

FEASIBILITY OF CONSTRUCTION
(MATERIALS, METHODS AND COSTS)
STANDARDS AND REGULATIONS AND
SHELTER DESIGN CONSIDERATIONS
IN THE EVENT OF NUCLEAR WAR

DEC 11 1950



Protection from radioactive fallout

The National Policy on shelter... states that, "In the event of... offer the best single... greatest number of our people... series of studies and tests... National Research Council..."

"Adequate shelter is... radiation casualties..."

"Medical prophylaxis... death following exposure... exist. There is extreme... which would provide treatment... small fraction of the population..."

"There is adequate... construction of effective..."

The principal requirements... shelter occupants and the... the more effective the protection... the most readily available... shielded by the earth... provides good shielding. Earth... walls increases their protective..."

Other construction materials... clay tile filled with sand... wood, covered with earth... shielding from fallout.

With our own engineering staff and the aid of our consultants we have developed numerous designs of home fallout shelter type of Model 7. The Family Fallout Shelter is a practical, five room, one and one-half bathroom shelter for a family of four in the home. Plans and blueprints are being widely distributed.

Designs for dual-purpose shelters for family protection in apartment buildings, and office buildings, are also being developed. In addition, we have written designs for shelters beneath bridges, in downtown areas, in parking garages, and in subways are being developed. We are collaborating with the industry to use various materials manufactured by several firms, including steel, aluminum and economical dual-purpose plastics for building protection.

The American Institute of Architects has accepted our dual-purpose shelter design based on our designs, and it will be displayed at the American Institute of Architects in Chicago in connection with the exhibit on fallout protection. It will also be on exhibit in the coming months in Los Angeles, San Francisco, Dallas, Houston, and Los Angeles.

We have also given technical assistance to many local health departments who have developed shelter designs for their own use in many areas of the country. We have been in housing developments and in public schools.

Adequate fallout shelter can be provided for the family of four for less than \$100 per person. The lowest figure \$20,000 will be for a shelter in a basement.

Where separate independent units are required, the cost may run \$150 per person or more. However, the cost can be reduced by building between these two extremes. We have been in the field where the shelter has been incorporated in new building construction.

What standards are required?

In planning for fallout protection, it is necessary to consider the degree of fallout contamination which may be expected, the type of fallout which is expected for humans, and the type of shelter required.

OCDM has undertaken to research and develop a set of standards which may vary from those included in the attached information. You are invited to contact us and builders to specify the degree of fallout protection.

This chart indicates the intensity of fallout from a nuclear explosion across Iowa after a 1000 megaton nuclear explosion at the Rocky Base near Omaha. The chart shows the fallout intensity in milligrams per square foot and the degree of fallout from a nuclear explosion under various conditions.

When a 10-megaton nuclear weapon is exploded at a point 100 miles from the earth, an area of blast and fire extends to a radius of 10 miles from ground zero during the first hour after detonation. The area shown by the cross-hatched area of the drawing represents areas that are immediately contaminated by fallout as shown by the inner and middle shaded areas. After the detonation, fallout would have spread 100 miles to the distance shown in 24 hours, about 300 miles to the location of Hick Island.

Without fallout protection, virtually all people in the radius of 10 miles would die during the first three days. A few would survive in the area between the yellow and inner green shaded areas. A few might survive in the outer green areas which might incapacitate them for several weeks. The cumulative outside radiation dose during the first few years after the explosion might be as high as 20,000 R. At a distance of 100 miles from the explosion, Grinnell, 400 R; at a distance of 200 miles, 100 R.

Medical advice to OCDM is that a fallout shelter should be built if the total radiation dose, spread over five days, does not exceed 100 R. A dose of more than 200 R within the first few days causes acute radiation sickness.

Time is a factor in measuring the total radiation dose. Some of the radiation damage is done by the radiation which is absorbed over a period of weeks without being immediately absorbed. Radiation absorbed in a few days could cause death.

In wartime, an individual required to take shelter should be advised to take as much as 900 R in a year. This is a high dose, but it is necessary, of course, to make sure that the radiation is spread more or less evenly over the year.

To keep radiation exposure below 100 R, the person should be given sufficient protection in much of the year. This is possible if the shielding afforded by the first hour of fallout is used. At a distance of 200 miles from the point of explosion, the degree of shielding shown on the right side of the drawing will reduce the radiation exposure to less than that which exists in open air. At a distance of 100 miles, the cumulative dose to people who remain in the fallout shelter for the first two weeks would be about 100 R. At a distance of 200 miles, it would be 100 R on the first three days of fallout.

At about 130 to 200 miles from ground zero in this example, the radiation dose to a home basement should be reduced to a level that will prevent radiation sickness. As indicated in the center of the drawing, fallout protection will reduce the radiation exposure to one-twentieth of the dose. In the Grinnell example, the radiation dose to a home basement during the 10-day interval, their radiation exposure would be approximately 100 R. In the Des Moines, the two-week exposure would be approximately 100 R.

However, better fallout protection is needed not to appear in the drawing but miles from ground zero. In the drawing, the dose to a home basement concrete block shelter will be between 200 and 300 R. A better shelter, which can reduce radiation exposure to about 1/10 of the dose, is an adequate fallout protection. In the drawing, the dose to a home basement remained in a basement concrete block shelter would be approximately 100 R during the 10-day interval. If the dose to a home basement of these cases, the cumulative dose to a home basement would be approximately 100 R.

In the event of a nuclear war, the fallout pattern over the United States. The fallout pattern will be complicated than this simplified drawing. The radiation dose will be greater radiation intensities than shown in the drawing. In the drawing, where homes and home basements are shown, the radiation dose is shown. However, there is no way of protecting a home from a nuclear war. We cannot advise that the installation of a fallout shelter in a home area will provide adequate protection. It is recommended that you to provide themselves with the fallout protection manual. The fallout shelter manual. With the help of the fallout protection manual, the initial blast and thermal effects of a nuclear war, the fallout pattern will be war.

The success of a program of fallout protection depends upon the quality of emergency services and, in particular, upon the quality of the fallout monitoring and upon adequate fallout protection.

OCDM's National Warning System consists of warning facilities in every State within 90 seconds of fallout points. The warning systems spread the public warning signal to the public and areas are alerted in minutes. Our warning system is a part of the national warning system every day at North American Air Defense Headquarters. The warning system military warning officers, both in the United States and in the Soviet Union.

We are strengthening this system and the fallout protection system. Our ultimate objective is to have a fallout protection system that all people will receive a fallout protection manual.

OCDM provides funds for such projects as necessary to provide warning points in this National Warning System (N.W.S.). The program is financed by State and local personnel. To extend the existing warning capability, OCDM also provides funds for the States to provide a basis for NAWAS extensions to other areas of the country in each county.

Sirens and other warning devices protect the public and are 100 percent Federal funds and fifty percent of the cost of the cities in the United States generally. Sirens are not to be remembered that sirens protect the public and are not to be

Considerable research has been done in the development of economical indoor warning devices. The National Emergency Alarm Report (NEAR) which is to be used in this system utilizes power from the existing electrical system in individual homes and other buildings. The system is regarded as probable. The development of indoor warning devices may be reduced to 15 to 30 percent of the existing system. It is to develop the maximum number of warning devices and to relay of information to a central point.

Standard AM radio, controlled by the OCDM, is an adjunct to the warning system. It is particularly valuable in advising people when the warning system is in effect.

We have a command command system which is a national call-up at any time. It is a system which is used by the States. This system is a system which is used by the States. The next year will have a radio system which is used by the States. It is placed on police and other personnel to be used by the States. State systems have been improved and are now available under the OCDM program. The system is available with the public will be improved.

A national radiological monitoring system is being developed to public rapidly of danger from nuclear power plants. Information upon which Federal, State and local governments and recovery actions.

A network of approximately 144 thousand radiation instruments will be established across the country. A preliminary network of 144 thousand stations will be at Federal facilities, and approximately 144 thousand remaining 144 thousand will be at private facilities. The total network of 150 thousand stations is scheduled for completion by the end of the year 1963. The Office of Technical Services is presently developing instruments required of Federal, State, and local Government employees.

OCDM and AEC have been studying the extent to which inexpensive home monitoring instruments can be used to estimate how long a room is safe to leave.

OCDM announced last fall that it had developed a portable radiation instrument for the public. The instrument is a package of two instruments and is priced at approximately \$20. It is used to measure (1) dose rates exceeding 500 rads per hour, and (2) to more than 100 roentgens per hour. OCDM is presently developing instruments, furnishing each State or set of States with a copy of the plans to offer instruments in the summer of 1964.

OCDM research to improve the accuracy of radiation instruments. A suitable instrument is developed, a portable instrument, packaging, distributing, and marketing. The development of a portable purchase must be reliable, simple, and simple. It is expected to be completed this summer. The instrument is currently under consideration for development.

We continue to utilize results of AEC research in the development of prototype developments under AEC research. The development of a portable combined with a radio, and a portable device for the detection of radiation given by a siren-like noise produced by the instrument. The instrument detector in a radio. The instrument is currently under development and is expected to be completed this summer. The instrument is currently under development and is expected to be completed this summer.

Citizens instruments will be... designated for operational use.

Neither will the widespread... need by trained CD monitors.

The National Policy of... or misrepresented. The National Policy... specifically. It states:

"Governments are... of warning as is prescribed by the..."

(1) "Evacuation... near assumed targets... plans for evacuation..."

(2) "Shelter... full advantage will be... protection will be..."

3) "The action to be..."

State and local governments... have established evacuation... would permit evacuation of... 2200 countries have developed...

We emphasize that evacuation... execute movement plans... dictate such action. It is... of shelter but neither...

This is the same tactic... conditions of nuclear war... explosion, their chances... if they are able to move... We would be derelict... moves when warning...

We are placing great emphasis on the evacuation of children from fallout areas. Evacuation plans should emphasize removal of children to their homes wherever possible. Sometimes this will be desirable in the event of an attack of intense radiation after an attack.

All of these programs -- warning of an attack, evacuation, sheltering, and movement -- together with other measures to protect the public and defense mobilization -- have the purpose of insuring the success of the National Plan for Civil Defense and Defense Mobilization, to "deter aggression, and in the event of aggression to enable the people to survive, recover and win." Plans should be developed to insure that until the fallout radioactivity reaches a level which is beyond the capability of emergency crews to spend limited resources on it.

In areas of heavy fallout that would be difficult to evacuate, it is necessary for everyone to remain sheltered for long periods of time. Each individual family would have to have a plan for survival which would be in effect at the time of attack.

Government action during this period includes limited hospitalization and "Services." These include hospitalization, medical care, and limited emergency feeding.

Later, as crews were able to spend more time on the ground, and the State and Federal Governments could devote more resources to recovery, emergency feeding and other assistance would be available.

We cannot say too bluntly that the individual family must be able to take care of itself and every citizen must have a plan for survival on his own.

Our economic system depends upon the free flow of goods and services across the nation. A city or even a State isolated by nuclear attack would be unable to meet the basic needs of its population and health care.

As these communities cannot depend on help from outside, the National Plan calls for States and cities to make preparations to provide their own help for at least four weeks after the initial 90-day period, and to call upon the Federal Government.

OCDM's overall responsibility for services management is carried out by using the capabilities of the Federal Government's existing to plan. The Department of Agriculture, for example, is responsible for food, interior for fuel and energy, and for transportation.

These and other resource areas are covered by the Office of Management and Administration, which have been developed by the Department of the Interior, the Federal directors as well as the other major departments.

Such problems of recovery are being addressed more completely in the more immediate survey. For example, the Department of the Interior is...

Announced on May 7, 1980, the Department of the Interior has a reasonable public acceptance of the Federal Government's role in letters and inquiries regarding public lands, particularly in obtaining appropriations to provide for the management of...

The Federal role has been defined in the following manner:

1. Education, with emphasis on public information, which can be taken from the Department.
2. Survey of existing structures, including the value of existing structures in providing...
3. Research to know the current state of affairs in existing, as well as research...
4. Prototype design and construction of research and demonstration...
5. Leadership and example in building appropriate new buildings...
6. Incorporation (including Federal funding).

I have touched on these points in the field of Federal responsibility, which is a barrier and do everything possible to help the Government realize the early stages of the problem. There are many issues involving Federal loan or grant programs...

1. The 1961 budget will provide for the expansion of fallout shelters in all new construction and for the construction of suitable. \$111.7 million has been approved.

2. The Federal Housing Administration and the Veterans Administration have announced that for the year 1961 eligible items in determining qualification for loans will be increased. In addition, FHA, home loans program is now available for the building of fallout shelter and day care centers.

3. The Housing and Home Finance Agency and the Federal Facilities Administration have announced that fallout shelter will be included in projects under the Federal Emergency Management Agency under its College Housing Program, the Public Health Service Program, and its Public Housing Program.

4. The Department of Health, Education, and Welfare and the Public Health Service have announced that general health care construction under the Public Health Service will include the construction of fallout shelter.

5. The HHEA and the Urban Renewal Administration will provide "Master Planning" grants to local authorities for the construction of the incorporation of fallout shelter in urban renewal projects. In addition, local authorities will be eligible for grants for development improvement projects for fallout shelter. The Federal Government will share of the project.

6. The Public Housing Administration is studying the possibility of ruling that fallout shelter may be included in existing public housing projects upon application of local authorities.

Survival is the only way to live. When the war comes, it will come.

I have made here three major points. They are:

First, fallout protection is *cheap*. The average cost per person is *less* than the cost.

Second, the standards of fallout shelter are *very* high.

And Third, fallout shelter is *not* a *luxury*. It is a *basic* need for radiological defense, a *basic* need for *survival*.

January 25, 1961