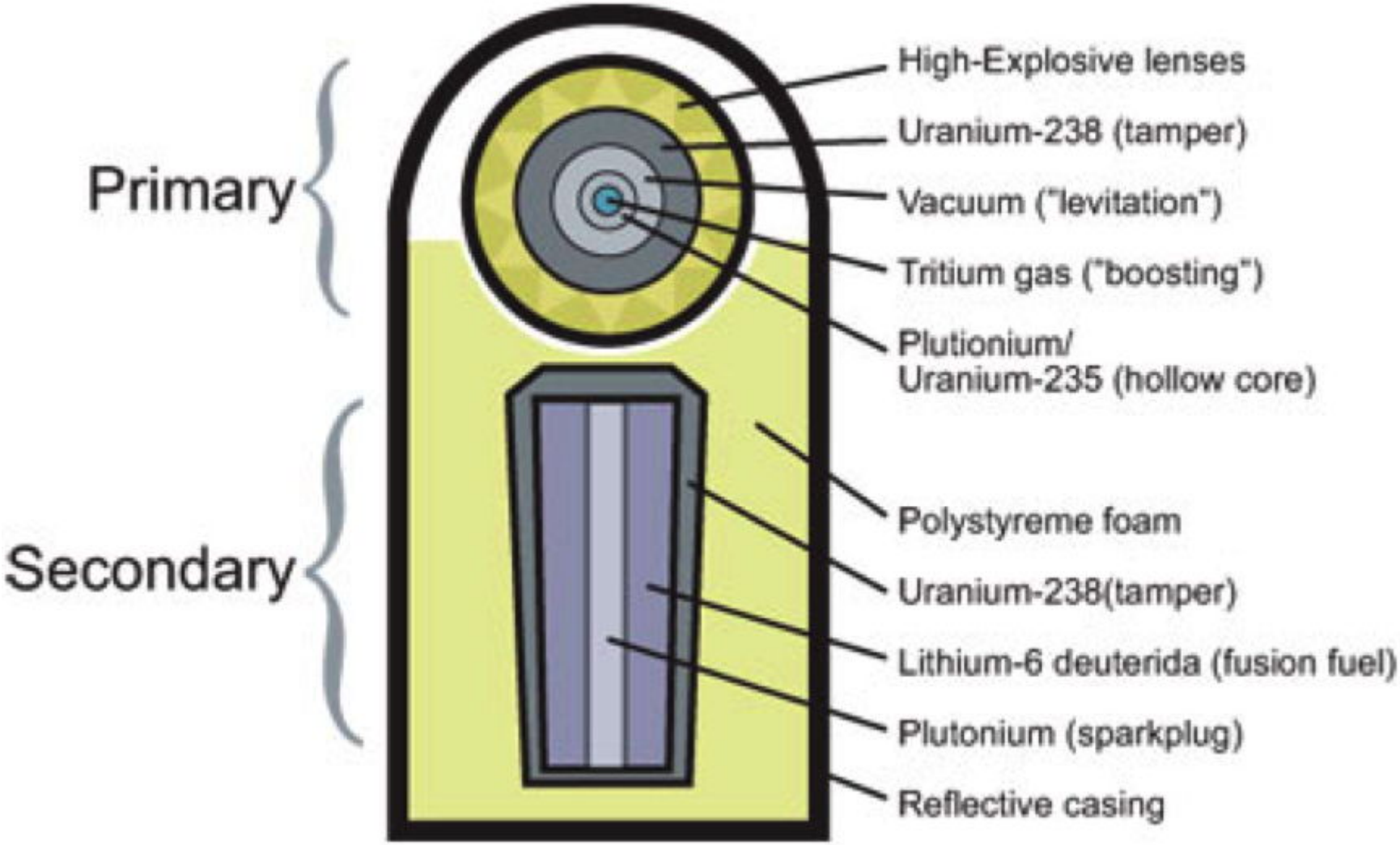


This picture is of a typical atomic bomb.

Thermonuclear Reaction

In a thermonuclear burst there is a combination of a primary **fission** and a secondary **fusion** reaction. It causes a greater release of energy due to both of the reactions occurring. It is called a hydrogen bomb because hydrogen is used in the reaction. The hydrogen is provided by Deuterium (H^2) or Tritium (H^3) gas and Lithium-6 Deuteride fuels the fusion reaction.


chemical explosive
plutonium pit
uranium outer
lithium deuteride (fusion fuel)
uranium inner layer
deuterium/tritium "boost" gas
neutron generator
Fission "Primary"
Fusion "Secondary"
Diagram of a Thermonuclear Warhead
© Union of Concerned Scientists



This is another picture of a different type of thermonuclear bomb.

Fallout

During a nuclear blast the actual ground and objects on and near ground zero are vaporized (surface burst) due to the heat and sucked up into a mushroom like cloud (heated air rises). This debris is mixed with unspent nuclear material from the bomb and the products of fission (even the fission products are radioactive) and are bonded together when they cool. There are also many high speed neutrons produced that can create radioactive isotopes in the debris

Fallout

as well. As the temperature cools, the now radioactive debris, falls to the ground as **Fallout**. Fallout is spread out over a large area due to the winds carrying the radioactive debris. The heavier debris falls out closer to the actual blast due to its heavy weight. However, the lighter debris can be carried over a larger area and it can be carried for years if it is in the higher altitudes.

Energy Released

- In a fission reaction, about 1 pound of fissile material can release about 8 KT of energy.
- In a thermonuclear reaction, 1 pound of the hydrogen isotope deuterium can release about 26 KT of energy.

Remember these are dependent on a number of conditions like the isotopes used and the efficiency of the reaction. I believe these sizes were used in the bombs that were dropped on Japan during World War II. Given the higher efficiencies of the bombs now they are more than likely now inaccurate. It is for demonstration purposes.

Blast Characteristics

- Initial Radiation
- Residual Radiation
- Thermal Energy
- Over-Pressure
- Blast Wave

Remember the characteristics are dependent on a lot of factors like the type of explosion used like fission or thermonuclear . So the following percentages are approximate. Over-Pressure and Blast Wave are sometimes combined and called Shockwave. Initial Radiation and Residual Radiation are sometimes combined and just called Radiation.

Secondary Effects

- **Pooling of radioactivity-**radioactivity could pool in bodies of water due to rain washing it out. “Black rain” is the rain that falls to earth after an explosion, washing the fallout (black debris) out of the sky. So be careful of rivers, lakes, and oceans where the fallout can concentrate.
- **Nuclear Winter**-if there is enough material put into the atmosphere it could block the sun’s rays from reaching the earth and cause drops of temperature.

Secondary Effects

- **Earthquakes-**the nuclear explosions can cause earthquakes especially along fault lines.
- **Famine**-due to the destruction of the infrastructure, crops will not be able to be delivered where they are needed. Also famine can be due to radiation concentrating in plants where you have to discard crops or due to plant death due to lowering of temperatures (nuclear winter).

Secondary Effects

- **Pandemics**-due to the biological effects of radiation and the destruction of the infrastructure, manufacture, and distribution of medicines will make them hard to come by and normal infections that will not normally kill you will probably be more deadly.
- **Pestilence**-without pesticides, insects may have full rain over what crops are left and have no checks and balances. There will probably be an increase in insect population and then a die out due to lack of food sources.

Secondary Effects

- **Decreased Oxygen**-due to the fires and lack of plant life there will likely be localized or a general lack of oxygen levels. Especially in a full nuclear exchange. Plants in your shelter and closing off outside air sources maybe your only choice.
- **Increase of Toxicity levels**-burning of chemicals and forests will increase toxic chemicals in the air and water. At a minimum you will need to filter the water and air intake from external sources. Make sure you have enough filters to last the duration.

Initial Radiation

- About 5% of the energy is given off as initial radiation.
- The initial radiation is in the form of gamma rays/x-rays and is the result of uranium or plutonium fission.

Residual Radiation

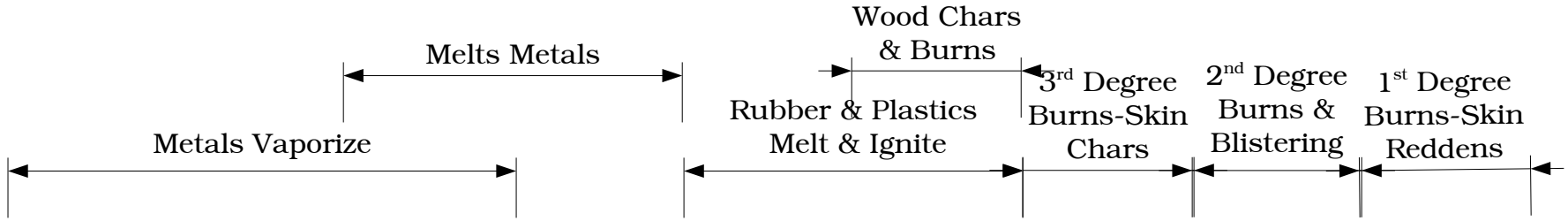
- About 10% of the energy is given of as residual radiation.
- The residual radiation is a combination of “unspent” free uranium/plutonium plus the byproducts of the fission/fusion from the explosion that are radioactive as well.

Thermal Energy

- About 35% of the energy is given off as thermal radiation or **heat**.
- The thermal radiation is in the tens of million degrees in the fireball (equal to the center of the sun).
- Photons or light is given off which can cause temporary or permanent blindness. So, do not look at the explosion.

Thermal Energy

- The thermal radiation that is given off by the explosion is the cause of materials to catch fire and cause residual fires.



Weapons Yield									
10 KT	783 ft	1107 ft	1566 ft	2215 ft	3132 ft	4521 ft	1.2 mile	1.7 mile	2.9 mile
20 KT	1107 ft	1566 ft	2215 ft	3132 ft	4430 ft	1.2 mile	1.7 mile	2.2 mile	3.8 mile
50 KT	1751 ft	2476 ft	3502 ft	4953 ft	1.3 mile	1.9 mile	2.7 mile	3.6 mile	6.0 mile
100 KT	2476 ft	3502 ft	4953 ft	1.3 mile	1.8 mile	2.7 mile	3.6 mile	5.0 mile	8.5 mile
200 KT	3502 ft	4953 ft	1.3 mile	1.8 mile	2.6 mile	3.6 mile	5.0 mile	8.0 mile	11.9 mile
500 KT	1.0 mile	1.4 mile	2.0 mile	2.8 mile	3.9 mile	5.5 mile	8.5 mile	10.5 mile	18.5 mile
1 MT	1.5 mile	2.0 mile	2.8 mile	3.9 mile	5.9 mile	8.3 mile	10.7 mile	15.0 mile	25 mile
10 MT	4.3 mile	6.0 mile	8.5 mile	11.9 mile	16.0 mile	24.5 mile	33.0 mile	46.0 mile	80.0 mile
100 MT	13.0 mile	18.0 mile	25.5 mile	35.0 mile	50.0 mile	75.0 mile	112.0 mile	150.0 mile	255.0 mile

This woman has burn patterns left from the clothes she was wearing.

This picture is of the “shadow people”. The flash from the burst burned the there shadow into the ground.

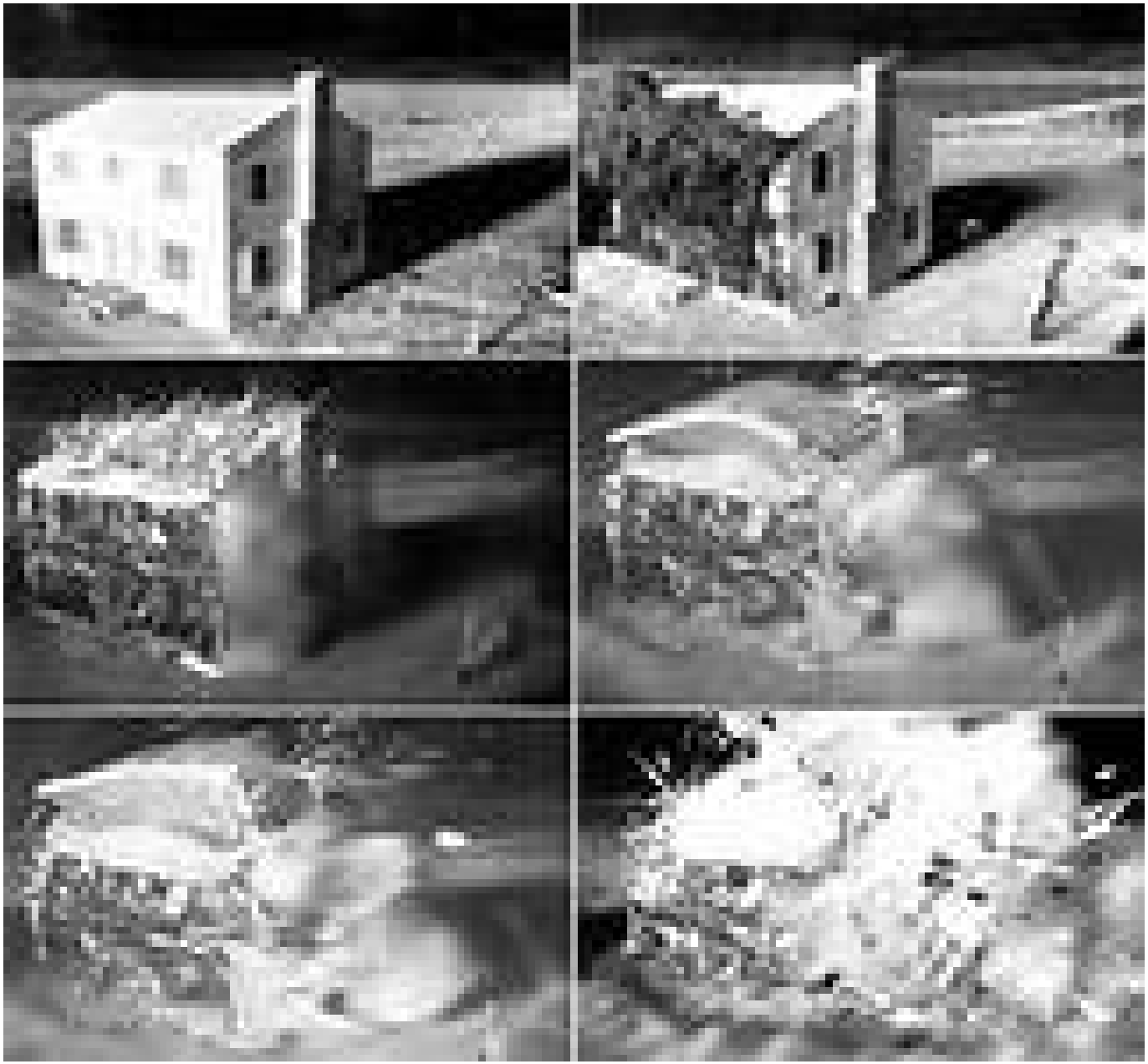
Over-Pressure

- About 50% of the energy from the blast creates the over-pressure and blast wave.
- Creates an increase in pressure usually given in pounds per square inch (PSI).
- Can create OVER 30 PSI near the blast and goes outward crushing buildings, people, etc.
- Is somewhat analogous to the crushing pressure on objects deep in the ocean.

Blast Wave

- This is the high velocity winds created by the over-pressure and is given in miles per hour.
- This can create high velocity projectiles that are dangerous to humans, animals, plants, and buildings. These winds can cause all kinds of injuries due to flying debris.

Weapons Yield	30 PSI 670 mph	20 PSI 470 mph	15 PSI 380 mph	10 PSI 290 mph	7 PSI 225 mph	5 PSI 160 mph	3 PSI 116 mph	2 PSI 70 mph	1 PSI 48 mph
10 KT	1665 ft	2010 ft	2297 ft	2872 ft	3590 ft	4310 ft	1.0 mile	1.2 mile	2.1 mile
20 KT	2098 ft	2533 ft	2894 ft	3619 ft	4523 ft	1.0 mile	1.3 mile	1.6 mile	2.7 mile
50 KT	2848 ft	3438 ft	3928 ft	4912 ft	1.1 mile	1.3 mile	1.7 mile	2.1 mile	3.7 mile
100 KT	3587 ft	4330 ft	4947 ft	1.1 mile	1.4 mile	1.7 mile	2.2 mile	2.7 mile	4.6 mile
200 KT	4522 ft	1.0 mile	1.1 mile	1.4 mile	1.8 mile	2.2 mile	2.8 mile	3.4 mile	5.9 mile
500 KT	1.1 mile	1.4 mile	1.6 mile	2.0 mile	2.5 mile	3.0 mile	3.8 mile	4.7 mile	8.0 mile
1 MT	1.4 mile	1.8 mile	2.0 mile	2.5 mile	3.1 mile	3.8 mile	4.8 mile	5.9 mile	10.0 mile
10 MT	3.1 mile	3.8 mile	4.3 mile	5.4 mile	6.8 mile	8.2 mile	10.3 mile	12.8 mile	21.7 mile
100 MT	6.8 mile	8.2 mile	9.3 mile	11.7 mile	14.6 mile	17.6 mile	22.3 mile	27.5 mile	46.9 mile



These are pictures of what happened to one of the building during a test. This demonstrates how much damage the pressure and winds can cause.

Important Types of Blasts

- High Altitude Burst
- Air Burst
- Surface Burst
- Other

A High Altitude Burst

- Can cause an electromagnetic pulse (EMP) over a large area. This causes a transistor to short out which effects radios, computers, cars, and other electronic devices. A Faraday cage can be used to help protect electronic equipment. You can purchase Faraday cage bags that you can place your electronic devices in thus helping to protect it.
- It is a burst over 100,000 feet high.

Air Burst

- Has the greater initial radiation compared to a surface burst or high altitude burst.
- The bigger the difference between the fireball and the ground, the less amount of fallout there will be due to the smaller amount of material being vaporized and sucked into the mushroom cloud.

This picture is suppose to represent an air burst. If you take radii from the center of the sphere you will notice that the gamma burst and heat will spread out more compared to a surface burst. With the fireball not directly hitting the ground, the energy will be able to spread out more and turns less of the ground into gaseous radioactive material thus creating less fallout.

Surface Burst

- Causes a larger amount fallout.
- Causes a crater that will be left after the burst.
- A burst on the surface produces the greatest over-pressure at very close ranges, but less over-pressure than a air burst at somewhat longer ranges. This is because more of the energy is being absorbed in ground and directed downward rather than outward.

This picture represents a ground burst. Notice that the energy from the burst is absorbed into the ground and directed toward the ground. In this type of burst a lot of the material on the ground and the ground itself will be vaporized and become fallout. Also, a smaller amount of energy, but certainly not all, will directed outward. But do not get me wrong though. There is still a mass quantity of energy left to destroy objects farther away from the initial burst.

This is an actual crater left from a surface burst from a test and is about a mile in diameter.

Other Types of Blasts

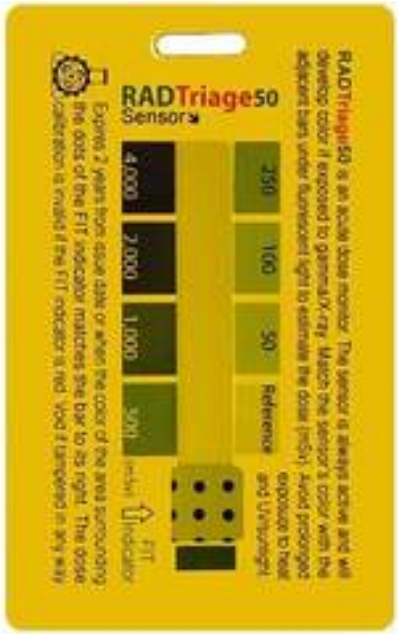
- **Water Burst**-It can cause a lot of steam and when cooled it will come down as radioactive rain. If exploded deep in the ocean away from a port it can cause a large tsunami. Russia threatened the United States will this type of blast.
- **Underground Burst**-There is a treaty preventing above ground testing due to the spreading of radioactivity all over the world and other hazards. There is also a ban on underground detonations. Now everything is simulated and theoretical.

MIRV's

Are (M)ultiple (I)ndependently targetable (R)e-entry (V)ehicles or MIRV's. In other words, it is an ICBM that carries multiple warheads that can hit different targets. There are also decoys on the missile used to make the odds of destroying an actual bomb less likely. That increases the chance that a bomb will actually hit the target even if you have a missile defense system.

This is a picture of a MIRV. What a scary thought.

<u>Section III</u>
Radiation Detectors



These are pictures of my radiation detectors. Notice that two of them are electronic and one is not.

Conversions

Conversion Equivalence

1 curie = 3.7×10^{10} disintegrations per second		1 becquerel = 1 disintegration per second
1 millicurie (mCi)	=	37 megabecquerels (MBq)
1 rad	=	0.01 gray (Gy)
1 rem	=	0.01 sievert (Sv)
1 roentgen (R)	=	0.000258 coulomb/kilogram (C/kg)
1 megabecquerel (MBq)	=	0.027 millicuries (mCi)
1 gray (Gy)	=	100 rad
1 sievert (Sv)	=	100 rem
1 coulomb/kilogram (C/kg)	=	3,880 roentgens

Conversion Factors

To convert from	To	Multiply by
Curies (Ci)	becquerels (Bq)	3.7×10^{10}
millicuries (mCi)	megabecquerels (MBq)	37
microcuries (µCi)	megabecquerels (MBq)	0.037
millirads (mrad)	milligrays (mGy)	0.01
millirems (mrem)	microsieverts (µSv)	10
milliroentgens (mR)	microcoulombs/kilogram (µC/kg)	0.258
becquerels (Bq)	curies (Ci)	2.7×10^{-11}
megabecquerels (MBq)	millicuries (mCi)	0.027
megabecquerels (MBq)	microcuries (µCi)	27
milligrays (mGy)	millirads (mrad)	100
microsieverts (µSv)	millrems (mrem)	0.1
microcoulombs/kilogram (µC/kg)	milliroentgens (mR)	3.88

Why Do I Need A Detector?

You need to be able to detect the amount of radiation being given off to determine how much radiation you have received or how much you are going to receive when you leave your shelter. This knowledge can save your life and the life of your loved ones by telling you when you have reached harmful or lethal doses.

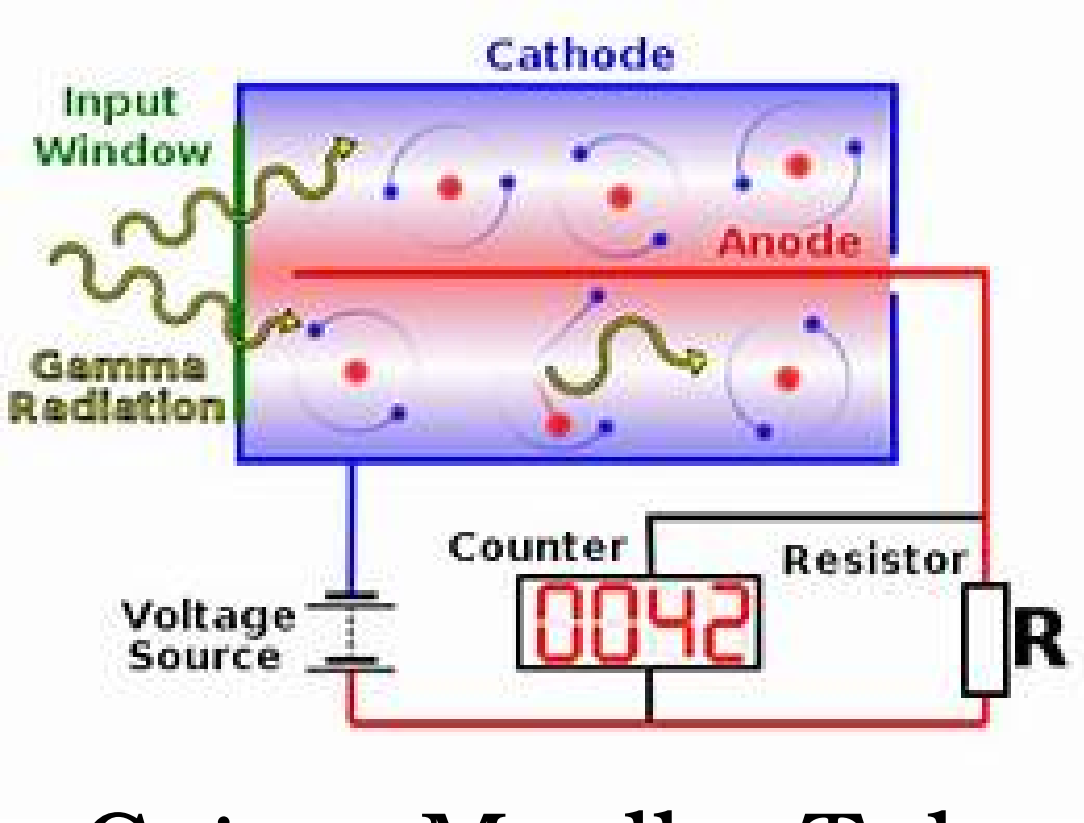
Types of Detectors

There are a number of different types of detectors (dosimeters) that you can choose from with different costs. Your detector should be able to detect gamma rays and X-rays since they are the most dangerous you might be exposed too. However, X-rays are not continually given off so they do not “hang around” thus not something to be continually worried about. The cheapest and most common way to detect radiation is a instrument that uses a Geiger-Mueller Tube.

Types of Detectors

You want at least one detector (dosimeter) to be non-electronic because of the EMP.

In “Nuclear War Survival Skills” by Cresson H. Kearny the book contains his directions on how to build a homemade Kearny Fallout Meter (KFM) which requires no electricity. You can buy a RADTriage 50 and NukAlert from http://www.amazon.com.



Geiger-Mueller Tube

Kearny Fallout Meter (KFM)

Units

- curie (becquerel)-amount of activity
- Roentgen (R)-amount of exposure
- rad (gray)-amount of absorbed dose
- rem (sievert)-equivalent dose

My GMC-320 Plus radiation detector can give me R/hr or Sv/hr in which I can look up in a chart to see what possible damage to my body will be.

Amount of Exposure

Roentgen is the unit used to express the amount of gamma radiation exposure an individual receives. It is the cumulative gamma radiation exposure. In other words, if you are exposed to 50 R one hour and 25 R a different hour, you are exposed to 75 R.

Absorbed Dose

Relates the different types of radiation (**α, β, γ**) to the **energy** they impart into a body or materials.

$$1 \text{ Gy} = 1 \text{ J/kg}$$

$$0.01 \text{ rad} = 1 \text{ J/kg}$$

Equivalent Dose

It is a unit of measurement that relates the dose of any radiation to the biological effect of that dose.

Equivalent Dose (H) = Absorbed Dose X radiation weighted factor (w_R)

Different tissues are more or less susceptible to radiation. Your lungs will be more susceptible to radiation then say your skin exposed to the same amount of radiation. So the weighted factor will be larger for lungs then for skin.

Interpretation

You need to be able to relate what units your detector gives to something meaningful. If your detector gives R/hr or Sv/hr what does that mean? Am I going to be sick? Or really sick? Can I leave my shelter or will it kill me? There are different charts in different units that relate the amount of radiation to the risk. We will be going over the risk in the next section.

<u>Section IV</u>

Our Risks, Biological Effects, and Protection

Our (and their) Nuclear Triad

- **Submarine**-about 5 to 10 minutes
- **ICBM's**-about 20 to 30 minutes
- **Bombers**-up to two hours

Where Are They Going To Attack?

- **Primary**-Our ICBM sites, Airports (long enough for bombers), Major Military Installations, Major Cities
- **Secondary**-More Major Cities, Ports, and Remaining Military Sites
- **Tertiary**-Everywhere else

Leave the cities! It is your best guess so choose wisely. I would like to be at least 100 miles from any potential target.

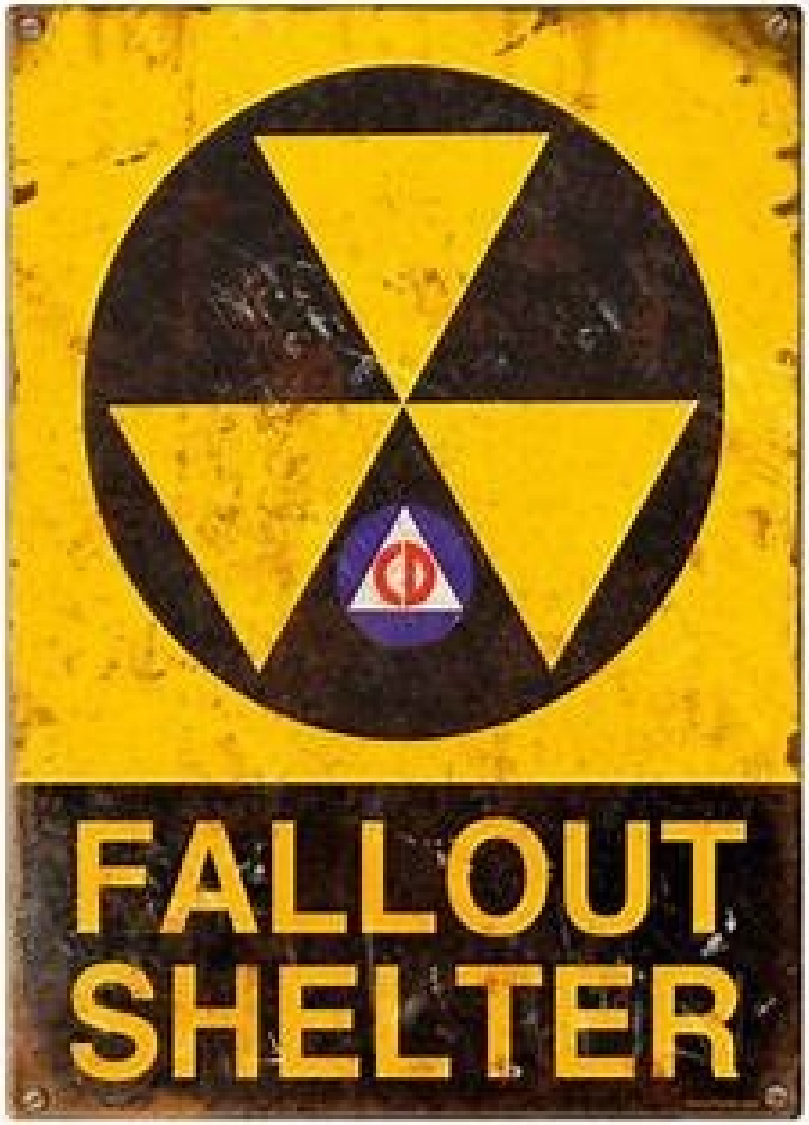
How Long Do I Shelter?

Nobody knows for sure!!

- **Rule of thumb**-every seven hours the radioactivity should decrease by 10 percent. However, to have any importance you will need a initial reading when the radiation hits your area. (Number of R)/ 10
- Or wait in your shelter for two weeks.
- Or use your radiation detector to determine when the radiation decreases enough. **The most accurate!**

Protection Of Major Biological Systems

- **Exterior**-cover yourself and keep radioactive dust off your skin. Duck tape the ends of your pants and your shirt so fallout will not get in that way.
- **Respiratory**-cover your mouth and nose with shirt or handkerchief but it is best to use a P100 mask or NBC gas mask.
- **Ingestion**-clean off the packaging of fallout and then you can eat the contents of packaged foods or bottled water. **Filter** water of radioactive particles if from outside sources.
- **Thyroid**-take Iodine tablets but will not protect much else but the thyroid.



This is a sign that was used to designate a shelter that could be used as a fallout shelter. However, did not designate that it would protect from other effects of blasts. You might still see on older buildings.

Shelters

- **Bert the turtle says, "Duck and Cover"**- There was a Civil Defense commercial that stated that caught out in the open then get to lowest point or behind something and duck and cover.
- **Basements**-Basements make great shelters since the earth and walls have a tendency to block radiation. They do suggest that you build a room inside the middle of the basement with concrete blocks to get the best protection.

Shelters

- **Using Buildings**-Building marked with a fallout shelter symbol provides some protection in a pinch. They are not usually long term solutions and you may have to leave them to get where there may be food and water and better protection. They say that if you are in a tall building that does survives then staying in the middle of the building and half way up is best. You avoid radiation on the ground and on the top of the building.

Shelters

- **Digging a shelter in your backyard**-There are many floor plans available in books or on the internet for building a shelter in your backyard that should not take a lot of time to build except for a couple of days. You would have to plan for what effects the shelter will need to protect you from your given location.
- **Building an offsite shelter**-Building a shelter offsite where there may not be high concentrations of fallout is another option.

Shelters

If it is engineered properly it can protect you from fallout and looters. It is also useful if you could design it to fit your family needs. This would probably be best just for that reason. However, getting there might be a problem. You might have to go through pockets of high radiation and you may have to walk there if there is no warning due to the EMP.

Note: Every family is different. You have to take into account the cost and the ideal place to place these shelters. The idea is if you can build a shelter before you need it you can stock it with supplies and put the features in it that will make it more comfortable for your entire family. It also gives you an opportunity to build using good materials and not something that is sub-par and in a pinch. You have to be careful about using a shelter that was designated a shelter 50 years ago though. The bombs have gotten bigger and more destructive. So, what worked in the past may not be adequate now. There are many plans on the internet and in books so you can find one that fits for you and your family.

Harmful or Lethal Doses?

- **Less than 200 R**-you have a chance for radiation poisoning.
- **Between 200 R and 800 R**-you are likely to get radiation poisoning and there is a chance for death.
- **Greater than 800 R-**there is a likely-hood of death but even that is not guaranteed.

Note: The estimates are based on no medical intervention. Different sources give different values so these are my ball park figures. 800 R is in-between 6-10 Sv. There is a chart on the next slide that I found on the internet that will you the risks of different levels of exposure that are more detailed. My NukAlert gives R/hr.

Chest X-ray	0.1 mSv
Average background exposure in one year	3 mSv
Abdominal X-ray	4 mSv
Living on the Colorado Plateau for one year	4.5 mSv
Typical yearly dose for a uranium miner	5-10 mSv
Full-body CT scan	10 mSv
Lowest dose for any statistical risk of cancer	50 mSv
Mild radiation sickness (headache, risk of infection)	0.5-1 Sv
Light radiation poisoning (mild to moderate nausea, fatigue, 10% risk of death after 30 days)	1-2 Sv
Severe radiation poisoning (vomiting, hair loss, permanent sterility, 35% risk of death after 30 days)	2-3 Sv
Severe radiation poisoning (bleeding in mouth and under skin, 50% risk of death after 30 days)	3-4 Sv
Acute radiation poisoning (60% fatality risk after 30 days)	4-6 Sv
Acute radiation poisoning (bone marrow destroyed, nearly 100% fatality after 14 days)	6-10 Sv
Acute radiation poisoning (symptoms appear within 30 minutes, massive diarrhea, internal bleeding, delirium, coma)	10-50 Sv
Coma in seconds or minutes, death within hours	50-80 Sv
Instant death*	>80 Sv

1 Sv = 1 J/kg = 1 joule of radiation energy into 1 kg of tissue ~ 5.5% chance of cancer.

* Actually, an instant death would be ideal. There have been a couple of recorded cases where people have been exposed to levels over 100 Sv and lived for hours or days. 1 Sv = 100 rem.

Symptoms

The symptoms are dependent on your current health before the exposure and dependent on the amount of exposure. Also, you can get sick, then well, and then sick again (latent phase) due to the damage to the bone marrow and other factors. So try to and be prepared for that second bout and be patient of others. This type of event is obviously going to take a toll on you psychologically as well as physically. The stress is going to effect everybody differently so things can get unhinged. Given that death is not guaranteed do not jump to conclusions and euthanasia anybody.

Early Radiation Sickness

- Nausea
- Vomiting
- Diarrhea
- Anorexia
- Burns and skin irritation
- Hair Loss

Latent Radiation Sickness

- Malaise
- Fatigue
- Drowsiness
- Weight Loss
- Fever
- Abdominal pain

Latent Radiation Sickness

- Insomnia
- Restlessness
- Blisters
- Spontaneous Abortion
- Possible Death

Severe Radiation Sickness

- Excitability
- Lack of Coordination
- Breathing Difficulty
- Occasional Periods of Disorientation
- Death

Timetable For Symptoms

It is hard to determine the exact time of symptoms because everybody is different. Your body is great about repairing itself but if the dose is high enough it will kill the cells in your bone marrow that produce your RBC's, WBC's, and platelets

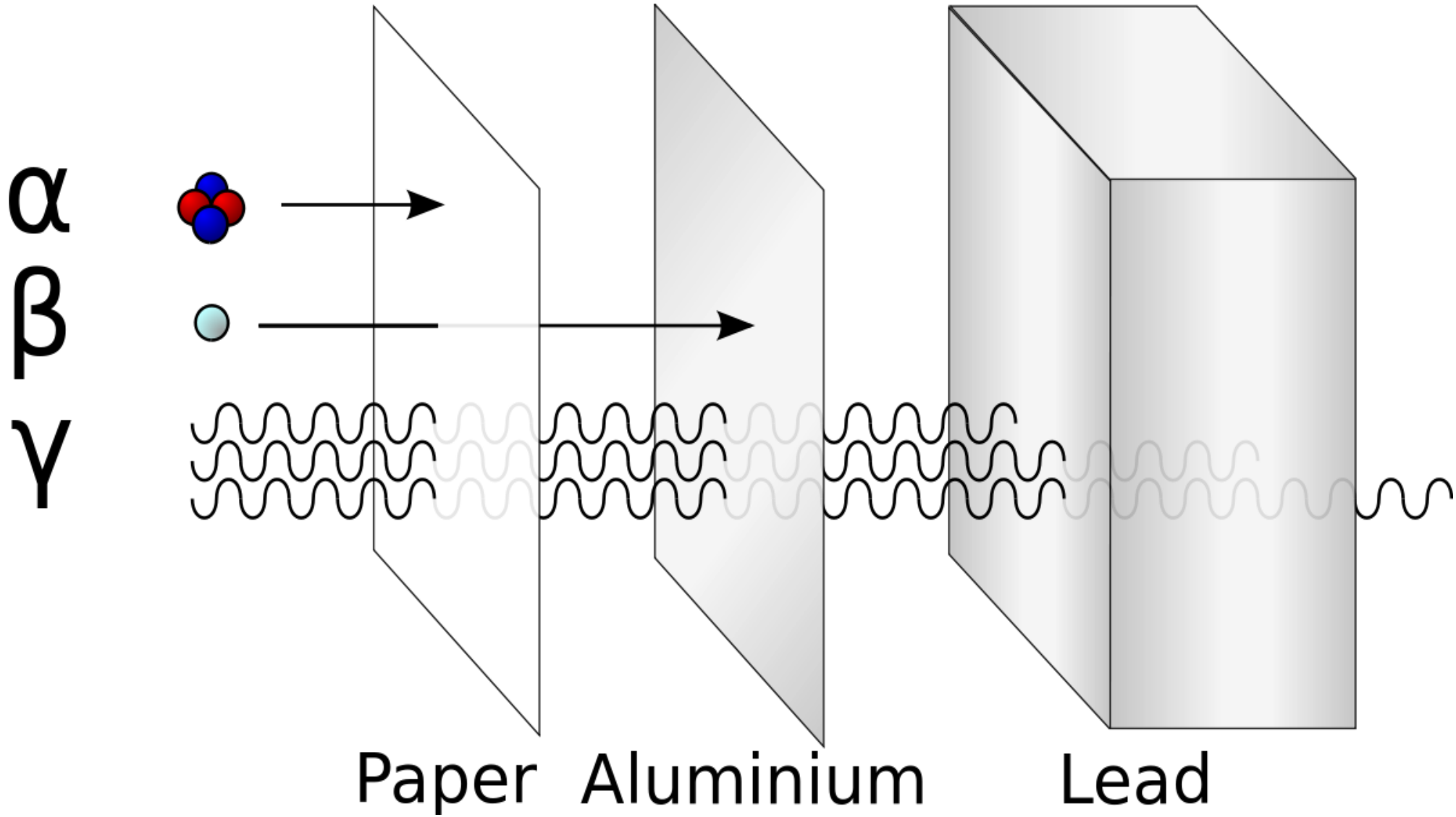
Timetable For Symptoms

The reduction in platelets causes bleeding. The reduction in WBC's means you will susceptible to illnesses. The reduction in RBC's will cause anemia and breathing problems because less RBC's means less oxygen getting to your cells.

Science of Protection

- **Time**-limit the duration of exposure.
- **Distance**-keep the distance from the source of radiation as far away as possible.
- **Shielding**-put as much material between you and the source of radiation. If not in a shelter you can lay a door against a wall and put anything you find against it (beds, doors, etc.).

Note: If close enough to an explosion to be exposed to the Thermal effects keep a bucket of sand and other fire fighting equipment in your shelter to fight the fires afterward.



The penetration power of different radiations.

Time

The amount of radioactivity will decrease with time, so, the **longer** you can spend in your shelter the **better**. The smaller your shelter is, the harder it will be to stay in your shelter. So, having games or books will help you pass the time.

Distance

The farther away from the blast you are, the more likely the lesser amount of fallout will be in your area. Remember, the heavier and more radioactive fallout will fall closer to the blast, but you still **do not want to be downwind of the blast**. That means the wind is blowing the radiation towards you. The closer you are to the blast, the more you have to worry about over-pressure, blast wave, and thermal radiation. So, you have to plan your shelter accordingly.

Shielding

Generally speaking, the thicker and denser the material the better the protection. Put as much material as you can between you and the radiation. You can download or find floor plans to build shelters. Tornado shelters are better than nothing and since I live where we do not have basements, will work in a pinch. Remember, it is to late after a war begins to start building a shelter.

Shielding

Materials Used For Making Shelters

- Wood
- Aluminum
- Earth
- Concrete
- Steel

Diet

You should keep a large bottle of vitamins in your kit. Take them when you eat whatever it is you have to eat to prevent stomach upset. Vitamins can help prevent things like scurvy, etc. Make sure your vitamins also have iron for the production of RBC's. Men's vitamins do not usually have iron so buy a separate supplement if necessary. If you are vomiting and have diarrhea you will be loosing your electrolytes more quickly so the electrolytes need to be replaced. So, drink plenty of fluids that contain no alcohol and preferably electrolytes like Gatorade, Power Aid, etc.

Diet

You will also need to grow some food for yourself. You will need non-hybrid seeds. I keep mine in the freezer because they last a few years that way. Otherwise, rotate them annually. You should grow them inside to avoid contamination with fallout. Remember to use filtered water when watering them or they will uptake the radiation with the water and nutrients.

Diet

When you come out of the shelter, if you have a greenhouse, or you can build one, that will work best. That will help you keep radioactive rain off your food. Anti-oxidant vegetables are very good to help fight cancer. During your confinement you could read a book on gardening to help pass the time if you do not know how to garden. Growing food, before requiring it, is best so you can get the experience. So, keep that in mind as well.

Medicinal Plants and Herbs

Since it may be difficult to get medicine for a while I would suggest that you have some knowledge/books about medicinal plants and herbs. It may be to dangerous to go to the cities where the pharmacies would be because of radiation or gangs. Prescription medicine is better than the plants or herbs so you have to weigh the risks.

Medicinal Plants and Herbs

I would try the plants or herbs out before you rely on them by buying them now and trying them. This gives you a chance to make sure your not allergic to them and that they will work for you. I have also looked mine up on at least two sources to make sure the information is at least the same. When you think you have found a good herb or plant then you have to order the

Medicinal Plants and Herbs

seeds by genius/species and once again make sure they are not hybrids. Know what you are growing and eating. Another reason for learning about gardening.

Disease

Antibiotics would be nice to have in your kit but not always possible. Medicinal plants and herbs may not always work. The best way to keep disease down is to keep up with your sanitation. You can keep your waste in trash bags until full and then throw them outside your shelter. You should bury the bags once it is safe to go outside.

Disease

Also, you may have to use some of your precious water to clean yourself. It can help you from getting infections. I have baby wipes in my kit to help keep me clean for a little while and bars of soap for later in my kit. You should remember that outdoor water sources may contain a lot of radioactivity so be careful where you choose to take a bath.

Section V

Summary

Nuclear war would not be isolated. Radiation would cover the globe. It would cause hardships for everyone living on the planet. Even if it started off between two adversaries it could lead others to get involved. For instance, if any country attacks a NATO country then the other NATO counties have agreed that that is an attack on them. Thus, leading them into the battle. The countries that have nuclear weapons also would probably use them or lose them. There is also a large number of nuclear weapons between the nuclear

powers. Enough that would probably make this planet uninhabitable. Mutual Assured Destruction or “MAD” is not a guarantee to keep the nuclear weapons from being launched because the threat from terrorist is very real and would cause nuclear retaliation. Also, there has been a few times due to one reason or another that they came very close to shooting them off by accident. Even if there is only a few that were launched the pain and suffering is unimaginable. It causes permanent physical and emotional wounds and its effects last for many generations. So that one act of anger could have lasting

effects on mankind. It is a scary topic and is depressing just thinking about it. However, it is a possibility and should not be dismissed. One good thing is if you are prepared for a nuclear exchange then you are probably prepared for many other types of earth shattering events. Including a nuclear meltdown at a nuclear power plant. The radiation is basically the same (some different isotopes) but the protection is the same. The main thing to be worry about is radioactive steam being release. So take heart. Be Prepared.

Addendum

72-hour Emergency Kit:

Emergency Kit (Backpack)

- Water Container (~36 ounces)
- Spoon and Fork
- Can Opener
- Bottle Opener
- Head Flashlight
- Mosquito Repellent
- Water Purification Tablets
- Hand Saw (Wire)

- Glucose Tablets
- Lighter with Fuel
- Pocket Knife
- Four in one Tool (Whistle,Thermo.,Compass,Mag.Glass)
- Pepper Spray
- Boy Scout Mess Kit
- Rope (Climbing, Crossing Water)
- First Aid Kit
- Emergency Clot (Celox Granules)
- Snake Bite Kit
- Sterno
- Portable Stove (Uses Sterno)
- Emergency Blanket
- Emergency Tent (Tarp w/Twine)
- Emergency Poncho
- Hand Warmers

- Duct Tape

- AM/FM Radio
- Tooth Paste
- Toothbrush
- Thyro Safe Iodine Tablets
- Compass
- Walkie Talkie
- Vitamins
- Work Gloves
- Anti-Microbial Wipes (Personal Hygiene)
- N95 Masks
- Water Pouch
- Texas Map
- Extra Batteries
- Eye Glass Repair (Small Screw Driver,Screws)

Car

- Bible
- 5 Gallon Collapsible Water Container
- Gasoline Container
- Folding Shovel
- Water
- Food
- Dish Soap
- Trash Bags
- Wagon
- Toilet Paper

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