LMI Newsletter

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New Magazine Format

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Comprehensive Nuclear Survival Issue Part II

The Nuclear Threat Today

Sections 7 through 11

Joining A Nuclear Survival Group

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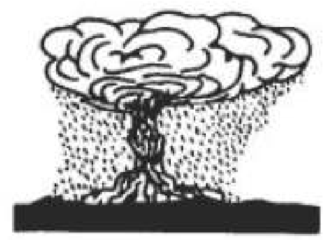

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LMI NOTES

Last month, LMI Newsletter sounded an alarm about several possible events that could lead to nuclear disasters. It is our contention that despite the collapse of the Soviet empire a cold war and weapons race is still being run. America is just not acting as though this is a serious race with serious consequences. We have a wide open border with a hostile government to the south, Russia deploying new weapons designed to evade anti-missile technologies and strike American targets and communist China with her communist allies who have accessed American nuclear warhead and launch technologies through the friendship with treasonous administrations. We have increasing tensions with hostile nations that are developing or buying nuclear technologies on their own and communist China is working with most of them, guaranteeing that they will have technologies similar to our own.

Though the current federal government in Washington, D.C. has seen it necessary to crack down on the freedoms, liberties and Rights of American Citizens, it has not found it necessary to stop trading with and developing the technologies of hostile nations. While the federal government continues to use American tax dollars to increase it's own powers and enrich it's corporate friends like Haliburton, it does not invest in securing our borders or American assets from attack. Should multiple attacks with nuclear weapons occur within our borders Americans will see the debacle of hurricanes Katrina and Rita multiplied nationwide on a scale hundreds of times worse.

Since average American Joes and Josephines have been betrayed and abandoned by government, it is up to us to educate and prepare ourselves for the inevitable consequences of treason. We began this last time with an expanded issue and we are continuing with even more information this issue.

We begin this issue where we left off last time. *The Nuclear Threat Today* is continued with Section 7: Monitoring Radiation. This section details radiation measurement conversions, how to record radiation levels, record dosimetry, estimate future radiation levels and assess when radiation levels become dangerous. Section 8: Neutron Radiation. This sections details the dangers of neutron radiation and neutron warhead technologies. Defenses and shielding materials and techniques are also detailed. Section 9: Radioactive Iodine. This section details the dangers of radioactive iodine, how it invades the body, it's effect on the environment and the body and defenses against it. Section 10: Radio-Nuclides. Besides radioactive iodine, there are other radio-nuclides to consider. This section details several different radio-nuclides and their various effects on the environment and body. Section 11: Aftermath. This section gives a summary of what you are hoping to survive, then explains what dangers you will face in the long term. Section 11 also details techniques to lessen these long term effects, reclaim farm lands and grow crops to produce clean food.

Pug Mahone is back with us in this issue with the latest in his Twighlight column. This entry details some thoughts on joining a group to survive a nuclear war. What can you bring to a group forming to survive a nuclear war? What can you learn and can you apply that to your own survival? Pug gives some pointers to help get you started.

Again, this is not all of the information you can learn on the subject and LMI will be covering more on this subject in the future. Look for more articles on nuclear survival from time to time. For now, we will be leaving the subject to bring you more survival information on other subjects. Next issue look for our reloading theme. Firearms are excellent tools for survival and self defense, but how can you get the most performance out of your firearms? What if ammunition is excessively taxed or banned? Reloading can help with all of these problems and we can help you get started. See you next time.

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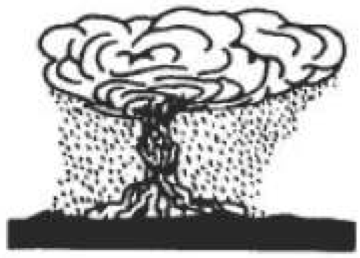
The Nuclear Threat Today

by Corcceigh Green



Section 7: Monitoring Fallout

As mentioned in preceding sections, fallout is created during a surface burst when the fireball from the warhead's detonation comes into contact with the earth's surface. Inside the fireball is where radiation is most intense. Neutron radiation within the fireball can actually radiate (cause non-radioactive materials to acquire enough energy from neutrons or captured neutrons to become radioactive) material on the surface. The materials on the surface that are radiated are dirt, concrete and glass from buildings, ash from wood structures and human bodies and dirt from the ground. Actually, this is any material within the intense initial radiation discharge of the fireball. Neutron radiation will not travel much farther than the expanse of the fireball.

The detonation of the warhead also results in the vaporization of tens of pounds of plutonium and/or uranium. These vaporized isotopes are absorbed into cooling particulates, which used to be materials on the ground. Buildings, earth and living beings on the ground are burned into ash and pounded into small particles by the weapon's initial effects. These particulates are super heated inside the fireball where neutron bombardment occurs. Due to superheating, the particulates rise from the ground in an updraft that forms the stem of a mushroom cloud. This is called the popcorn effect. So called because particulates are super heated to the point that they loose all moisture and seem to jump into the atmosphere. As these particulates rise in the updraft, they gradually cool. As they cool, they begin to absorb gasses present in the cloud. The cloud begins to cool and spread out, forming the classic mushroom shape.

Some of the gasses present in the cloud are the vaporized plutonium and/or uranium. Many of these are absorbed into the particulates and add to the radioactivity. As the cloud cools, it spreads out and is carried downwind. The particulates drift back down to the earth across the area the cloud is carried by the wind. These particulates are highly radioactive and known as fallout. Much of the column of smoke and particulates making the stem of the mushroom cloud will collapse after cooling. This will bring heavy fallout to the local area and areas close by that are downwind. The farther an area is away from ground zero, the less fallout will be experienced. Also, areas that are perpendicular to wind direction to ground zero will experience far less fallout.

Because fallout is highly radioactive, it releases it's energy very rapidly. Radiation levels start out extremely high during the first hours after detonation. Gamma and X radiations are intense, but this means that the high rate of energy loss will diminish quickly. Fallout undergoes one half life approximately every two hours. This means that the radiation emitted by a particle of fallout will diminish by one half it's level every two hours. An intense deposit radiating five hundred roentgens per hour will diminish to two hundred and fifty roentgens per hour within a two hour time span. Two hours after this, radiation levels will have diminished to one hundred and twenty five roentgens per hour. Radiation levels will continue to diminish by one half every two hours for many years, but radiation levels begin to diminish to safe levels after three weeks, assuming no further strikes deposit fresh fallout.

Most areas within the several States will experience fallout in a strategic exchange, but if a few weapons are detonated during a ‘terrorist’ incident, only areas downwind of the detonations will experience fallout of an immediate hazard. This will provide safe areas to evacuate to, however, tensions will be high after internal terrorist strikes and a nuclear war may proceed in the aftermath. See section 1 for details on this threat.

Preceding sections have detailed shielding a structure to shelter against the threat of radiation. You will now need to monitor radiation levels efficiently to maintain the safety of shelter occupants. You must first have the means to measure radiation levels. Ionizing radiation is the most common form of radiation released in a nuclear event and aside from neutron radiation it poses the greatest threat due to it's penetrating ability. Ionizing radiation gets it's name from the effect it has on the environment. When ionizing radiation interacts with molecules of gasses in the atmosphere, it imparts some of it's energy into electrons within the molecule's atoms. The electrons absorb enough energy from the radiation to break free from their orbit. This turns the atom into an ion, an atom devoid of one or more electrons and having a positive charge. This also causes the atmosphere to have a mild electrical charge.

Fortunately, this effect allows us to measure the amount of ionizing radiation in the immediate environment. Expedient fallout meters like the Kearny Fallout Meter (KFM) or manufactured units like the CDV-715 measures the electrical charge in the atmosphere and calculates the amount of radiation being encountered in the immediate vicinity. I strongly suggest purchasing a surplus fallout meter that has been professionally calibrated. Calibrated and functioning Civil Defense survey meters can be purchased from www.radmeters4u.com. If you do not have the money for one of these units, get yourself a copy of Cresson Kearny's *Nuclear War Survival Skills* and obtain the supplies to build a KFM or even purchase all of the materials for a KFM below $20 at Ready Reserve Foods. You must have a radiation meter in working condition before the arrival of fallout and hopefully before the arrival of a crisis.

Tom from New England recommends a Russian unit called the RKCB-104. Purchased from www.excaliburmineral.com/equipment.htm, these units work as low level radiation monitors, so should probably be used only in your shelter. This unit also doubles as a dosimeter and will help you calculate your accumulated doses. I’ll be testing this unit myself sometime this summer.

You will need at least one meter. Two or more are better as they will confirm the readings from each of the meters. It is very important to gain accurate radiation readings to gauge the danger to your group. You will also want a backup if one unit should happen to fail. Two meters may confirm a correct reading if another meter has failed and giving a false reading. If you have only two meters and they are giving different readings, the meter whose readings are varying wildly is the malfunctioning meter, while the meter giving a more steady reading is the functioning meter. If you have only one meter and it’s readings are varying wildly, you may not be getting accurate readings. You’ll need to keep your meter operating for half an hour to an hour for the circuit to warm up. If the meter begins giving a steady reading after this, your trouble may have just been a cold circuit, but without another meter, you may not know if the readings are accurate. Since a KFM is so cheap, there is no excuse for not having a backup. If your KFM is not assembled and functioning, you should begin assembling the KFM immediately after sealing yourself into your shelter.

You will need to assign someone to monitor the radiation meters constantly. This person will be the radiation monitor and will be responsible for taking readings, keeping records of dose rates, estimating future radiation levels, estimating outside radiation levels, finding the protection factor of the shelter, estimating future dose rates, keeping the radiation logs, converting readings and maintaining safe exposure practices. The radiation monitor should have basic math skills and write legibly. An assistant should also be assigned which will learn to accomplish all of the tasks of the radiation monitor and take on his/her duties while the radiation monitor sleeps or should he/she become incapacitated.

Radiation readings are logged into a radiation log book. The log book should contain The date, time, the reading inside the shelter, the reading outside the shelter, the dose rates inside and outside the shelter and space for notes. Below is a good example of an entry.

Date	Time	Reading Inside	Reading Outside	Dose Inside	Dose Outside	Notes
8/29/1997 H+2hours	2:00PM	1R/hour	500R/hour	0 RAD	0 RAD	Shelter
H+3hours	3:00PM	.75R/hour	375R/hour	1.14 RAD	570 RAD	PF=500
H+4hours	4:00PM	.5R/hour	250R/hour	1.995RAD	997.5RAD	

The date and time entries are very important for calculating dose rates. H in the date entry refers to H hour or the time of weapon detonation. H+2hours is the first entry for the time fallout first arrives. This is two hours after H hour. By 2:00 PM in the time entry enough fallout to radiate at 500 roentgens per hour is deposited. Before this hour no fallout was present, so zero RADs of accumulated dose is recorded. You have divided the recorded reading of outside radiation levels by the recorded inside readings of radiation levels to arrive at your shelter's PF or protection factor. From now on, all outside radiation levels may be estimated by multiplying inside levels by the shelter's PF. This will protect occupants from the hazard of exiting the shelter to take readings.

At H+3 hours you can see that radiation levels are beginning to decay. The inside reading has fallen to .75 roentgens per hour and the outside reading will have dropped to 375 roentgens per hour. Your estimated dose inside your shelter will be based on the previous hour's reading. This will give you a high estimate, but will also force you to act more safely. Dose rates are calculated in RADs. A RAD is a (R)oentgen (A)bsorbed (D)ose. This estimates the amount of biological damage done to your body by absorbing radiation. Any amount of radiation you absorb will become part of your accumulated dose. This accumulated dose will add up as you can see by the example above. While radiation levels continue to drop, the doses for inside and outside the shelter continues to rise. Again the dose rate is based on the previous hour's radiation reading. This is converted to RADs and added to the previous dose to provide the accumulated dose.

Because radiation is measured in different units, it will be necessary to convert those units in order to convert to RADs and to know the correct radiation levels reported in other areas in respect to the unit of measurement you are measuring radiation in. There are several different units you will need to be familiar with. These are the Roentgen, RAD, REM, Gray and Sievert.

Since most equipment used by Americans will use the roentgen (R) as the unit of measure, we'll base other units as comparative to the roentgen. Because of it's ionizing ability, Gamma and X radiations create an electrical charge in the atmosphere. This electrical charge is measured in coulombs and calculated to read as roentgens. One coulomb is the amount of electrical charge carried in a current of 1 Ampere maintained for 1 second. This charge is measured in a cubic kilogram of air. A roentgen is the measurement of enough ionizing radiation to create 1 electrostatic unit charge in this kilogram of air which converts to 1 electrostatic unit of charge = 2.58 X ^10-4 coulombs = 1R. The charging chamber of a fallout meter will calculate the electrostatic unit charge and convert the reading into roentgens on it's readout.

Despite the small electrical charge this ionization produces in air, the penetrating ability of ionizing radiation and it's effect on living tissue makes this very dangerous. To equate the measurement of roentgens to damage accumulated in living tissues, scientists have established two units of measure to consider this.

The RAD as mentioned above is the Roentgen Absorbed Dose. It measures the accumulated dose of roentgens to living tissue. The roentgen is measured by the electrostatic charge it produces by bumping into electrons in the air. Your body is much more dense than the air and ionizing radiation will impart more energy into your living tissues than empty air. For this reason you must record your accumulated dose in RADs rather than roentgens as RADs reflects more correctly the amount of damage inflicted to your body by that accumulated dose. The energy imparted into your body is on the order of fourteen percent above that of empty air, therefore a very simple formula for converting roentgens into RADs can be used for conversion. Take your reading in roentgens (R) and multiply by 1.14. (R X 1.14=RADs.)

In the example log you will notice that the inside and outside doses always accumulate. To estimate your dose, use your reading in roentgens from the previous hour (R) and multiply by 1.14. The first inside dose reading was based on 1R per hour. This gives us a dose of 1.14 RAD. During the second hour radioactive decay gave us a reading of .75R per hour. Applying the formula R X 1.14=RAD we have a RAD reading of .855 RAD. This latest dose must be added to the previous dose of 1.14 RAD to give us an up to date accumulated dose of 1.995 (1.14+.855) RAD. You must add your accumulated doses every hour in this manner for reasons we will explain in a few paragraphs.

Another unit of measurement is the REM. A REM is a (R)oentgen (E)quivalent (M)ammal. The REM also measures the amount of damage done to body tissues by radiation. The REM differs from the RAD in that it uses a qualifier to gauge each type of radiation's effect on living tissue. This qualifier (Q) is then multiplied by the dose in RAD to arrive at the dose in REM. Fortunately, the Q for ionizing radiation is 1 making a REM measurement of Gamma and X radiation the same as the RAD measurement. (RAD X Q=REM). For all intents and purposes, a REM reported from other areas is the same as a RAD.

A REM varies from a RAD when Q is not valued at 1. Radiation forms exist that do give a different value for Q. The value for Q when the radiation present is in the form of alpha particles is 20. If your Geiger counter or RKCB-104 unit gives you a reading of .5R/hr near a radiation source giving off alpha particles you would convert your reading to RAD giving you .57. You would then multiply this by the REM Qualifier (Q) in this case Q=20 for alpha particles giving you a REM reading of 11.4. Other factors where Q differs from 1 is in the presence of neutron radiation which also varies with the energy of the neutron particle. Neutron particle energy is measured in Milli-electron Volts (MeV) or Kili-electron Volts (KeV). Neutrons with an energy of less than 10KeV has a Q of 5. Neutrons with an energy between 10 and 100KeV has a Q of 10. For neutrons between 100KeV and 2MeV Q=20. Because energy for neutrons equals speed you will have a spike in the graph where neutrons of a greater energy will actually decrease the value for Q. This is because neutrons of such energy may zip through your body without completely "thermalizing" or being captured. Though these neutrons will still impart some of their energy into your body, so Q is still greater than 1. Neutrons with an energy between 2MeV and 20MeV will have a Q of 10. Neutrons greater than 20MeV posses a Q of 5. Beta particles are high speed electrons and can damage uncovered skin and internal organs if ingested. Beta particles have a Q of 1.

Where the Q for calculating REM is greater than 1, you should note this in your log and use the reading from REM as your accumulated dose. Because damage to your body by any radiation is accumulative the dose must be added to previous doses. Notes must be made when you add a dose from a REM rating that is greater than it's RAD equivalent. By adding a REM dose to your accumulated dose you will more accurately gauge the damage done to your body and give greater caution to working safer in a radiated environment.

The Gray is the Standard International (SI) equivalent of the RAD. The Gray (Gy) is easily converted to the RAD and Roentgen. One Gray is the equivalent to 100 RADs. If you have a unit such as the Gamma Scout which measures radiation in Grays, you may need to convert to RADs and Roentgens to compare readings from reports of other areas or if you are using a KFM or other unit which gives reading in roentgens you may have to convert roentgens to Grays. Not to mention FEMA will report radiation levels using Grays and how will you know how that relates to your readings without converting?

Grays are divided into units like the centiGray (cGy). This is one, one hundredth of a Gray. Since one Gray is 100 RADs, one cGy would equal one RAD. That was an easy conversion to RAD, now you may have to convert to roentgens. Remember that a RAD is expressed as the energy of a roentgen plus 14 percent the roentgen's energy. That is arrived at R X 1.14=RAD. With this knowledge, we can reverse the process and take that 14 percent of energy away from the RAD reading to give us the roentgen reading. This is done with the formula RAD/1.14=R. Convert your cGy to RAD. 2 cGy=2 RAD. Now divide by 1.14 to arrive at 1.755 roentgens. Now you can convert RAD to roentgen and Gray to roentgen. To convert roentgen to Gray, first use the formula to convert roentgen to RAD. Once you have your RAD it will the same as a cGy.

The Seivert (Sv) is the SI unit based on the REM. Like the Gy=100 RAD, the Sv=100 REM. Again, 1centiSeivert (cSv) =1 REM Just as 1cGy=1 RAD. Conversions here are easy as well, as long as you know what form of radiation is being monitored. Most radiation in the aftermath of a nuclear detonation will be emitted by fallout, which will mostly take the form of gamma radiation. Remember, to arrive at the reading for REM the qualifier Q is necessary. Q is a variable based on the type of radiation being measured. If reports are not qualified as to ionizing radiation, alpha particles or beta particles, Q will remain unknown and a conversion will not be possible. However, unless otherwise instructed, it would probably be safe to assume that the radiation being measured is gamma radiation. In this case, Q will equal 1 and the reading in cSv will equal the reading in RAD.

Should you wish to convert a cSv reading to roentgens where Q does not equal 1, the formula is (cSv/Q)/1.14=R. An example of the need to convert Sv to R could present itself in a terrorist incident. For example, should terrorists acquire a quantity of pulonium-210 which is an alpha emitter and the terrorists build a dispersal bomb. This bomb is set off at a mall. Reports of the situation are given over the news with radiation readings of about 1Sv/hour. You know that pulonium-210 is an alpha emitter with a known qualifier of 20. Further, your daughter is close to this area visiting a friend and you decide the situation warrants that you must pick her up and drive to a safe area due to the possibility of further terrorist incidents. You have a Geiger counter that gives readings in roentgens and will rely on that to warn you of radiation fields as you pass close to the area. At what reading in roentgens can you expect to encounter the high readings of 1Sv if you should encounter the most dangerous areas? One Seivert is the equivalent of 100cSv or 100RAD, so in this case, the formula given above will translate as (100/20)/1.14=4.39R. Should you encounter a reading of 4.39 roentgens per hour from your Geiger counter, you have encountered an alpha emitter source of 1Sv/hour.

The above may also be useful if terrorists were to disperse radiological materials including alpha emitters by aircraft or car over an urban or suburban area. You can also convert your roentgen reading to RAD and multiply by Q to arrive at a reading in REM or Sv. Because alpha and beta particles lack in their ability to penetrate, if you have sealed your shelter well and filter your air, alpha and beta particles will not be present inside and they will not register on your meter or Geiger counter in the shelter. As mentioned, most radiation reports after a nuclear incident will concern ionizing radiation. Other forms of radiation with the exception of neutron radiation will be easily shielded against. We will discuss neutron radiation in a future section.

The ability to jot down the figures and convert radiation readings has a purpose. These figures will tell you about your survival and your future prospects to survive through the crisis. To tell you how you and your group are doing, researchers have calculated the damage these figures means to human and livestock bodies. Your accumulated dose, measured in RADs will be compared to what is referred to as the LD-50. LD stands for Lethal Dose. 50 stands for 50%. The figure means that 50% of those with a set accumulated dose within a month will die from the exposure. For human beings, this set accumulated dose is 400 RADs. The LD-50 is an accumulated dose for a one month figure.

You will see in the example entry log and the paragraphs above how to calculate and log an accumulated dose for inside and outside the shelter. This will give you an overall estimate of general dose rates for your group in the shelter and for anyone who might be exposed on the surface. This is good for a general estimation of safety hazards, but lacks for individual dose rates. To change air filters or make repairs inside or outside your shelter, individuals may have to exit the shelter or hardened areas for a time. This will result in varying dose rates for each occupant of the shelter. Each individual will need a separate sheet for accumulated doses.

The sheet for each individual will have each individual's name, hourly dose rates and special dose rates with notes. An example of this would follow:

John Doe

Date	Time	Dose	Spec. REM Dose	Notes
8/29/1997 H+2hours	2:00PM	0RAD	0	
H+3	3:00PM	1.14 RAD	0	
H+4	4:00PM	1.995 RAD	0	5 min. outside to replace
H+5	5:00PM	26.315 RAD	0	filter.

John Doe has just received an alarming accumulated dose because the air filter needed to be replaced which is why you should protect the open end of the filter with a larger protective box as described in section 5. Until John needed to exit the shelter, he was absorbing the same dose rate as everyone else inside. Once outside at 4:00PM, he was absorbing 285RADs per hour. This must be logged on his personal sheet. The formula to calculate John's true accumulate dose reading is simple. Take RAD per hour (RADhr) and divide by 60 to arrive at RADs per minute (RADmn) (RADhr/60=RADmn). Multiply RADmn by how many minutes John spent outside (Tm) to arrive at the accumulated dose of John's excursion outside (ADE). RADmn x Tm=ADE.

In John's case RADhr=285. 285/60=4.75RADmn. John spent 5 minutes outside (Tm), so 4.75 x 5=23.75 ADE. This is added to his inside hourly dose for the next hour as shown in John's sample sheet. John has a 5 minute accumulated dose of 23.75 RADs. His hourly inside rate from 4:00PM to 5:00PM was 2.565 RADs calculated from previous doses and the radiation decay rate of .57 RAD inside reading (1.995+.57=2.565). Add this inside dose to John's outside dose of 23.75 to arrive at his hourly accumulated dose of 26.315RADs. John must not exit the shelter again for the remainder of the crisis.

In John's case, calculation was easy because he wore protective clothing and an NBC rated mask before exiting the shelter. This means that he did not encounter alpha particles which are extremely limited in their penetrating ability. No special REM dose was necessary to calculate John's overall dose. In the scenario where you are able to seal up in a shelter, REM doses will be unnecessary to calculate, but in the case where our father must drive through an area contaminated with alpha emitters to rescue his daughter, you will need to calculate this dose. Merely convert your hourly REM dose (REMhr) to REMs per minute (REMmn). This is done in the same way as RADhr is converted to RADmn. The formula is the same, it is REMhr/60=REMmn. After that find your dose by REMmn x Tm. This will give you your ADE in REMs. Add your REM dose to your regular dose, but mark the REM dose separately under the special REM dose column and make a note under the notes column. An example might be as follows:

Dad

Date	Time	Dose	Spec. REM Dose	Notes
5/19/2007 H hour	5:00PM	25.04 REM	25.04 REM	4.39Rhr/60=.0732Rmn 15mn drive through area 1.098R ADE=1.252RAD alpha emitter Q=20 1.252RAD x Q=25.04REM

In this case, the dispersal bomb was not followed up with a device which could create fallout and therefore no ionizing radiation. If this had occurred, RAD doses would have been added to the REM dose under the dose column and marked as RAD. The one reading under REM and the notes would denote the difference in radiation forms, but the damage to the body created by the REM dose is real and needs to be added to the accumulated dose.

You can see by the example above, the father drove into a contaminated area registering 4.39R on the Geiger counter, spent 15 minutes driving through a contaminated area to rescue his daughter and accumulated 25.04 REMs from alpha particle radiation.

As mentioned, these figures add up and denote real damage to living bodies. To correlate the accumulating dose figures in RADs to the LD-50 dose rates mentioned in preceding paragraphs follow the LD-50 chart for the following species.

Table of LD-50 for animals and humans dose rate estimated at 30 days

animal	LD-50
humans	400 RADs
Dogs, pigs	300 RADs
Goats	350 RADs
sheep	540 RADs
cattle, horses	630 RADs
rabbits	800 RADs
chickens	1000 RADs
turtles	15000 RADs

Fifty percent of animals listed that receive an accumulated dose of RADs listed for their species in a thirty day period will die from the exposure. That is for healthy animals and humans in their prime. Elderly, infant and sick humans and animals will be effected worse and a higher percent of those will die from the exposure.

Because you now know the accumulated dose that you can receive, you will know if your shelter will provide you with enough protection to keep you safe for the duration of the crisis. Because radiation from fallout decays at a constant rate, you can estimate the accumulated dose you will receive within any set period of time.

An estimated dose rate and radiation count should be begun by the radiological monitor immediately upon logging current radiation counts after sealing the shelter and getting a true shelter PF. Logs for estimated dose rates may be logged in two hour intervals for ease of estimation. Radiation from fallout's half life is every two hours. Just divide the previous two hour's reading by 2 to arrive at the estimated reading for the next half life. To estimate an hourly rate divide the next two hour's reading by 2, then subtract this sum by the previous reading. Example: previous reading=500R/hr. 500/2=250. 250/2=125. 500-125=375. The next hour's reading will be 375R/hr. This example is from the outside reading, but may be applied to the inside reading as well. Convert roentgen readings into RADs and add to accumulated doses as demonstrated in previous paragraphs.

If for convenience you are estimating accumulated doses in RADs for every two hours, convert your reading from roentgen to RAD and multiply the reading by two. This will give you a slightly lower dose rate, but you can correct for the estimated readings when you log the actual readings. Example of estimated two hour reading: Inside reading in roentgen at H+10=.03125R/hr.
.03125 x 1.14=.035625 RAD. .035625 x 2=.07125 RAD over the next two hours. Add .07125 to the previous accumulated dose RAD reading from H+8 and you will have your estimated accumulated dose for the next two hours.

Using a chart for the decay rate of every two hours, if John Doe does not exit the shelter again, he will accumulate an estimated dose of 26.707 RADs in 24 hours. A dose of 30 RADs in 24 hours can cause a healthy human in his/her prime to become ill. If John is healthy, he is just under this dose, but not all people will react to exposure in the same way. This dose is close enough to be a concern and John should be monitored throughout the crisis should he become ill. Also John should not exit the shelter again until radiation levels have greatly diminished to non-crisis levels.

You must keep the accumulated doses of all occupants well below the LD-50 from the chart above. A radiation monitor's ability to calculate, measure, convert and log radiological readings will alert the group/family to danger and give them the opportunity to take actions to lessen or negate the dangers.

You will need to estimate accumulated doses for at least several days in advance and hopefully for a month in advance. Estimated accumulated doses should be well below the LD-50s. The occupants of a shelter should receive not over 100 RADs in a one month period of the crisis. This dose can make some people sick. It is the monitor's job to alert the group should estimated doses become dangerous. Should that become the case, evacuation of your area will become necessary.

The above examples were given as simple scenarios for ease of learning. In reality fallout will not be deposited at full strength within several minutes to give sudden hourly readings. Readings will start small and rise steadily for up to hours before leveling off to full strength. You will need to take readings for every 15 minutes at the minimum to monitor the deposit of fallout, but it probably won't be necessary to log doses at the minimum time interval readings. Logging doses for hourly accumulations will serve well enough.

Do not assume that a single fallout deposit is all that will be collected in your vicinity. Even if the detonation is reported to be a single terrorist incident, later terrorist weapons may be detonated in various targets or a limited to full scale war may result. This could result in further fallout being deposited in your area that will change your estimates. Should this occur calculate new estimates from the newer radiation readings. Should those new estimates become dangerous, you'll need to alter or make new plans for survival.

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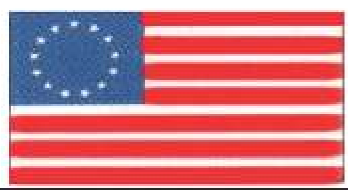

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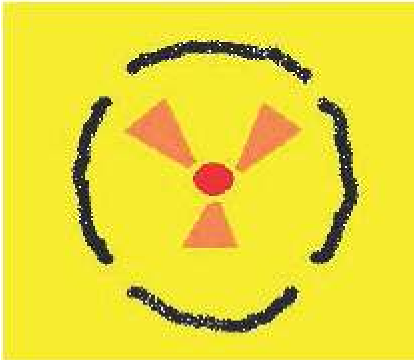
The Nuclear Threat Today

by Corcceigh Green



Section 8: Neutron Radiation

One nuclear threat that is rarely covered by survival publications is the threat of neutron radiation. Survivalists would be well advised to educate themselves to this threat. It is through knowledge of the threat that survivors are able to defeat the danger and thrive during the aftermath. The following is a treatise on the subject describing what threat is posed by neutron radiation and what steps must be taken to survive it's effects.

During the 1960's the Soviet Union and the United States were in the midst of an arms race to build bigger weapons designed to obliterate unprotected cities. When the Soviet Union stole or bought bits and pieces of the technology to build the atom bomb from the U.S. and England, the United States decided to fund the development of a theoretical method to increase the yield of a fission warhead. The ordinary delivery system of the day depended mainly on aircraft bombers. Missile development was ongoing and progress was being made, but to increase the capability of delivering a knock-out blow to the enemy, the U.S. wanted a weapon that could flatten an area as wide as a city, so that follow up blows and secondary strikes with diminishing assets would not be necessary.

The new warhead would be a fusion weapon. This would increase the yield of an ordinary fission weapon many fold. The fusion weapon would make use of a fission warhead surrounded by an easily fusionable material. The fusionable material was surrounded by a neutron reflecting material, in turn. When the warhead detonated, the intense heat and neutrons caused the easily fusionable material (tritium) to fuse into helium atoms, releasing many times more neutrons than normal. These neutrons are reflected back into the core by the neutron reflecting material causing greater fusion within the tritium and plutonium core itself. The fusion of the core's atoms caused an increase in yield as much as 1,500 times the yield of the first crude Hiroshima bomb. That's 30 Mega Tons!

Of course, that doesn't mean the destructive power of the fusion weapon was 1,500 times greater. To increase the destructive power of a bomb by 2, the yield must be increased by a factor of 4. That makes the 30 MT bomb 375 times more powerful than the Hiroshima bomb. Still a whopping number and what the U.S. wanted at the time. The new warheads were called thermonuclear (for their ability to increase yield due to heat and neutron radiation) or hydrogen warheads (due to the hydrogen isotope, tritium, used as a fusion material).

As technology developed and missiles became capable of greater range and accuracy, the need for super yield weapons diminished. Since 30 1 MT weapons dispersed over a larger area will cause greater damage than a single 30 MT weapon detonated over a single target, the strategy of targeting more strategic assets with more warheads with smaller yields was incorporated. This didn't mean the end of the hydrogen warhead, however. It's technology was key in warhead miniaturization. Warhead miniaturization was necessary in missile and MiRV advancements.

During these advancements another concern developed. The Soviets enjoyed a significant numerical superiority in manpower and tanks. Borrowing from Nazi German ground warfare tactics, Soviet upper echelon commanders fully expected to overrun 100 miles per day in a "blitzkrieg" style attack. Soviet doctrine called for cavalry units (tanks) augmented by mechanized infantry and ground support aircraft (hind helicopters, Mig-23 and 27 Floggers and Su-17 Frogfoot fixed wing jet aircraft) to overwhelm NATO forces and take ground through sheer numbers and momentum.

Though the helicopters could have been troublesome, Soviet fixed wing jets were not up to western standards. The scariest portion of the Soviet juggernaut were the tank and mech infantry units. To counter this threat, the U.S. prepared to fight on the policy of the use of "tactical" nuclear weapons.

Tactical nukes were low-yield warheads designed to devastate small strategic areas occupied by enemy armored forces. At this point, it was noticed that steel is an excellent protector against the effects of nuclear weapons. Tanks are armored fighting units wrapped in steel. Properly dug in, a tactical nuke would need to detonate fairly close to armored units to inflict enough damage to consider the unit destroyed. By dispersing armored forces, and preparing defended positions, the Soviets hypothesized that they could limit damage to armored units and continue to fight NATO forces, who would also be necessarily dispersed.

The Soviets continued to hold a numerical edge despite NATO policy of the use of tactical nukes. Until a smart scientist noticed that while steel is an excellent protector against fallout, it is practically transparent to neutron radiation. Neutron radiation will zip through steel and find human living tissue behind the otherwise protective metal. If only there were a way to generate a great amount of neutron radiation on the battlefield.

As it happens, scientists realized that the ability to generate neutron radiation already existed. It was developed to increase the yield of nuclear warheads. Hydrogen warheads. By a very simple modification, the process used in hydrogen warheads to produce neutron radiation could be used on the battlefield to introduce Soviet tank jockeys to a very lethal dose of neutron radiation.

By simply removing the neutron reflecting material and using the smallest yield nuclear core available, the neutron radiation produced by the fusionable material is scattered into the environment of the immediate vicinity. Steel, earthen dugouts, foxholes and fortified positions are all easily penetrated by the neutrons.

The neutron warhead would be airburst, increasing the area affected by neutron radiation. The small yield of the warhead would minimize blast damage. Being an airburst (where the nuclear fireball does not touch the ground), and modernized miniature warhead, fallout would also be extremely minimized. This would help in reclaiming land over which the weapon had been used.

Soviet armored units would be decimated and NATO forces would not need fear fallout and blast effects. At least from friendly fire. In this application, the neutron bomb is a "tactical" nuclear weapon. It is meant as an area denial weapon capable of defeating enemy advantages.

It was also observed that the neutron warhead produced an intense neutron flux that penetrated and interfered with the guidance system on Soviet warhead re-entry vehicles. While this wouldn't destroy an incoming warhead, it could cause the warhead to stray off course and miss it's intended target by many miles. This wouldn't fare well for those in the area where the warhead fell, but would save strategic assets from Soviet attack.

While a fascinating history and development, the story of the neutron bomb does not end here. In a maneuver that is becoming common place, the neutron bomb was acquired by the Chinese communists during the Clinton regime. After wildfires spread out of control in New Mexico (The fires were originally set by federal land officials with the excuse of preventing brush fires. The feds quickly lost control of the fires, so the story goes.), top secret papers describing neutron weapon technology were left out of a safe when Los Alamos had to be evacuated. Upon the return to Los Alamos, it was discovered that the papers were missing. Several weeks later the papers were "found" behind a water cooler.

It was soon after that communist China began testing neutron warheads. The warheads were obvious copies of American technology. It was also around this time that the Clinton regime received an influx of communist Chinese money in it's campaign funds. Another act of treason committed by the Clinton regime? Probably. However the communists received this transfer of technology, it is obvious that the threat of neutron weaponry may be faced in a future war by Americans.

Like the United States, the Chi-coms will use the neutron bomb as a tactical weapon. In their case, however, it will be more advantageous for them to use the bomb to destroy hardened defensive positions while using numerical advantages to overwhelm conventional defending forces. As the Chi-coms enjoy overwhelmingly numerical manpower and their political philosophy calls for the spread of communism through any means, they will most assuredly be aggressors should no practical opposition be present.

This is where the threat presents itself as such to Americans. As the Chi-coms continue to acquire technology and strength at the expense of stupid American taxpayers, they will inevitably challenge American dominance in the Pacific and eventually the world. America will either acquiesce to Chi-com dominance or fight a desperate war. If Americans have secured their courage at that point and set themselves to defend American soil, they will face as much might as the Chi-coms and other communist allies have purchased from America's politicians. This will include the neutron bomb. Americans must be prepared to defeat the effects of neutron radiation to survive a future war.

Neutron radiation is unique in it's nature. Neutron radiation, like all energy, acts on the environment as a particle or an energy wave. Neutrons are sub-atomic particles. They are similar to protons and reside in the nucleus of the atom, but lack a charge. Being neither positive nor negative, they have been termed neutrons for this characteristic.

When released from the atomic nucleus where they reside, neutrons travel through the environment at 81% the speed of light. Nuclear shielding used against gamma and X rays as well as alpha and beta particles will not stop neutron energy. Unless your shelter is built from concrete, neutrons will penetrate your shelter's walls as though they were transparent. This is because neutron radiation is not effected by the electron shells of the atomic structures of dense material like lead, steel or dirt. Neutrons, being similar to protons travel from nucleus to nucleus through solid structures. Atoms containing large numbers of electrons also contain large numbers of protons and sometimes neutrons.

When traveling into the nucleus of an atom, the neutron will collide with other neutrons or protons. When the neutron collides with other neutrons, they are split from the atom, creating a chain reaction, like within plutonium or uranium warhead cores. Within non-fissionable material, like steel, neutrons will collide with protons, imparting some of their kinetic energy and continue through the substance. The dense nucleus of these atomic structures means that the atom will not be able to capture the neutron and the neutron will penetrate the structure, finding it's human target.

Neutrons will travel through human tissue in the same manner as any other structure, such as the steel. The damaging aspect of neutron radiation is it's aftermath. As mentioned, when a neutron collides with the nucleus of an atom it imparts some of it's kinetic energy. The atom will release this energy over a period of time as either high energy photons, like gamma and X rays, or, depending upon the atom, will release an electron (beta particle) or part of their nuclei (alpha particles). It is the release of this energy that is hazardous to humans an animals. Much more of this energy will be released if the neutron is actually captured by the atom.

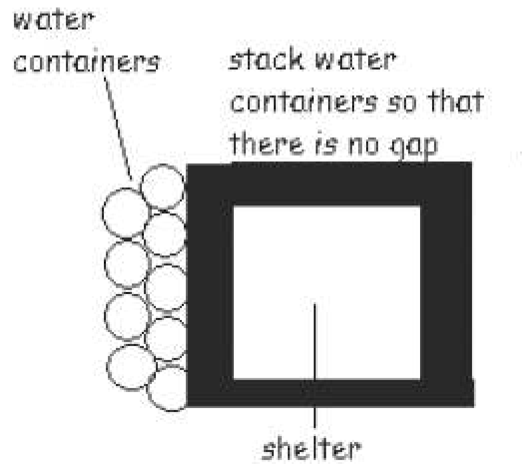
As mentioned earlier, dense materials whose atoms contain many electrons are not efficient at stopping or capturing neutrons. This makes shelter material that is designed to protect occupants against X and gamma radiation ineffective against neutron radiation. Fortunately, less dense materials can be effective at stopping neutron penetration.

The hydrogen atom is the lightest atom known to exist. It consists of one electron and one proton. Because the nucleus consists of only one proton, the hydrogen atom is the most effective at capturing neutrons. When a neutron is captured by an atom, it travels no further. Penetration of neutron radiation is thereby stopped. To be effective in protecting against neutron radiation, a shelter must be surrounded by a wall and roof made of hydrous material. Hydrous material is a substance that is made of a high number of hydrogen atoms.

Of the most effective hydrous materials, water may be the survivalist's most numerous and inexpensive supply of neutron protective material. Being composed of two thirds hydrogen and existing as a liquid throughout most of the year in most climates, neutrons would be unable to penetrate significant amounts of water without encountering several million hydrogen atoms.

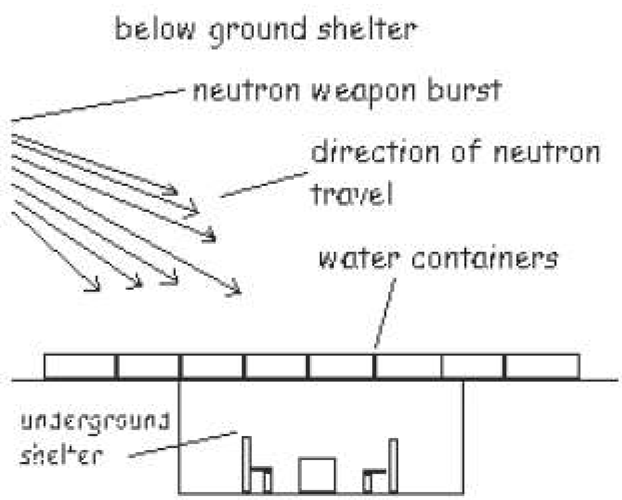
Every time a neutron encounters a hydrogen nucleus, it imparts some of it's energy into the hydrogen atom. After some collisions, the neutron loses enough energy to be considered a thermal neutron. A thermal neutron is degraded of energy significantly enough to be captured by a hydrogen atom. A container holding water about 10 inches thick will stop most if not all neutron penetration. For maximum protection, 16 inches of water shielding will keep your shelter free of neutron radiation.

You will need to stack your water containers so that no gap exists in the "water wall" you are building. It would be convenient to use square containers for this purpose, however, if you can't, layer your buckets so that no area of the wall is exposed as illustrated below.



Top down view of placement of water barrier against one wall.

Neutrons are extremely penetrating and will penetrate normal shelter shielding material. This includes dirt. If you have wisely provided for your family a below ground shelter, you must be aware that a neutron bomb detonation will likely occur as an airburst and at an angle to your shelter. This means that neutron radiation may penetrate the ground adjacent to your protective water wall and find the inside of your shelter. For this reason, extend your protective water wall beyond the roof and outer wall of your shelter to block neutrons from entering your shelter at an angle as in the following illustration.



Other hydrous material is also available for survivalists. Paraffin wax is an excellent attenuator of neutrons and is solid, so will be easier to build into a wall. Anti-freeze, diesel fuel, plastic, motor oil and gasoline are all hydrous and capable of blocking neutron radiation. Nuclear power plants and the Department Of Energy has used polyethylene/boron blocks to shield against neutron radiation nearly since it's discovery. If you have the means to acquire polyethylene blocks or a sufficient quantity of paraffin wax, then you will find these shielding materials most convenient. For most Americans, however, the more cost efficient method will have to suffice which will be the water shielding method.

There is nothing wrong with the water shielding method. In fact it is one of the most efficient methods there is. It can be used expediently, hastily or as a permanent fixture in warm climates. During months when freezing will occur, it will be best to drain the water containers, but maintain a readiness to refill the containers should danger arise. In cold climates when the danger of neutron weapon deployment is significant, the containers may be filled with antifreeze or a combination of water and antifreeze. Make certain that the containers do not leak. By the way, the environmentally friendly, non-poisonous brands of antifreeze are also excellent neutron shielding material. Plus, they won't poison your pets or children in case of an accident. Unfortunately, this will run you into some money. Compare the price you will spend with paraffin or polyethylene.

As mentioned earlier, concrete will also afford some protection against neutron radiation. This is due to the water that is chemically locked into concrete. Every 12 inches of concrete will reduce the amount of neutron radiation reaching the shelter's inside by a factor of 10. Twenty four inches of wet earth will also do the same. Does this mean that a concrete wall 120 inches thick will block all neutron radiation. Close, but that isn't the only danger when shielding against neutron radiation.

Neutron radiation is unlike all other radiological energy in that it has the ability to cause non-radioactive material to become radioactive. For every neutron blocked by the shielding, another atom of that shielding actually becomes radioactive. This is because the neutron has been captured and the atom has absorbed the neutron's energy, which it is releasing as gamma rays, X rays, alpha particles or beta particles. Your shielding may have actually saved your largely hydrous butt from glowing in the dark, but now that same shielding will be emitting fallout-like radiation into your shelter.

A double shelter wall will be necessary to survive a neutron assault. Your first shielding barrier will be hydrous material placed specifically to absorb neutrons. This shielding material will become radioactive. To block this secondary source of radiation, high density material, like concrete, steel, lead or packed dirt will be used. Concrete is very useful as secondary shielding material. Most military and government manuals state that 2 feet of concrete will stop a sufficient amount of radiation. You will need to extend this to 3 feet, however. This is because the military and government are concerned only with the immediate effects of radiation. Some casualties are expected and acceptable. Also, military planners are not concerned with after effects that may manifest themselves thirty years after the incident. This is not the case for you or your family. Casualties are not acceptable among those you wish to protect. Extend your shielding material to add an extra degree of protection.

A below ground shelter will protect against far more ionizing radiation than an above ground shelter. This shelter style makes protection against the after effects of a neutron radiation burst far easier, so this shelter style is recommended. Remember to place your neutron shielding as illustrated earlier.

So far, we have discussed permanent, fabricated shelters for protection. It is possible that you may find yourself in unfamiliar territory and in need of protection when a danger of a neutron weapon attack presents itself. For this scenario, you may need to hastily build an expedient shelter.

To build an expedient shelter, you must have a source of water. A river, lake, pond, irrigation canal or water hose will serve well. Begin your shelter as a trench. You will probably be in a hurry, so make the trench just large enough for your car. Make the trench wide enough and deep enough to cover your car. Also make a slope in the trench, so that you can drive your car into it. Over the top of your trench, lay down some thick poles. If you have any, cover the poles with plastic film. Shovel dirt over the poles, while wetting the dirt from the water source. Shovel the dirt over the trench at least 36 inches high, making certain it is moistened. Moisten the earth around your shelter for at least 3 yards, more if you have time.

When you have accomplished this, drive your car into the trench and shut off the engine. Begin monitoring radiation levels. You may notice the neutron burst as a flash of light similar to an atomic bomb. After radiation levels rise or the flash has passed, wait in your shelter for at least 10 minutes. If you are monitoring radiation levels and radiation has not risen for 5 minutes after the flash, the detonation probably wasn't a neutron warhead, or was a warhead detonated too far from your vicinity. In any case, after 10 minutes have passed, back your car out of the expedient shelter and drive like crazy away from ground zero and hopefully to your prepared safe area where you have shelters and equipment prepared for you and your family.

If you have the time, the above shelter can be improved by filling water containers and stacking them in the opening of the trench's slope to protect you at that dangerous, open end. To hurry the project along, try to locate a diesel cat or back hoe. If you are fairly certain of the targeted area, you may use the time to merely evacuate, but keep in mind that you may need to build a shelter quickly and expediently.

When a neutron warhead is detonated over an area, neutron radiation will be present in the effected area for a period of 10 minutes. You will need to remain under cover of neutron shielding for at least this amount of time. The area effected will be a radius of 6 to 10 miles from ground zero depending upon the size of the warhead, terrain and atmospheric conditions. Weather conditions will also play a part in the area effected. Cloudy or rainy conditions place large amounts of hydrous material in the atmosphere having the effect of scattering and blocking neutrons reducing the effectiveness of the warhead.

The above suggestion for expedient protection against neutron warheads is valuable only if you know that such an attack is imminent. It may be more likely that neutron warheads will be used only on tactical targets, which means you'll only encounter these weapons if you find yourself in an area with troops, helicopters or armored cavalry. Because these troops may come to your area, it is best to have shelter in place that will defeat neutron penetration. If you find you must travel outside your shelter and area for any reason during a time of war with a nuclear power, it would be best to make a foxhole for yourself to sleep or camp in built in the manner described for driving your car into. If you are on foot, it is best to build a foxhole built for yourself, but if you need to travel by car you will have to protect it too. This is because neutron radiation will cause an unprotected vehicle to become radioactive. If it is in the open during the detonation of a neutron warhead, you have lost your vehicle.

The after effects of a neutron radiation burst on a specific area will be somewhat similar to fallout. Areas radiated by neutron energy will become radioactive rendering the area uninhabitable outside of a shelter. While neutron radiation is not detectable by Civil Defense and expedient fallout meters, the ionizing radiation produced by the after effect, is detectable by this equipment. By monitoring the levels of ionizing radiation, you will know when it is safe to leave your shelter. Unless you have encountered neutron radiation within a makeshift shelter. In this case, remain within the makeshift shelter for 10 minutes, then vacate the area moving away from the direction of the detonation and moving 10 miles from the spot as fast as possible.

Sources of radiation in an area effected by neutron radiation will be plant life, the bodies of animals and humans, standing water, and structures. You can expect radiation sources to remain dangerous over a 2 week period. As the carbon atom has the longest half life in radioactive decay of neutron energy, expect human and animal bodies to remain dangerous for the longest amount of time. Even though your immediate vicinity may be safely reduced in radioactivity, always monitor radiation levels when traveling outside of your vicinity. Even though a 2 week period will bring radiation levels down to “safe” levels, reduce your activity in effected areas for an additional week or 2. Again, government manuals take in to account that some casualties are acceptable. You can afford no casualties among those you protect. By constantly monitoring radiation levels, you will be better able to judge for yourself when levels are safe.

Knowing when and where to seek protection matters greatly. Should Americans find themselves at war on their own soil against a Chi-com coalition or against a federal regime determined to usurp American freedoms, Americans may expect neutron assaults in areas where armored units are concentrated, where bunkers, tunnels and fortified positions have been effective defenses and where pro-American forces have gained the upper hand.

Keep radiation meters in good condition after a crisis and during a war. Always monitor any area being traveled through. Know how to shelter against the effects of neutron radiation and ionizing radiation and be prepared to implement such safeguards.

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The Nuclear Threat Today

by Corcceigh Green

Section 9: Radioactive Iodine

Radiological dangers are not limited to the initial effects of nuclear warheads. Radio-nuclides having differing half-lives and differing forms of radiation will be present in the environment. Because radioactive iodine is an extremely common radioactive effluent in power plants, weapons detonations and use in the medical industry, it will be addressed in an entire section. Radioactive iodine is so common in our society that it's acquisition for use as a radioactive dispersal weapon is quite realistic.

Nuclear power plants are a ready source of electricity. Unfortunately, they are also a source of radioactive material. Usually well contained, this material sometimes is released in accidents or in government experiments and exercises as has been the case at the Hanford, Washington plant near my area. Radioactive isotopes pose a serious health risk to Americans. The fission of uranium and/or plutonium produces several effluent radiological products, radioactive iodine being among the most common.

Radioactive iodine is chemically the same as stable iodine. It is a non-metallic solid with a low melting point at 236 degrees Fahrenheit upon which it becomes liquid. Upon being heated very fast, iodine can transform from solid to gas without becoming liquid. Iodine gas is an irritant to the throat and eyes in sufficient quantity and can be seen as a purple vapor. After dispersing into the environment, radioactive iodine may be hard to detect by eyesight. Detection will need to be via radiation meters. Iodine is highly soluble in water and alcohol. Iodine also reacts readily with other chemicals to form compounds, making iodine absorbable into the environment and available through the food chain, water and air.

Fortunately, stable iodine is not a threat to mammals. Iodine is constantly taken into the blood stream and stored in the thyroid gland. Excess iodine is passed out of the body through the kidneys and urinary tract. As mentioned, stable iodine is chemically identical to radioactive iodine and your body does not know the difference between the two. This means your body will take up radioactive iodine, store it and pass it through your body as though it were ordinary, stable iodine.

It is during the fission of uranium or plutonium that radioactive iodine isotopes are formed. The radioactive forms of iodine are beta particle and gamma ray emitters. Gamma radiation is a high energy photon of light. It is very penetrating and damaging to body tissues, especially protein. Beta particles are highly energetic electrons stripped from their atoms through atomic decay. Beta particles are damaging to exposed skin, eyes and respiratory tract.

After a nuclear release or attack, most radioactive iodine will exist in the environment as a gas. Much of this gas will be dissolved in water, through rainout or contact with streams, rivers or lakes. Radioactive iodine gas will also come into contact with grass and green, leafy vegetation. Due to iodine's ready solubility, the contacted vegetation will absorb the radioactive iodine and pass it into animals that eat the vegetation. Those drinking water contaminated by radioactive iodine will absorb the nuclide in this manner as well. Radioactive iodine gas can be breathed into the lungs and absorbed into the skin and eyes.

Once in the lungs, skin or eyes, the iodine is absorbed into the blood stream through small capillaries. The iodine will circulate through the blood stream until it reaches the thyroid gland which absorbs the iodine and stores it. When the thyroid has reached it's capacity to store iodine, excess iodine remains in the blood until it encounters the kidneys, which filter out the iodine and pass it out of the body through the urinary tract.

Because iodine will remain in the blood stream after the thyroid has reached it's storage capacity, human beings eating the meat of contaminated animals may absorb radioactive iodine through the animal's blood. Iodine is also readily excreted through a mammal's mammary glands. Thus radioactive iodine will be prevalent in milk from contaminated areas.

Radioactive iodine that contacts the skin or remains in the blood stream will contribute to the whole body radiation exposure. This is the exposure that tends to effect or damage the whole body. Upon being filtered through the kidneys, radioactive iodine will contribute to the kidneys' specific organ exposure. Radioactive iodine stored in the thyroid will also contribute to that organ's specific organ exposure.

Beta particles emitted by radioactive iodine will ulcerate tissues within the organs in which it is stored. This will leave roughly spherical areas of dead tissue surrounding molecules of the stored radio-nuclide. Tissues will be damaged in a similar manner as thermal burns.

Gamma radiation breaks down organ tissues, interacting especially with proteins. Protein is broken down by gamma radiation, decomposing body tissues. Gamma emitters stored in specific organs will still tend to contribute to a whole body exposure. It will also more heavily effect the organ in which it is stored, breaking down the organ's tissue and eventually destroying the organ. Organs damaged in this way may contract cancer after a period of time due to cellular damage.

Iodine stored in the thyroid gland typically has a biological half life of one hundred days. In this case, half life means that it will take one hundred days before one half of the iodine stored in your thyroid gland is eliminated from your body. Biological half lives of other organs are not so long, as the thyroid's function is partly to store iodine. The biological half life of iodine from bones is fourteen days. From the kidneys and urinary tract, the biological half life is one week.

Radioactive iodine's ability to damage body tissues relies on the amount of time that it decays or remains radioactive. In the environment, radioactive iodine will continue to emit gamma rays and beta particles, effecting the whole body exposure of animals and human beings approximate to deposits. As long as radioactive iodine remains in the body, it poses a serious problem as a source of radiation.

Radioactive iodine differs in respect to the specific isotopes' half life. While radioactive iodine and stable iodine all share the exact biological half life, (or the amount of time it takes to eliminate from the body), differing isotopes have differing radiological half lives (or the time it takes for the isotope to decay and become reduced in radioactivity).

Each isotope will decay at varying rates. Iodine-131 has a half life of 8 days. It is the longest lasting of the short-lived isotopes and will require the passage of 150 days to decay to safe levels.

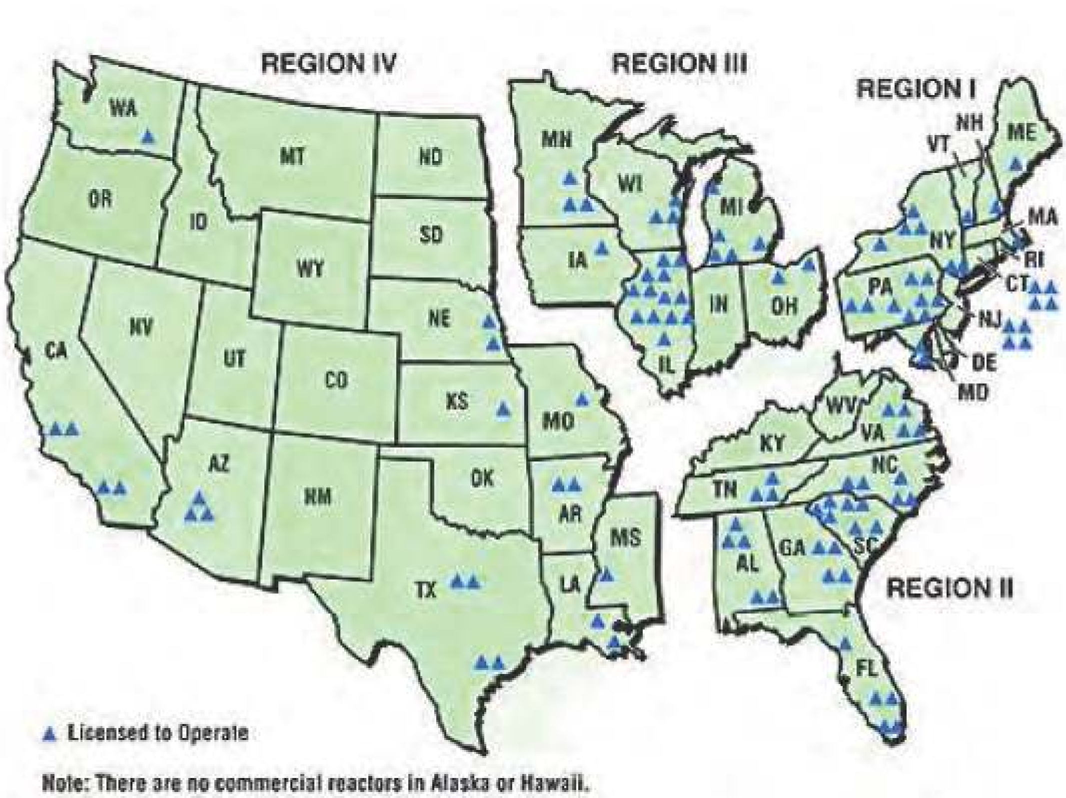
Iodine-125 has a half life of a few hours and is sometimes used in radiation therapy in the treatment of cancer. Iodine-125 decays by the capture of electrons. The product of this decay is technetium-125 which also emits gamma radiation and X rays. Iodine-132 is similar to iodine-125 in that it decays through electron capture into technetium-132. Technetium-132 also emits gamma and X radiation. Iodine-133 possesses a half life of 21 hours. Iodine-135 has a half life of 6 2/3 hours.

When calculating time for the short-lived iodine isotopes to decay to safe levels, always calculate by iodine-131's half life. The other short-lived iodine isotopes will have already decayed to safe levels at this time.

Iodine-129 is a long-lived isotope. It has a half life of 15.7 million years! You will need to be able to take more active measures against this isotope as waiting for it to decay to safe levels is not feasible. Fortunately, iodine-129 produces low activity, emitting extremely low energy beta particles. Due to it's slow decay, it's level of radioactivity is reduced, but is still dangerous.

Iodine isotopes are produced at the quantity of 125 million curies per megaton of fission. It will be dispersed over a wide area via wind patterns. The chances of encountering radioactive iodine after a nuclear exchange is high. The chances of encountering radioactive iodine after a terrorist incident or release from a nuclear power plant depends upon your proximity to the incident, wind patterns and weather conditions.

The map on the preceding page shows the locations of nuclear power plants in America. If you



US government map denoting nuclear reactor locations.

live in a down wind area of any of these plants (and that's nearly all Americans) you need to have radiological protection, a plan to evacuate contaminated areas and a means to reduce the effects of radioactive iodine.

Your plans must include a place to stay outside of effected areas. Family and friends will be able to provide this during an accident, release or single incident. During an exchange, however, you will need an independently established shelter for your family or group. Descriptions of shelters and air filtration systems in earlier sections will be of use to establish such a shelter.

As mentioned, radioactive iodine is stored in the body by the thyroid gland. To help reduce the effects of radioactive iodine, you may take in enough stable iodine to cause your thyroid to reach it's capacity to store iodine. This will keep your thyroid from storing radioactive iodine. Radioactive iodine that is absorbed into your blood stream will remain there where it will be eliminated from your body via the kidneys and urinary tract. Radioactive iodine will still contribute to your whole body dose and specific kidney dose, but will be eliminated from your body much sooner, causing less damage.

It is preferable to purchase prepared iodine tablets to ingest for the purpose of blocking the thyroid. There are currently two options regarding thyroid blocking iodine tablets. The first and oldest option is potassium iodide (chemically KI).

Potassium iodide is the blocking agent preferred by most nations and agencies for the sole reason that it is less irritating to the intestinal tract than straight iodine. Potassium iodide is distributed in adult human doses. It's tablet form is quite small and brittle, making for a tough time at dividing the tablet into children's and pet dosages. Potassium iodide is also hygroscopic, giving the tablets a more finite shelf life. Studies have shown that unopened bottles of potassium iodide will retain their efficacy for approximately 11 years when stored at room temperature depending on the brand. Some brands may last for only 5 years.

Potassium iodide may also be purchased in granulated form. Store granulated potassium iodide in an airtight, waterproof container (enamel lined, metal cans are best) in a dark, dry area at or below room temperature. To use, dissolve 130 milligrams of granulated potassium iodide in 4 2/3 gallons of water. One teaspoon of this solution is an adult dose. One half teaspoon is a children's ages 3 to 16 dose. For infants younger than one month, administer one eighth teaspoon. For children between one month and 3 years of age, administer one quarter teaspoon.

Potassium iodide is quite bitter tasting. If you are administering the dissolved granulated form, you will need to dilute the solution in fruit juice or milk.

Potassium iodate (chemically KIO_3) is the other alternative. Notice, this is an iodate, not an iodide. Potassium iodate contains an extra molecule of oxygen. This makes potassium iodate non-hygroscopic and extends storage life. The iodate form is also neutral tasting. Since there is no bitter taste, it is easier for children to swallow. Tablet forms are sold in children's doses. This means that you do not have to divide the small tablet for children, they swallow one whole tablet. Adults take two tablets. Infants one month to 3 years of age takes one half tablet and newborns to one month takes one eighth tablet. The tablets may be crushed and sprinkled in food or mixed in juice or milk.

Pets will also benefit from potassium iodate as it is not harmful to mammals in the proper doses. Large dogs will need one or two tablets per day. Medium dogs will need one half to one tablet per day. Cats and small dogs will need one quarter tablet per day. Consult your veterinarian for the exact dose for your pet. If your veterinarian is uncooperative in your inquiries, get another vet!

Potassium iodate does have the potential to be more irritating to the stomach and intestinal tract than potassium iodide. However, when taken with food is less irritating and easier to keep down, as is the case with potassium iodide.

For groups or families with children and pets, potassium iodate will prove to be the best choice in thyroid blocking agents. The choice of potassium iodate allows the family or group to more easily treat children and pets, as well as adults.

The doses mentioned above are daily doses and should be continued for a minimum of 15 days to a maximum of 85 days. Calculate your doses for the decay of iodine-131 which will take 150 days to decay to negligent levels. This is longer than the recommended maximum dose of stable iodine, therefore stop administering stable iodine for a period of 15 days after the maximum dose has been administered and begin doses again after the 15 day period. This will complete a 100 day cycle, allowing some of the iodine to be eliminated from your body, before you begin re-administering stable iodine doses. Maximum doses after the first maximum dose has been accomplished should not exceed 15 days.

A nuclear release from a power plant may occur only once and the decay rate may be calculated from this release. However, if a release occurs more than once, or in the event of a nuclear war, nuclear detonations will occur up to several days after the first detonation in an exchange. You must calculate the decay rate of iodine-131 from the last detonation or release. Also, try to provide enough protection at your shelter sight so that you will not need to re-administer doses continually.

As mentioned, radioactive iodine will continue to contribute to whole body and kidney specific radiological dose even when the thyroid is blocked with stable iodine. To reduce the harmful effects of radioactive iodine, blocking the thyroid with stable iodine is very important, but further protective measures should be taken as well.

When planning to shelter from the effects of nuclear war or nuclear plant effluent, it is important to provide your shelter with an air filtration system. Forcing air through a charcoal filter will remove a good portion of iodine compounds even those compounds existing as a gas. This is due to iodine's propensity for forming compounds with whatever it comes in contact with, as well as charcoal's propensity for absorbing and holding impurities. Some of the radioactive iodine may have formed compounds with oxygen and nitrogen molecules in the atmosphere, however. Some of these compounds will probably penetrate your filter, though in reduced numbers.

If you have wisely positioned yourself outside of nuclear target areas and as far as possible from downwind areas of nuclear power plants, this will probably be sufficient in your preparations. Unfortunately, the world isn't perfect and you and your family may find yourselves in a heavily saturated area. You may add a water trap and condenser to your shelter's air filter (which will remove all radio-nuclides from your air supply), however, if your area is that heavily saturated you will do better to evacuate.

When evacuating, you must protect yourself from radio-nuclides like radioactive iodine. Your first line of defense should be a stable iodine blocking agent administered to every member of your group or family and pets.

Secondly, MOPP (Mission Oriented Protection Posture) gear is essential for keeping contaminants off your body and from being inhaled. Mask up using a modern gas mask with a NATO NBC rated filter. Though not perfect, this filter will protect you from inhaling most of the radio-nuclides in the air.

You will also need to suit up. Current issue charcoal lined MOPP suits are somewhat effective at protecting against radio-nuclides and gasses, however, their effectiveness is limited to the saturation of their charcoal lining. These current issue suits have also been stored at military facilities. This means that they have been treated with a fungicide, sprayed onto the garments. This fungicide is absorbed by the charcoal lining which, at least, partly saturates the charcoal, limiting it's protective efficacy. You will be better prepared by utilizing the non-permeable suits. Though, these non-permeable suits will be uncomfortable in warm weather, they are more effective at protecting against gasses, radio-nuclides and other agents.

Have a place to go! You ***MUST*** have evacuation routes already planned and a safe haven where you will be welcomed to go to. Decontaminate in a safe area. With your MOPP gear still on, jump into an empty 55 gallon drum and spray yourself down with a water hose. Next, use any kind of soap and brush to scrub your suit off with and rinse with the hose. Do not decontaminate your mask yet. Remove your suit from the hood down to the boots, while keeping your unprotected clothing and flesh out of the water collected at the bottom of the barrel. You may climb out of the barrel while you remove your MOPP suit. Next, wipe down your mask with baby wipes and rinse with a wet cloth. Remove your mask then remove the filter from the mask and place the filter in a plastic bag and mark it as contaminated. The water in the 55 gallon drum is also contaminated. Your MOPP suit can be recovered after another scrubbing and rinse. Seal the 55 gallon drum and mark it as contaminated.

After a future event or war, health hazards from radioactive iodine will cause rises in cancers, hypothyroidism and hyperthyroidism. To what extent can we expect radioactive iodine to impact our abilities to treat it's effects? You can ask yourself this right now.

Hundreds of millions of curies, if not billions of curies, has already been released into the atmosphere during atomic testing and accidental and deliberate releases of nuclear power plant effluent. Radioactive iodine has been disseminated world wide through these methods. While short lived isotopes like iodine-131 has already decayed to safe levels, iodine-129 still remains a hazard and exists in the environment. Practically every American has ingested the isotope in some manner. While cancers have been on the rise since these tests were conducted, there has been no indication that a threat to the human race as a whole exists. This is not very comforting to those who may have contracted cancer or another disease due to ingestion of radioactive iodine. Use the above knowledge and techniques in your survival preparations to defeat the threat of radioactive iodine.

The Nuclear Threat Today

by Corcceigh Green

Section 10: Radio-Nuclides

In Section 9, we briefly discussed an after threat of nuclear war or accidents called radio-nuclides. Radio-nuclides are elements that act like minerals and nutrients to plants and animals, but are harmful in that they are radioactive. They are capable of tissue damage, organ death, are a cause of cancer and chronic illnesses. Ingested in quantities they can cause shorter term death and extreme or acute illness. They contribute to chronic organ specific radiation exposure and in some cases, whole body exposure.

Radio-nuclides can exist in gaseous, liquid or solid form. They can contaminate soil, air and water, as well as contaminate the food chain. Some high level radio-nuclides have relatively rapid half lives and will cease to be a threat over a small period of time, while other radio-nuclides are low level radiation emitters having very slow half lives and will remain a threat over many decades, centuries and even millennia. Below is a brief enumeration and explanation of threats of the common radio-nuclides likely to be encountered after a nuclear detonation, war or accident. Since Radioactive iodine has already been covered in Section 9, we will exclude it from our list in this section.

Americium-241 is used in soil density and moisture testers for construction sights, smoke detectors and the M8A1 Chemical Agent Monitor. Americium-241 is an alpha, beta and photon emitter. When mixed with powdered beryllium and compressed as it is in the soil density and moisture tester, it becomes a neutron emitter. It is more likely to be encountered after nuclear detonations than accidents and can also be encountered in radioactive dispersal weapons. Americium-241 is a metal and will contaminate soil and the silt or bottoms of bodies of water. It can be ingested by fish and livestock and enter the food chain. Americium-241 is a low level radiation source having a half life of 432 years. It will last in the environment for a millennium or more.

Americium-241can be ingested through eating contaminated food or meat from animals who have ingested Americium-214, breathing in particles or drinking contaminated water. When breathed in, Americium-214 can settle in the lungs where it is hard to remove and will contribute to the organ specific radiation dose to the lungs. Americium-241 also stores in the bones and liver. This radio-nuclide will also contribute to the organ specific dose to the GI tract, skeletal system and liver as well as cause heavy metal poisoning. It will contribute to chronic illnesses and cancer.

Calcium-45. Calcium-45 is a radio-isotope of calcium. The body will not differentiate between the radio-isotope and the stable mineral. Calcium-45 will contaminate soil and the sediments of bodies of water. Calcium-45 is highly absorbable into the body where it is stored in the bones, lungs and mammary glands. It is ingested through eating contaminated meat, milk and plants from areas where the soil has been contaminated. It is also absorbable through the skin and by inhalation. Calcium-45 is a beta emitter and contributes to the organ specific dose of the skeletal system, lungs, breast in females and teeth. The radiological half life of calcium-45 is 163 days. It is a mid-low level threat and will remain active for a decade or 2. It's biological half life (the time it takes for half of the isotope to be excreted from the body) is about 50 years. Once absorbed it will remain a biological hazard to your body for a long time. It will contribute to leukemia, bone cancers, breast cancer, lung cancer and chronic illnesses.

Cesium-137. Cesium-137 is a beta emitter and strong gamma emitter. Cesium-137 is produced in large quantities by nuclear fission. It is a metal that turns liquid at 83 degrees Fahrenheit. In the heat of a nuclear detonation, it will be spread as a gas, becoming a liquid, then solid when temperatures cool below 83 degrees. During an accidental release from a power plant it is likely to be encountered as a liquid. Cesium-137 may also be encountered in a dispersal weapon as it is used in many forms of gauges measuring moisture content of soil and thicknesses of sheet metal and paper in industries.

Cesium-137 is highly absorbable into the environment and bodies of humans, animals and plants where it is deposited in the bones, teeth, mammary glands, muscle and soft tissues and fat. It will contribute to the whole body exposure dose. Cesium-137 will contaminate soil, water, plant and animal food sources especially milk. Cesium-137's biological half life is relatively short, but non-linear with 10 percent of the product passing through the body with a biological half life of 2 days. The remaining 90 percent will leave the body with a biological half life of 110 days. Cesium-137 has a radiological half life of 30 years and will remain in the food chain for centuries.

All cesium isotopes have the same chemical characteristics and biological half lives, however, there are 2 other cesium isotopes with differing radiological half lives. Cesium-134 has a half life of 2.1 years and will remain in the food chain for a decade or more. Cesium-135 has a radiological half life of 2.3 million years. It will be a more or less permanent radio-nuclide in the food chain. Radioactive cesium contributes to all forms of cancers.

Cobalt-60 is a common product of nuclear fission and especially when steel comes into contact with neutron radiation. Cobalt-60 is a gamma and beta emitter. It's half life is 5.2 years. It can be ingested by inhalation of dust or through the food chain from animals who are fed fish intestines. It will contaminate soil and the bottoms of bodies of water. Colloids can be absorbed into plant life grown on contaminated soil and passed into the food chain. A portion of the absorbed cobalt-60 is eliminated within 24 hours through feces. Much of the cobalt-60 is absorbed into the body and is accumulated in the liver, kidneys and skeletal system. This cobalt will remain in the body for years with a biological half life of 800 days where it will contribute to the specific organ dose of the liver, kidneys and bones, as well as the overall whole body dose. Cobalt-60 in close proximity, but not ingested will also contribute to the whole body dose due to the gamma radiation it emits.

Depleted Uranium. The depletion of uranium does not refer to the depletion of it's radioactivity. Depletion refers to the depletion of the uranium-235 isotope, leaving mainly the uranium-238 isotope. Uranium-238 is not fissionable and has a half life of 4.46 billion years. This makes depleted uranium a low level gamma and alpha emitter that will be in the environment virtually forever. Depleted uranium (DU) is used in munitions. When penetrating armored targets, a projectile made of DU will fracture and powderize. A portion of the projectile will also aerosolize. The aerosolized particles may be breathed in and absorbed through the lungs into the body. The powdered particles will corrode in the environment forming DU salts. Some of the salts formed by DU is soluble meaning that they will easily enter the body and enter into cellular structures. DU accumulates in the liver, spleen, kidneys, reproductive organs and GI tract and contribute to those organs' specific dose.

DU contributes to birth defects in infants. DU breaks down the DNA structures in reproductive organs, so whether the mother or father has been contaminated with DU is not of issue in cases of birth defects. DU is also a heavy metal which combines it's toxicity with it's radioactivity causing chronic illnesses, cancers of the reproductive organs, lung cancer, leukemia, cancers of the liver, spleen and kidneys, prostate cancer, cancer of the intestines and is quite probably responsible for the Gulf War illness brought home by our soldiers.

DU will contaminate soil, the bottoms of bodies of water and enter the food chain through fishing and through animals who have ingested soluble forms. Plants will also utilize soluble and colloided forms allowing DU to enter the food chain from plant sources as well. Currently, DU is coming into the U.S. via surplus from the Gulf Wars.

Iridium-192. Iridium is a dense metal. It's isotope, iridium-192 is used in industrial gauges to inspect welding seams and in cancer treatment. It is more likely to be encountered after the detonation of a dispersal weapon. It is gamma and beta emitter with a half life of 73.83 days. It will contaminate soils and the bottoms of bodies of water. It does not corrode except in the presence of fluorine gas. Iridium fluorine may be ingested by inhalation, drinking contaminated water, through the skin and eyes and by eating contaminated food. Uncorroded iridium is not soluble, but may be ingested by swallowing or eating animals fed the intestines of fish from contaminated bodies of water. Ingested iridium-192 will contribute to the specific organ dose to the GI tract, while the external presence of iridium-192 will contribute to the whole body dose.

Radioactive Iron. Iron isotopes are iron-55 and iron-59. Iron-55 has a half life of 2.7 years and is an X-ray and beta emitter. Iron-59 has a half life of 45.6 days and is a gamma and beta emitter. Radioactive iron will contaminate soil and the bottoms of bodies of water. It is created in nuclear fission and will be present after a nuclear detonation or power plant release. Iron can be absorbed into the body through food grown or grazed on contaminated soil. Most iron is incorporated into the hemoglobin of blood. Iron will also accumulate in the liver and spleen. Soft tissues will also accumulate iron due to blood content. Biological half life of radioactive iron will differentiate due to iron's chemical ability to combine with organic molecules. About 2 percent of radioactive iron will be eliminated from the body in 24 hours. The remaining radioactive iron has a biological half life of 5.48 years. Radioactive iron will contribute to the body's whole dose and ingested radioactive iron will contribute to the specific organ dose of the liver, spleen and GI tract.

Manganese-54. Manganese-54 is a gamma, X ray and beta emitter with a half life of 312.7 days. Manganese-54 is readily absorbable into the environment and will contaminate soil, water, milk, plant and animal foods. It will be present after the release of radioactive effluent from power plants and exist mainly in liquid form. It is easily absorbed by the body where over a third is taken into the bones. About 15 percent accumulates in the liver and the rest is accumulated into the soft tissues. Manganese-54 has a biological half life of 40 days in the skeletal system and 4 days in the organs and soft tissues. It contributes to the specific organ dose to the skeletal system and liver. It also contributes to the whole body dose. Manganese-54 contributes to cancers of the bone, leukemia, liver cancer and chronic illness.

Nickel-63. Nickel-63 is a beta emitter and dangerous only when ingested. It is introduced into the environment mainly as nuclear power plant effluent in liquid form. It will contaminate water and soil. Soil contamination will occur mainly around power plants. It's liquid form will help it to assimilate into the food chain with ease. Nickel-63 accumulates in the bones and contributes to the organ specific dose to the skeletal system and the GI tract. Nickel-63 is a heavy metal and beta emitter which contributes to leukemia, bone cancer, heavy metal poisoning and chronic illness. It's radiological half life is 100 years and it's biological half life is 667 days.

Radioactive Phosphorous. Radioactive phosphorous is phosphorous-32 and phosphorous-33. Phosphorous-32 has a radiological half life of 14.3 days. Phosphorous-33 has a radiological half life of 25.34 days. Radioactive phosphorous is created by nuclear fission and is readily absorbed into the environment. It will contaminate soil, water, plant life and the food chain. Radioactive phosphorous accumulates in the bone and soft tissues. It contributes to the organ specific dose to the skeletal system, heart, lungs, upper intestines and muscular system. It contributes to all forms of cancer, chronic illness and heart and lung disease. Radioactive phosphorous comes in soluble and insoluble chemical compounds. Soluble compounds have a biological half life of 19 days. Insoluble radioactive phosphorous has a biological half life of 3.164 years.

Potassium-42. Potassium-42 is a beta emitter with a half life of 12.4 hours. Potassium-42 is created by nuclear fission and is readily absorbed into the environment. It readily contaminates water and soil and is soluble to plant and animal life entering the food chain. Potassium-42 accumulates in the bones and liver. It contributes to leukemia, bone cancers and liver cancer as well as chronic illness. Ten percent of ingested potassium-42 is eliminated from the body within minutes. The rest has a biological half life of 9.59 years.

Radioactive Ruthenium. There are two primary isotopes of ruthenium created in nuclear fission. Ruthenium-103 and ruthenium-106. There are other isotopes, but they are not as prominent in the environment after an accidental release or detonation. Ruthenium-103 has a radiological half life of 39.26 days. Ruthenium-106 has a half life of 373.59 days. It is likely to be released in liquid form from power plants and as a gas after nuclear detonations. It is likely to contaminate soil and water, thus entering the food chain. Ruthenium is a heavy metal that accumulates in the bone. It contributes to the specific dose to the skeletal system and GI tract. It contributes to leukemia, bone cancers, heavy metal poisoning and intestinal cancers. Much like lead, ruthenium has such a biological half life that it remains in the body virtually forever.

Sodium-24. Sodium-24 is created in nuclear fission. It will contaminate soil and water, is highly soluble and will enter the food chain readily. Sodium-24 is a beta emitter. It's radiological half life is 15 hours and has a biological half life of 11 days. It's short radiological and biological half lives makes sodium-24 less dangerous than many other radio-nuclides. Sodium-24 will exist as a gas or liquid upon release into the environment from detonation or power plant spill. It is ingested into the body by eating foods or drinking water contaminated with sodium-24 and through breathing sodium-24 gas and through absorbing the gas, liquid or solid through the skin. It is accumulated in all tissues of the body. Sodium-24's radiological and biological half lives are short enough so that the isotope does not contribute to chronic illness and may not contribute to most cancers, but the isotope will contribute to the whole body exposure to beta radiation and the specific organ dose to the lungs and large intestine.

Radioactive Strontium. There are two major isotopes of radioactive strontium produced in nuclear fission. These are strontium-89 and strontium-90. Both isotopes are beta emitters. Strontium-89 has a radiological half life of 50 days while strontium-90 has a half life of 29 years. Strontium-89 is useful in medicine to treat bone cancer because of it's relatively short radiological half life. The biological half life of strontium isotopes is 30 years. Radioactive strontium will contaminate soil and the sediments of bodies of water. Micronized strontium isotopes will be taken into the plant life growing on contaminated soil and water and will be eaten and assimilated by animals and humans. Animal foods will also be contaminated in this manner. Humans will ingest strontium by eating contaminated crops and animals as well as drinking contaminated water and through breathing wind born particles. Strontium accumulates mainly in the bones and will contribute to bone cancer, kidney cancer, leukemia and chronic illness. It contributes to the specific organ dose of the skeletal system and kidneys.

Tritium. Tritium is useful in making dials and sights that glow in the dark. An isotope of hydrogen, tritium is readily created in nuclear fission and through neutron bombardment. Tritium is a beta emitter. It is more likely to be encountered in an accidental release from a broken night sight casing or dial. Tritium is readily absorbable into the environment and bodies of humans and animals upon contact with the skin, breathing in or eating and drinking contaminated food and water. It accumulates in all tissues of the body and contributes to the overall whole body dose for beta radiation. Tritium has a radiological half life of 12.4 years and a biological half life of 10 days. The biological half life of tritium can be decrease through flushing, which is merely drinking a larger amount of water than you need to take in. Thus tritium can be eliminated from the body relatively quickly limiting damage.

Zinc-65. Zinc-65 is most likely to be encountered as power plant effluent in liquid form. It is a beta, gamma and positron (anti-matter) emitter. It has a radiological half life of 244.4 days and a biological half life of 4 days. It is a trace mineral that is also a heavy metal. Stable forms of zinc are beneficial to the body, but in greater than trace amounts, zinc can contribute to health problems. Zinc-65 accumulates mainly in the bone marrow where it's high radioactivity is extremely harmful. Because it is a gamma emitter, zinc-65 poses an external as well as internal threat and will contribute to the whole body dose. It also contributes to the specific organ dose of the skeletal system and GI tract. It will contaminate water and soil and enter into the food chain via contaminated water and feed crops. Zinc-65 contributes to leukemia, bone cancers and chronic illness.

Radioactive Zirconium. Radioactive zirconium is created in nuclear fission and neutron bombardment. There are several isotopes of radioactive zirconium, but the two of major concern are zirconium-93 and zirconium-95. Zirconium-93 is a beta emitter while zirconium-95 is a beta and gamma emitter. Zirconium-93 has a radiological half life of 1.5 million years. Zirconium-95 has a radiological half life of 65 days. After a detonation, zirconium is released as a gas or liquid. Zirconium will, then, form salts and will contaminate soil and water sediments. It is easily absorbed in to the food chain. Radioactive zirconium accumulates in the bone and the soft tissues to a lesser degree. All forms of zirconium have a biological half life of 22 years. Radioactive zirconium contributes to bone cancer, leukemia and various other cancers.

Most of the radio-nuclides are dangerous because they are ingested. Their radiological half lives are not the only factor in the limits of the danger to the contaminated organism. Their biological half lives predict the time in which these hazards leave the body, which further limits their dangers. When factored together, radiological and biological half lives reveal the effective half life for a radio-nuclide that has been ingested. Each radio-nuclide has it's own unique effective half life. The effective half life is factored by a simple mathematical formula. **Et=(Bt x Rt) / (Bt + Rt)**. Where Et is the effective half life, Bt is the biological half life and Rt is the radiological half life. The effective half life is the factor which will give you an idea of the damage your body or specific organ will accumulate due to ingestion. It is the effective half life that will be recorded by the radiological monitor in Section 7 as your dose rate.

It may be unusual for a group to have laboratory equipment to detect the ingestion of radio-nuclides, should you be able to access hospital testing after a crisis, a laboratory technician will be able to tell you what radio-nuclides you have ingested. You may then calculate this hazard into your dose rate. Use the list of radio-nuclides above to find your biological and radiological half lives, then use the formula above to find the effective half life and factor it into your dosimetry. For example John had left his shelter to fix the air filter shortly after the arrival of fallout. In this time he was wearing a respirator, but did not fit it properly and ingested a small quantity of cobalt-60. In this case, cobalt-60 has a half life of 5.2 years and a biological half life of 800 days. **Bt=800, Rt=(5.2 x 365)=1898**. As you can see, you must convert your factors to the number of days that form a half life for an accurate reading unless both Bt and Rt are measured in years. The same logic applies when one factor is measured in hours. Both Factors must be converted to give it's sum in the same measure of time.

Now that you have the factors for your formula, you may proceed to find your effective half life. In the above example, your figures will formulate as follows: **Et=(800 x 1898) / (800 + 1898) = 1518400 / 2698 = 562.79.** This gives you your Et as 563 days. (Round up to the next day for ease of factoring time tables.) If John had ingested 5 millirems of cobalt-60, he will eliminate half of this hazard every 563 days or every 1.55 years. This should be recorded in John's dosimetry and special notes should be made for the specific organs that store the radio-nuclide.

Radio-nuclides can remain a hazard in the soil and water for years after a nuclear war or accident. They can be present in the food chain for as long. We will look at methods to reduce our risk to these hazards in the next section.

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The Nuclear Threat Today

by Corcceigh Green

Section 11: Aftermath

In the preceding sections, we have discussed the initial effects and short term hazards of nuclear war, nuclear terrorist events and nuclear accidents. We have discussed methods for minimizing these hazards and surviving the period of this crisis. Because nuclear fission can create products that are long term, the aftermath of such events will be long term as well.

Section 10 detailed the hazards of radio-nuclides and their long term effects. Soil, water, the food chain and the whole of the environment will be contaminated by radio-nuclides for centuries to come after any wide spread nuclear incidents. Even small scale incidents have released quantities of radio-nuclides that have been hazards to American communities. Some radio-nuclides have entered and remain in our environment. Others have since decayed to safe levels. In this section, we will focus on methods to limit or negate this long term threat as best as possible.

Of course, we all know to seek shelter, filter our air and water and protect ourselves by wearing NBC rated filter masks or respirators and wearing non-permeable garments when exiting our shelters during the short term of the event. This helps us to keep from ingesting radio-nuclides and fallout particles. While inside the shelter, radio-nuclides will be filtered out by our air filtration system detailed in Section 5. Your shelter will block much of the gamma and X radiation from reaching you. Your non-permeable MOPP (Mission Oriented Protective Personnel) suit that you'll wear when outside the shelter will also keep you from ingesting radio-nuclides and fallout particles as well as keep them off your clothes and body, but will not block gamma and X radiation from penetrating your body.

There will come a time, however, when the short term hazards of the crisis will have decayed and it will be time to begin restoring your surroundings to produce the necessities of life. Though, you must have storage food and while properly contained, radio-nuclides will not contaminate this food, your storage food will eventually be depleted and you will be forced to acquire clean food from another source. There is probably no way for you to test for radio-nuclides in foods unless you are rich and are preparing now by purchasing lab equipment and hiring technicians. I'm going to assume that you can't afford this route.

A year's supply of food for each member of your family/group will be the least amount of food storage that you'll need. Food and possibly uncontaminated farm land may become hard to find after a nuclear attack. You can not rely on your food reserves to last forever. At some point you will need to grow your own food, but if you have experienced fallout your soil will be contaminated. Plants that are grown in contaminated soil will draw in radio-nuclides as though they were any other type of nutrients and in turn will impart these radioactive elements to you when you ingest them.

As a defense against this hazard set up airtight green houses at your safe area. These will keep fallout off of the soil within the green houses. Where larger fields for crops, such as wheat are needed, build a large metal warehouse and make it airtight by caulking seams and covering vents, windows, doors and openings with six ml plastic. In this warehouse, you will have stored, (before a nuclear incident), fourteen thousand, five hundred, and twenty, (14,520), cubic yards of top soil for every acre that you need for crops.

After fallout has decayed to a safe level, use a diesel tractor with blade or bulldozer to scrape four to twelve inches of top soil from your fields. Pile this soil in an out of the way area, away from water and mark it as contaminated. Replace the soil that you have scraped from your fields with soil from your warehouse. It generally takes two acres of wheat to sustain a family of four for a year. If there are eight members in your family/group, you will need four acres of replacement top soil in your warehouse for this one crop. In your warehouse, the soil will remain uncontaminated, as fallout particles will be unable to reach it.

The above option will be too costly for many people. Another solution that can be used by those with less funds would be to place tarps and/or plastic sheets over your fields and bury them with whatever rocks, soil or debris necessary to keep them from blowing off. When fallout has decayed to a safe level remove the covering as carefully as possible not allowing the fallout or contaminated debris to fall from the covering onto your soil. Dispose of the covering and debris in sealed drums or as you would have disposed of the contaminated soil. Keep all fallout contaminated material from contaminating creeks, streams or water supplies.

If neither of these solutions are suitable for your situation, you could try scraping the appropriate amount of soil off of your fields then use the land as is. It will be poor growing at first, but the new top soil can eventually be conditioned to grow crops well. Raising radiation resistant livestock like chickens will help with this as well. Add chicken compost that has not bee exposed to fallout to your soil that has been scraped. This will build the fertility and nutrient levels of your soil back quickly. Also grow green manure crops that are also useful as food crops. Buckwheat can be planted on poor soil, it’s seeds harvested as a grain food for humans and livestock and the green leaves and stocks tilled back into the soil to rebuild humus and nutrient into a new top soil.

Of course, you’ll have to have some seed stored back for this. This is nothing new to farmers or homesteaders, but groups planning to retreat will need to buy and replace these seeds every year. Make certain your seeds are non-hybrid so that you can save seeds back from your crop every year and use them to grow new crops the next year.

Yet another solution would be to let the land grow wild for several years. You’ll need to plant the field in grass to keep the radio-nuclides from being bourn away by winds and dust storms into populated areas. Keep the fields watered to keep the grass lush and healthy. At the end of each growing season, cut the fields with a scythe or any other equipment that you might have and haul the wild hay away to a safe area for storage. Do not utilize the wild hay, as it will contain radioactive nutrients and do not utilize it's compost, as this will replace the radioactive nutrients back into the soil. Store the wild hay as you would contaminated soil. Eventually, the radioactive nutrients will be farmed out of the soil in this manner.

Orchards may also be reclaimed and utilized for food production. Trees take in a majority of their nutrients from deeper in the ground than fallout will reach. By rinsing the ground in and around your orchard with water and allowing the water to run off, a good deal of fallout particles will be rinsed away from your orchard leaving the soil less contaminated. Keep the grass cut around your orchard and trees and rake the grass away and store it as you had other contaminated material. If you had placed tarps over the ground around your trees you will be able to rinse away almost all of the fallout. After this, allow the orchard to produce for the next three or four years. At the end of each growing season gather the fruit, fallen leaves and limbs and store as you had the wild hay for your fields. The radioactive nutrients can be farmed out of your orchard in this way, as well.

This method is not 100%, especially in the case of your fields, but you must eat and this method will reduce the amount of radioactive nutrients that you ingest. If you have used the tarp method for your orchard and have rinsed the trees along with the tarps allowing the fallout to run off, there is no reason that you shouldn't utilize your trees' fruits starting the first harvest.

Another consideration will be in staying warm in the winter. Power companies may still be up and running after a single terrorist incident in another city, but probably not after a nuclear war. Many survivalists rely on wood stoves or fireplaces to provide heat for their families. Other than moving to a tropical climate, this is a good option for the consideration of nuclear war and terrorism, as well. Do not leave your firewood unprotected from fallout; however; or you will track fallout into your shelter creating a radiation hazard within your living quarters. Burning fallout contaminated wood will also release fallout back into the atmosphere.

Keep your firewood in a warehouse or under tarps. Treat the wood lot from which you intend to gather firewood as you would an orchard, as radioactive nutrients can be left in ashes or released into the atmosphere by burning wood grown in contaminated soil. If you must burn wood suspected of being contaminated with radio-nuclides, limit the amount of ash that backs into your shelter by keeping the stove door closed when burning. Vacuum or sweep immediately after loading the stove and wear protective clothing and a respirator when cleaning the stove and pipes. Store the ash and creosote as you would other contaminated material.

Livestock must be another consideration. Livestock must have clean air, water, food and shelter to survive. In many cases, shelter can be provided by building mangers. While well ventilated, mangers can be closed off easily and their heavy rock or earth construction render excellent protection against ionizing, beta and alpha radiation. Emergency air filtration is easy to make as detailed in Section 5. Tunnels from shelters to mangers can be constructed allowing occupants to reach mangers to feed, water and pump air to livestock. Also shelters for a family/group may be built into a manger easily negating the need to construct tunnels. Portions of larger mangers can be fenced off and partitioned to provide room for livestock and human occupant alike.

Enough foods like hay, grain and commercial feeds can be stored within the manger to last livestock through the immediate crisis while a greater amount may be stored within airtight warehouses or sheds for use after emerging from the shelter. Treat your fields by scraping top soil or removing tarps and re-planting before turning livestock into them. Do not allow your livestock to wonder into contaminated fields.

You will have to grow your own crops to feed your livestock if you wish to keep their food products like eggs, milk and meat safe. This means treating a good deal of potential farm land. One thing that can help is to raise animals that are specially bred for small spaces and reduced food intake. This will include chickens. Even large breeds of chickens are small enough to be raised in a minimum of space and much less than many animals. They will provide eggs and meat in an aftermath. Goats provide milk and meat and eat much less than a full size cow. Some species of cattle, like the Irish Dexter and the Scottish Highland grow much smaller than other species and can be bred for dual purpose (milk and meat) production.

Such specially bred livestock require much less growing space and are more easily cared for in the aftermath of a nuclear event. The only problem is in breeding them for the long term. You will need to develop breeding programs for your livestock so that you can replace stocks that have been culled or die. This is most easily done through cooperation with other survivors. By sharing your knowledge of clearing farm land of radio-nuclides and helping others to do so, surviving herds and flocks of livestock may be bred in other communities and bred to your herds and flocks, continuing the future of these species as well as your descendents.

Water from deep water wells will remain uncontaminated from radio-nuclides and fallout. All other water must be filtered. Fortunately this is easily accomplished. Use the instructions provided in Cresson Kearny's *Nuclear War Survival Skills* for filtering water or purchase an Aqua Rain or Berkey now. They have the ability to filter out radio-nuclides and fallout. You'll need a deep water well to grow crops in order to keep contaminated water off your soil and food.

Pay attention to weather conditions on your future aftermath homestead. Any storm front may blow in radio-nuclides. Any wind blown radio-nuclides may be removed. You will need to check over your lands every time a weather front moves through. Use a Geiger-counter to locate newly accumulated particles and dig them out of your soil with a trowel. Don't forget to suit up in your protective clothing and respirator first. Place the contaminated soil in a sealable jar or bucket, mark as contaminated and store it with other contaminated material.

Clean farm land, livestock and food are essential in rebuilding a future. This section gives enough cursory knowledge to reclaim contaminated land in your area and help other communities to reclaim land as well. With this start, agricultural endeavors can feed what's left of a recovering nation. When the problems with food production have been solved, industries can begin to reclaim land and the environment as well which will recreate a viable society again. There will be much more to address than the above when rebuilding a community in a nuclear aftermath. Unfortunately, due to space, this is all we can address for now. A bibliography is included below. Acquiring and reading the titles listed will help you to prepare better. Documents like our Constitution and Declaration Of Independence will preserve the kind of society and government we have deemed best to live with.

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The Constitution for these united States of America

The Declaration Of Independence

The Federalist Papers

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Twighlight

Pug Mahone

Readers may have noticed that my column was not present in the last issue. Never fear, I have not been canceled. In fact, I've been told that this newsletter may need to present a more politically inspiring editorial in the future. That's right up my alley and I'm going to be happy to stick it right up the alleys of the corrupt politico organizations in the District of Criminals and the various States. For now, I'm told we need something of a nuclear survival theme. This is partly why my column was absent in the last issue. I'm not a nuclear expert. Even during the cold war when we survivalists thought the commies and the U.S. were going to be pounding each other with atomic bombs, I had just a small readiness. Of course, I had a food supply, water, guns and ammo, but as a shelter, I just had a small hole in the side of a hill with a dirt roof I used as a part time root cellar. No air filters or fancy anti-radiation entrance, just a kind of hole in the ground. The darn thing even leaked when the snow melted in the rainy season.

I learned a lot better since then. I, like most Americans, am lucky that the bomb was never dropped. Or hasn't been dropped yet, that is. I'm even luckier than most Americans. Most Americans are going about their business as if the bombs will never fall at all. I know better because I am lucky enough to run with a crowd who has done some thinking on the problem of the bomb. LMI's layout editor Corcceigh Green happens to live near my stomping grounds. He knows a lot about nuclear war. He went to school to learn this stuff so he could tell his barefoot hillbilly friends like me how to survive. As I am convinced that he is right about nuclear war being a danger today, I want to take action that will get me prepared to survive the danger.

I have read what Corcceigh has written on the subject and am convinced that I don't want to embark on the subject without a lot of help. I have done what many Americans should do. I have secured a position in a group to ride out atomic fallout, then get help in salvaging my property in the aftermath. This arrangement is mutually beneficial for all involved. I bring an extra pair of hands and, though I am no expert, I understand the dangers of the bomb and fallout and understand what tasks should be performed and why. I am also an extra rifle (and bayonet) for defense of the group and can contribute in the aftermath by contributing growing land and resources from my woodlot. I have also learned how to improve my little shelter/hole and make an air filter in case I am stuck at my place when I need shelter.

That is the option many Americans can have for their survival against the danger of nuclear war. Become part of a group that is equipped and know what they are doing. Don't just think that you can join and just show up when the bombs start falling, though. You will need to learn and to contribute. Oh gosh, how awful, you may have to learn to contribute to your own survival! That's why we're all here reading this newsletter isn't it?

What to do when the shelter you are taking refuge in isn't yours. Like I said above, if you don't have all of the know how you need to put everything together yourself, join a group. You will have to get along with everyone in the group. Not being an axe murdering miscreant loner, (I prefer bayonets), I can get along with anyone who recognizes my Natural Rights or isn't a commie. If you don't get along with everyone, you should ask the people in the groups that has the know how to share their info with you and form your own group and maybe bring some of the other group members who can stand you over to your new group.

You should contribute to the hands on projects of the group. Since you are joining because you don't have the know how to get things done on your own, you will learn more when you are involved in fixing up the shelter and putting together the equipment. You also need to provide for your own personal needs. One rule we have is to bring our own bed rolls. Each of us has a pillow, sleeping bag and something to lay on besides the floor. I store a lot of my necessities at the shelter in a large cardboard box. When the time comes those necessities come out, the box collapses and goes on the floor. An exercise mat goes on top of the box, then the sleeping bag and pillow.
Another rule we have is everyone stores at least a month of food at the shelter. A month is the minimum we

are expecting to stay sealed in. It is encouraged to either store more at the shelter or bring more with you when the time comes. Everyone is responsible for storing more food at their homes or caches. It is urged that at least a year's supply per person is needed. Everyone contributes to extra water filter units or brings along their own. Best food to bring is canned meat, fruits and vegetables. Canned food adds to your water intake. This tends to conserve water while feeding your face. For food that is stored for a longer amount of time we use dehydrated and nitro packed food in cans or buckets.

We are planning to eat three meals per day for the first few days, then to save on food we will cut down on the amount of food we eat until we are eating two meals a day as long as we stay healthy. Our food storage continues to call for storing enough for three meals per day for the full month, though. That should give us an extra margin in case we need to stay in the shelter longer. That will also help us save food and poop out much less. Poop can be a problem when you're sealed up inside a shelter. We plan to use a portable john and plastic trash bags. You take a crap in the proper room, then seal up your doody, dump it in a sealable bucket and seal that, then light up an air freshener stick. After a week, it'll probably be possible to start dumping this crap outside the shelter. Baby wipes will save on water for washing. You won't have to use the plumbing for baby wipes which you can't use because it'll pump fallout inside the shelter with the water. For more comfort and sanitation, bring some extra wipes and toilet paper too.

Thirty one or so days in a shelter is going to be a long and boring time. If you want light and entertainment from any of the electronic gadgets you'd better bring batteries. Whatever you have in the drawers and cabinets at your place should be scooped up and brought with you to the shelter. For us hillbillies who ain't got no electronic learnin', bring magazines (that you aren't embarrassed to show the younguns) , books and a sticky board dart game. A song book and your guitar or other musical instruments will keep your group occupied and your mind off your bayonets for a while.

The shelter will be a refuge for a long time even after atomic fallout has weakened. Each of the group's homes will be cleaned from fallout before the families move back to their places. Yards and gardens will also be salvaged. That will be done one at a time until the group's families are living at their homes again. Farms and crop lands will be salvaged year by year until we have some bon-a-fide agricultural projects going. The same goes for other projects. Small cottage projects like gunsmithing, ammunition reloading, tool making and lumber will create a trading economy and eventually life will find a normal balance again.

That's our plan anyway. It can be your plan too. A bunch of regular Americans with the right info can put their heads together and come up with a good plan to not only survive an atomic catastrophe, but can form the core to restore an economy and the Constitutional Republic afterwards. Now let's get to work.

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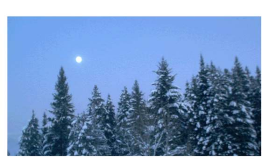

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