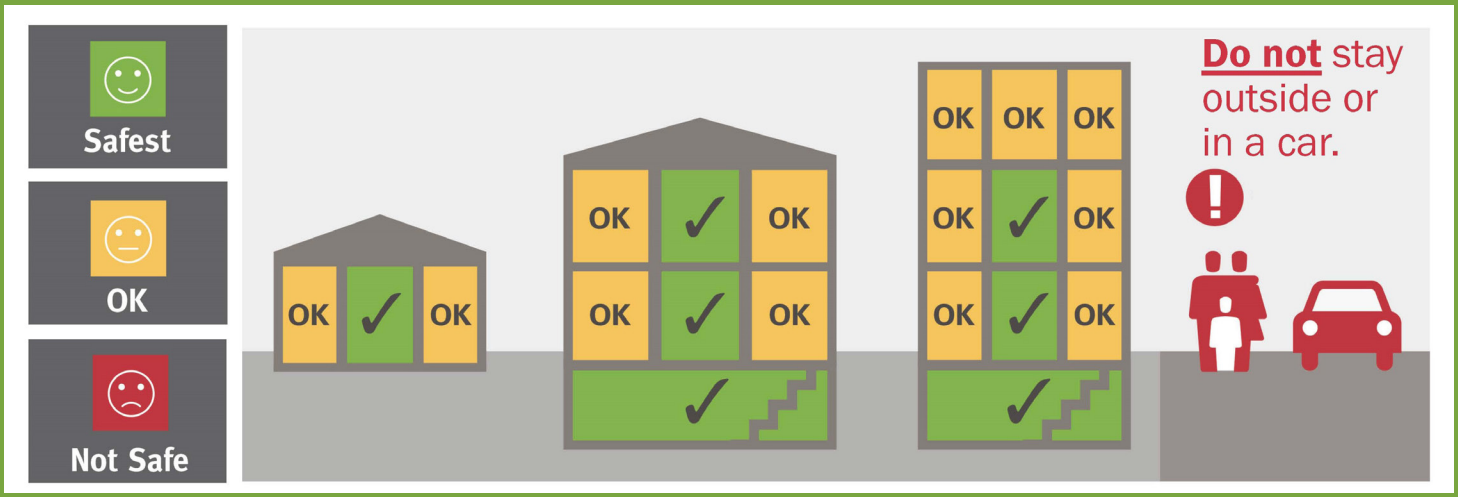
JOURNAL OF
Civil DEFENSE
VOLUME 59
2024 ISSUE 1

EXPEDIENT SHELTERING
in Radiological Emergencies



www.TACDA.org

Together We Are Stronger. Let Your Voice Be Heard!

Contact your elected officials! Tell them your emphatic desire to have an official Civil Defense Program for our citizens, no matter the cost.

Our United States government currently:

- Has NO Department of Civil Defense
- Does NOT educate our children about the effects of nuclear weapons
- Has NO fallout shelters for the general public
- Has NO directives on how to build hardened fallout shelters
- Has NO information for post-war survival
- Has NO government directed warning systems, sirens, evacuation plans, or general preparations for nuclear attack available for the general public

Here are three easy ways to find and contact your Senators:

1. **By Email**
   Go to https://www.senate.gov/general/contacting.htm, locate your state's senators with the provided links, and email them.
2. **By Telephone**
   Call the United States Capitol Switchboard at (202) 224-3121.
3. **By Postal Mail**
   You can direct postal correspondence to your senator or to other U.S. Senate offices at the following address:

   For Correspondence to U.S. Senators:
   Office of Senator (Name)
   United States Senate
   Washington, D.C. 20510

   For Correspondence to Senate Committees:
   (Name of Committee)
   United States Senate
   Washington, D.C. 20510

Click here or scan the qr code to contact the United States Senate.

IN THIS ISSUE

WARNING:

When building a shelter, seek a professional design from appropriate, certified professionals, including electrical and civil engineers and ask to see the appropriate credentials from your builder and installer. Secure your area while under construction. Consult a geotechnical engineer to test your water table and soil type, and do not place your shelter in an area that could flood or accumulate water. Wet shelters could destroy and contaminate your supplies. You must keep entrances securely covered at all times. A poorly built or flooded shelter could result in death or injury from structure failure or dangerous levels of CO or CO_2 or other chemicals. TACDA and the authors of JCD journal entries offer this material as conceptual ideas, only, and cannot legally design your shelter nor can it ensure it has been safely constructed.

TACDA

PO BOX 1003
Sandy, UT 84091
www.tacda.org
info@tacda.org
Office: (800) 425-5397
Fax: (801) 662-0367
ISSN: 0740-5537

PRESIDENT'S MESSAGE

Your mind is your most important survival tool. If you know what to do in an emergency situation, you are much more likely to survive – as are the family and friends that are with you. I would suggest that you use the book, "Nuclear War Survival Skills" by Cresson Kearny, to get the information that you need to survive potential emergencies. The book teaches how to use commonly available materials to purify water, make or find expedient shelter for nuclear events, grind wheat, cook food, and perform many other necessary functions in the event of a disaster. The print form of the book can be ordered on the TACDA website or downloaded from many sources on the internet. I would suggest that every household obtain a copy of this book and become familiar with its contents.

I would also suggest that you use this publication, the "Journal of Civil Defense", to provide additional information that you may need to survive in a disaster situation. Members receive a free downloaded version of the journal each time it is released. You may also purchase a subscription for a paper copy. The content provides practical information about how to prepare for many emerging threats.

We live in perilous times and there are many potential threats on the horizon. I would suggest that you prepare your minds for what may come. I wish you well in your efforts.

Sincerely,

Jay Whimpey, PE
TACDA President

FROM THE DIRECTOR

Expedient Sheltering

By Roseanne Hassett, Executive Director

"Expedient" (noun): something done or used to achieve a particular end, usually quickly or temporarily

At TACDA, we get many questions from our members about civil defense tactics, but the question that we get asked the most is, "How do I protect my family in a nuclear event if I don't have access to a shelter?" First, take comfort in the fact that nuclear fallout is survivable! Begin planning now. You can take proactive steps in your preparations and make plans for an expedient shelter by studying this journal, deciding where the safest place in your home is to shelter, and gathering your supplies.

You don't have to have a basement or live in a traditional brick home to survive low levels of nuclear fallout. By utilizing books, food storage, water, heavy furniture, mattresses, and other readily available supplies in your home, you can shield yourself from much of the radiation exposure. Equally, if not more important, is to have adequate ventilation, food, and water supplies. In a nuclear event, more people will die from lack of food, water, and medicine than will die from the effects of nuclear weapons.

Carefully follow the instructions and guidelines that are outlined in this journal and past Journals of Civil Defense (JCD), as well as by FEMA and other trusted sources on nuclear preparedness. ALWAYS seek professional advice from certified civil engineers when building a shelter of any kind. Dangerous levels of CO or CO2 and/or a poorly built structure could result in death or injury. TACDA and the authors of the JCD journal entries offer practical advice but cannot legally design your shelter nor ensure it has been safely constructed. Through meticulous preparation and adherence to safety protocols, most families can endure the effects of a nuclear attack. Remember to STOP: Study, Think, Observe, and Prepare!

BE PREPARED FOR A NUCLEAR EXPLOSION

Nuclear explosions can cause significant damage and casualties from blast, heat, and radiation but you can keep your family safe by knowing what to do and being prepared if it occurs.

FEMA

FEMA P-2149/March 2018

A nuclear weapon is a device that uses a nuclear reaction to create an explosion.

Nuclear devices range from a small portable device carried by an individual to a weapon carried by a missile.

A nuclear explosion may occur with a few minutes warning or without warning.

Bright FLASH can cause temporary blindness for less than a minute.

BLAST WAVE can cause death, injury, and damage to structures several miles out from the blast.

RADIATION can damage cells of the body. Large exposures can cause radiation sickness.

FIRE AND HEAT can cause death, burn injuries, and damage to structures several miles out.

ELECTROMAGNETIC PULSE (EMP) can damage electronics several miles out from the detonation and cause temporary disruptions further out.

FALLOUT is radioactive, visible dirt and debris raining down that can cause sickness to those who are outside.

Fallout is most dangerous in the first few hours after the detonation when it is giving off the highest levels of radiation. It takes time for fallout to arrive back to ground level, often more than 15 minutes for areas outside of the immediate blast damage zones. This is enough time for you to be able to prevent significant radiation exposure by following these simple steps:

GET INSIDE

Get inside the nearest building to avoid radiation. Brick or concrete are best.

Remove contaminated clothing and wipe off or wash unprotected skin if you were outside after the fallout arrived.

Go to the basement or middle of the building. Stay away from the outer walls and roof.

STAY INSIDE

Stay inside for 24 hours unless local authorities provide other instructions.

Family should stay where they are inside. Reunite later to avoid exposure to dangerous radiation.

Keep your pets inside.

STAY TUNED

Tune into any media available for official information such as when it is safe to exit and where you should go.

Battery operated and hand crank radios will function after a nuclear detonation.

Cell phone, text messaging, television, and internet services may be disrupted or unavailable.

HOW TO STAY SAFE

IN THE EVENT OF A NUCLEAR EXPLOSION

WHAT TO DO: NOW Prepare

Identify shelter locations. Identify the best shelter location near where you spend a lot of time, such as home, work, and school. The best locations are underground and in the middle of larger buildings.

While commuting, identify appropriate shelters to seek in the event of a detonation.

Outdoor areas, vehicles and mobile homes do NOT provide adequate shelter. Look for basements or the center of large multi-story buildings.

Make sure you have an **Emergency Supply Kit** for places you frequent and might have to stay for 24 hours. It should include bottled water, packaged foods, emergency medicines, **a hand-crank or battery-powered radio** to get information in case power is out, a flashlight, and extra batteries for essential items. If possible, store supplies for three or more days.

FEMA

FEMA P-2149
Catalog No. 17233-16

WHAT TO DO: DURING Survive

If warned of an imminent attack, immediately get inside the nearest building and move away from windows. This will help provide protection from the blast, heat, and radiation of the detonation.

If you are outdoors when a detonation occurs take cover from the blast behind anything that might offer protection. Lie face down to protect exposed skin from the heat and flying debris. If you are in a vehicle, stop safely, and duck down within the vehicle.

After the shock wave passes, **get inside the nearest, best shelter location** for protection from potential fallout. You will have 10 minutes or more to find an adequate shelter.

Be inside before the fallout arrives. The highest outdoor radiation levels from fallout occur immediately after the fallout arrives and then decrease with time.

Stay tuned for updated instructions from emergency response officials. If advised to evacuate, listen for information about routes, shelters, and procedures.

If you have evacuated, do not return until you are told it is safe to do so by local officials.

WHAT TO DO: AFTER Be Safe

Immediately after you are inside shelter, if you may have been outside after the fallout arrived:

Remove your outer layer of contaminated clothing to remove fallout and radiation from your body.

Take a shower or wash with soap and water to remove fallout from any skin or hair that was not covered. If you cannot wash or shower, use a wipe or clean wet cloth to wipe any skin or hair that was not covered.

Clean any pets that were outside after the fallout arrived. Gently brush your pet's coat to remove any fallout particles and wash your pet with soap and water, if available.

It is safe to eat or drink packaged food items or items that were inside a building. Do not consume food or liquids that were outdoors uncovered and may be contaminated by fallout.

If you are sick or injured, listen for instructions on how and where to get medical attention when authorities tell you it is safe to exit.

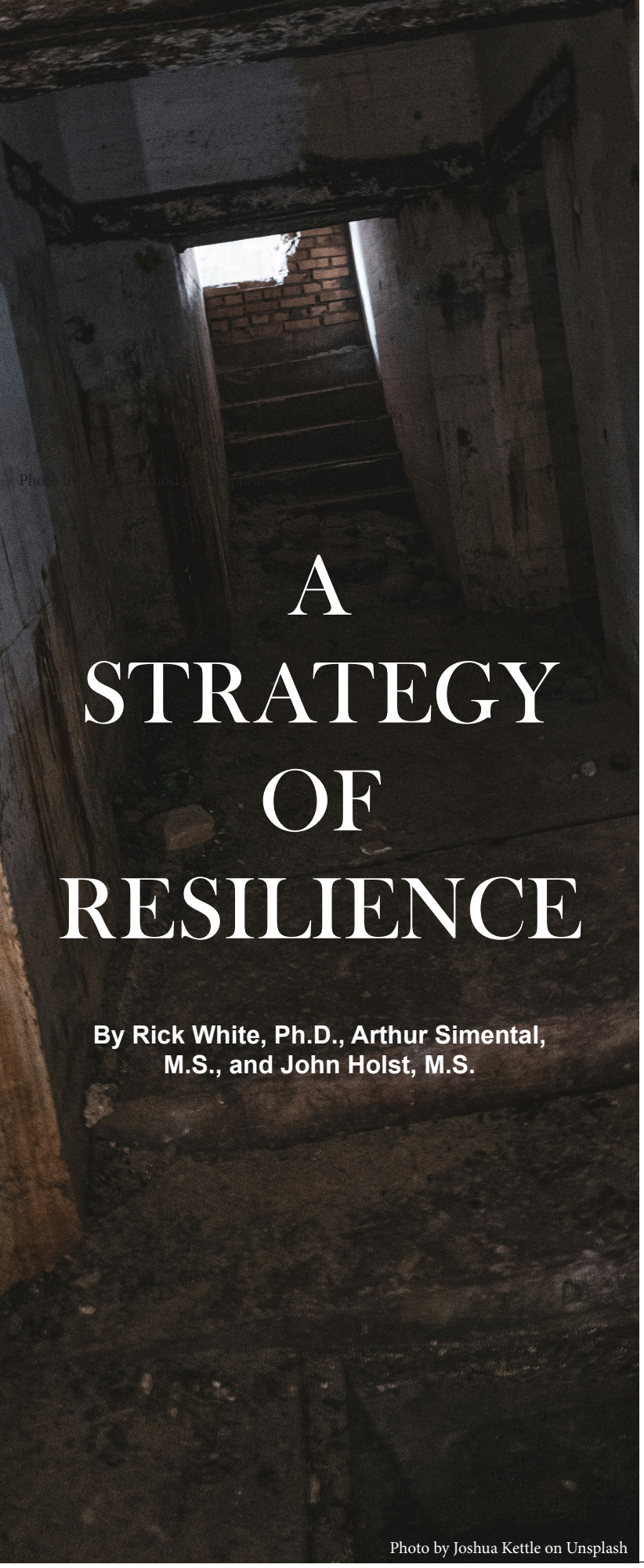
Take an Active Role in Your Safety

Download the **FEMA app** to get more information about preparing for a nuclear explosion.

Go to **Ready.gov**: https://www.ready.gov/nuclear-blast

Go to the **Centers for Disease Control**: https://emergency.cdc.gov/radiation

Go to **Health & Human Services**: https://www.remm.nlm.gov/nuclearexplosion.htm



A STRATEGY OF RESILIENCE

By Rick White, Ph.D., Arthur Simental, M.S., and John Holst, M.S.

Photo by Joshua Kettle on Unsplash

Excerpt from "21st Century Homeland Defense & Civil Defense: An Analytical Study" published by the Homeland Defense Institute.

War in Ukraine has raised the prospects of a nuclear exchange between Russia and the US to a height not seen since the Cold War. In pursuing their own national interests, China and North Korea have also raised the nuclear stakes. Even if these countries choose not to risk a nuclear war with the US, they might still venture other forms of strategic attack to achieve their national objectives. Although a nationwide electromagnetic pulse (EMP) or cyber-attack against the US might not inflict the destruction of a nuclear attack, the consequences would still be catastrophic. How can US citizens be protected from any such attack?

Protecting the US population from attack is a primary responsibility of Homeland Defense. Homeland Defense has been a concern since the founding of Jamestown in 1607. The US Army and US Navy have fought to protect American interests and territory since 1775. The threat of direct attack on the US by conventional military forces diminished significantly after World War II in 1945. However, the threat of direct attack on the US with long-range nuclear weapons became an increasing reality after the Cold War with the Soviet Union began in 1947. Technical challenges made early anti-ballistic missile systems impractical, so the US relied on a strategy of retaliation to deter nuclear attack until the end of the Cold War in 1991. Confronted with the challenge of coordinating US defenses across four different commands, President Bush revised the Unified Command Plan after 9/11. The US Northern Command (USNORTHCOM) was created and charged with the conventional defense of the continental US. The US Strategic Command (USSTRATCOM) retained control over the US nuclear triad. The US Cyber Command (USCYBERCOM) was later created to conduct offensive and defensive cyber operations. Even after 9/11, US defense strategy remains predicated on deterrence, and the threat of direct conventional attack by a foreign power is still unlikely, which is why, in part, USNORTHCOM has no permanent, assigned forces. However, USNORTHCOM does have a role to play in US deterrence strategy. According to the 2022 National Defense Strategy, one of the key aspects to Homeland Defense Strategy is resilience.

Civil Defense is also responsible for protecting the US population from attack and has undergone significant evolutionary change. The 1950 Civil Defense Act created an agency to coordinate federal efforts and assist state and

local governments with protecting citizens from nuclear attack. Fallout shelters were deemed the best means for surviving nuclear attack, but they were also considered too expensive and never publicly funded. Urban evacuation was a cheaper alternative, but it was also less effective and never seriously exercised. As public support waned, the Nixon Administration introduced a "dual use" policy whereby Civil Defense funds could also be applied towards Emergency Preparedness projects. In 1979, President Carter issued Executive Order 12148 creating the Federal Emergency Management Agency (FEMA) to coordinate federal efforts and assist state and local governments with protecting citizens from natural disasters. In 1993, the Civil Defense Act was repealed after the end of the Cold War. Following 9/11, the Federal Emergency Management Agency was made part of the new Department of Homeland Security. Absent the threat of nuclear war, the remaining Civil Defense authorities transferred to FEMA in 1988 were subordinated to Emergency Preparedness. They had to be. The frequency and severity of natural disasters have grown fourfold since the 1980s. Since 2003, FEMA has used Homeland Security Grant Program funding to better prepare state and local governments for disaster. Since 2005, the basic strategy of the National Preparedness Goal has been resilience.

FEMA has gotten quite proficient at helping state and local governments prepare and respond to natural disaster. The problem is that even the largest natural disasters are only regional. Large parts of the nation remain unaffected and provide a safe haven from where disaster assistance can be deployed. This would not be the case following a nationwide nuclear, EMP, or even cyber attack. There would be no safe havens from where to mount assistance. FEMA would be overwhelmed. The National Response Framework would likely fail. States would be on their own. State governors would need every resource at their disposal to restore basic services and deliver food, water, and medicine. They would likely hold on to their National Guard. They would likely ask for assistance from local military installations.

Military installations have manpower, supplies, and transportation that would prove most helpful to state governors following a nationwide attack. DOD Directive 3025.18 gives local commanders immediate response authority to save lives and prevent suffering. However, in the wake of a nationwide attack, local commanders might be understandably reluctant to share their resources. Defense Support of Civil Authorities (DSCA) might be the key to resilience that the 2022 National Defense Strategy says is

Photo by Jake Espedido on Unsplash

essential to Homeland Defense. But how will USNORTHCOM perform DSCA when FEMA is overwhelmed, and the nation is in shambles? Perhaps they can adapt and improvise as they did following Hurricane Maria in 2017. Or even better, they could plan ahead and have authorities and procedures in place so local installation commanders don't have to wait on orders when the state governors come asking for assistance.

The absence of permanently assigned forces and Posse Comitatus present challenges to developing DSCA contingency plans, but nothing that can't be overcome. Perhaps such plans already exist, but when was the last time they were updated? And equally important, when was the last time they were exercised with FEMA? Although FEMA created the National Disaster Recovery Framework, exercises still tend to focus on regional disasters, not ones that are nationwide. USNORTHCOM might want to broker discussions with FEMA promoting exercises that examine what happens when the National Response Framework fails. USNORTHCOM might also want to participate and use this opportunity to gain insight to State and Local requirements to help develop or update DSCA contingency plans.

What about fallout shelters? They were deemed the most effective means of protecting the domestic population from nuclear attack. It seems a national program to build fallout shelters would receive no more public support today than it did during the Cold War, perhaps even less*. What about improved anti-ballistic missile defenses? USNORTHCOM already has operational control over 44 missiles deployed to Vandenberg Air Force Base and Fort Greeley. Unfortunately, they are insufficient to

counter a mass strike by Russia or China and perhaps even North Korea. For understandable cost reasons, the current system is a shadow of the one envisioned by the Strategic Defense Initiative. Perhaps forty years of technological advances - particularly in reusable rockets - could produce a more capable missile defense within an acceptable cost range that could eliminate or greatly reduce the need for fallout shelters. As part of its Homeland Defense responsibilities, USNORTHCOM could lend its voice to those already advocating for an upgraded and improved national missile defense capability.

Homeland Defense and Civil Defense share a similar strategy: resilience. Homeland Defense and Civil Defense also share a causal relationship: Civil Defense is what happens when Homeland Defense fails. This does not mean they can't be mutually supporting. USNORTHCOM can work with FEMA to enhance state and local resilience following a nationwide attack, and in return, improved resilience can raise a potential attacker's opportunity costs and reduce their expected benefits to help deter attacks on the US homeland.

Click here to read the full analytical study.

**The opinion of TACDA board members is that the public would actually support a fallout shelter program.*

Dr. Rick White, PhD, USAF Ret. is a retired Air Force officer and semi-retired university professor living in Colorado Springs. During his twenty-year Air Force career, he served as a programmer analyst, network engineer, software engineer, Communications Director for Operation Provide Comfort, Deputy Communications Commander for Cheyenne Mountain, and professor of military studies at the Air Force Academy. He earned his Ph.D. in Engineering Security and conducted research for the Department of Homeland Security while advancing game-based teaching techniques at UCCS. He also spent three years as an exercise developer for USNORTHCOM. He now consults and teaches emergency planning for Tulane.

Arthur J. Simental, M.S. is a Homeland Security & Emergency Management Adjunct Instructor for the College of Security Studies at Colorado Technical University. Mr. Simental is also the Founder & CEO of Simental Industries Ltd., a Homeland Security & Emergency Management Consulting Firm & Disaster Research Collaborative and is concurrently the Director of Emergency Management for the University of Colorado - Colorado Springs. Mr. Simental is a former Public Health Advisor for the Centers for Disease Control and Prevention and has fourteen years of service in Government, Homeland Security & Emergency Management and Emergency Services. He earned a Master of Science in Homeland Security, Emergency Management, and Public Health from Colorado Technical University and has published on various topics spanning homeland security, emergency management, disaster resilience, and others.

John Holst, M.S., USAF Ret. worked for over five years providing direct support to the Missile Defense Agency's (MDA) Ballistic Missile Defense System Test Program/Directorate for Test. Prior to working with the MDA, Mr. Holst served in the United States Air Force (USAF). He gained 11 years of extensive leadership experience in the USAF as an officer and Space Operator. Mr. Holst started as a "missileer"—a Deputy Missile Combat Crew Commander. He progressed, eventually training other missileers, first in Minot AFB, ND, then in Vandenberg AFB, CA for onboarding new officer missileers. Afterward, Mr. Holst was assigned to Denver, ultimately working as a National Space Systems Operations Director.

CRITICAL OBJECTIVES TO

In this issue, we are discussing a very important concept known as expedient, or in-place, valuable concepts that we could ever present, due to its life-saving potential and availabilit ing STOP critical objectives and apply them to your individual situation and circumstance

STUDY

CRITICAL OBJECTIVE: Understand the definition of expedient sheltering and learn all that you can about the subject.

The first step to empowering yourself, your family, friends, co-workers, and community is to understand the basic concept behind expedient or in-place sheltering. It is extremely simple and can be understood and implemented by almost anyone, including children.

Expedient sheltering can be defined as the utilization of common materials and pre-existing facilities to provide shelter in the event of a disaster. Or, more simply put, taking cover in a non-conventional place (such as a home basement or pipe chase) during an actual emergency. It is important to understand the major implications and advantages (and disadvantages) of this concept.

Although "All Hazard Sheltering" is the safest and most reliable sheltering method, it can be expensive to install, while expedient sheltering facilities are available to just about everyone at no, or very little, cost. The compromise is that, in certain circumstances, expedient sheltering may not provide the conveniences or level of protection associated with permanent solutions. Also, even if you have installed the most sophisticated and elaborate shelter at your home, what would you do if a disaster or emergency caught you away from your shelter? You would most likely have to rely on some type of expedient solution until you could come back to your permanent shelter. This is why it is so important to learn all that you can ahead of time.

THINK

CRITICAL OBJECTIVE: Think of specific circumstances or emergencies that might occur that would require you to seek expedient sheltering, even if you do have access to permanent sheltering facilities.

It's OK to use your imagination here. In fact, it's imperative. Although our main thrust and focal point is sheltering against NBC threats, the concept can and must be applied to all types of possible threats, including natural disasters. Consider all of the obvious (and not so obvious) threats that may exist in your particular area. For example:

1. Do you live or work near a nuclear power plant, military facility, etc.?
2. Is your city/community a high-risk terrorist gate?
3. Do you live or work near any chemical manufacturing plants or storage facilities?
4. Are you located in an area that is prone to flooding, tornados, hurricanes, etc.?
5. Will you be traveling into areas (either for vacation or on business) where these and other threats may be an issue?

Think, think, and think some more, making a list of as many other threat scenarios as possible that might require you or your family to seek expedient sheltering.

D EXPEDIENT SHELTERING

sheltering. In all that TACDA teaches, this is perhaps one of the most significant and y to help virtually anyone, anywhere. We strongly encourage you to consider the follow-e:

OBSERVE

CRITICAL OBJECTIVE: Look around and determine what potential sources of expedient sheltering are available, if you should need them.

This is not a hard task, but it will require an open mind. Refer back to the list of possible threats that you made in the previous step, and then take close inventory of your surroundings, making note of suitable expedient sheltering solutions. Take into account the nature of the threats on your list, and match each threat up with the most suitable and practical solution.

For example, if you determine that you would be in or near a potential blast zone during a nuclear attack, pair this threat up with a shelter that provides the most in the way of blast protection. Likewise, if you are sheltering against possible flooding, you would not want to take cover in a low-lying area such as a culvert. Just because one solution may be practical for providing shelter from one threat does not mean it is suitable for every threat. When studying all of the expedient and in-place sheltering options, be sure that you evaluate each for strengths and weaknesses and understand both the good and bad points of each.

PREPARE

CRITICAL OBJECTIVE: Acquire the necessary supplies that you would need to have available in the event that you were forced to seek expedient sheltering.

Obviously, due to the nature of expedient sheltering itself, you will not necessarily have time to go out and gather shelter supplies before taking cover. In fact, in most situations, the extreme opposite would be true. However, there are a few things that you could do ahead of time, regardless of where you take final refuge, in order to make your stay more successful.

For example, it is advisable that you purchase or prepare two or three 72-hour emergency preparedness kits; one for your home, one for your work place; one for your automobile(s); and one for any other place that you may find yourself when disaster strikes. If you are planning to use your home as a shelter (perhaps in a basement or cellar), you can take preparedness actions before an actual emergency strikes to ensure that you are ready when the time comes. For example, make sure that you have a supply of food and water, required medicines and sanitation items, batteries and flashlights, etc. In the event that you are forced to take shelter on the run, where it is not possible to prepare the shelter ahead of time (such as in a bank vault, tunnel, or subway), it is a good idea to always have available some type of emergency preparedness kit, perhaps in your automobile or backpack, that you carry with you when traveling.


Photo by Vicky Hladynets on Unsplash

EXPEDIENT SHELTERING AWAY FROM HOME

By TACDA Staff

Deep, underground shelters will protect us from all nuclear, biological, and chemical (NBC) effects within a very short distance of ground zero. However, building such shelters is not possible for all people, especially for those living in apartments. It is also possible that after building a shelter, a nuclear event could occur when we are not in the vicinity of the shelter. This may be discouraging to some, but I believe if we carefully follow our STOP concept (Study, Think, Observe, and Prepare), we will find a solution. Look at the risk by considering both the probability and consequence of the event. There are many natural fallout and blast shelters already in our neighborhoods. If we plan ahead, these shelters could be quickly accessed in the event of an emergency.

STOP!

STUDY your options of various evacuation routes leaving your area. Keep a notepad and pencil in a covered container outside your home so that family members can leave vital information for you if they have left the area. Evacuation is a viable solution if the event is small and localized.

THINK about getting current information and updates. Keep tuned to the radio. Authorities may be able to warn you of escalating crises.

OBSERVE unnatural situations like empty trucks and cars in unusual places or people who are acting strangely. Watch for anniversaries of previous events.

PREPARE a small survival kit (72-hour kit). A kit should be placed in the trunk of every car. Supplies should also be stored at workplaces and in your home.

Always keep your car at least half-full of fuel. If the event is widespread, we may need to shelter in the nearest place possible. If early warning is taken from a loss of electrical power (from perhaps an EMP) we could have as much as 25 minutes warning of a possible attack by ICBM missiles.

In the event of the detonation of a fission weapon, we must protect ourselves from both blast and radiation. Radiation decays very quickly. Ninety percent of the gamma radiation decays after the first seven hours, leaving only 1/10th of the original levels. After two days the radiation levels decrease to 1/100th of the original levels, and after two weeks we have only 1/1000th of the original levels remaining. In most situations, after two days, we could leave our expedient shelter and go quickly to our homes. However, if possible, we should stay sheltered for two full weeks.

You should always carry a small dosimeter or nuke alert meter. Watch the radiation levels carefully.

Penalty tables show us that if we accumulate a total of between 150 and 250 Roentgens (R) of radiation in one week, we would expect few, if any, deaths. If you receive more than 10 Roentgens (R) in the first hour, the accumulated doses may exceed that number. In that event, look for a better location or add shielding to your area.

If caught away from your home and shelter during an actual emergency, consider some of the following areas for expedient sheltering possibilities:

- Garages - Service pit area.
- Basements - Look for basements with small amounts of exposure. Homes with walkout basements will not provide adequate shielding.
- Hospitals - Usually have massive basements and are well-built. Some hospitals have underground tunnels between buildings.
- Residential homes - Look for basements with maximum soil coverage.
- Schools - Most schools have pipe chases, and some have good basements.
- Tunnels - Consider railroad, car, and pedestrian tunnels.
- Culverts - Look for long runs under highways. Be aware of possible danger from rats or water runoff.
- Boiler Rooms - In churches, schools, and other large buildings.
- Underpasses - There is good blast protection (10 psi) high up under overpasses, however, there is no radiation protection.
- Community Swimming Pool Equipment Rooms - Be aware of possible danger from chlorine gas, which is often stored in pressurized containers.
- City and County Buildings - Many have underground tunnels between buildings.
- Underground Parking Garages - Provide both blast and radiation protection, however, be aware that there is a danger that the upper floors may fall and trap you.
- Boats - Covered boats in a lake provide good radiation protection, but little blast protection. Be aware that you must have the capability to wash fallout from the cover.
- State or County E.O.C.s - These buildings are usually well-built and well-stocked.
- Root Cellars - These offer better radiation protection than blast protection.
- Subways, fire departments, and armories are usually well-built and can also be considered as possible expedient sheltering solutions.

Keep in mind that a home basement is not adequate protection in and of itself, even in areas of light fallout. However, shelter could be taken in the basement under a strong table. Two feet of books or other heavy objects should be placed on and around the table. A hose could be attached to the water heater and run to the shelter for drinking water. A 5-gallon bucket with plastic bags could be used for sanitation. These options, however, must be initiated well beforehand.

Originally published in 1970 Nov-Dec *Survive*

SHELTER FOR THE UNSHELTERED

The U. S. is shelter shy and shelter short. Millions with no ready protection will need it desperately at the time of a nuclear attack. What to do? The answer here is "make do with makeshift." It can never match the survival odds of planned permanent shelter. But it's much better than nothing!

A *Survive* (*Journal of Civil Defense*) Staff Study

In Sweden and Switzerland, civil defense plans are to have "hard" shelter for everyone. Attainment of this goal is in sight. Schools, factories, apartment houses, railway stations, air terminals, all public and most private buildings must provide shelter. Shelter not only against fallout radiation, but against blast and fire, and chemical and biological weapons.

In the United States, the story is remarkably different. In existing urban structures, there is shelter for only a portion of the population. This shelter is fallout shelter only, much of it substandard, most of it in cities where it would be largely useless against blast and fires.

Fallout shelter in rural America, away from possible targets and only subject to fallout, would be effective. Here, however, over 60% of the people have no such shelter. Although it may seem at first glance that nothing can be done to help them in crisis, this is not true. Ingenuity, imagination, and a good bit of hurry and sweat can provide a tremendous variety of last-minute, improvised protection.

The same reasoning applies to improvising shelter by those who find themselves unprepared in the face of nuclear attack. Civil defense literature is rich in these ideas. Community shelter plans also provide a special kind of guidance that stresses the types of expedients locally practicable.

In many areas, for instance, ***a covered boat*** can be a real lifesaver under fallout conditions. A couple of hundred feet or more from shore, all surfaces swept or washed off, and in water over five feet deep, a boat would afford protection from fallout radiation about as well as a good basement.

A foxhole or trench can be a particularly handy expedient shelter (Figure 1). Although not quite the last word in comfort and not ideal for children, young adults might find it very workable. It needs a light cover overhead periodically cleared during the descent of fallout. A heavy cover such as a motor vehicle is better, but foxhole sides sometimes crumble. In soft soil, support of the sides may be in order.

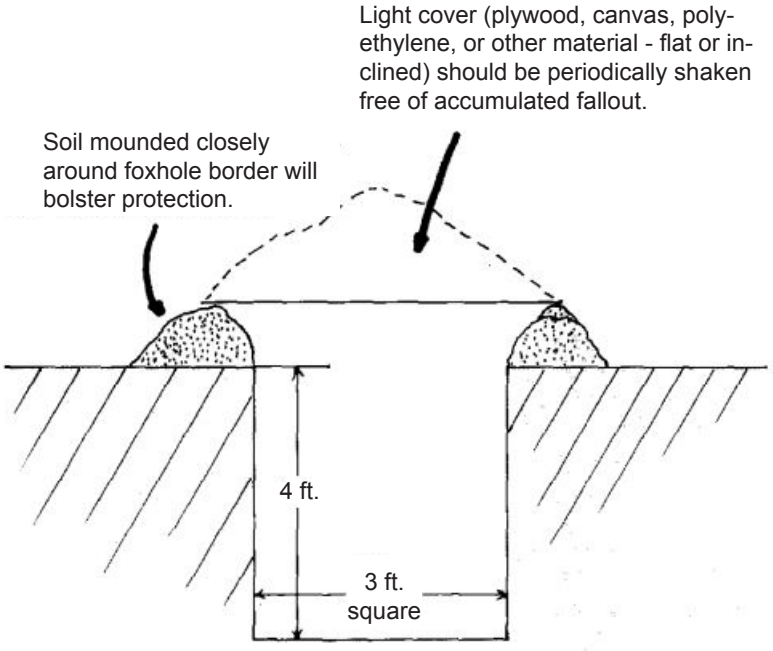


Figure 1. A PF of about 40 is provided by a foxhole 3 feet in diameter and 4 feet deep (*The Effects of Nuclear Weapons*, 1964, Atomic Energy Commission).

Possibilities for expedient shelter are limited only by the imagination of those seeking protection. The number one criterion for protection against fallout radiation is mass: the weight of materials between those protected and

the expanses of fallout particles. For convenience, this is usually measured in weight per square foot of protecting surface floors, walls, and roof. The greater the mass or weight of the materials giving protection, the more these materials reduce the radiation. One hundred pounds per square foot (psf) overhead and laterally is a practical minimum to shoot for. Where overhead weight is a problem, 50 psf overhead and 200 psf laterally will do about as well. One hundred psf overhead and 200 laterally brings the "protection factor" up near the federally accepted level of 40.*

In a boat, this mass is represented by the water (fallout particles, like dirt, settle to the bottom), and the deeper the water the greater the protection. Also, the farther away from land the greater the protection. In a foxhole, horizontal protection can be considered infinite. The smallness of the overhead opening (plus the clearing of fallout from the cover) cuts down on radiation from that direction.

Weight, of course, needs support, and this is a technical question that needs serious consideration. Adequate ventilation is hardly less important, and is relatively easy to provide, but cannot be neglected.

A variation of the foxhole shelter is the "through the floor" shelter in a franc house. After making a hole in the floor you simply dig a foxhole or a narrow trench. You wind up with a dry refuge that gives decent protection. A barn or almost any other building with a wood or dirt floor holds similar promise. Usually supported materials can be put in place over the hole to increase the protection factor.

Caves, culverts, tunnels, mines, sewers, pier ends, grease pits, stadiums, bridge abutments, boiler rooms, and old military tanks in most cases are expedient shelters for the asking.

In tunnels, hallways of large buildings, and similarly shaped spaces the farther back one goes the smaller the field of fallout exposure from the opening becomes. At about 25 feet or so from the opening, depending upon the height and width of the space, there is significant protection without blocking it off. Careful baffling will increase the protection as well as the usable space.

Mass can be found in stacks of books in ***a library***, and shelves are often so high that a modified "foxhole effect" is evident. ***A warehouse*** for this same reason may be an excellent expedient shelter. Even though the building itself is usually of little protection, stored materials may provide so much mass and be stacked so high that protection approaches that of lower-grade permanent shelters.

Lumber yards, factories, subways, bunkers, stone quarries, freight yards, kilns, crypts, and prisons also contain excellent expedient shelter possibilities. Materials in commercial outlets such as ***supermarkets and appliance stores*** may well be heavy enough and plentiful enough for use in building interior shelters. ***Cases of canned foods and beverages***, for instance, make ideal walls.

A house may at first glance show little promise as shelter. Even so, there are improvements that can give it value as an improvised shelter. ***A basement*** is a big help. Floors, ceilings, and even roofs may provide space (and support) for materials that in turn provide mass and protection. Furniture, appliances, books, baggage, canned goods, bottled water, containers of dirt, bricks and stone, old papers, and old junk are among the endless items that may be the building blocks of expedient shelter. Even ***vehicles*** drawn up close to outside walls and entrances can be of significant help. So can the bulldozing of dirt around a barn, which is also a technique used for animal shelter.

Shelter against blast and thermal effects is considerably more difficult to come by. Blast zone survivors of Hiroshima and Nagasaki testify that reinforced concrete buildings provided lifesaving protection deep into the "total damage" area. Later experiments gave similar evidence. Conclusions can be drawn on likely expedient blast shelter locations. Reinforced concrete buildings provide fair survival odds. So do many steel-framed buildings. The fewer and the smaller the windows and the farther away the windows are from a person seeking protection, the higher the chances of survival.

Shattering windows make lethal projectiles of glass slivers. A basement, especially one with a reinforced concrete slab overhead, improves the odds. ***A bank vault*** or similar structure does the same. Anything with some type of shield against the explosive force and flying debris - ***an underpass, a ditch, a vehicle*** - may spell the difference between life and death. Time is a precious commodity. Heat is instantaneous and may last for as long as a minute. The blast arrives in a matter of seconds. (See "In the Shadow of Ground Zero," by Wm. Cornelius Hall and Carsten M. Haaland, *Survive*, May-June 1969.)

Estimates of Protection Factors Attainable Under Ideal Conditions in Expedient Shelter

Fox hole (cleared light cover)	40+
Fox hole (cover exceeding 100 psf or a cleared area 4 feet wide around fox hole)	100+
Boat (cleared surfaces)	50+
Culvert	20+
Cave	200+
Mine	200+
Aircraft (over 2,000 feet)	200+
Pier end (with cleared tent-type cover)	20+
Bridge abutment (underneath concrete)	25+
Library (using books and tables)	40+
Lumber yard	30+
Subway	200+
Crypt	100+
Home: (all with expedient improvements)	
One-story, no basement	15+
Two-story, no basement	25+
Basement	40+
Through-the-floor-dugout	80+
Warehouse	25+

(The above figures are intended as a rough guide and depend on the amount and arrangement of the protective mass. Overhead support, ventilation, water, food, sanitation, and medication are problems which easily become acute - or are acute to begin with - in expedient shelters.)

We have only scratched the surface of the subject of expedient shelter. Details have been sacrificed. In many cases, there are restrictions that must be taken into account (for instance, foxholes will be of little value in low, marshy country and boats might not be practical in mountainous terrain).

Analyzing expedient shelter possibilities beforehand in the light of probable environments at the time of the emergency will be of great help. Perhaps most importantly: once a serious analysis is made, the advantages of a permanent-type shelter become obvious. After all, this is the real solution. An expedient shelter may well be a lifesaver, but a first-class permanent shelter is the only device that can fill this role with the kind of sure-fire odds we honestly want for ourselves and our families when the nuclear chips are down.

**The amount by which the radiation is reduced by this shielding is called the "protection factor" or PF. If, for instance, the shield cuts radiation to 1/20 of its outside value we have a PF of 20.*

"Until war is eliminated from international relations, unpreparedness for it is well-nigh as criminal as war itself."

Dwight D. Eisenhower

Photo by Janko Ferlic on Unsplash

Join the TACDA Team

with t-shirts, sweatshirts, stickers, and more!

Get your TACDA swag today!

Click here or scan the QR code.

HOW TO PREPARE A 72-HOUR KIT

By TACDA Staff

When possible, 72-hour kits should match the anticipated crisis. People in areas prone to wildfire would prepare differently from those living in flood-prone areas. Consider your 72-hour kit for use in the short term to reach long-term survival. Earthquakes may result in closed and impassable roads. The 72-hour kits should be light enough to carry. Most people can carry one-third to one-fourth of their body weight. The items in the kit, therefore, must be chosen carefully.

Commercial kits may not meet your particular needs, and you may need to add or remove items accordingly. Some disasters result in long-term relocation. People in those potential areas should think well ahead of time to pre-position supplies at another location.

Backpacks make excellent 72-hour kit containers. Boxes or filled buckets would be difficult to carry. An empty bucket, however, can be strapped to a backpack and becomes very useful in many situations. Dress according to the weather. Prepare for the coldest temperatures that you expect.

Store foods that can be eaten without cooking. Do not store personal information in the car-pack (such as birth certificates, names on pictures, social security numbers, and full names on telephone numbers). Gather this information and put it in one location in your home so you can grab it quickly in an emergency.

There are some general items that should be considered for 72-hour kits. Some items (those in bold) should be in every kit. Other items can be used by the entire group and may not need to be duplicated. Use these suggestions only as a guide.

72-HOUR KIT SUGGESTED ITEMS

- **Purified water (2 liters/person/per day)**
- **Food (3-day supply requiring no cooking)**
- **Blanket, sleeping bag, or emergency metallic space blanket; coat, hat, and gloves in winter months**
- **Large plastic garbage bag, poncho, or rain gear**
- **Eating utensils, dishes, can opener**
- **2 rolls of toilet paper**
- **Compass, map, mirror, whistle**
- **Cash in small bills**
- **Tool kit**
- **Small/med/large flat and Philips screwdrivers**
- **6" adjustable wrench**
- **8" wire cutters**
- **10" channel lock pliers**
- **Vise grip pliers**
- **Claw hammer**
- **Small ax**
- **50' cord or small rope (20 lb. test min.)**
- **Electrical and duct tape**
- **Hack saw blades with a small handle**
- **Sharp knife or utility knife**
- **List of phone numbers and addresses, ID Cards, insurance cards**
- Small 2-man tent
- Change of clothes, jacket, shoes, socks, underwear
- Instant hand warmers
- Small water filter or iodine crystals
- Flashlights (extra batteries and bulb)
- Sewing kit
- Matches, light sticks
- FRS or small transistor radio with extra batteries
- Fish line and hooks
- Leather gloves, dust masks
- Personal Items:
  - Shower cap (to keep radioactive fallout out of your hair)
  - Chapstick, hairbrush, hand lotion
  - Feminine supplies
  - Toothbrush & toothpaste
  - Soap, washcloth, small towel, razor, deodorant
  - Extra eyeglasses (even if you wear contacts)
  - Baby wipes and diapers
  - Infant needs, if necessary
  - Family pictures
- Notebook, marker, pencil
- First aid supplies & essential prescription medications:
  - Over-counter meds (Benadryl, Imodium, Calamine lotion, Aspirin, Decongestant)
  - Insect repellant, sunscreen
  - Bandages, antibiotic ointment
  - Needle, tweezers, scissors
  - Triangular bandages, gauze, elastic bandages
  - Hot pack, cold pack
  - CPR face mask, rubber gloves
  - Tourniquet and compress bandages
- Pet supplies
- Books, favorite toy, special treat or candy, and games for children

Again, items in bold are considered necessary, but ultimately you will have to determine what is essential for your own bag.

EMERGENCY COMMUNICATIONS

Part 6

By Dr. Randall Smith

This is the sixth and final communications article in a series of articles that are being published in the Journal of Civil Defense (JCD). If you have not studied parts 1 through 5 of this article, please refer to the previous five issues of the JCD. We have now completed all six of the communication articles, and the entire series will be available to you on the TACDA website.

The Channel 3 Project

In January 2014, members of the American Redoubt Radio Operators Network (AmRRON) joined with The American Preparedness Radio Network (TAPRN). One outgrowth of this merger is the Channel 3 Project. Essentially, this project focused on designating certain channels or frequencies as "emergency communications" channels in the non-ham radio community among those who routinely monitor amateur radio traffic (communications) but do not possess an FCC license. These services include Citizens Band, Family Radio Service, General Mobile Radio Service (GMRS), and the Multi-Use Radio Service. GMRS is included since it shares several frequencies with the Family Radio Service. Additionally, several frequencies in the V/UHF portions of the amateur radio service have also been designated for emergency communications purposes. The standard is simple: in an emergency, the radio operator simply turns to channel 3 on any of these devices and attempts to establish contact with another listening station. The goal is to establish a network consisting of radio operators operating on the same frequency or frequencies. A network or "net" is only a net if fellow operators are able to communicate with each other. The AmRRON website contains more in-depth information on the Channel 3

Photo by Olena Bohovyk on Unsplash

Project. While membership in AmRRON is available, it is not required in order to participate or access information on their website.

General Short Wave Listening

In the discussion of radio transmitters and receivers, reference was made to short wave listening as a hobby by which is enjoyed by thousands of radio enthusiasts worldwide. If there are any requirements, an FCC license is not among them. What is needed is a good quality, general coverage receiver. General coverage, as previously mentioned, refers to the lowest and the highest frequencies that a receiver is capable of receiving. Common frequency coverage specifications include 500 KHz. to 30 MHz. This range is tuned across several of the receiver's bands. Ideally, a receiver will be capable of decoding AM, FM, and SSB (single-sideband) signals. Note that this will include the 26-27 MHz. Citizens Band. Even better is a radio capable of receiving nationwide weather broadcasts provided by the National Oceanic and Atmospheric Administration (NOAA). These broadcasts are transmitted on seven different frequencies on a 24/7 basis. They are designated as: WX1 162.550 MHz., WX2 162.400 MHz., WX3 162.475 MHz., WX4 162.425 MHz., WX5 162.450 MHz., WX6 162.500 MHz. and WX7 162.525 MHz. NOAA weather stations and transmitters blanket the United States. In addition to broadcasting current weather reports and forecasts, NOAA weather stations also broadcast warnings and alerts regarding severe weather, adverse travel conditions, updated information regarding natural or man-made disasters, and other important information regarding environmental hazards. Most higher quality short wave radios are able to receive NOAA weather broadcasts. Some models have the ability to respond to specially encoded signals transmitted by NOAA stations to alert listeners to pending dangers and threats to safety and well-being in their listening area.

Amazon, Inc. seems to offer a wide range of radios in terms of features and pricing. As with most telecommunications equipment, one gets what one is willing to pay for. Selecting a quality, general coverage receiver should not be based solely upon price. Once a particular model is selected, it does pay to shop sites such as e-Bay, Ham Radio Outlet, Universal Radio, and similar sellers to obtain your radio at a good price. There are a plethora of books available devoted to short wave listening. Your local library is also a good place to start and a good source of relevant reading materials. In this writer's experience, quality, portable short-wave radios (most of which include NOAA broadcasts) include C. Crane, Sangean,

Tecsun, and Grundig. Again, try to purchase the best radio that you can afford. In addition, it would be wise to purchase a supply of non-rechargeable batteries (non-rechargeable since the power required to operate a charger may be unavailable). Purchase quality brands and keep a fresh supply on hand at all times.

On a slightly different note, if, for whatever reason, you would like to know the exact time, be aware that you can receive time signals transmitted 24/7 by the National Bureau of Standards in Ft. Collins, CO. The source is an incredibly accurate, atomic (cesium)-powered clock. These broadcasts are transmitted in AM mode on 2.5 MHz., 5.0 MHz., 10 MHz., 15 MHz. and 20 MHz.

A Word About Communications Security

Disasters of practically any magnitude can have profound effects upon human emotions, thinking, and behaviors that arise from that thinking. One must remember that speaking and communicating are forms of behavior. Furthermore, different individuals respond to adverse events differently. What may be a minor irritation to one person may register as a traumatic experience to another. As communicators, including - or perhaps especially - on the air, it is imperative that we give attention to our speech and language behavior, particularly when involved in sensitive, communicative situations. The notion of "think before you speak" seems appropriate in this context.

In the event of a widespread or national disaster, the idea of practicing communications security or "comsec" takes on added gravity. At its most basic level, comsec means not divulging your specific location and/or status over the air unless it is a dire emergency, and you need help at your location. Those who have prepared adequately for various disaster scenarios will be well stocked with food, liquids, and other necessities of daily living. Those who have not prepared will be in search of those who have, particularly when the ravages of intense hunger or thirst set in. Most healthy individuals can go for several days without food and still function at an acceptable level. However, dehydration can become clinically relevant in as little as 1 hour, depending on environmental and individual health factors.

Whether the threat comes from fellow Americans in need or from unquestionably hostile foreign or domestic adversaries for whom human life has little value, it is essential that, as a radio communicator, one remains fully conscious of the information that he or she shares relative to status, location, equipment, protection, etc.

With respect to communications security, Communications S.O.I. (Signals Operating Instructions) published by The American Redoubt Radio Operators Network suggests, "Never blab your location out over the air. Guide them close to your vicinity, especially in a place where you can observe them if you can. Then give them instructions that bring them in closer. They should be implementing their own security plans as well because they don't know who you are. Don't be offended or alarmed (p.24)." Communications operators, both civilian and military, should expect this kind of caution from each other and appreciate its practical value.

In Conclusion

The purpose of this lesson was not to provide anything approaching a comprehensive treatise on emergency electronic communications. It is hoped sincerely that the information presented has raised more questions than it has answered and, more importantly, that it has stimulated your curiosity and your desire to know more about a vast, multi-faceted subject about which volumes could be - and have been - written. They continue to be written. This means that there is no scarcity of information available to you; no reason why any question should go unanswered if the questioner is willing to expend a relatively small amount of time and energy in pursuit of answers and knowledge.

It is this writer's sincerest hope that you will not only be motivated to study for and earn your amateur radio operator's license, but that you will combine your skills and knowledge with your interest in Civil Defense. While an electronics officer with the United States Air Force, we shared a saying: "If you don't have communications, you don't have squat". In the absence of effective communications, such things as tactics, strategy, command, and control, are merely words - symbols without referents. If you apply the skill and knowledge you have acquired to further the goals of Civil Defense in the United States, you will be providing a truly unique and much-needed service not only for yourself, loved ones and friends, but for your country as well. I wish you the very best in your future endeavors as you embark on a rewarding and fascinating journey of discovery into the world of electronic telecommunications.

Dr. Randall Smith has held an FCC license since 1984. He has served as a radio operator in the U.S. Army's Military Affiliate Radio System, and with the IBM Corporation first as a field engineer, then as a systems engineer, and finally as a marketing representative. He participated in the construction of the emergency communications portion of the St. Louis Civil Defense Agency's underground emergency command center.

Photo by Emily Park on Unsplash

BUILDING A HOME FALLOUT SHELTER

By Paul Seyfried and Sharon Packer

Our first choice, as civil defense advocates, would be for all Americans to have access to a hardened nuclear blast (NBC) shelter. One of the most well-known parts of the United States Constitution is its preamble, which in part, states that the purpose of the Constitution is: **"To provide for the common defense--for ourselves and our posterity".** This constitutional promise, unfortunately, does not appear to apply to the defense against a hostile exchange of nuclear weapons. Other than highly 'important' government officials, only a tiny percentage of our citizens have access to hardened shelters.

It is likely that in a full-scale nuclear exchange much of our population would be outside the range of damaging blast effects. Most of us, however, could still have significant fallout levels, leaving radiation and EMP-driven power outages as the greatest threat to our lives.

Throughout the years, much discussion from TACDA journals has been dedicated to measuring personal risk and identifying primary and secondary nuclear target areas. Basically, for a primary target, the question we must ask is: How close do we live to facilities such as military bases and airports with long runways, which would be considered a 'retaliatory' threat to the enemy? Secondary targets (such as dams, refineries, and power plants), likewise, could be targeted with the same yield weapons, and blast damage could occur up to 12 miles from a detonation on these types of facilities.

Targeting, however, is not a perfect art, and if you live near a target, you could still be well within a range where a simple fallout shelter would save your life. In a large-scale nuclear exchange, lethal levels of radiation would affect most of the continental United States.

Fallout shelters are much less expensive and much more easily constructed than are blast shelters. Four inches of dirt, or three inches of concrete, will reduce radiation levels by 50 percent, resulting in a protection factor (PF) of 2. Each additional layer will multiply the PF by a factor of 2. We recommend at least 24 inches of concrete or 32 inches of dirt cover in a basement shelter, which will result in a PF of over 250. Your upper floor, if it survives the attack, will provide an additional PF of 5 in a one-story home resulting in a PF of 1,250.

HOME SHELTERS

Main Floor Home Shelters (no basement)

Homes and apartments without a basement should look to interior rooms as the best location for fallout protection. Interior rooms of an apartment complex could give significant fallout protection (Figure 1). Any additional shielding over and around your location will multiply these protection factors. Placing 12 inches of books, or other heavy items, on a sturdy table, with food

and water supplies surrounding the table could provide a multiplication of that shielding by a factor of eight. Pull drinking water and prepared foods into the secured space and provide a bucket for sanitation. Gamma radiation decays quickly. Stay under the table for at least two days. After two days, the radiation levels should decay to one-one hundredth of the original levels. Plan and prepare these items well ahead of time, so that you can gather them quickly.

(See page 31 of the 2023 V58, I-2 issue of Journal of Civil Defense for how to use water as shielding around a kitchen table.)

Apartment Shelters

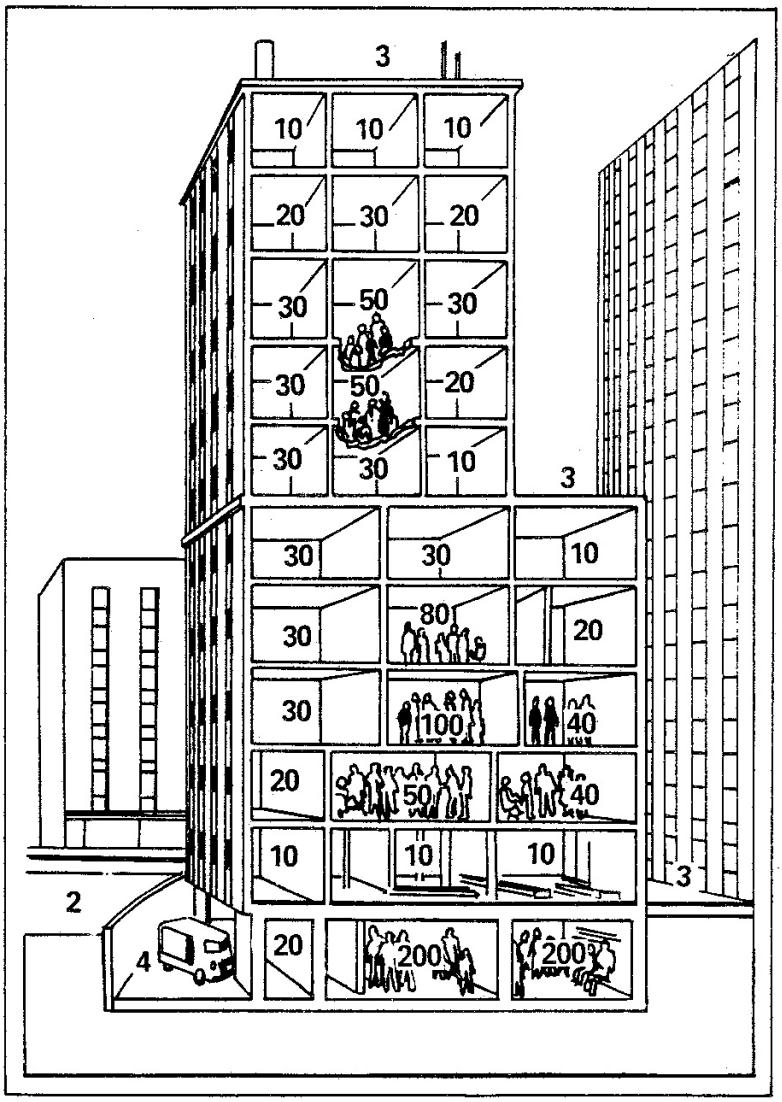


Figure 1. Relative levels of fallout protection in different parts of a typical building.

Basement Shelters

Typical home basement shelters, with one or two levels above, must have about 24 inches of shielding overhead to obtain a PF of 1,000. The ceiling and walls will, most likely, not have been engineered to carry such a heavy load. You must, therefore, build from the floor up, constructing a new shelter ceiling. Figure enough room between your new, finished shelter ceiling and your basement ceiling to easily stack 24 inches of heavy material inside the vacant area.

Shelter Placement

If possible, place the shelter in a corner of the basement so that two walls have outside levels of soil that reach above the level of the basement ceiling. If there is a window inside the chosen shelter area, the window should be removed, and the opening should be blocked. The window-well should then be filled with dirt.

Shelter Ceiling and Walls

Your engineer will design a suitable support system for the overhead shielding. The ceiling beams will need to be massive and placed on short centers. Your supporting walls will need a similar structure to support the heavy shielding and must be securely tied to the ceiling beams. Consult with your engineer on additional supporting beams or walls on the interior of the shelter. Greater spans require greater support. They will also advise you on the placement of cross beams, torque issues, and the ultimate thickness of your support walls.

Your engineer may choose to shield the ceiling of your shelter with solid 16" x 8" x 4" concrete blocks. If so, load them to a level of 24 inches deep. The blocks MUST be solid without interior holes. Do not leave spaces between the blocks. Place them close together and stagger the joints. The radiation shielding is provided by the mass of the material. These blocks will weigh about 33 pounds each and should be stacked six high for a total height of 24 inches.

Depending on the distance between the ceiling of the shelter and the ceiling of the basement, you may need to load your concrete blocks as each layer of plywood is laid on the ceiling beams. Finish stacking the shielding onto the area above each plywood layer before installing the next plywood layer.

Some homeowners, such as the one in the attached picture, may want to use sand bags. Sand bags, though less expensive than concrete blocks, may eventually deteriorate, leaving uneven shielding. Sand bags weigh less than concrete blocks, and they will need to be stacked higher to get the same shielding effect.

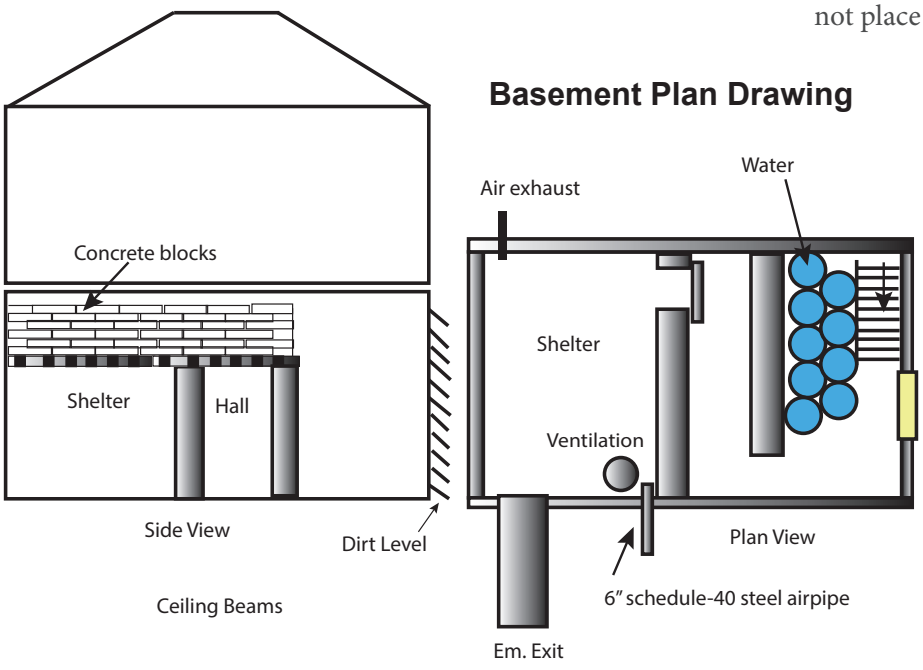
Have your engineer test your basement floor and footings to ensure they will carry the wall and ceiling weight, and make sure they plan for securing the walls

Shelter life must balance comfort, responsibilities, social interaction, and privacy needs.

and ceiling against a potential 'twisting' motion caused by blast or earthquake. Falling blocks of concrete would cause more injury to the inhabitants than would the radiation. Stacked six high, the concrete blocks alone will weigh about 1.54 lbs. per square inch. The shielding for a 100 square foot shelter would weigh about 22,175 lbs.

Entrances

About 90 percent of gamma radiation is attenuated by each 90-degree turn. Entrances should have a hall, which forces a 90-degree turn before entering the shelter.



In the plan shown, if the entrance to the shelter faces outside windows, the shelter walls facing the window should be 24 inches thick. Use water or food supplies to help add additional shielding to those interior walls.

Place an emergency exit into the shelter wall. Core drill a 30-inch hole into the lower part of the wall. We would suggest that you use 36-inch-diameter corrugated steel pipe (CSP) welded into an elbow with the horizontal end being no shorter than 10 feet. Weld a flange to the end of the elbow and bolt the flange over the hole in the basement wall. The vertical portion of the elbow should reach grade at some convenient area of the yard. Use a hatch-type door to secure the exit.

EXTERIOR HOME SHELTERS

Exterior home shelters may prove to be less labor intensive and less expensive than interior shelters. We would suggest a minimum of four feet of dirt cover, which will give you a PF of about 1,000. You may want more cover for areas of extreme temperature variations. In most areas, six feet of cover will ensure that your shelter will not freeze or become too warm. Flat-topped steel shelters will not carry enough dirt load to provide for proper radiation protection.

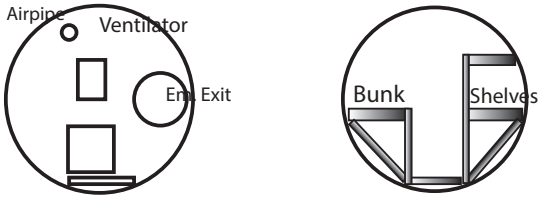
CSP Shelters

We have liked working with corrugated steel pipe (CSP) material for outdoor use. The arch gives great strength, and the design has been tested under actual blast conditions. Diameters up to seven feet can be constructed from 16-gauge material. We recommend using 12-gauge material for CSP over seven feet in diameter.

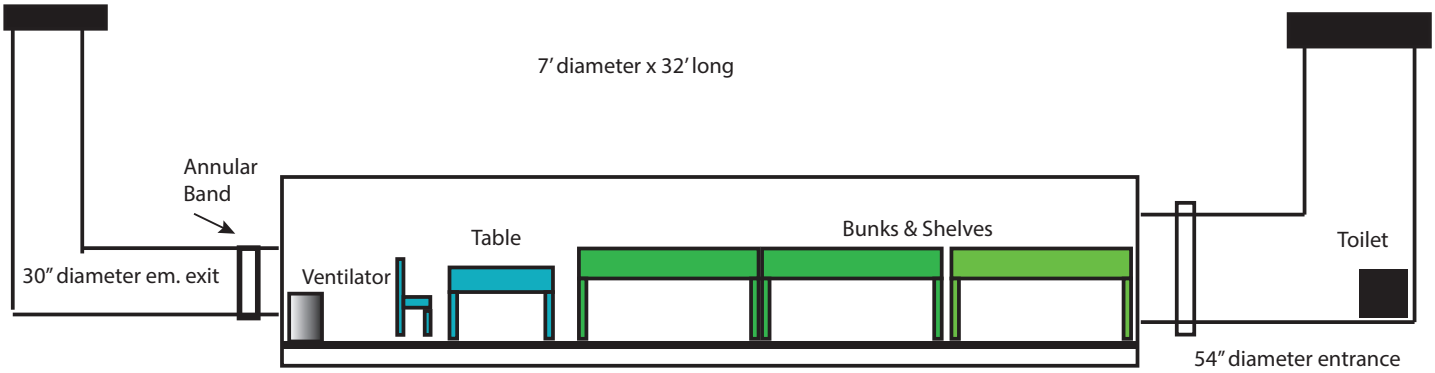
CSP shelters will leak if placed into water. You must not place CSP shelters into a high water table or into areas where water will accumulate (such as in gullies or at the bottom of hills).

7-Foot CSP Shelters, 16 Gauge

Seven-foot-diameter CSP shelters are relatively inexpensive and easily constructed. Ask the CSP provider to weld ¼ inch steel end plates to each end of the CSP shelter. Paint the end plates with a rust inhibitor. You may want to paint the interior of the shelter with white latex paint. Before painting, carefully wipe down the shelter interior with acetone. It is not necessary, or recommended, to paint the exterior of CSP. Do not weld any items to the sides of the CSP shelter. Welding will weaken the metal, and after a few years the welded area may crack



CSP Shelter Drawing



or tear. You can, however, weld items to the ¼ inch steel end plates.

Interior

Place a two-foot-wide, ¾-inch furniture grade plywood floor into the shelter. Provide for a two-foot-wide hall. Build narrow bunks and shelves into the sides of the CSP shelter. Weld unistrut to the end plate for mounting of the ventilator (see CPS Shelter Drawing). Bolt unistrut to the walls of the shelter at the 3:00 and 9:00 position for DC wiring and DC LED lights. Use ½-inch spring nuts for hanging other items into the unsitrut. Each ½-inch spring nut has a 1,200-pound pull-out strength and can easily hold a person in a hammock. The use of hammocks will greatly increase your shelter capacity. Place 6-volt gel cell batteries into the shelter and connect them to the DC lighting system. We often connect a fan to the batteries, to keep fresh air moving into the shelter when the NBC ventilator is not in use. You may want an electrician to add an inverter system with AC wiring, as well. We recommend placing a solar system next to the shelter to keep the batteries in a charged state.

Shelter air filtration system with exit tunnel on left side.

CSP Entrances

Always provide two entrances. Ask the CSP provider to cut a hole into the end plates and to weld a one-foot stub of the proper diameter over the hole on the outside of the end plate. During installation, you will connect the entrances to the stub with annular bands. The provider will guide you on the proper installation techniques for these bands and gaskets. We like 30- to 36-inch diameter exits and 48- to 54-inch diameter entrances. In seven-foot-diameter shelters, we prefer 30-inch diameter emergency exits, in order to leave room for a ventilation system on the exit end plate.

If you want access to your home from the shelter, weld a flange to the end of the horizontal entrance pipe, and after core drilling a hole into the basement wall, bolt the flange over the basement opening. In most instances, a 90-degree turn is not required with this type of entrance. Choose an entrance location into the home that does not face a window or other outside basement opening. Place the shelter at least 20 feet away from the home to protect the foundation of the house during installation.

Doors

We recommend steel, hatch-type doors for CSP shelters.

Typical shelter access hatch. Provides security and shelter integrity.

CSP Installation

Hire a geo-technical engineer to test your soil and the depth of your water table. Always hire a track hoe operator with experience in large-diameter CSP pipe installation. Let them guide you in the process. CSP shelters should be covered to the top, with clean, ¾-inch crushed rock. This type rock is readily available and is used in concrete. Do not use pea gravel. Continue filling to the required level with soil from the excavation, or fill over the crushed rock with road base. If the soil is of a clay type, dig a wider hole and do not use the clay to back fill the shelter. Seven-foot-diameter shelters should have a minimum of four feet of cover. Seven feet of cover, however, will give excellent blast protection as well.

We hope this information will help you in building a home shelter. Any amount of shielding you can place over and around your sheltered area will greatly enhance your probability of survival. Study the TACDA academy material for post-war survival suggestions. The material is on the TACDA website and is free to all.

Paul Seyfried is a graduate from the Missouri Military Academy and enjoyed a 30-year career in the aerospace and defense industry. Sharon Packer has a Bachelor's degree in Mathematics with a minor in Physics, and a Master's degree in Nuclear Engineering. Sharon is currently the owner and operator of Underground Shelters USA and builds and designs all hazard NBC shelters throughout the nation.

ANDAIR USA

beehive SHELTER SYSTEMS

Sharon Packer **tel: (801) 380-2932**
Engineer / Designated North American Andair representative
www.andairusa.com

ANDAIR AG in Switzerland
All ANDAIR components tested and approved
by the Swiss Federal Department of Defense.

ANDAIR Ventilation & Filtration System

- Electric and manual driven motors
- Explosion protection valves & air rate metering device
- HEPA and carbon high efficiency filters rated to .1-micron

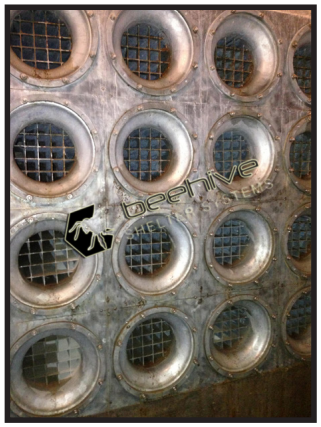
ANDAIR Concrete Filled Doors (type PT and DT)

- 8" thick steel frame, to be filled with concrete
- Blast and fire resistant to 45 psi
- War gas resistant gasket

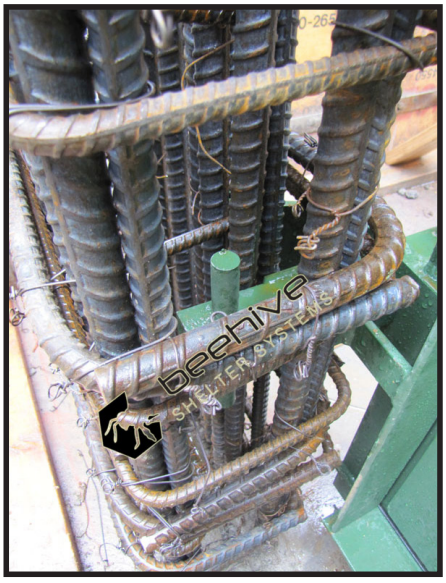
Lane M. Lythgoe, MBA **tel:(435) 654-4064**
Founder / Architect / Engineer
www.beehiveshelters.com

17 years of full "NBCE Engineering Services" for concrete cast in place BUNKER design.

- Client confidentiality & NDA
- Threat & Risk assessment:
- Bunker 3D Design Development:
- Bunker Engineering: (NBCE)
  - Nuclear
  - Biological
  - Chemical
  - Electromagnetic
- Bunker Construction Administration & Management:



VENTILATION SYSTEMS



BLAST DOOR SYSTEMS

"By failing to prepare, you're preparing to fail"
Benjamin Franklin

The American Civil Defense Association
Contributing Member

EXPEDIENT SHELTERING IN HOMES *WITHOUT* BASEMENTS

By Sharon Packer,
MS Nuclear Engineering

Photo by Scott Webb on Unsplash

We were recently asked by a member to design a shelter for a typical stick-built home with no basement. Unfortunately, there is no "typical" plan. So much depends on the targets in your area. Liability issues as well as the TACDA organizational plan prevents us from designing and engineering shelters. We can, however, give basic guidelines. In this journal issue we are showing some of the old FEMA plans as well as similar ideas for other types of expedient shelters.

Typical homes will be destroyed at even 5 psi overpressure, so sheltering inside an above-ground home would assume a "low fallout" threat, with no blast or thermal effect.

Most people will not die from direct weapon's effects. They will die from disease and lack of food and water. Just staying inside the home for two weeks will ensure protection for many people in our rural areas (depending on their proximity to targets).

Evaluate Potential Nuclear Targets

You need to evaluate potential nuclear targets nearby. I live in an area with no obvious primary or secondary targets. Prevailing winds typically travel from west to east. Our nearest targets to the west would be in California (about a 650-mile distance). There is an air force base to the south of us that is about 110 miles away. With this scenario, our area is considered to be in a very low fallout zone (if there is not a full-scale nuclear war), and we would most likely not receive any of the other nuclear effects (blast or thermal).

I have suggested two feet of heavy shielding on shelter walls and ceilings for above-ground home shelters in our area. Two feet of dirt cover will decrease the radiation level by a factor of 64 (PF 64). Two feet of concrete will give a PF of 256. Multiply these numbers by a factor of "2" because main floor homes already have a PF of 2. Basements have a much better protection factor with a PF of 10 or more (Figure 1). Choose the area for your shelter with the greatest number of walls between you and the outside and try to stay away from direct view of windows.

List of Potential Targets to Consider

Primary

Military Installations - Airports with Long Runways - Command, Control, Communications, and Intelligence Installations (C3I) - Seats of National Government - Munition Storage Installations

Secondary

Large Population Centers - Large Industrial Complexes - Dams - Refineries - Power Plants - Financial Centers

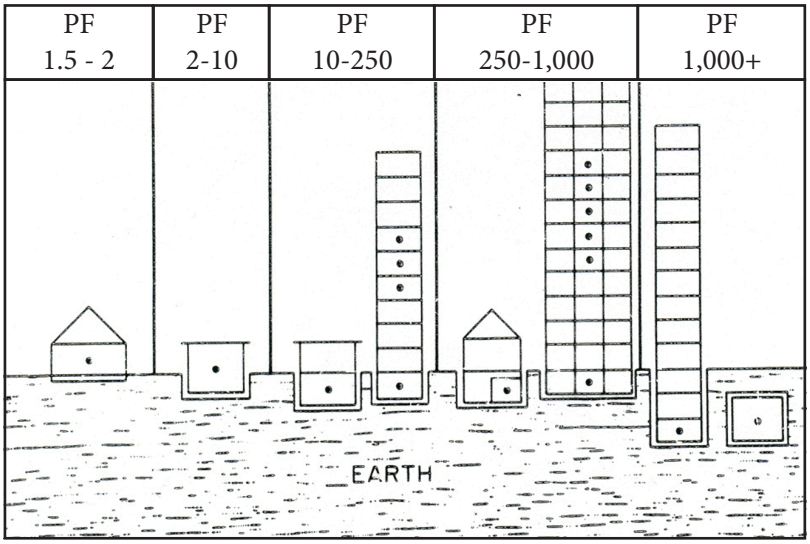


Figure 1

It's much easier to provide shielding if the ceiling of the shelter structure is low. Consider building shielding from bricks, concrete blocks, books, sandbags, water storage containers, food storage and other heavy items. Case lots of canned food can be eaten as the radiation levels drop. Make sure items such as flour, rice, wheat, and beans are placed in airtight plastic or metal containers so that fallout does not contaminate the food.

The heavier the shielding, the better the PF. Four inches of compacted dirt would protect you from half of the radiation (PF 2). You would need about six inches of water for the same level of protection. In order to hold the weight of this much shielding, your shelter must be very strong. Consult a civil engineer before building the top and sides of your shelter. If possible, place the entrance so that it looks towards the most sheltered part of your home.

The minimum requirements in Switzerland for above-ground structures are 31" of concrete on walls and 22" of concrete in the ceiling. Of course, the floor would need to be concrete with heavy footings to match. This would give what the Swiss believe to be a 15 psi blast protection and a fallout PF of about 500. However, they are assuming targets as close as five miles away.

If you are in a closer proximity to primary targets, you should consider an outside below-ground-type shelter. Otherwise, you should consider evacuating to a safer area during an escalating crisis.

In previous articles we have described the fast decay of gamma radiation. In seven hours, 90% of the gamma radiation has decayed. In two days, another 90% will decay, and in two weeks, the level will decrease by another 90%. Plan to stay sheltered for at least two weeks. These numbers are based on the actual time of the detonation, and not necessarily at the time that you receive your dose. We would suggest that you purchase either a radiation metering device or a dosimeter. Meters need to be calibrated on a regular basis. Dosimeters do not. They just need to be "charged". Dosimeters should read to a minimum range of 200 R (Rads). Many dosimeters only read in the mR (milli-rad) levels, which would measure in just thousandths of one R, and are not useful during the critical two week period after a nuclear attack.

Magic Number

You must keep your total dosage during a one-week period under an accumulation of 150 R in order to survive without potential medical help (Figure 2). The magic number is 10 R per hour. If the reading on your dosimeter is above 10 R per hour, you will most likely exceed the accepted one-week dose. The dose may actually increase over a period of time if there are multiple attacks. Pay meticulous attention to your hourly dose rate and keep records of your accumulated dose. If the magic number of 10 R per hour is approaching, add MORE SHIELDING to your shelter. Dosimeters in the 200 R range can be purchased from our TACDA store.

	Accumulated Exposure (Roentgens)		
	1 Week	**1 Month**	**4 Months**
Medical Care Not Needed	**150**	**200**	**300**
Some Need Medical Care Few if Any Deaths	**250**	**350**	**500**
Most Need Medical Care More than 50% Deaths	**450**	**600**	*

Figure 2: Radiation Penalty Chart

We are disappointed that our government has not provided sheltering for the general public. Please write to your representatives and demand a sheltering program.

Together We Are Stronger! Contact your elected officials! Tell them your emphatic desire to have an official Civil Defense Program for our citizens, no matter the cost.

Sharon Packer has served on the TACDA board of directors for over 20 years in several different capacities. Sharon is an expert in civil defense and in NBC shelter design.

NEW PRODUCTS!

742, 746, and W500 Direct-Reading Dosimeters

- Measures and reads accumulated dose of gamma and x-ray radiation exposure.
- Satisfies military specifications for the IM-Series RADIAC METER and ANSI N13.5 and N322 requirements.
- Metal clip attaches to any object to monitor total radiation exposure.
- Hermetically-sealed and immersion proof.

Link here or scan code.

DMC 3000 Personal Electronic Dosimeter

- Rugged, high impact polycarbonate-ABS case.
- Designed to be worn on the body and keep a live record of dose and dose rate.
- Two push buttons for customized data and parameters display.
- LDC display with high-quality white backlighting.
- Operates with a standard AAA battery.

Link here or scan code.

Model 909B Dosimeter Charger

- Spring-loaded with positive mechanical stop (cannot damage dosimeters through excessive charging force).
- Easier charging, viewing, dosimeter protection, and improved accuracy.
- Best value on the market today!

Link here or scan code.

TACDA

PO BOX 1003
Sandy, UT 84091
www.tacda.org
info@tacda.org
Office: (800) 425-5397
Fax: (801) 662-0367

ISSN: 0740-5537

The American Civil Defense Association is on Facebook!
Take the time to LIKE us and receive more valuable links and updates!

Together we are stronger! Join us!

The mission of The American Civil Defense Association is to empower and equip individuals, families, and communities through educational means to be prepared for emergencies and disasters.

Become a member now and receive information and resources to better understand current threats and practical solutions for handling emergencies.

www.TACDA.org

TACDA™ is a registered 501(c)3 non-profit, non-political organization.
Donations are always appreciated.

TACDA MEMBERS RECEIVE:

A FREE E-JOURNAL OF OUR BI-ANNUAL PUBLICATION, THE JOURNAL OF CIVIL DEFENSE

ACCESS TO READ, BUY, AND/OR DOWNLOAD ALL BACK ISSUES OF THE JOURNAL OF CIVIL DEFENSE ARCHIVES FROM 1968

ACCESS TO THE TACDA ACADEMY AND OTHER MEMBER RESOURCES

MEMBER DISCOUNTS ON PRODUCTS AND SERVICES THROUGH THE TACDA STORE

HARD-COPY SUBSCRIPTIONS TO THE JOURNAL OF CIVIL DEFENSE ARE NOW AVAILABLE FOR $15/YEAR!