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GUIDE FOR THE DESIGN AND DEVELOPMENT OF A LOCAL RADIOLOGICAL DEFENSE SUPPORT SYSTEM

Federal Emergency Management Agency

Guide for the Design and Development of a Local Radiological Defense Support System

Federal Emergency Management Agency
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PREFACE

This publication was developed to provide guidance to local director/coordinators, and Radiological Defense (RADEF) staff, for designing and developing local RADEF support systems. In some communities, the application of this guidance may require only the realignment or improvement of already existing capabilities. In others, the design, development and implementation of additional capabilities may be necessary.

The guide is divided into three major parts:

- Part I, Overview of Radiological Defense gives a brief non-technical introduction to the components and capabilities required in a total local RADEF support system.

- Part II, Design and Development of Local Radiological Defense Capabilities provides detailed guidance for designing the various elements of the local RADEF support system. It deals with staffing for the major RADEF components: 1) Shelter, 2) Self-Protection 3) Monitoring, Reporting and Assessment and 4) Decontamination. There is a separate guide for each, which is designed to assist in its design. Each of the sections is developed to stand by itself to facilitate working with one component at a time.

- Part III, Operations of Local Radiological Defense Capabilities provides information needed to develop a fully operational local RADEF support system. It includes brief discussions of reporting, communications, EOC operations, decontamination, planning, training, and radiological instruments.

The guide is designed to be a working tool. It contains guides, checklists, and worksheets to help in the development of the local RADEF support system. First, it should be read in total to provide a complete picture of the RADEF program. However, it is developed in sections which can stand alone and be used separately. This may result in minor repetition of some points. Most importantly, the guide is written from the point of view that a person need not be an expert in nuclear physics or fully understand the biological effects of radiation to help implement a local RADEF support system. If properly used, it will assist any community to develop a more reliable RADEF program.

Louis O. Giuffrida
Director

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PART I

OVERVIEW OF RADIOLOGICAL DEFENSE

INTRODUCTION

We live in a nuclear age. The nature of nuclear weapons and the available means of delivering them preclude complete military protection. All sections of the Nation are vulnerable to immediate blast effects or dangerous fallout radiation from nuclear detonations. Any industrial or population center or military area is a potential target. If an aggressor were to mount an all-out attack on the United States, almost all of our population would be located within 100 miles of at least one nuclear detonation and much of our Nation would be blanketed with fallout. Our leaders must attempt to make sure that nuclear weapons are never used--but if they fail, we must be prepared. It is our responsibility as citizens who are part of the civil preparedness organization (Federal, State and Local), to develop the plans and programs that will assure the survival and recovery of our Nation.

> "The mission of Radiological Defense (RADEF) is to provide to individual citizens and officials the skills and knowledge, situation information, and guidance needed (1) to minimize the effects of fallout radiation hazards of a nuclear attack in terms of injury and loss of life, and (2) to facilitate recovery efforts in a radiological environment.
>
> A secondary mission is to provide support as appropriate for emergency response to peacetime nuclear incidents."
>
> (This secondary mission is not considered in this document. It will be covered in future guidance.)

RADEF is an integral part of all Civil Defense programs. Therefore, the Civil Preparedness Director/Coordinators must assure that RADEF is factored into their various program plans. Much needs to be done in this regard because, historically, RADEF has been treated and has performed as a program separate and apart from others.

The radiation threat from nuclear detonations is very different from the threat from natural or man-made hazards such as fire, flood, tornado, explosion, or chemical spill. Detection of radiation requires special instruments and trained personnel normally not available within a community, particularly in the quantities that would be required in a nuclear war emergency. Local government officials must make life-saving decisions concerning protection from radiation effects. Emergency workers who operate in the fallout environment need a means of controlling their radiation exposures. Government must provide timely and accurate guidance to the population on the radiation hazards present and on what protective measures are appropriate. The RADEF program provides the trained personnel, the instruments and the capability for the radiological monitoring, reporting, and analysis of radiological data necessary to fulfill the mission. Radiological defense is essential. It is the most unique element of the civil defense program.

An operational civil defense RADEF program may also be utilized in peacetime radiological emergencies. Systems in everyday use have a greater probability of being available for use in emergencies. Therefore, whenever possible, emphasis should be given to the dual use of radiological resources. By applying this concept, on-going peacetime emergency activity can be incorporated into emergency response systems. There should be a written understanding, however, regarding the role of the civil preparedness organization with other organizations that have primary responsibility for response to peacetime radiological emergencies. As noted earlier, peacetime radiological emergencies will be covered in other guidance.

This guide describes the Radiological Defense Support System as consisting of four distinct capabilities: Shelter monitoring; Self-protection monitoring; Monitoring, Reporting and Assessment; and Decontamination. This is done mainly for planning and development purposes. In reality, these capabilities overlap. The instruments and trained personnel from one capability can easily be used in other capabilities. Decontamination is a good example. The other three capabilities are concerned with survival during and immediately after the attack. Decontamination becomes significant later in the postattack period. Therefore, instruments and personnel from the first three capabilities can be used to support decontamination. Hence, radiological equipment and trained personnel are not dedicated solely to the decontamination capability.

REQUIREMENTS FOR AN OPERATIONAL LOCAL RADIOLOGICAL DEFENSE SUPPORT SYSTEM

Development of an operational local Radiological Defense (RADEF) Support System requires that:

- A Radiological Defense Planner (RDP) be selected and assigned
- A Radiological Defense officer (RDO) and staff for the Emergency Operating Center (EOC) be selected, assigned and trained
- The RADEF system be designed and developed to include:
  - a Shelter monitoring capability
  - a Self-protection monitoring capability for emergency services, vital facilities and essential industries
  - a Monitoring, Reporting and Assessment capability including a network of weapons effects reporting stations linked to the EOC
  - support for the Decontamination capability
- Radiological instruments be obtained and distributed throughout the jurisdiction for use in emergencies
- Personnel be trained to use the radiological instruments for their own protection, as well as to provide weapons effects and radiological information to a central collection point
- A single location be designated for direction and control of RADEF operations
- Communication capabilities and reporting procedures be planned and established
- Procedures for analyzing, displaying and presenting information for use in decision-making be established within the EOC
- Arrangements be made for radiological instrument inspection, maintenance, calibration and replacement as necessary
- Periodic test and exercises be conducted
- Refresher training for RADEF Officers, monitors, instructors, and the EOC RADEF staff be provided periodically
- Personnel be replaced as required to keep the RADEF emergency response capabilities effective

- Plans and procedures be developed to provide for:
  - operating the existing system
  - developing future capability

RADIOLOGICAL DEFENSE CAPABILITIES

A complete, operational radiological defense support system must be developed in the local community. It should include the ability to advise the decision-makers on:

- The arrival of radioactive fallout
- The radiation environment, particularly in the shelters
- The effect of actions to reduce the radiation levels in the shelter.

In addition, the RADEF system provides the radiological information which the decision-maker must consider along with other factors to determine:

- When people may emerge from shelters
- What and when emergency operations can be initiated
- When decontamination is necessary and possible
- When other radiological countermeasures should be taken
- When restrictions in shelter living may be relaxed
- When emergency unprotected activities may begin.

In order to do this, it is necessary to:

- Develop a plan and procedures
- Provide and maintain radiation detection instruments
- Train personnel as radiological monitors (RM's)
- Measure exposures and exposure rates
- Train an RDO staff to analyze the data and make recommendations.

The radiological defense support system is made up of four capabilities. For planning purposes, each of the capabilities is considered as being separate, yet each is related to the others and together form a complete operational system for RADEF. The capabilities are:

Shelter Radiological Monitoring Capability - for monitoring and assessing the radiation environment for shelterees. It is necessary to:

- Find the best protected area in the shelter
- Evaluate shielding improvements made in the shelter

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- Measure and control the radiation exposures of the shelterees

- Assist in determining when short trips may be made outside the shelter for essential items such as food, water, and medical aid

Self-Protection Radiological Monitoring Capability - for monitoring and assessing the radiation environment in order to control the radiation exposure of personnel who must conduct emergency operations in a fallout radiation environment. This capability is required for personnel in emergency services organizations; at vital facilities, including hospitals, utilities, and essential industries; and for the large number of additional emergency workers who would be required for postattack recovery operations. It is necessary to:

- Evaluate the radiation risks of proposed operations

- Maintain individual exposure records of emergency workers

- Measure actual exposure rates at the location where emergency operations are being conducted to confirm or revise estimates

- Evaluate how long personnel can work without exceeding established exposure limits

- Measure the actual radiation exposures of personnel performing emergency operations

Monitoring, Reporting and Assessment Capability - for determining the extent and magnitude of the radiological hazard in a jurisdiction. This capability is necessary to provide decision-makers with information on:

- When and where weapons have detonated

- When fallout arrives

- The extent and severity of fallout radiation

Using this and other information the decision-maker may then consider:

- If and when emergency operations can be initiated

- When people may emerge from shelters

- When restrictions in shelter living may be relaxed

- When decontamination or other countermeasures should be undertaken

It is necessary to establish a network of Weapons Effects Reporting (WER) stations to report:

- Sightings of nuclear detonations (by time and direction)

- Observed damage, such as glass breakage or structural damage, in the vicinity of the station

- Arrival and subsequent fallout radiation levels

These reports are made to the Emergency Operating Center which is responsible for:

- Processing, displaying, and analyzing the weapons effects information
- Supplementing the routine data by special query when data are missing
- Providing data on the radiation environment to the decision-makers in the EOC
- Providing simplified summaries of the status of the radiological hazards for the general public
- Providing summaries of the local radiological situation to higher governments and other communities in accordance with agreed procedures

Radiological Decontamination Capability - for reducing the radiation levels from fallout contamination to acceptable levels.

It may be necessary to get certain items of equipment or essential facilities back into operation after an attack prior to the time radiological fallout has decayed to a point where operations are permissible. This capability is necessary to:

- Allow earlier use of essential facilities
- Reduce radiation exposure to personnel sheltered in or required to work in vital facilities or industries

The radiological decontamination capability includes any measures that would be used by a community to reduce the exposure rates in or near selected critical facilities (power stations, hospitals, police and fire stations, water pumping stations, sewage processing facilities) or to remove fallout particles from vital equipment (rescue vehicles, fire trucks, ambulances). RADEF support for decontamination is necessary to:

- Measure exposure rates at each location where decontamination is being considered
- Evaluate the effectiveness of various methods of removing or covering the radioactive fallout
- Measure exposure rates during and following decontamination operations
- Measure the exposure of the personnel participating in decontamination activities

A fundamental part of the decontamination effort is a detailed plan that includes a listing of facilities and equipment, in order of priority, that will need to be decontaminated. It should also indicate an estimate of the personnel and equipment needed and the time required to decontaminate each facility. Both in planning for and conducting decontamination operations, it is important to remember that:

- Decontamination is not a substitute for shelter during the postattack period
- The decontamination method selected should require the least expenditure of labor and materials, and hold radiation exposure of personnel to a minimum
- For any decontamination activity, the expected benefit to be gained must outweigh the risks taken by the personnel.

COMPONENTS OF A LOCAL RADEF SYSTEM

There are several components of a local radiological defense (RADEF) program which are necessary for development of an operational system. These components are:

Leadership - The local Director/Coordinator has overall responsibility for the community's civil preparedness program--including the RADEF program. The Director/Coordinator must exercise leadership or the program will never become operational. It is necessary to exercise the leadership responsibility by:

- Becoming as knowledgeable as possible about radiological defense and what constitutes an adequate RADEF program, and
- Appointing a Radiological Defense Planner designated to assume the responsibility for policy recommendation, and the development and implementation of the community's radiological defense program.

The Radiological Defense Planner (RDP) can assume much of the responsibility for development of the RADEF program. Don't let the word planner scare you. We are talking about any individual who is able and willing to assist in developing the program on a day-to-day basis. The RDP may also be the Radiological Defense Officer (RDO). We will pursue the distinction between the two positions later in this guide. For now, we want to make the point that the person who helps design the local RADEF system may be other than a fully qualified RDO and may have little knowledge of nuclear physics. Trained RDO's are still required for operating in the EOC in an emergency, but they may have little time to spend on developing the local RADEF capability. Someone must design the local RADEF system, including the local plans and preparedness, and the resulting requirements for facilities, monitors, instruments, and communications. If an RDP is not recruited, the work for developing the RADEF program will fall on the Director/Coordinator's shoulders.

Planning - This is the first priority for establishing a viable, operational RADEF system. Each jurisdiction requires RADEF plans and procedures. These are usually contained in an annex to the Basic Emergency Operations Plan. The RADEF annex describes the plan of action for establishing, maintaining and operating a radiological defense system within the community. It also provides procedures describing how people, facilities and equipment will be used in an emergency. The RADEF plans and procedures should outline who, what, when, where and how all elements of a RADEF capability will operate in an emergency and how they interrelate with other emergency operations systems. The activities that are maintained in an operationally ready mode on a day-to-day basis, and the ones that are to be implemented during a period of increased readiness should be identified. Enough detail should be provided in the plan so that some relative unfamiliar with the total system could still effectively operate it in an emergency.

The development of the detailed plans and procedures necessary for a complete RADEF system requires a person at each level of government designated as the Radiological Defense Planner. The Director/Coordinator and the RDP together are responsible for the development and implementation of the RADEF system.

Facilities - Several types of facilities are included in the RADEF program. Each has a special purpose as follows:

- Fallout shelters. The primary countermeasure in the system to protect the population from exposure to radiation.

- Emergency Operating Center (EOC). A fallout protected command post. Here the weapons effects and radiological data are analyzed and decisions impacting on emergency or recovery actions of local government are made.

- Weapons effects reporting (WER) stations (formerly called monitoring and reporting stations). Locations with fallout protection, communications, instruments and trained radiological monitors. Their function is to observe and report weapons effects and radiation conditions to the EOC.

- Local bulk repositories. Facilities where RADEF instruments assigned to a jurisdiction are stored in quantity. During a period of Increased Readiness the instruments can be distributed to shelters, emergency services and vital facilities and industries, and additional weapons effects reporting stations.

Instruments - Radiological monitoring instruments are needed to detect and measure nuclear radiation. These special types of instruments are not normally available within a community in numbers necessary to fulfill the requirements imposed by a nuclear attack. Therefore, the Federal Emergency Management Agency has purchased large quantities of RADEF instruments and has granted them to the States for distribution to the local jurisdictions. Several different types of instruments (including survey meters and dosimeters) are usually issued as a set. Different configurations or sets of instruments are packaged for various uses (Shelter, Self-Protection, and Monitoring, Reporting and Assessment).

Maintenance, repair and calibration of RADEF instruments which are issued to State and local jurisdictions are provided through a State operated Radiological Instrument Maintenance and Calibration facility. These facilities are 100 percent Federally funded to maintain the RADEF instruments at an acceptable level of operational readiness and reliability. These services are available at no cost to local jurisdications.

Personnel - An operational radiological defense system requires several types of personnel who are trained to perform specific duties. These include:

- A Radiological Defense Planner (RDP) who is responsible for development of the overall RADEF program.

- A Radiological Defense Officer (RDO) who would operate in the EOC in an emergency and be responsible for analyzing and evaluating radiological data.

- An EOC RADEF staff to assist the RDO.

- Radiological Monitors (RM's) trained in detecting, measuring and reporting radiation and in performing surveys.

- Radiological Monitor Instructors (RMI's) to provide training for the monitors.

Training - Radiological defense is unique. Except for the Radiological Defense Planner, it requires personnel specifically trained to function in a capacity significantly different from their normal occupations. Their training and participation in RADEF is an extra duty. Even radiological technicians in hospitals, health department laboratories and industry, or those who have had radiological training in the military require additional training in radiological defense for civilian operations. This is because the exposure criteria and radiation protection guidelines for the nuclear attack environment vary greatly from the guidelines for normal peacetime operations, peacetime emergencies, or for military radiological operations.

Some RADEF personnel such as Radiological Defense Officers and their assistants, Radiological Monitor Instructors and some Radiological Monitors (RM's) should be recruited, assigned and trained well in advance of an emergency so they are ready to perform their duties if a nuclear attack occurs with little or no advance warning. Following initial training, they should receive periodic refresher training to help them retain technical skills and to keep them aware of any changes in techniques and/or procedures. Generally this means at least one intensive review and practice session each year. Refresher training may be in the form of formal classroom or field work, tests, exercises, or seminars. It should be varied in format to avoid the repetition and boredom of doing it the same way all the time.

Other RADEF personnel, such as Shelter Radiological Monitors and decontamination personnel would only be trained during an Increased Readiness Period. Supplemental RM's and EOC RADEF staff can be trained during a period of Increased Readiness or receive on-the-job training.

Communications - An operational communications capability is an essential and integral part of any system. The Radiological Defense system requires a complete and effective communications capability. The communications capability is necessary to provide for reporting of weapons effects, radiological information between jurisdictions and for direction and control of all RADEF operations.

Because of the diversity and complexity of the many types of communications services available throughout the U.S. and the quantity of different locations involved in emergency management operations, communications plans and procedures must be included as an integral part of the Radiological Defense system. Plans should be constantly updated and detailed to the extent

necessary to assure communications via many types of communications media. Procedures must be sufficiently detailed to permit a person not familiar with all types of communications devices and media to make use of whatever communications resources that survive a disaster event.

Tests and Exercises - Any system that relies on trained personnel, and especially any system that must work right the first time it is needed, must be periodically tested and exercised to assure its ability to function. The RADEF system is no exception. The entire RADEF system and each of the separate capabilities (Shelter; Self-Protection; Monitoring, Reporting and Assessment; and Decontamination) should be periodically exercised to:

- Evaluate the overall plan.
- Evaluate the operational procedures.
- Maintain the technical skills of the trained staff.
- Detect deficiencies in the plan or operational procedures.

After the development of an operational capability is underway, the RADEF personnel should participate in exercises to provide the EOC RADEF staff and radiological monitors with an opportunity to practice and test operating procedures. This can be done by first exercising parts or components of the system. Then, as local experience grows, the entire system should be exercised to see how well all the separate components work together. The RADEF system will not perform effectively in an emergency unless it has, as an entire system, been repeatedly exercised so that all its components function effectively together.

Following any exercise, the radiological defense personnel should document the results of the exercise and make appropriate recommendations for improvement.

RELATIONSHIP OF FEDERAL, STATE AND LOCAL RADEF SYSTEMS

Radiological information is needed by citizens in fallout shelters to maximize their chances for survival. Radiological information is also needed at each level of government as a basis for planning and directing survival, rescue and recovery operations following a nuclear attack. Local need for this information is most critical since it is at this level where lives are saved and resources are expended. The local RADEF system must be complete and operational. RADEF capabilities for State and Federal governments will be built upon the local capabilities. The Federal Emergency Management Agency (FEMA) has developed criteria for establishing a weapons effects reporting (WER) network to provide reports on the extent and severity of weapons effects and fallout conditions following attack. It provides for reports to flow from local WER stations through local, State and Federal EOC's. At each level necessary data is analyzed and used for decision making. At the National level the reporting system may be the only source of much of this type of information.

PART II

DEVELOPING THE LOCAL RADIOLOGICAL DEFENSE SUPPORT SYSTEM

DEVELOPING THE LOCAL RADIOLOGICAL DEFENSE SUPPORT SYSTEM

There are many ways the local RADEF support system may be developed. There are minimun levels as outlined in CPG 1-5, Standards for Local Civil Preparedness, which should be established initially for each capability and then expanded as time permits. It is possible to develop several of the RADEF capabilities simultaneously. Some may already be partially or fully developed. How the RADEF system is actually designed and developed is dependent upon local priorities and capabilities, keeping in mind some basic concepts.

Priotities - In developing the RADEF support system, remember the primary purpose of radiological defense is to contribute to the survival and recovery of the population in the event of a nuclear attack.

The shelter monitoring capability is the primary and most important RADEF capability. This is the capability that contributes directly to the saving of lives. Without shelter and survival of personnel there would be no need for the other capabilities. However, the shelter capability must be developed as an integral part of the jurisdiction's Nuclear Civil Protection (NCP) plan and provide a RADEF shelter capability for both the shelter-in-place and crisis relocation options if both are included in the jurisdiction's NCP plan. Therefore, first attention during normal times and crisis buildup should be given to this capability.

The second planning and implementation priority is provision for self-protection of emergency services, vital facilities and essential industries. This capability again would contribute significantly to the survival of the population during the Emergency Phase and accelerate recovery.

Development of the monitoring, reporting and assessment capability is lower in priority. While information on the radiation environment may be important to decision-makers, it does less than the shelter and self-protection capabilities to contribute to the survival of the population during the Emergency Phase. This capability is important in the Recovery Phase to determine the radiation conditions and coordinate the recovery activities.

Finally, there is a need for the decontamination capability. This capability is important in that it accelerates recovery of the jurisdiction especially through the activation of vital facilities and industries essential to the jurisdictions recovery.

RADEF is not an isolated system. It must be considered in conjunction with all other civil preparedness activities for nuclear attack survival, that is, survival of the population. For radiological defense this means: first, providing the people in shelter a means to measure the radiation in their shelter and guidance on remedial actions they can take to reduce the radiation levels in order to increase their survival; and second, providing the decision-makers with guidance on the effect of the radiation environment on recovery activities.

In the various sections of this guide, the RADEF capabilities are listed or discussed according to the above in order to guide States and localities in the application of limited manpower and other resources.

Capabilities - A complete local RADEF support system is composed of several interrelated components or capabilities (shelter; self-protection; monitoring, reporting and assessment; and decontamination) each of which will be discussed in greater detail later in this section. Each is an improtant element in the total local RADEF support system. Taken together they create a complex and interrelated system which cannot be developed overnight. An overall approach to developing each of the local capabilities in RADEF should be established in order to guide local efforts.

Staff - An individual should be designated by the Director/Coordinator to assist in developing readiness for emergencies as well as to carry out these functions in emergencies. A systems-oriented Radiological Defense Officer (RDO) or a Radiological Defense Planner (RDP) can do much of the conceptual and leg work necessary to design and implement the local RADEF support system. One individual may be able to help design and develop the RADEF support system, but a trained staff is necessary for operations in the Emergency Operating Center (EOC) during an emergency.

Time Phases - The requirements for a local RADEF support system vary according to specific time phases which have been categorized as follows:

Normal or Pre-emergency Phase - The objective of this phase is preparedness. This is the period when the local RADEF support system should be designed and at least partly implemented in order to be operational if an attack occurred with little or no advance warning. A minimum capability would require that:

- Plans and procedures be written
- Necessary facilities be located
- Instruments be distributed from the State to local level for storage in RADEF facilities or local bulk storage repositories
- Communications be planned and established
- Minimum radiological staff be trained

Increased Readiness (Surge) or Preattack Phase - The objective of this phase is improved capability, recognizing that most local RADEF support systems will be developed short of a fully operational state during peacetime and allows for expansion of the local system to the maximum capability needed by the community. Activities during this period should include:

- Accelerated training of additional personnel, especially radiological monitors
- Distribution of RADEF instruments from local bulk repositories to shelters, emergency service organizations, vital facilities and industries, and additional weapons effects reporting stations
- Review and updating of RADEF plans and procedures

Emergency or Attack Phase - The objective of this phase is survival. It begins with warning that attack is imminent. It may last from several days to two weeks after attack--or until radiation levels have decreased sufficiently to allow performance of urgent short-term unprotected operations. The primary function of the local RADEF support system would be to provide data on the radiation environment. This would enable shelterees to take remedial actions, if necessary, and the heads of government to make decisions affecting the jurisdiction's survival. Most of the population will be in shelters during this phase, but some emergency services personnel may be required to perform their duties of it can be shown that the benefit justifies the risk.

Recovery or Postattack Phase - The objective of this phase is, initially, the reestablishment of essential functions that will sustain servival and, later, the restoration of other improtant functions. This phase begins at the earliest practical time after the emergency phase, or when early rapid decay has caused the levels of radiation to decrease sufficiently to allow limited performance of unprotected operations. It includes the period starting when limited emergence from shelter is possible to initiate recovery countermeasures until recovery is complete and the jurisdiction has returned to near normal operations. Since the effective decay rate is slower than during the Emergency Phase, the length of the Recovery Phase may be substantially longer. It may last for months, depending on the severity of damage and residual radiation levels. Activities during this phase will vary greatly depending upon the radiation environment resulting from the attack. If the radiation intensities are high, initial activities may be limited to lifesaving actions, such as obtaining food and medical supplies and decontamination of vital facilities and industries. As the radiation intensities decrease, decontamination operations may be initiated as well as the redistribution of the population. During this phase, capabilities would be directed to provide radiation monitoring in conjunction with the remedial actions taken by the jurisdiction to recover from the effects of the attack.

Integrated Systems - The radiological defense support system is not a separate system operating in isolation. It is an inherent and integral part of all programs and systems which collectively provide the means for surviving the effects of a nuclear attack. Each capability described as part of the RADEF support system is also an integral part of other systems. For example, a shelter RADEF monitoring capability is necessary to support the entire shelter system. The RADEF monitoring, reporting and assessment capability is an integral part of the overall direction and control system. Similarly, self-protection monitoring and decontamination must be included as part of any emergency services systems. Many local emergency services workers do not recognize the limitations that the radiological environment will place on their operations. Nor do they understand how much they will have to rely on trained radiological monitors and Radiological Defense Officers to guide them in a nuclear emergency. One of the biggest jobs facing civil preparedness staffs is to convince other governmental services how much the RADEF program will mean to them for survival. The concept of an integrated RADEF support system needs to be kept in mind by all responsible National, State and local officials in planning and implementing systems for defense against nuclear attack.

Aerial Monitoring - The aerial radiological monitoring (ARM) network is part of the State RADEF operations. It provides the State with the ability to rapidly and safely survey:

- Relatively large geographical areas
- Areas where no local monitoring capability exists
- Areas where radiation intensity is too high to permit ground monitoring
- Areas where no data is available
- Evacuation and supply routes and key locations such as bridges, railyards, airports, etc.

Aircraft flights after a nuclear attack will be controlled by the North American Air Defense Command (NORAD) through the FAA Air Route Traffic Control Centers and permission must be obtained by the State to conduct aerial radiological missions. Although the aerial radiological survey teams are part of the State RADEF system, they must be located at dispersed locations throughout the State. Aerial radiological monitoring could be used by a local jurisdiction to obtain RADEF information on remote areas within the jurisdiction, or areas where the Weapons Effects Reporting (WER) network is not functioning. However, since ARM is part of the State system, this must be coordinated with State RADEF operations.

Putting the Pieces Together - The first step is to assign responsibility for the design and development of the local RADEF program. One of the first things the responsible individual will have to look at, whether dealing with shelter; self-protection; monitoring, reporting and assessment; or decontamination, is the facilities requirements. The individual must find out where shelters are located and decide where self-protection operations may take place, where radiological monitoring may be required and where decontamination may be needed. After the facilities are identified, assure that they provide sufficient fallout protection, or develop plans to upgrade their protection in an increased readiness period. The individual must also assure that the facilities have adequate communications, particularly the weapons effects reporting stations, for reporting to the EOC. Wherever deficiencies exist, plans must be developed for providing the required capabilities during normal operations or during the increased readiness period.

Once facilities are selected or provided for, several other activities may be initiated simultaneously. Radiological instruments should be ordered from the State Instrument Maintenance and Calibration Facility through the State Emergency Preparedness Office. There are different configurations of instruments placed into sets for each type of operation, so it is necessary to order sets for the particular purpose or purposes for which the facility is selected.

Additionally, radiological monitors need to be trained in the use of the instruments, reporting to the EOC and analyzing the data so as to understand the limitations radiation places on their operations. A

RADEF capability must be established in the EOC to provide for receiving, plotting and analyzing the data and making recommendations as appropriate.

Finally, operational plans and procedures must be developed to describe how the existing capabilities of the overall RADEF support system will be utilized in an emergency and how the system will be upgraded during a period of increased readiness.

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LOCAL RADEF PROGRAM STAFFING

Establishment of an operational local radiological defense program requires dedicated leadership. This is the responsibility of local Director/Coordinators. They are responsible for the overall planning, promotion and development of the local RADEF program. They can best meet this responsibility by recruiting a staff to assist in the program. Staffing the local radiological defense program has been a frustrating experience for many local Director/Coordinators. But without an effective staff who are trained, assigned and exercised, the local RADEF program will be ineffective in the period when it may really be needed.

Local Director/Coordinators are responsible for developing, in the existing departments of government within their community, the unique skills and capabilities required for local RADEF operations. Other elements of local emergency operations, such as law enforcement, firefighting and medical/rescue operations, have an existing day-to-day capability or can be quickly augmented with auxiliaries, reserves or volunteers. RADEF operations, however, have no local operational counterpart and are the local Director/Coordinator's direct responsibility. If we are ever involved in a nuclear war, the elected officials will look to the local Director/Coordinator and staff for guidance. At that point, the elected officials must have the answers on what to do--and what can be done in the radiological environment. Otherwise, there is a failure in the responsibility to provide for the protection of the citizens of the community.

Whether they do it themselves or recruit qualified assistants, local Director/Coordinators must assure that RADEF programs are developed within their communities. It is now, when the threat of war is low, that the basis of the radiological defense program should be established in each local community. In a period of increased international tension, there will be other competing demands on local time and energies. It will be difficult to establish an adequate RADEF program in a short time. Normally, the Director/Coordinators will be involved on a daily basis in a multitude of activities deemed important by their elected officials. They may not have time to develop adequate radiological defense programs by themselves. For this reason, priority attention should be given to selecting and training a qualified Radiological Defense Planner (RDP) in each jurisdiction to assist in the planning, development and implementation of a detailed local RADEF program. With or without the assistance of qualified Radiological Defense Planners, the local Director/Coordinators should establish a complete radiological defense program for their communities, using this guide as a basis. It is important that they also acquire a basic understanding and knowledge of radiological effects and emergency operations in a fallout environment.

Once a radiological defense program is established locally, the Director/Coordinators must support and assist the Radiological Defense Planners in continuing the maintenance, exercising, testing, evaluation, updating and improvement of all aspects of the program. This will include:

- Designing the overall local RADEF support system including the component capabilities

- Acquiring radiological instruments

- Training and exercising personnel

- Preparing operations plans and procedures

In summary, local Director/Coordinators cannot do everything themselves. Development of a viable emergency response program requires a variety of skills and capabilities melded into an integrated unit. One of the unique reguirements is knowledge of radiation effects and means of protecting against them. Another is the capability to plan to operate effectively in a radiation environment. Local Director/Coordinators need individuals on their staffs to help design and implement a RADEF system and to assist in direction and control in emergency operations.

Radiological Defense Planners (RDP's) function principally in the preattack phase. The concept of a planner to assist in designing and developing the local RADEF support system is new. It is based in part on the following considerations:

- More than one local RDO is required in most jurisdictions. It has been stressed tha the first RDO trained should be "systems-oriented". That is, this RDO should know how to help design and implement the local radiological defense support system. However, current training for RDO's does little to provide this systems orientation.

- Although many RDO's have been trained, few have been adequately utilized by the community. They may know about RADEF analysis procedures, but they require familiarity with the operational aspects of emergency operations in the community.

- They need to be brought into the mainstream of the EOC staff. They need to become more familiar with work patterns and the prevailing human factors.

- Development of a local RADEF capability can be accomplished by someone who is not fully trained as an RDO. It is not mandatory to have a full knowledge of the physical and biological aspects of radiation in order to know how to develop the local RADEF system.

The RDP is visualized as an assistant to the local Director/Coordinator. The RDP's primary responsibility is to assist in development of the local RADEF support system. The RDP may also be the RDO. However, it is possible for an individual to design and develop the local RADEF support system even through this person may not be technically trained or qualified to operate in the EOC in an emergency. If it is not possible to include both an RDO and an RDP in the local organization, the responsibility for systems development will fall on the RDO or ultimately on the Director/Coordinator. If there is a qualified RDO who has the ability and time to design and implement the local RADEF support system, it is not necessary to recruit another individual

as a RDP. However, if an RDO is not currently assigned or trained, or lacks either the time, interest, or ability to develop the RADEF program, an RDP should be recruited.

The RDP should be capable of assisting the local Director/Coordinator to establish a complete local RADEF support system. Responsibilities include:

- Designing, implementing and maintaining the local RADEf support system
- Writing operational plans and procedures
- Conducting indoctrination courses for administrative personnel
- Assisting in the preparation, administration and evaluation of tests and exercises

The RDP's qualifications should include a knowledge of local government operations and an ability to plan and design a commuity system. Experience in local government, community service and adminstration is desirable.

Radiological Defense Officers (RDO's) are responsible for RADEF operations, particularly in the attack and postattack phases. They are the principal advisors to the Director/Coordinators and the local elected officials on matters pertaining to radiological defense operations following a nuclear attack. They are essential to local operations and must be:

- Knowledgeable about the physical characteristics and biological effects of radiation
- Familiar with radiation measurement and reporting procedures
- Capable of evaluating the probable effects of radiation on people and other resources
- Capable of recommending appropriate protective actions (remedial movement, shelter, decontamination)

The RDO's operate in the EOC and are responsible for:

- Assisting in preattack increased readiness actions
- Directing the EOC RADEF staff and monitoring operations
- Assessing and analyzing the radiological situation in the community
- Making technical recommendations to the Director/Coordinator concerning remedial actions to be taken in a radiological environment
- Recommending actions and coordinating emergency radiological service activities in the community to include:
    - Monitoring, reporting, analyzing and evaluating radiological data

- Preparing summary reports and fallout warning messages

- Initiating appropriate protective messages

RDO's are the persons who have been designated to assume the responsibility for recommendations for the radiological defense of their communities. They must have some knowledge of the governing principles, techniques of planning and management, availability of resources and awareness of the overall policy framework within which they must work. Formal education qualifications should include college-level training in the physical sciences or experience which gives a like background. Experience in teaching or training is desirable. Whenever possible, the RDO should be involved in training and exercising the local RADEF capability and in planning and developing activities that are discussed in this handbook.

RADEF Staff Personnel operate in the Emergency Operating Center (EOC) during an emergency to assist the RDO. The staff should be large enough to provide for 24-hour operations in the EOC. To the extent possible, the staff should be composed of qualified local or State government employees who do not have conflicting emergency assignments.

In addition to the RDO, staff positions in the EOC should include at least one Assistant RDO and specialists in recording, plotting and analyzing radiological data and in decontamination procedures. (See EOC RADEF Staffing Guide, Page 2-17, for recommended staffing levels.) An individual may function in more than one of these categories. For example, the analyst and recorder may be the same person, and decontamination planning may be the responsibility of the Assistant RDO. (In fact, you will notice that the staffing guide does not show a separate position for decontamination.) Duties of the RADEF staff personnel are described briefly below:

- The Assistant RDO would provide backup in the EOC for the RDO. Assistant RDO's should have the same general qualifications and training as the RDO, although the position may not require as much administrative and planning skills

- A Decontamination Specialist is a RADEF staff member who works under the general direction of the RDO to develop plans for radiological decontamination of vital facilities, equipment and areas. The Decontamination Specialist coordinates field training of fire services, engineering and public works services and private contractors for performing postattack decontamination operations. The Decontamination Specialist also recommends, coordinates and provides technical direction of decontamination activities. Formal educational qualifications should include engineering or other appropriate technical training. (NOTE: Decontamination operations are beyond the scope of this guide.)

- Analysts Summarize radiological data for use in the community and for reporting to other levels of government. They estimate future exposure rates and radiation exposures associated with

shelter occupancy, emergency operations and postshelter living. Qualifications should include competence in algebraic computation and ability to present information graphically and to use charts and graphs effectively.

- Recorders and Plotters record incoming data on report forms and record it in appropriate tabular form on maps. They may also perform routine computations under direction of the RDO. Their qualifications should include an understanding of the weapons effects and radiological reporting system, a familiarity with the area and maps of the area served and an ability to make simple accurate computations.

In order to provide training for the EOC RADEF staff, the RDP's or RDO's can develop exercises involving fallout situations in their community. They should select a possible target, or targets, that could produce fallout in the community. The maps, logs, reporting stations and reporting procedures used should be consistent with the State and local operations plans. They can then develop the exposure rates, situations and problems or requirements for the community. Exercises which involve actual local operations are necessary to provide for an operational RADEF capability. Assistance in developing a RADEF exercise can be obtained from the State or Region.

Radiological Monitors (RM's) may be considered the backbone of the radiological monitoring system. Trained personnel are needed to operate the instruments and correctly interpret and report the data. Radiological monitors for self-protection monitoring and for weapons effects reporting stations need to be trained and assigned during the normal or Preemergency Phase. During the Increased Readiness Phase, radiological monitors for shelters and any additional monitors necessary to augment self-protection and weapons effects monitoring will be trained through accelerated training by mass media.

Radiological Monitor Instructors are needed to train the radiological monitors needed to replace those lost through attrition and to provide update or refresher training. The Instructor may be the RDO or one of the Assistant RDO's if qualified. However, during an increased readiness period, the RDO staff may be involved in preparing the EOC, etc., and may not be available for expedient training.

The Peacetime Role of RADEF Staff Personnel has often been overlooked. In addition to the design and development of the local RADEF program outlined above, the RDP and RDO have potential roles in peacetime nuclear incident planning, and coordination, training and exercising of the local system. As stated before, the RDP and RDO may be the same person.

Peacetime Nuclear Incident Planning and Coordination - There is a great potential for leadership in the area of nuclear incident planning. For example, the development of a Radiological Emergency Response Plan in areas near nuclear power reactors. Developing such a plan involves essentially the same planning activities as nuclear attack RADEF planning except that coordination is with different State and Federal agencies.

(NOTE: Unless specifically trained and provided with special instruments, the RDP or the RDO should not get involved directly in local peacetime nuclear incident operations. FEMA radiological instruments provided to local government were not developed to detect the levels of radiation emitted from most peacetime nuclear incidents. The Nuclear Regulatory Commission (NRC) and State Radiological Health or other agency designated by the State have the statutory responsibility to respond to such incidents. The local RDP or RDO may provide backup support, but should avoid taking the lead in operational response activities.) There should be a written understanding regarding the role of civil preparedness organizations and personnel for response to peacetime radiological emergencies.

Training and Exercising - the RDP or RDO should also assist in the periodic in-service training or orientation of the heads of the local government's emergency services or operating departments. They need to understand that RADEF involves them and supports their operations, rather than both operating in isolation. Training should include:

- Significance, interpretation and use of radiological information
- Objectives, requirements, hazards and procedures for decontamination operations
- The limitations placed upon their operation by radioactive fallout
- The fundamentals of exposure control for emergency workers
- How the RADEF section will operate in the EOC during a nuclear attack emergency and support their operations
- The fundamentals of decontamination

Recruiting a RADEF Staff is not an exact science, particularly recruiting volunteers. However, there are some skills involved and some points that need to be considered if you intend to recruit effectively. Most often the RADEF staff is a volunteer staff, but remember that a volunteer can do anything a paid professional can do, given the proper guidance and training. The only real difference between the paid professional and the volunteer is the salary. Therefore, you should recruit as carefully for a volunteer as you would for a paid member of your staff.

Successful recruitment is not a hit or miss proprosition. Recruitment and use of volunteers is going on constantly. It is a necessary way of life for many organizations. Following are some thoughts that should help make your recruiting job more productive:

- Enthusiasm generates enthusiasm. You must be convinced that the job is important and essential. A potential volunteer can tell from the sincerity and enthusiasm in your pitch whether you are

really sold on the program and want that particular individual you are talking to for the job. Without a positive approach, you will likely not succeed in your recruiting efforts.

- Positive attitude about volunteers. You must be convinced that a volunteer can do anything a professional can do - given the right amount of direction, guidance and supervision. It does require time on your part to provide orientation, arrange for training, check on progress and help to resolve problems; however, the rewards are worth it.

- Be selective. Do not take the first "warm body" you locate to fill a position just because the individual is available - wait until you find the "right body," just as you would if hiring a paid staff.

- Competition for volunteers is tough. Other agencies are constantly looking for a variety of qualified volunteers to carry out community services. The competition is tough, but it is not an impossible task.

- Do not prejudge availability. Do not let someone discourage you from going after potential volunteers by telling you they are too busy, already involved, or do not like civil preparedness. Approach them and let them tell you. Too many good people are lost because you do not ask them and someone else does.

- Treat volunteers as staff members. Most volunteers merely want to be treated as you would treat other employees - fairly and honestly. They do not expect to be placed on a pedestal. Just as you would provide a staff person with working tools and their own space (desk, chair, phone, etc.) you must also provide volunteers with an adequate place to work. Also provide them the opportunity for training and let them participate in staff meetings. This tends to lend importance to the job and makes them feel like a part of the staff.

- Expenses. Today, more than in the past, you need to take into account some way to assure that the volunteers you recruit, especially if they are retired persons on fixed incomes, are reimbursed for out of pocket expenses. Just as you would discuss salary and fringe benefits with a staff person being hired, you need to discuss payments for expenses in advance. Check what your community has available.

- Do not be intimidated by working with volunteers. You are probably working with volunteers every day through your work with civil preparedness volunteer groups (SAR, HAM operators, RACES, etc.) or with community oriented volunteer groups (Red

Cross, Salvation Army, Explorer Scouts, religious organizations, etc.) who are a part of the emergency operations plan and/or staffing pattern. If you need some specific training or more confidence in working with volunteers, there are courses available through Red Cross and other volunteer organizations. Check in your community and take those available.

- Success speaks for itself. Many organizations in your community depend on the constant use of volunteers - look around and you will find organizations which could not survive without a large part of its work force being volunteers. (Red Cross, Boy Scouts, Girl Scouts, Salvation Army, Campfire Girls, United Way, etc.)

- Break down large projects. Dividing a large project into smaller components makes it easier to recruit people. For example, while finding an RDO may be tough, finding an RDO who will also take the job of developing the RADEF system increases the difficulty of finding and recruiting a person. Dividing the job between an RDO and RDP requires locating two people - but makes it easier to recruit someone to take each position.

Table 2-1

Comparison of Duties of Radiological Defense Planner - Radiological Defense Officers

Note: As described here, the Radiological Defense Planner (RDP) functions during the Normal (Preattack) and Increased Readiness Phases and the Radiological Defense Officer (RDO) functions during the Attack and Postattack Phases. In essence, the RDP does the planning and the RDO is the implementor.

	RADIOLOGICAL DEFENSE PLANNER	RADIOLOGICAL DEFENSE OFFICER
Time Frame	PREATTACK	ATTACK AND POSTATTACK
Responsibility	Design, develop and maintain a radiological defense system that will operate effectively in the jurisdiction to minimize the effects of radiation resulting from a nuclear attack on the United States.	Manage the radiological defense system from the Emergency Operating Center during a nuclear attack to include analyzing radiological data, preparing reports and providing policy recommendations on permissable activities in the fallout environment. Serve as a staff person and technical advisor to the local Director/Coordinator.
Knowledge Required	Requirements of local radiological defense systems, including shelter RADEF operations, self-protection, the weapons effects reporting network, exposure control and decontamination.	Concept of operations for the RADEF program as reflected in the RADEF annex and the status of its implementation.
	Federal guidance and assistance available to local jurisdictions through the State and the procedures for obtaining this assistance (such as radiation detection instruments, planning guidance, etc.)	Fundamentals of RADEF including the biological effects of radiation.
	General knowledge of civil preparedness operations and a thorough understanding of radiological defense operations plans--Federal, State and local.	Radiological monitoring techniques and principles of attack analysis.
	Methods to promote the development of the radiological defense program.	Principles of self-protection and radiological exposure control for emergency workers including how to maintain radiation exposure records.
	Relation of RADEF operations to other operating forces.	Decontamination techniques and other countermeasures for fallout radiation.
	Impact, if any, of the crisis relocation option on the local RADEF program.	Understanding of total EOC emergency operations and the role of disaster analysis in the overall operation.
	How to write the radiological defense annex to the local emergency operations plan.	How to formulate and persuasively present policy recommendations on permissable activities in the fallout environment to the local Director/Coordinator and elected officials.
	How the local RADEF system may be applied to peacetime nuclear emergencies.	EOC reporting and analysis functions and relationship of local EOC activity to State and Federal requirements.
		Roles of emergency services and vital facilities in survival and recovery.

	RADIOLOGICAL DEFENSE PLANNER	RADIOLOGICAL DEFENSE OFFICER
Functions	Analyze local requirements and capabilities for RADEF response. Design the required local RADEF system to include: shelter RADEF operations; self-protection; monitoring, reporting and analysis; and decontamination capabilities. Acquire radiological instruments from the State Calibration Facility and arrange for their storage in the facility or in local bulk repositories with plans for distributing them in an Increased Readiness Period. Designate a single location for the direction and control of monitoring operations and establish reporting procedures. Provide for the training of personnel as radiological monitors to use the radiological detection equipment for their own protection and to provide radiological information to a central collection point (i.e., the EOC). Check with trained monitors annually on their availability and provide for periodic refresher training and replacement of personnel as required to keep emergency operations effective. Develop a decontamination capability. Develop, in coordination with the jurisdiction's emergency communications planning officer, communications plans and procedures for the RADEF system. Develop EOC display, analysis and reporting procedures for emergency operations. Prepare and maintain RADEF annex to the local emergency operations plan. Provide for integration of RADEF operations with other services during emergency operations at both the operational and policy level. Coordinate with Federal and State agencies for inclusion of their RADEF capability in the local weapons effects reporting network. (See continuation in next column)	Collect and analyze weapons effects and radiological data from weapons effects reporting stations, shelters and self-protection units as necessary. Present damage and radiological analysis information and recommendations to the local Director/Coordinator and government leaders for decision making. Develop and forward reports to the State (or State Area) as required as part of the Emergency Operations Reporting System. Provide information and direction to weapons effects reporting stations, shelters and self-protection facilities and units (such as police, fire, public works) regarding exposure control; i.e., what is the recommended maximum permissable radiation dose accumulation for workers, what activities can be undertaken in the fallout radiation environment that exists (such as decontamination of equipment, foraging for food, etc.). Make recommendations and provide guidance for decontamination activities. (Radiological Defense Planner) Prepare a development plan for improving, upgrading, or expanding all aspects of the RADEF system in an Increased Readiness Period. Provide for periodic tests and exercises of the RADEF system (personnel, plans, reporting, EOC operations). Initiate and participate in public information and education programs covering such things as radiation hazards, protection against fallout, countermeasures, etc.

EOC RADEF STAFFING GUIDE
for Two-Shift Coverage

Population	RDO's*	Asst. RDO's	Recorders	Analysts	Plotters
Up to 25,000	2	0	1	1	1
25,000 to 250,000	2	2	2	2	4
250,000 to 1,000,000	2	4	3	3	6

NOTE: This staffing guidance is minimal and allows little reserve capability to compensate for the absence of one or more staff members. Therefore, it is important that the staff members be trained to perform several functions in order that efficient operations can be realized through adjustment of assignments. Consideration should also be given to the appointment and training of alternates for the various staff positions. They might be assigned, to assist with radiological defense operations at centers of operation for other emergency services.

*Radiological Defense Officers

(See continuation in next column)

GUIDE TO ESTABLISHING A RADEF STAFF

This section contains guidance on finding, recruiting and training a Radiological Defense Planner (RDP and/or a Radiological Defense Officer (RDO); however, the discussion applies equally well to recruiting all members of the EOC RADEF staff. As you complete recruiting of the RADEF staff, use the worksheet (Page 2-27) for recording staff selections and make it an attachment to your radiological plan or annex.

Finding an RDP and/or RDO

Finding someone who would be interested in being a local RDP or RDO will be challenging in many localities. Part of the solution is in knowing where to look. Following is a shopping list of places where you may be able to find an individual who will be qualified to serve as your RDP and/or, when trained, as your RDO.

Public Sector

State or local government personnel such as police, fire, public works, or health--however, it should be remembered that these individuals have day-to-day assignments from which they may be unable to spare time to be a RDO and they will likely have emergency responsibilities that would prevent them from serving in the EOC as an RDO.

Teachers (technical, science, math, physics) from the public or private schools, colleges, or vocational-technical schools would likely have the time required for training and working if they can be sufficiently motivated. They would more likely be available to be an RDO in the EOC in an emergency since they would have no conflicting emergency assignment.

Mobilization Designee (MOBDES) Program. If there is a qualified reservist in your community with an interest in civil preparedness, this may be one of your best sources of individuals for both an RDP and an RDO.

Private Sector

Hospital radiologist, physicians, or health technicians with practice in radiology. However, as with State or local government persons, time constraints and emergency assignments may make them unavailable.

Industrial radiographers or laboratory physicists. Many industries now use radioactive sources for industrial or experimental operations. The individuals dealing with the sources may be interested in getting involved in your radiological defense program. Check with the State Radiological Health Officer for listings of current licensees for radiation sources in your community.

Industrial safety officers, industrial and professional engineers, chemists or pharmacists may also have the appropriate kind of technical background.

Community service groups. Whenever talking to community organizations including organizations for minorities, women, handicapped, senior citizens, etc., you should use it as an opportunity to recruit volunteer staff. They do not have to be trained in nuclear physics to be qualified to assist you as an RDP in the development of your RADEF program.

Volunteer services, organizations, such as RSVP (Retired Senior Volunteer Program), may be able to provide an individual with both the interest and time to serve as your RDP or RDO.

Former military personnel who have had some experience in chemical, biological and radiological operations or experience in developing plans and programs may be a source of assistance. Those who are retired may be looking for something to do in their spare time.

Friends and acquaintances, if qualified. You may find someone around you who would be willing to help out or who knows someone else who might be available. Even someone who has no knowledge of radiological defense may make a good RDP or RDO if properly trained and motivated.

Recruiting the Radiological Defense Planner or Officer

Realistically, you probably will wait a long time before someone walks in your door and volunteers to be an RDP or RDO. In order to find someone to assist you in the development of your radiological defense program, you will have to go out and actively recruit. In most cases your RDP or RDO will be a volunteer, although you may be able to find one part-time under the P&A program, or have one assigned on a limited basis from another local governmental agency. If you have no RADEF program, it will take a concerted effort initially to get it developed. You will need to find someone who is willing to give the time and effort necessary to design and implement the system. You will have to be an evangelist and salesman to effectively recruit such a person.

Direct Approaches

Direct approaches involve personal contact. You must ask some department or organization for help and hopefully the assignment of someone to assist you, even if on a part-time basis.

Check to see if they can:

- Provide someone on a part-time basis to do your basic RADEF system design and development, or
- Recommend someone on their staff who might have sufficient interest to volunteer.

You should consider contacting:

- Heads of State or local government agencies (police, fire, Public works, health, etc.)

- Superintendents of school districts, presidents of colleges or heads of science departments

- Heads of radiology departments of local hospitals

- Managers of local industry (which have a radiological capability).

Follow up directly with individuals named to encourage them to volunteer to assist in development of your radiological defense program. You may follow up by:

- Phoning the individual to request a meeting and/or to attempt to recruit by phone. Remember that it is easy to say no on the phone, and it will likely take you too long to explain your needs. However, if the phone call is a follow up to a personal letter, you improve your chances for success.

- Mailing a letter of inquiry outlining the job you have and asking for a statement of interest. Letters can be improved if they are prepared individually and are personal rather than mimeographed and general.

- Visiting the individual to personally sell the program and solicit assistance.

General Approaches

Contacts

Check with employment offices, welfare offices or other volunteer services to see if they know of anyone willing to assist.

Contact associations such as the Association of Retired Military Personnel.

Search for names on the reserve lists utilized for MOBDES assignments. The reserve list, available from the State office, shows all eligible military reservists in your community. You can follow up to see if they are interested in participating in the MOBDES program.

Announcements

Send announcements to civic organizations or make appeals for assistance whenever you are invited to speak to them.

Post announcements on bulletin boards and in public places (i.e., city hall, college campuses, grange halls, etc.).

Place an ad in the newspaper. Be sure to specify that it is volunteer, etc., to head off questions regarding pay.

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Investigate possibility of recruiting and funding someone under the FEMA Emergency Management Assistance Program.

Check with friends and acquaintances for names of qualified people or ideas on where to find a qualified person.

Watch newspaper articles on local activities for names of retired citizens, etc., with background experience that would be useful as an RDP or RDO.

Note: General announcements are probably the least effective approach to recruiting because they lack the personal touch and cannot provide sufficient detail.

Selling Points

Emphasize the ideals of public service and preparedness.

Be honest about the workload; i.e., initially it will take quite a bit of time to design and implement the RADEF system, but maintaining it or refining it will not be nearly as time consuming.

Inform them about radiological defense. It can be an interesting subject to deal with, you do not need to be a nuclear physicist or technician to be able to deal with it, and there is hope for mankind following a nuclear war.

Show some consideration for their families; i.e., in a nuclear war perhaps you can arrange for them to be a part of your EOC staff, etc. It is important that staff personnel know their familites will be taken care of.

Training the RADEF Staff

The RADEF staff requires training as indicated below. However, the training should be spread over time so as not to discourage or overwhelm the individual.

Radiological Defense Planner (RDP)

The RDP requires less training than the RDO in order to accomplish basic design and development of your local RADEF system. However, training may be beneficial and it would be well if the RDP were trained as follows: (As Director/Coordinator, you should also be familiar with these publications.)

Civil Preparedness Home Study Courses. These take little time to complete and provide a good general knowledge of civil defense operations. The Home Study courses should include:

- HS-1, Civil Defense Director/Coordinator
- HS-3, Introduction to Radiological Monitoring (followed by hands-on instrument training to qualify as a radiological monitor)
- HS-6, Civil Defense, U.S.A.

In-service Orientation. The RDP should read the available printed material relating to radiological defense including:

- Civil Preparedness Guide 1-5, Standards for Local Civil Preparedness
- Civil Preparedness Guide 2-1A, Attack Environment Manual
- Civil Preparedness Guide 2-6.1, Radiological Defense Preparedness
- Civil Preparedness Guide 2-10, Civil Defense Emergency Operations Reporting Systems
- Civil Preparedness Guide 1-30, Guide for the Design and Development of a Local Radiological Defense Support System.

Radiological Defense Officer (RDO)

Even a radiologist or radiology technician in a hospital, health department, or local industry, or former military personnel with a radiological background need specialized training. Their backgrounds do not provide enough operational knowledge of RADEF operations or systems in a nuclear attack environment. When you have recruited an RDO, contact the State Civil Preparedness Office for the schedule of courses or assistance in providing the required training. The RDO should have the training indicated above for the RDP plus the following:

- The minimum required course is the Radiological Defense Officer course.
- The RDO should also complete the training required in order to be qualified to provide instruction to local radiological monitors.

Analysts, Recorders and Plotters

These individuals do not need to be full-time RADEF personnel during preattack. They may be employees of other government services or personnel having the necessary capabilities but not having another priority assignment for the attack and postattack periods. They should be prepared for their positions through in-service training programs and exercises.

Radiological Monitors (RM's)

In order to make a local RADEF system fully operational, local personnel must be trained as monitors for the self-protection of emergency services, industries, and vital facilities personnel and for

WER stations. The local RDP or RDO should normally provide this training. However, if they cannot, the help of someone locally should be enlisted to conduct the training.

The local RDP or RDO should also assist the local Director/Coordinator in the development of plans for the crisis training of shelter radiological monitors, additional operational radiological monitors for self-protection monitoring and WER stations, and the additional personnel required to assist in the EOC.

Training during the period of increased readiness is the primary means of training shelter monitors.

CHECKLIST FOR RADEF STAFF

Yes	No	
___	___	Do you have a Radiological Defense Planner (RDP)--an individual responsible for planning and developing your RADEF system?
___	___	Do you have a qualified Radiological Defense Officer (RDO)--an individual who is trained and assigned to operate in the Emergency Operating Center (EOC) in an emergency?
___	___	Do you have a Radiological Defense Officer who is assigned but not yet fully trained?
___	___	Is the Radiological Defense Officer partially trained? Has the individual received some training but not completed all training recommended for an RDO?
___	___	Is the Radiological Defense Planner and the Radiological Defense Officer the same individual?
		_____ Who is responsible for design and development of the RADEF Program (RDP)?
		_____ Who is expected to operate in the EOC in an emergency to analyze fallout data (RDO)?
___	___	Do you have trained and assigned Assistant Radiological Defense Officers?
___	___	Do you have Assistant Radiological Defense Officers who are assigned but not fully trained?
		_____ Number of Assistant RDO's required?
		_____ Number of Assistant RDO's assigned?
		_____ Number of Assistant RDO's assigned and fully trained?
		_____ Number of Assistant RDO's assigned who are partially trained?
___	___	Do you have an individual assigned as a decontamination specialist?
___	___	Do you have assigned RADEF analysts, recorders and plotters for operating in the EOC?
		_____ Number of analysts required?
		_____ Number of analysts assigned?
		_____ Number of analysts trained?

Yes No

_____ Number of recorders required?

_____ Number of recorders assigned?

_____ Number of recorders trained

_____ Number of plotters required?

_____ Number of plotters assigned?

_____ Number of plotters trained?

___ ___ Has your EOC RADEF staff participated in tests and exercises?

WORKSHEET NO. 1

RADEF STAFF

Jurisdiction _____ Date _____

Prepared By _____

Position	No. Required	Assigned	Trained	Name	Mailing Address	Phone Nos.
Radiological Defense Planner						
Radiological Defense Officer						
Assistant RDO(s)						
Decontamination Specialist(s)						
Analyst(s)						
Recorder(s)						
Plotter(s)						

SHELTER RADIOLOGICAL MONITORING CAPABILITY

Function - In the event of a nuclear attack, the population must be protected from the fallout radiation to ensure their continued survival. The shelter is the primary countermeasure to protect people from radiation. While people are in fallout shelters, they require the capability to:

- Determine actual radiation levels in their shelter areas
- Locate the safest area(s) within the facility
- Determine if the protected area needs improvement
- Monitor how much radiation exposure they are receiving, and
- Decide when to leave the shelter.

Some of this information may be made available from the local EOC, but the shelter must have the capability for self-sufficiency. Some information, such as where the safest area in the shelter is, can only be determined from within the shelter. In addition, the shelterees may be unable to communicate with the Emergency Operating Center (EOC). Therefore, for RADEF monitoring purposes, each public fallout shelter facility must have at least one set of shelter RADEF instruments and one radiological monitor who is capable of reading the instruments.

The shelter radiological monitoring capability provides people in public shelters with the means to detect, measure and assess the radiation hazards from fallout following a nuclear attack. The only way that shelterees can obtain information on how the radiation hazard is affecting them is by having radiological instruments in the shelter and using them. By using this information, necessary remedial actions can be developed.

The shelter radiological monitoring capability is most important in the early shelter period. This is the time when radiation levels could be very high. This period could extend from a few hours to several days postattack. This is also the period when the shelterees are most likely to be isolated and have no communications with persons outside their own shelter. Thus, they are on their own to assess the radiological situation and to do something about it, if necessary.

Facilities - Public fallout shelters are facilities which have been surveyed and found to have a protection factor (PF) of at least 40 and a minimum capacity for at least 50 shelterees at 10 square feet per person. If there are not enough public shelters meeting these criteria to provide radiation protection for all the population, the jurisdiction may have to use facilities with less protection and/or less than 50 spaces. They may have to develop additional shelters in an emergency by:

- Improving the protection of a facility by blocking windows or adding earth or other mass to the sides and roof area. These are called upgraded shelters.

- By quickly constructing facilities specifically for use as fallout shelter. These are called expedient or improvised shelters.

Radiological instruments should be obtained for all the public shelters which are identified for use in the Community Shelter Plan. RADEF instrument sets for public shelters are available from the State Instrument Maintenance and Calibration Facility. There will also be some "private" shelters such as home basements. These will not be provided with Federally procured instruments, and it will be necessary for local plans to cover how people in them will be informed of the radiological situation in the jurisdiction.

Instruments - The public shelter is the first line of radiological defense for the citizen. Providing instruments for these shelters is essential, especially the lower grade, upgraded, or expedient public shelters. Shelterees will require instruments in order to fully utilize the protection afforded by these lower grade shelters and to be able to increase the value of this protection by every expedient means available to them. There should be at least one set of radiological instruments for each public shelter. However, some public shelters may require more than one set of instruments, depending on the shelter capacity and the number of floors dedicated to shelter use.

In order for the shelter program to be effective, each jurisdiction must determine the number of shelter sets needed, obtain the instrument sets and develop a plan for:

- Their storage in secure locations referred to as local bulk repositories

- Their distribution to shelters during an Increased Readiness Period

- Training shelter radiological monitors during an Increased Readiness Period.

The jurisdiction must also arrange for the periodic operational testing of the shelter RADEF instruments in accordance with the State's schedule; and for the exchange or replacement, by the State, of instruments that do not pass the operational test. The State will also provide for the periodic calibration of these instruments.

Communications - It is important in a radiological environment for people in fallout shelters to know what is going on in their community. They need to know when it is safe to leave shelter or what missions are critical enough to risk leaving shelter early. Shelters may also be an important supplemental source of radiological data for the Emergency Operating Center staff. In some cases, shelters will have telephones available or a local emergency service employee, such as a policeman or fireman, may be in the shelter with a mobile radio. However, citizens should not rely on the availability of these communications capabilities. Instead, citizens should be encouraged to bring a battery-operated AM or FM radio or Citizens Band equipment to the shelter so they can receive and broadcast information related to the radiological conditions in the community. They may also receive guidance from the EOC via AM/FM or CB on the length of stay in the shelter, permissible activities and other RADEF related actions.

Staff - There should be a minimum of one, and preferably two, shelter radiological monitors for each shelter RADEF instrument set required in public shelters. However, it is expensive to train and continuously update the large number of shelter monitors required. In addition, it is realistic to assume that the required number of people would only volunteer for this training under crisis conditions. Therefore, radiological monitors for shelters are not trained and maintained on a day-to-day basis. Instead, they will be trained during the Increased Readiness Period. Training will be through the use of mass media such as TV and newspaper and, as backup, through the use of simplified, in-place self-instruction cards. Each shelter RADEF instrument set contains simplified instructions on the operation of the RADEF instruments. The instructions are designed to enable anyone to use the instruments in order to determine the best protected locations in the shelter.

Plans - The shelter RADEF monitoring capability is a part of the total local RADEF system. The RADEF plans should include details on how the shelter RADEF monitoring capability will be provided. The plans should include a list of the types of RADEF instrument sets available for shelter use and where they are located; whether in local central storage (bulk repositories), in selected individual shelters (recommended only for low-risk areas) or both. If they are stored in local bulk repositories, Standing Operating Procedures (SOP's) must be available to provide for timely distribution of the equipment in an Increased Readiness Period.

Additional Considerations - The shelter RADEF capability is a key element of the total local RADEF system. It has been perhaps the most consistent element of the system over time and yet it too is changing. During the 1960's, it supported a national shelter program which provided for moving people to large public shelters which had been surveyed and stocked. These were often located in the downtown core areas of cities. Communications with these shelters were assumed to be possible so that the RADEF capabilities were primarily focused on the direction and control of shelterees during the in-shelter period.

Most of the national inventory of large public shelters is located in high risk areas and, for this reason, many would not be used in current shelter plans which provide for sheltering populations either in-place or in low-risk areas. As a result, the shelters that are now planned for use are generally lower in protective value and of reduced capacity. In addition, the potential direct effects of an attack, including electromagnetic pulse, on communications and power nets reduce the likelihood of effective communications between the EOC and the shelters for the direction and control of shelterees. Therefore, RADEF must be reoriented to support a sheltered population which may be without communications and located in low grade shelters during the early postattack period, when radiation levels can be most dangerous. This means that attention must be given to all possible preparedness actions during normal times and the periods of international tension in an effort to assure that shelterees can survive a period of high radiation levels. In addition, increased attention must also be given to protection during the recovery period so that the radiation exposure to survivors can be kept to a minimum.

Because of funding limitations, shelter sketches, which show the protected area in a facility, are no longer provided for surveyed public fallout shelters. Therefore, the radiological instruments will have to be used after fallout arrives to identify the safest area in shelters. The result of this change, associated with the change in shelter concept outlined above, places greater responsibility on shelter managers and RADEF monitors to understand the impact of RADEF on the sheltered population and to control in-shelter operations during a nuclear attack.

An additional result of the changes is that the current inventory of RADEF instruments may be insufficient to meet all existing instrument requirements. The need to utilize lower grade shelters, both upgraded and expedient, will increase the overall requirement for shelter RADEF instrument sets. This is because of two factors:

- Previous guidance only provided for instruments in surveyed public shelters which met the minimum requirements of space and fallout protection. It did not consider the need for instruments in low grade shelters which are needed to satisfy a local shelter deficiency.

- The low grade public shelter, both upgraded and expedient, will average a smaller capacity than standard (surveyed) shelters and; therefore, more instrument sets are required to provide for the same number of shelterees.

You should determine your total shelter instrument requirements, but look to satisfy the requirements of standard (surveyed) shelters first.

SUMMARY

SHELTER RADEF CAPABILITY

Location	- Wherever surveyed public shelters are located
	- Wherever facilities can be upgraded to provide increased protection
	- Wherever there is space to construct expedient public shelters
Protection Factor	- Surveyed shelters - PF 40 or better
	- Upgraded shelters - with added mass (earth) to get PF 40+
	- Expedient shelters - constructed to a PF 40+ level
Communications	- Desirable, but not required
	- Telephone or radio to the EOC, if possible
	- Battery-operated AM or FM radios for information over EBS
	- Citizens Band radios, if available
Additional Use	- Shelter may also be part of the self-protection capability for emergency services or vital facilities and industries, or contain a weapons effects reporting station
Instruments	- Surveyed shelters - one or more sets of radiological instruments for each facility
	- Upgraded shelters - one set of radiological instruments for each facility
	- Expedient shelter - one set of radiological instruments for each cluster of 3-7 facilities
Monitors	- Monitors are trained during Increased Readiness Period
	- Recommend 2 monitors per shelter instrument set
Space	- 10 square feet per person
	- 50 spaces or more for each public fallout shelter for which instrument sets are provided

GUIDE TO ESTABLISHING A SHELTER RADEF CAPABILITY

This section contains guidance to assist you to outline the requirements of the local Shelter Radiological Defense capability. This will, of necessity, require an analysis of local public fallout shelters following the procedure outlined below. We are not advocating that this is a responsibility of the local RDO. However, if there is no local Shelter Officer, it could legitimately be the responsibility of the RDP or the Director/Coordinator. The guidelines that follow are for whoever has to do the analysis of the shelters to arrive at the requirement for shelter RADEF monitoring instruments and shelter RADEF monitors. This section does not deal with any other aspect of making the local fallout shelter system operational, such as locating shelters, stocking or marking the facilities, or training shelter managers.

Overview

The shelter RADEF capability is an important element in both the overall local shelter system and the local radiological defense system. It is important for the well-being of the shelterees. As part of the local shelter system, it provides the means for shelterees to determine:

When fallout radiation is present?

What the exposure rate is?

Where the safest area in shelter is?

When to leave shelter for short or long periods of time?

What the total exposures of the shelterees are?

As part of the local RADEF support system, the shelter RADEF capability provides a means for contributing to the protection of the local population. It may also serve to provide radiological data to the EOC, which would supplement the information acquired through the weapons effects reporting network.

Local policy should be to use the best available shelter first, and utilize lesser quality shelters only as needed. It is important to determine the realistic number of shelter RADEF instrument sets needed to meet these requirements. This basic task requires careful consideration.

Establishing Requirements

Requirements of Shelter RADEF Capability

What is needed to begin:

National Shelter Survey All-Facility List for your community. This is a computer listing of public fallout shelters which have been surveyed.

Local Community Shelter Plan (CSP) which outlines the shelters to be used in an emergency. If it is unavailable or out of date, it will need to be developed or updated before you can make an accurate determination of the shelter RADEF capability requirements. During the interim, you will need to make a local determination of which shelters will be used and revise this later when a CSP is completed.

Estimate the current resident population. (Note: All computations should be based on the current resident population (shelter in-place). Any changes in requirements as a result of crisis relocation activities should be determined by NCP Contract Planners and if a host area, added to the requirements for the current resident population. The added requirement for NCP Crisis Relocation should be so noted.)

Adding machine or calculator (if you have a large number of shelter facilities to deal with).

Procedure:

Existing Public Shelters - The first step is to determine the number of existing facilities which provide sufficient fallout protection in order to determine the number of shelter RADEF sets required. Start by utilizing the National Shelter Survey All-Facility List to identify facilities that could be used to shelter people. (Note: If you have a CSP, begin with it and use these steps to verify and update it.) It may be necessary to supplement the shelter listing with local knowledge or on-site survey to verify the probable shelter configuration, where the facility still exists, and its suitability for shelter. Use the worksheet on Page 2-43, or any other means that you are comfortable with for recording the results and make it an attachment to your Radiological Plan or Annex.

Look under the columns headed "PF CAT 2-3" and "PF CAT 4+" for facilities with 50 or more fallout shelter spaces. List them on the worksheet and add the totals of all the columns (except for total basement) for each facility. (Note: Add the totals from the columns headed "PF CAT 0" and "PF CAT 1", as well, since all space within a facility will be used in an emergency. PF CAT 0 indicates a protection factor of 10 to 19 and PF CAT 1 indicates a protection factor of 20 to 39. Both PF CAT 0 and 1 would require additional protection or (upgrading). PF CAT 2-3 indicates that the facility has a protection factor of 40 to 99 and would provide adequate fallout protection. PF CAT 4+ indicates a protection factor of 100 or higher which would provide excellent fallout protection.)

Eliminate facilities which require security (sensitive facilities such as power plants or substations, vital facilities, etc.) or would not be available for general public shelter use for any other reason (reserved for medical treatment, EOC's, uninhabitable, etc.).

Compute the number of shelter RADEF sets required:

Allocate at least one set of shelter RADEF instruments to each public shelter.

For facilities with more than 500 spaces, or with spaces located on more than one floor, or with widely separated shelter areas, allocate an additional shelter RADEF set for each multiple of 1,000 spaces (if in a single large shelter area), additional floor, or additional shelter area, up to a maximum of 6 instrument sets per shelter.

If there is a remaining unsheltered population in the jurisdiction, they will have to be accommodated in private home shelters, upgraded public shelters, or expedient public shelters. Determine the unsheltered population by totaling the fallout shelter spaces available and subtracting from the current estimated resident population.

Home Fallout Protection - Develop a rough estimate of the number of home fallout shelter spaces that may be utilized. This will reduce the number of upgraded and expedient shelter spaces that must be provided. (Note: The figure arrived at in this step will be very unprecise. If uncomfortable with it, go on to the next steps.)

Obtain the figures from the Home Fallout Protection Survey (HFPS) conducted in 1969. These figures, if still available, can be found in the Community Shelter Planning files maintained by the State Office. Some are still available on computer printouts maintained in the Regional Office. Contact the State Office to see if the figures are available for your jurisdiction.

If the HFPS figures are not available, you may be able to compute a figure from one of the following sources:

Check your local public library for the 1970 Bureau of Census booklet, "Detailed Housing Characteristics" to find the number of homes with basements. Multiply by 3.5 to get an approximate number of spaces. (Note: The figure of 3.5 is used as the average family size. Even though a home basement may shelter more persons. not all basements are adequate to provide fallout protection and/or not all basements will be used.)

Check with the local assessor to see if records are maintained which show the number of homes with basements. Multiply by 3.5 to get an approximate number of spaces.

Upgraded Public Shelters - Upgraded public shelters are those which could be improved to provide adequate fallout protection through the addition of mass (earth, bricks, or other heavy material). They must be utilized if there are insufficient spaces in surveyed facilities and home shelters for the entire population. Determine the following and show the date on the worksheet.

The remaining unsheltered population. This figure is determined by totaling the fallout shelter spaces available in existing fallout shelters and home fallout shelters (if used) and subtracting from the current resident population.

List facilities with only PF CAT 0 spaces and PF CAT 1 spaces, indicating the total number of these spaces provided by each. (Note:

378-222 0 - 82 - 5

There should be at least 50 spaces in the facility before RADEF instruments can be provided.) These facilities provide poor protection against fallout unless improved in an Increased Readiness Period. (Note: If you do not need all the facilities in order to shelter your population, select those most likely to be used. Eliminate any facilities that would not be available for use as a public fallout shelter.)

Compute the number of RADEF instrument sets required. Allocate at least one set of shelter RADEF instruments to each public facility in which people will be sheltered. Few separate upgraded shelter facilities will be large enough to require additional shelter RADEF instrument sets, but if they do, utilize the same criteria for determining additional instrument requirements; i.e., multiples of 1,000 spaces or additional floors or shelter areas within a facility.

If there is still a remaining unsheltered population in the jurisdiction, it will be necessary to utilize expedient fallout protection.

Expedient Public Shelter - Improvised or expedient shelter is that which is actually constructed during an Increased Readiness Period, usually by a combination of digging a pit and piling dirt over the top on an A-frame construction. Such an A-frame shelter is crude, but each one could shelter up to 100 people from the disabling effects of nuclear radiation. (Note: This procedure would not be appropriate for a risk area since the population would likely relocate if there were sufficient time for this type of activity.) To determine your local requirements for expedient shelter, you should do the following:

Compute a new figure for remaining unsheltered population. This figure is determined by totaling the fallout shelter spaces available in existing fallout shelters, home fallout shelters (if used) and public shelter spaces in upgraded facilities (with only PF CAT 0 and PF CAT 1 spaces.) This total is subtracted from the estimated current resident population to give the remaining unsheltered population.

Divide the remaining unsheltered population by 100 to determine the number of expedient shelters required.

Allocate one shelter RADEF instrument set to each cluster of three to seven shelters.

Prepare a complete list of the public fallout shelters (existing, upgraded and expedient) showing number of people to be sheltered in each and number of shelter RADEF instrument sets required for each. Do not include home basements in these calculations. Provide a copy of this list to the State Instrument Maintenance and Calibration Facility and attach a copy to the Radiological Plan or Annex.

Develop plans for acquiring, storing and deploying instrument sets and for upgrading or constructing shelter in an Increased Readiness Period.

Additional Considerations

Instruments

FEMA policy is that shelter RADEF instrument sets should not be stored in the shelter facility because of problems of poor storage conditions

(dampness, dust, etc.), loss or pilferage, theft and difficulty in the periodic checking of instruments. It is recommended, therefore, that one or more facilities be selected for use as a central storage location (bulk repository) for RADEF instrument sets including those for shelters. Ideally the repository should be a local governmental facility to provide for proper management and control. In addition:

The bulk repository should be clean, cool and dry.

It should be convenient for rapid dispersal of the instruments in an Increased Readiness Period.

The instrument sets should be located to provide ease of periodic inspection and operational testing by local personnel and exchange by the State maintenance technicians; i.e., they should not be stored behind or under other supplies.

It is important that a list be maintained with the shelter RADEF sets showing which facilities are to receive them and how many each gets.

Staff (Trained Monitors)

There should be a minimum of one, preferably two, shelter RADEF monitors for each shelter RADEF instrument set. However, because of the difficulty in recruiting monitors for shelter, keeping them trained and preventing high turnover, the policy is to train shelter radiological monitors during an Increased Readiness Period.

Shelter Area Identification

Sketches of the fallout shelter areas in the facilities surveyed are no longer provided. The current concept is that a shelter RADEF monitor should use radiological instruments to monitor within the facility after fallout has arrived in order to identify the areas that provide the best protection from radiation.

Instructions

Shelter RADEF monitors are normally trained in the Increased Readiness Period. In addition, shelter facilities may be unable to communicate with the EOC. Therefore, it is important that instructions on the use of instruments and the limitations of activities in fallout situations be provided. Normally it is best to include these instructions in each shelter RADEF instrument set. As a minimum, MP-72 should be used for this purpose and supplemented with local detailed guidance as applicable.

Planning and Implementation

Implementation

After the local community shelter plan has been developed, requirements for shelter RADEF sets have been determined, a local central storage area designated, and distribution lists prepared, the instruments should be ordered from the State Instrument Maintenance and Calibration Facility. These are the basic items for implementing the shelter RADEF capability.

Other activities, such as distributing instruments or training shelter radiological monitors should take place in the Increased Readiness Phase.

Planning

Local plans and SOP's need to be developed which identify:

Where all of the shelter facilities are located?

Where the instrument sets are located?

How the sets will be distributed?

Assignment of the sets in central storage to specific shelters?

How shelter RADEF monitors will be trained?

How, if communications permit, the shelter RADEF capability will provide radiological data to the Emergency Operating Center to supplement the weapons effects reporting network?

How guidance will be furnished to shelters (via EBS, CB, etc.)?

CHECKLIST
FOR
SHELTER RADEF CAPABILITY

Yes No

__ __ Do you have enough public fallout shelters for your current population?

_____ What is your current estimated resident population?

_____ How many can be sheltered in surveyed public shelters that meet the criteria (PF 40+ spaces)?

_____ How many can be sheltered in home shelters?

_____ How many can be sheltered in upgraded public shelters?

_____ How many require expedient public shelters?

__ __ Are shelter RADEF instrument sets provided in the community for all public shelters?

_____ How many sets do you currently have?

_____ How many sets are required (total)?

_____ How many sets are required for surveyed public shelters?

_____ How many sets are required for upgraded public shelters?

_____ How many sets are required for expedient public shelters?

_____ How many sets do you need to order?

__ __ Are all shelter RADEF instrument sets stored in one or more central locations (bulk repositories)?

_____ How many sets are stored centrally?

_____ How many sets are stored in the shelter facilities? (Should provisions be made to relocate these to central storage?)

__ __ Do you provide for periodic inspection and operational testing of the RADEF instruments?

__ __ Do you provide for periodic battery replacement for shelter instruments in accordance with State guidance?

__ __ Do you have plans for training shelter radiological monitors in an Increased Readiness Period?

_____ How many shelter RADEF monitors are required?

Yes No

_____ How many shelter RADEF monitors are currently trained and assigned?

__ __ Do you have written plans for operation of the Shelter RADEF Capability?

WORKSHEET NO. 2

SHELETER RADEF CAPABILITY

Jurisdiction _____ Date _____

Prepared By _____

Facility Name	Facility Address	Total Spaces	Type 1/	Comm. 2/	Instrument Sets			Monitors	
					No. Req'd	No. Avail.	Stored 3/	No. Req'd	No. Avail.

1/ Type: S—Surveyed (PFCAT 4+ or PFCAT 2), U—Upgradeable (only PFCAT 1 and/or PFCAT 0), E—Expedient (to be constructed in IR)

2/ Communications: T—Telephone, R—Radio; not a prerequisite for shelter, but advantagious if available

3/ Stored: OS—Onsite, BR—Bulk Repository

SELF-PROTECTION RADIOLOGICAL MONITORING CAPABILITY

Function - In the event of a nuclear attack, emergency services personnel and the staffs of vital facilities and essential industries may be required to function in a fallout radiation environment to carry out essential services such as:

- Handling casualties
- Removing debris
- Performing other recovery operations
- Operating vital facilities and industries.

To minimize the radiation risk to personnel involved in these activities, self-protection radiological instrumentation must be available for use by trained individuals. The term "self-protection" as applied to radiological defense means those emergency services, vital facilities and essential industries having the ability to detect, measure and assess the radiation environment at their location with the objectives of:

- Reporting radiological information to their headquarters
- Evaluating the radiation risks of proposed operations
- Minimizing exposures to personnel in the course of performing their missions.

This self-protection capability is needed by organizations and units such as police, fire, rescue-ambulance, city-county road maintenance departments, water and sewage disposal plants, telephone, power and gas companies (see list in Table 2-2). They must be able to perform independent radiological monitoring in order to support their own activities. Unlike a weapons effects reporting station, these units would not routinely report radiological data to an EOC. However, they may receive radiological and operational information from the EOC in conjunction with emergency assignments, and the EOC may request radiological information from them on certain areas during the course of emergency operations.

Facilities - Self-protection monitoring locations are vital facilities and installations of emergency services that would be needed by the jurisdiction during the early Postattack Period to carry out essential services. These facilities should have the best available protection against radiation since the personnel will be required to perform their services during periods of relatively high radiation and/or function outside the shelter as soon as radiation intensities permit. If the base facility itself provides inadequate protection or if emergency work crews must operate at a distance from it, the emergency services and vital facility personnel should be relocated before fallout arrival to nearby shelters providing better protection.

The distribution of self-protection monitoring locations will depend upon their geographic location in the community. Where the distribution is appropriate, the self-protection location may also be designated as a weapons effects reporting station, if this does not interfere with their emergency services mission. The RDP or RDO, together with the Director/Coordinator, should determine where emergency services and vital facilities are located in the jurisdiction and which would require a self-protection capability.

Instruments - Special RADEF instrument sets for self-protection are available from the State Instrument Maintenance and Calibration Facility. In order to reduce the chance of sending emergency response crews on suicidal missions, where they may accumulate enough radiation to cause serious illness or death, instruments are required to:

- Determine the radiation levels in the work area
- Find the safest areas in which to work
- Measure the accumulated exposure that emergency workers receive while performing emergency functions.

Self-protection locations should be provided sufficient radiological monitoring instruments to enable the personnel to adequately conduct radiological monitoring of their environment during the performance of their duties. The number of radiological self-protection instrument sets required for each service must be determined by the or RDO in coordination with the local Director/Coordinator. They may be assigned several sets of RADEF instruments for use by emergency personnel. CPG 1-5 contains guidance on determining the number of instrument sets required by the various emergency services.

The number of sets issued to each emergency service and vital facility will depend upon:

- Their functions as detailed in their emergency operations plans and the radiological defense annex
- The number of trained radiological monitors for self-protection
- The availability of radiological equipment
- The approval of the local Director/Coordinator.

Radiological instrument sets for operationally ready self-protection should be stored in the facility itself or on the emergency vehicle. Sets for expansion of the capability during increased readiness should be stored in local bulk repositories with plans for crisis distribution.

Communications - The facilities and activities that are designated as part of the local self-protection radiological defense capability should have at least a minimal communications capability with the Emergency Operating Center (EOC) and/or with their dispatch location. The

communications requirement will vary at different locations because of constraints imposed by their location or in order to accomplish particular mission assignments. Self-protection locations, unless designated as part of the weapons effects reporting network, would not routinely report radiation intensities. However, they may require some communications capability with the EOC or a central dispatcher in order to:

- Give and receive information and guidance on the radiation environment

- Give and receive mission assignments, and

- Report conditions while performing missions.

Staff - Each emergency service or vital facility that requires a self-protection radiological monitoring capability must determine the number and type of personnel that will require training as radiological monitors, as determined by their operational requirements. Some services may include radiological monitor training as part of the overall training program for their personnel (e.g., police and fire academies). Others may designate only certain personnel as radiological monitors (e.g., telephone linemen or hospital emergency room staff). As a minimum, there should be at least two trained and assigned radiological monitors for each set of self-protection RADEF instruments issued.

Certain emergency services that are organized to receive emergency assignments from a central location such as a central dispatch for fire units, a central office for State or local police, or a central dispatch for telephone repair vehicles or city maintenance vehicles, may desire to have one or more of their staff at this central office trained as an RDO. This would enable them to provide more comprehensive radiological defense guidance to their personnel. Services wishing to obtain this type of training should contact their civil preparedness Director/Coordinator and arrange for RDO training. In addition, services that include radiological monitor training as part of their overall training program should arrange to have one or more of their training staff qualified as a Radiological Monitor Instructor (RMI).

Plans - The self-protection radiological defense capability is an integral part of the total local RADEF system. The RADEF plans should include details on how the self-protection RADEF monitoring capability will be provided. They should include a listing of the facilities, equipment, and trained personnel needed by each emergency service, vital facility and activity included under the self-protection capability. The plans for self-protection should identify what is necessary for maintaining an operational capability and what additional steps would be taken during an Increased Readiness Period to supplement the day-to-day capability. In addition, the plans must be related to the requirements of these services and facilities as outlined in their respective annexes to the basic emergency operations plan. Each service, facility, or crew identified as requiring self-protection capability must be identified in their respective operations plan and given specific emergency response and recovery responsibilities.

Additional Considerations - The self-protection RADEF capability is one concept in the overall radiological defense program that has received the least attention in the past. Self-protection bridges the gap between immediate emergency lifesaving activity and recovery operations. In the past all instruments were allocated for either monitoring and reporting stations or shelter RADEF purposes. Many of the local elements that would be classified as part of the self-protection capability were assigned instruments and included as part of the monitoring and reporting network--even though plans were never established to provide for reporting. This should be corrected.

The self-protection RADEF capability provides for a more realistic local RADEF program. However, care must be taken to see that the program does not get out of hand. When determining who requires self-protection, it would be easy to include everyone who comes to mind. As with shelter, however, the current instrument inventory may not be sufficient to meet all potential requirements. It is necessary to first establish the most important requirements to be filled from existing inventories and then if additional instruments are available, or are made available later, the lesser requirements can be filled.

SUMMARY

SELF-PROTECTION RADEF CAPABILITY

Location	-	Wherever emergency services, essential facilities and industries are located.
Protection Factor	-	Best available. If there is inadequate protection in a self-protection location, employees should be assigned to the best available nearby public shelter or upgraded or expedient shelter developed.
Communications	-	Desirable, but not necessary to the EOC.
	-	Required between workers and supervisors or central dispatchers.
Additional Use	-	May also serve as a weapons effects reporting station, or a shelter.
Instruments	-	One set of radiological instruments per self-protection facility.
	-	Additional sets of radiological instruments for emergency vehicles and/or work crews.
Monitors	-	Minimum of two monitors per self-protection instrument set
RDO's	-	Some larger services or private industries may desire to train their own staff personnel as Radiological Defense Officer(s) to provide better guidance to their personnel.

GUIDE TO ESTABLISHING A SELF-PROTECTION RADEF CAPABILITY

This section is designed to assist you to identify the facilities and emergency response crews that require a self-protection radiological defense capability. This will, of necessity, require an analysis of local emergency operations capabilities following the steps outlined below. We are not advocating that this is a responsibility of the local RDO; however, it could legitimately be the responsibility of the RDP or the Director/Coordinator. The guidelines that follow are for whoever has to do the analysis of the local emergency response capability to arrive at the requirements for self-protection monitoring instruments, trained self-protection radiological monitors and the plan for their use.

Overview

The self-protection radiological defense capability is an important element in the local emergency operations and radiological defense systems. The answer to the question of who needs this capability will have to be determined by analysis of each jurisdiction's unique local requirements. Normally, it would include emergency services such as police and fire, vital facilities such as hospitals and utilities, and possibly, essential industries such as food processing, storage and distribution or pharmaceutical manufacture and supply. These are characterized by the fact that they must operate in the hostile radiation environment in the early Postattack Period to save lives and maintain health and safety.

There are several subcategories of operation that may be included in the self-protection category:

Category One includes those activities and facilities which have to operate in the Attack and immediate Postattack Periods. These will normally be local governmental services such as police, fire and medical, rescue or ambulance services, that are involved in immediate or critical lifesaving activities. Also included would be the Emergency Operating Center since this is where the elected officials and heads of emergency services are located and The Emergency Broadcast Station, it is the source of official information on the situation to the general public.

Category Two includes those activities or facilities which may be able to suspend operations for a short period, until fallout levels decay somewhat, before they resume performance of their functions. Included here would be activities like public or private utilities, public works, major transportation facilities and agencies involved in the manufacture or wholesale of pharmaceuticals.

Category Three includes more of the private sector, such as major food processing and wholesale supply agencies, petroleum refineries, and industrial plants that contribute to immediate state and local recovery operations. (Note : We are attempting to identify industries useful to local recovery needs rather than a National war recovery capability.)

Category Four includes all other agencies and activities that you feel may require a self-protection capability. Included might be small food processing agencies and State and local offices of State or Federal Agencies. The latter would normally receive any instruments they need directly from the State.

In general, self-protection capabilities for vital facilities should first be provided to those stated in the local plan with a critical life support activity that requires personnel for operations, such as an EOC, hydroelectric or water supply dam, sewage treatment plant, EBS station, or hospital. Self-protection for emergency response personnel should be provided to independently operating crews with emergency missions identified in the local emergency operations plan, such as those relating to police vehicles, fire apparatus, ambulances, aid vehicles, rescue vehicles, or utility line trucks.

Establishing Requirements

Requirements of self-protection RADEF capability

What is needed to begin:

Local Emergency Operations Plan. Include The Basic Plan, all annexes, and available Standing Operating Procedures (SOP's).

Any available local resource inventory or listing.

Telephone and address directory of local governmental and emergency services.

Chamber of Commerce listing of key industries (if available).

Telephone yellow pages.

National Shelter Survey All Facility List (of surveyed fallout shelters).

Steps to follow:

The first step is to determine the Category One requirements for self-protection RADEF operations. These are the minimum capabilities required to save lives and maintain continuity of local government in an emergency. They must be specifically identified to assure that they are provided sufficient radiological instruments. To accomplish this step you will need to:

Determine operational requirements for emergency facilities, vehicles and/or work crews.

Utilize Table 2-2, Page 2-58, as a guide.

Review the local Emergency Operations Plan to identify:

Responsibilities of emergency services (specifically police, fire and medical).

Location of critical facilities.

Number of police, fire and medical (ambulance/rescue) vehicles in the jurisdiction.

Review the resource inventory, if available, to determine the location and number of police, fire and medical facilities and vehicles.

Specifically identify facilities, vehicles and/or crews to be provided with a self-protection capability.

Review the All-Facility List to identify emergency facilities which provide a fallout protection capability. (Note: self-protection instruments would normally be assigned only to facilities which provide fallout protection and which would be continually manned during an emergency.)

List all facilities which must continue to operate in an emergency and which have fallout protection or an ability to develop fallout protection in an Increased Readiness Period.

Talk with local Emergency Service department heads to identify the number of emergency vehicles with radio communications capabilities that will be used in a nuclear emergency. (Note: Whenever possible these should be related to facilities identified above.)

List all facilities showing the number of vehicles associated with each.

Allocate self-protection RADEF instrument sets as follows:

One set to each facility in which continuous operations are planned (i.e., for communications dispatch or direction and control of field forces). This set would also serve the requirements of the facility shelter if appropriate.

One set to each unit of emergency vehicles (See CPG 1-5, Size of unit varies with emergency service).

Prepare a listing of the Category One self-protection RADEF instrument requirements. This will need to be provided to the State Instrument Maintenance and Calibration Facility to justify allocation of radiological instruments.

The next step is to determine the Category Two requirements for self-protection RADEF operations. These are important activities required to begin restoration of the local government and economy. Their operations may be suspended for a short period immediately following attack, but would require initiation of operations before fallout levels have decayed enough to allow unsheltered and/or uncontrolled operations. These activities and facilities must be identified to assure that they are included in recovery plans and provided with radiological instruments in the Increased Readiness Period. To accomplish this step you will need to:

Determine operational requirements for emergency facilities, vehicles, and/or work crews.

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Utilize Table 2-2, Page 2-58, as a guide.

Review the local Emergency Operations Plan to identify:

Responsibilities of local public works and utilities.

Location of facilities.

Number of public works and utility repair vehicles in the jurisdiction.

Review the resource inventory, if available, to determine the location and number of key public works and utility facilities and vehicles.

Review telephone book (yellow pages) to identify important private utilities such as power, water, sewer and phone. (Note: To prepare for these utilities to be included in the operations plan it is important that you talk with them about their responsibility and capability, rewrite the local Emergency Operations Plan to include them as key resources, arrange to provide them RADEF instruments, and assure that radiological monitor training is provided.)

Specifically identify facilities, vehicles and/or crews to be provided with a self-protection capability.

Review the All-Facility List to identify emergency facilities which provide a fallout protection capability or are near a public fallout shelter in which personnel may be protected when radiation levels are high.

List all facilities which must resume operation in a fallout situation and which have one of the following:

The ability to develop fallout protection in an Increased Readiness Period;

Substantial fallout protection;

Nearby public fallout shelter in which emergency workers may be sheltered.

Talk with heads of local public works and utilities to identify the number of vehicles with radio communications capabilities, and/or independent work crews who would operate following a nuclear emergency.

List all facilities with associated vehicles and crews and all independently operating vehicles and crews.

Allocate self-protection RADEF instrument sets as follows:

One set to each facility which is expected to resume operations in the immediate Postattack Period to provide for emergency recovery operations and/or direction and control of emergency response crews. This set would also serve the requirement of the shelter facility if appropriate.

One set to each unit of emergency vehicles or emergency work crews (See CPG 1-5).

The next step is to determine the requirements for Categories Three and Four. These are activities required for State or local recovery operations. Defining them is more imprecise, open to greater subjective judgement, and probably applicable only to larger (urban) political jurisdictions. These activities are unlikely to be covered in the local emergency operations plan unless it extends to the recovery period but should be considered when updating the plan. Specific steps will not be outlined here, but, in general, they will follow the general steps outlined above.

As you complete each step, the worksheet (Page 2-51) should be used for recording the results and the completed worksheet should be made an attachment to the radiological plan or annex.

Additional Considerations

Instruments

RADEF instrument sets for operationally ready self-protection should be placed in the facility or with the vehicle to which it is allocated. Sets for expansion of the capability during the Increased Readiness Period should be stored in local bulk repositories. It is recommended that sets for non-operationally ready facilities and vehicles be centrally stored for the following reasons:

The turnover of personnel in emergency services or utilities may make it difficult to maintain instrument inventory if not centrally stored.

Central storage reduces the chances for loss, theft or pilferage of instruments and facilitates periodic operational check and replacement or repair of defective instruments.

The Director/Coordinator has more operational control of instrument sets which are centrally stored and may break-out the sets in an emergency to provide for maximum utilization of existing instruments.

Staff

Most self-protection activities require trained radiological monitors (RM's) who can read the instruments and make individual assessments of the limitations on their operations, normally within ranges provided by the local RDO. Some activities, however, may require their own trained RDO. This is particularly true in large jurisdictions where, for example, the police or fire services operate a large independent facility which must continue to function in an emergency for operations and/or communications. In such cases, rather than relying on the RDO in the local Emergency Operating Center to provide guidance on permissible activities, they may want to have their own trained RDO who could provide guidance on exposure accumulations for emergency workers and recommend activities that could be performed in the radiation environment. Requirements should be determined as follows:

Radiological Monitors (RM's) - A minimum of two trained RM's for each self-protection RADEF instrument set.

Radiological Defense Officers (RDO's) - One RDO (two are preferred for 24-hour coverage) for each independent operating emergency service, vital facility and/or essential industry who must operate in the fallout environment. This must be agreed upon between the service, facility management and the local Director/Coordinator and provided for in the local plan.

(Note: Guidance on RADEF operations is available to essential industry prior to an emergency. However, in an emergency the EOC may be unable to provide immediate or specific RADEF guidance to individual private organizations or industries because of problems with span of control or lack of adequate communications.)

Planning and Implementation

Implementation

After the requirements for self-protection RADEF instrument sets are determined, a central storage facility (bulk repository) should be designated and instruments ordered from the State Instrument Maintenance and Calibration Facility. Some local operationally ready emergency services may desire to have the instruments assigned to them for possible day-to-day use, such as for determining if radiation contamination results from a truck or train accident. Local judgment must prevail. Sets for expansion of the capability during the Increased Readiness Period should be placed in bulk repositories.

Where possible, training of radiological monitors should be incorporated into the general training of an emergency service, such as police or fire, or provided by locally available Radiological Defense Instructors.

Planning

Local plans and SOP's should be developed which identify:

All of the emergency services, vital facilities and essential industries that require a self-protection capability.

Where the instruments are located (in central storage, assigned to the emergency services and facilities, etc., or both).

How the instruments will be distributed from central storage.

How the monitors will be trained.

Which services and facilities need an RDO.

Communications with the EOC.

The RADEF plans and the specific emergency procedures (annex) covering each emergency service and/or vital facility and essential industry should

provide for a level of operational readiness so that the service or facility could function if a nuclear attack should occur with little or no advance warning. They should also provide for accelerated training of additional personnel and the deployment of additional RADEF instrument sets from local bulk repositories during a period of Increased Readiness to provide for an expanded RADEF self-protection capability.

TABLE 2-2

SELF-PROTECTION RADIOLOGICAL MONITORING

(A REPRESENTATIVE LISTING)

The local Director/Coordinator or Radiological Defense Planner must decide who is to be provided with a self-protection radiological monitoring capability. This table includes a listing of the kinds of activities or facilities that may require a self-protection monitoring capability.

1/ Category	2/ Facilities	3/ Work Crews/Vehicles
One	Emergency Operating Center (primary) and alternate)	
	Emergency Broadcast Stations	
	Police and fire stations (including precincts, satellite facilities, etc., where emergency operations such as dispatching will continue to take place)	Police patrol vehicles and fire apparatus (or equivalent unit)
	Hospitals and clinics (general care and emergency types which will continue to operate in an emergency)	Ambulances, aid and rescue vehicles
	Communications dispatch facilities (for the EOC)	
Two	Public and private utilities: Water and sewage facilities (pumping stations, treatment facilities, dams) power plants (hydroelectric, nuclear, coal or oil)	Repair and service trucks and independent work crews
	Telephone exchange and repair facilities, radio transmitter and repair facilities, communications repair facilities, natural gas pipeline pumping and repair facility	
	Public Works (engineering, county highway maintenance)	

1/, 2/, 3/ See page 2-59

1/ Category	2/ Facilities	3/ Work Crews/Vehicles
Two	Transportation facilities (major airports or railroad switching yards that would be needed to move emergency supplies)	Independent work crews
	Pharmaceutical manufacture and supply facilities	
Three	Major food processing and wholesale supply agencies	
	Petroleum refineries	
	Industrial plants (that contribute to immediate state and local recovery operations)	
	Red Cross Blood Centers	
	NAWAS Points	
Four	State and local offices of Federal Agencies (Federal Aviation Administration, Department of Agriculture, Post Office, Labor, etc.)	
	Local offices of State Agencies (Highway, Forestry, Patrol, etc.)	
	All other local self-protection requirements	

ks
ews

1/ It is important to identify Category One and Two capabilities. Instrument sets can be provided for the Category One requirements and can probably be provided for most Category Two requirements. It is less likely that they can be provided from the current inventory for Category Three and Four capabilities.

2/ Final determination of the facilities that require a self-protection capability must rest on local knowledge of the jurisdiction. Normally, one set of self-protection radiological instruments would be assigned to each facility, or industry, which would be continuously manned during an emergency.

3/ Final determination of the number of emergency response crews (or vehicles) that require a self-protection radiological monitoring capability can be made only after discussion with local emergency services or utility chiefs. The emergency response crews should be designated

3/ continued:

in the Emergency Operations Plan indicating which vehicles have a communications capability (such as police cars, fire trucks or ambulances). Sets for emergency vehicles and crews should be determined in accordance with the guidelines in CPG 1-5.

CHECKLIST
FOR
RADEF SELF-PROTECTION CAPABILITY

Yes No

___ ___ Have you selected all emergency services, vital facilities and essential industries requiring a self-protection RADEF capability?

____ How many emergency services facilities require self-protection capabilities?

____ EOC

____ Police Stations

____ Fire Stations

____ Hospitals

____ EBS Stations

____ Communications facilities

____ Other (list)

____ How many emergency services vehicles require self-protection capabilities?

____ Police cars

____ Fire trucks

____ Ambulances/rescue vehicles

____ Other (list)

____ How many vital facilities require self-protection capabilities?

____ Water and sewer treatment facilities

____ Power plants

____ Communications (radio transmitter, telephone exchange)

____ Transportation facilities

____ Public utilities (telephone, power, etc.)

____ Other (list)

____ How many emergency vehicles or work crews require self-protection capabilities?

____ Power

____ Telephone

____ Natural gas

____ Other (list)

____ How many essential industries require self-protection capabilities?

____ Food processing

____ Pharmaceutical supply

____ Other (list)

Yes No

— — Are fallout shelters available for emergency workers in or near all critical facilities?

— — Are RADEF instrument sets provided in the community for all self-protection requirements?

____ How many sets do you currently have?

____ How many sets are required (total)?

____ How many sets do you require for Category One requirements?

____ How many sets do you require for Category Two requirements?

____ How many sets do you require for Category Three and Four requirements?

____ How many sets are stored in the self-protection facilities?

____ How many sets are stored in local bulk repositories?

____ How many sets do you need to order?

— — Do you have at least two trained Radiological Monitors (RM's) for each self-protection set required?

____ How many (total) RM's are required? (Recommend minimum of two/set)

____ How many RM's are trained and assigned for self-protection operations?

____ How many RM's need to be trained for self-protection?

— — Do you need any trained self-protection Radiological Defense Officers?

____ How many self-protection RDO's are required?

____ How many self-protection RDO's are assigned?

____ How many self-protection RDO's are trained?

— — Do you have written plans for operation of the self-protection RADEF capability?

— — Do you have written plans for the distribution of self-protection RADEF instrument sets stored in bulk repositories?

WORKSHEET NO. 3
SELF–PROTECTION RADEF CAPABILITY

Jurisdiction _____

Date _____

Prepared By _____

Service/Facility Identification	Facility Address	No. Vehicles or Crews 1/	Instrument Sets			Monitors		Fallout Shelter	
			No. Req'd	No. Avail.	Where Stored 2/	No. Req'd	No. Avail.	Availalbe (Yes–No)	Address

1/ Emergency Vehicles or Work Crews only

2/ Stored: OS–Onsite, BR–Bulk Repository

RADIOLOGICAL DEFENSE MONITORING, REPORTING AND ASSESSMENT CAPABILITY

Function - In the event of nuclear attack it will be important to determine the extent of damage, the resources and capabilities remaining, and the fallout radiation intensities. This is particularly important at local levels where resources are expended to save lives and reduce losses resulting from a nuclear attack. States are largely reliant on information provided by local governments. Federal information requirements are built upon a uniform local system of reporting. At the Federal level, the Federal Emergency Management Agency (FEMA) provides this information to other Federal agencies.

The radiological Monitoring, Reporting and Assessment (MR&A) capability provides the Emergency Operations Center (EOC) staff and decision-makers with current information on the radiation environment resulting from a nuclear attack.

The MR&A capability includes:

(1) An Emergency Operations Center (EOC)

(2) Trained personnel for radiological assessment

(3) A network of Weapons Effects Reporting (WER) stations (also known as monitoring and reporting stations).

(4) An Aerial Radiological Monitoring Network (State level).

The EOC, with its radiological assessment responsibility, is the focal point for radiological intelligence within the jurisdiction. The RADEF staff predicts the arrival of radioactive fallout in the jurisdiction. After fallout has arrived, exposure rate data are received from the individual WER stations. These data are analyzed to determine the radiation environment of the jurisdiction. Information on the radiation environment is forwarded to the State level in accordance with procedures established by the State. At local level, information on radiation levels is combined with other information and the combination is used by the EOC staff to determine what remedial actions or countermeasures are needed and how they may best be implemented.

The Weapons Effects Reporting (WER) Network consists of a series of monitoring locations, WER stations, strategically located to provide the EOC RADEF Operations or Disaster Analysis section with data on the weapons effects and radiological exposure environment throughout the jurisdiction. The locations are generally fixed, but may contain provisions for a mobile monitoring capability. Units that normally are part of the self-protection capability may be used for WER stations and/or mobile monitoring if this does not interfere with their primary missions. The WER stations will report sightings and direct effects of nuclear detonations and fallout radiation levels.

The WER stations are selected for their:

- Geographic dispersion
- Communications capability
- Operational feasibility
- Physical protection

The reports from the WER stations are provided to the local EOC which forwards data to State which in turn provides information to Regional and National agencies. Thus, WER stations provide basic information needed for local operations and allows State and Federal governments to:

- Develop an overall estimate of attack and fallout patterns
- Identify residual capabilities
- Develop policy recommendations and priorities for restoration activities.

It is expected that monitors in the WER stations will receive technical direction and supervision from the local RDO. The data that they report to the EOC, which is an integral part of the WER capability, is analyzed by the EOC RADEF operations staff and subsequently used in direction and control activities by the local authorities.

If a local jurisdiction contains large areas where WER stations cannot be located, the jurisdiction may want to utilize the State aerial monitoring capability to supplement local knowledge. In some cases the airfields, aircraft, aerial monitoring instruments and trained monitors will be located within their boundaries. It is important to recognize that these capabilities are available and should be included in the planning. However, aerial monitoring is a State system. Therefore, any local use of aerial monitoring to supplement the WER stations must be coordinated with the State.

Facilities - The facilities required for the WER Network are WER stations and the local EOC. They also include State or State area and Regional FEMA EOC's. The WER stations should be located in government facilities preferably at fire, police, welfare, highway patrol, highway maintenance, forestry, agricultural, health or other State and local government facilities whenever possible. This will provide better operational control. They may also be situated at radio transmitter sites, Emergency Broadcast System stations, hospitals, facilities with NAWAS (National Warning System) drops, other communications centers and county airports. Or they may be placed in industrial, commercial or private facilities such as businesses, homes or farms where the criteria of geographic and population dispersion, communications and fallout protection are met. Note

that many of these locations may already be designated for self-protection monitoring. They should serve both purposes. Where community shelters provide for the proper geographic dispersion, they may also be designated as WER stations.

Generally, WER stations should be spaced two to three miles apart in metropolitan or urban areas and seven to ten miles apart in rural areas. The actual distribution will depend upon local requirements. Locations should generally favor the sheltered population distribution. They should be selected to maximize information in densely populated areas, as well as to give adequate geographical coverage, even in sparsely populated areas. Additionally, an attempt should be made to locate WER stations in facilities with a protection factor (PF) of at least 100. However, they may be located in facilities with only 40 PF or where crisis action can improve the protection to 40 PF or better.

Instruments - Each WER station should be issued a radiological instrument set to be used for detecting and measuring radiation. (Note: There is a separate configuration of instrument sets for each of the radiological defense capabilities: weapons effects reporting, self-protection and shelter. The proper set should be obtained for each special use.)

Radiological instruments will be maintained and calibrated in accordance with the State radiological instrument maintenance and calibration program. However, the local jurisdiction should arrange or provide for the periodic inspection of these sets. This could be done as part of a test or exercise. These sets should be stored in any WER station which is operationally ready; i.e., has trained monitors, communications and fallout protection, and is ready for immediate operation. However, because of the changeover of personnel over time and the problems of loss, theft or vandalism of instruments as well as the ease of maintenance, sets may be stored in a central location, called a bulk repository, for distribution in an Increased Readiness Period. In addition, instrument sets required for rapid expansion of the WER Network in an Increased Readiness Period should also be stored in the local bulk repository.

Communications - WER stations must have a means of communication with the EOC in order to report sightings of nuclear detonations, weapons effects and radiation exposure rate measurements. It is recommended that they also have a second means of communication to serve as backup. Whenever possible, at least one method of communications should be independent of commercial power and should be protected against Electromagnetic Pulse (EMP).

In most jurisdictions the most readily available means of communication will be the telephone. Telephones should be installed and operated on a day-to-day basis and not be a form of communications that would be installed during an Increased Readiness Period. Alternate methods of communication may include RACES and CB radio. Police, fire and other emergency services radio systems should not be relied upon for weapons effects reporting unless the location is serving as a multiple use radiological defense facility; i.e., for weapons effects reporting and self-protection. In other words, avoid selecting a shelter or private

facility as a WER station with the expectation that the police or fire service will dispatch a mobile communications unit there for use in weapons effects reporting. The emergency services will probably require all of their communications and personnel resources for their own operations during a nuclear emergency.

Staff - Each WER station must have a minimum of two trained RM's assigned to the station. It is recommended that each station have at least four trained and assigned monitors to provide in-depth coverage for 24-hour operations and backup as necessary. When stations have only two trained monitors, the RADEF procedures should provide for the crisis training of additional monitors for these stations during an Increased Readiness Period. The EOC must have sufficient trained personnel, including RDO's and staff personnel for recording and plotting radiological data, to provide for round-the-clock operations.

Plans - The Radiological Defense Annex should cover the RADEF operational plans and procedures. It should identify:

- The number and location of WER stations that comprise the network.
- The monitors assigned to each location
- The frequency, type and format of information to be reported
- The reporting procedures
- The internal EOC operations involved in receiving, plotting and analyzing the data.

The plans should also provide for the distribution of instruments from local bulk repositories to the WER stations and expansion to a more comprehensive network, if required, during an Increased Readiness Period.

Additional Considerations - We have long had a system of fixed fallout monitoring stations which would report fallout conditions to the local EOC. Many local jurisdictions still have these monitoring and reporting stations in their inventory. This inventory is maintained in National computer listings and if not available locally, can be obtained from the State Instrument Maintenance and Calibration Facility. Many of the local reporting stations will be adequate as WER stations--but they must be looked at in terms of current criteria.

Many jurisdictions have more stations than are required under current guidelines. For example, as the geographic dispersion criteria are receiving more attention, the current computer inventory shows reporting stations bunched in population centers. In addition, the previous guidelines did not always recognize self-protection as a separate radiological defense capability. As a result, many of the existing reporting stations in the inventory are really self-protection locations. The computer listing does allow for differentiating between a self-protection location

and a WER station but some States have not made the differentiation. However, self-protection locations and shelters can be selected for use as WER stations. In fact, local Director/Coordinators and RDP's or RDO's should be looking for as much multiple use as possible in their programs. Whenever possible, WER stations should be located in shelters or self-protection locations.

The RDP and RDO should be aware that a fallout monitoring capability has already been developed at some field locations of State and Federal agencies and departments--and this capability can and should be included in the local RADEF system. The State RDO is responsible for establishing monitoring capability at State facilities, particularly those remote from municipalities such as highway patrol and maintenance stations, conservation stations, forest and game preserve stations and State institutions.

The Director/Coordinator, RDP or RDO should contact State and Federal installations with radiological monitoring capabilities that are in the local jurisdiction and establish procedures for incorporating their monitoring capability into the local WER network. Federal monitoring stations within the jurisdiction should be requested to report fallout information to local government in time of emergency. In addition, some Federal installations may need fallout information from local government. Procedures must be coordinated between Federal installations and local authorities to work out the details for accomplishing mutually agreeable objectives.

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SUMMARY

WEAPONS EFFECTS REPORTING STATIONS

Location	- 2-3 miles apart in urban areas
	- 7-10 miles apart in rural areas
	- Maximize geographic and population coverage
Protection Factor	- 100 or better is preferred
	- 40 is minimum
	- Improvable or upgradable to at least 40 PF
Communications	- Required between each reporting station and the EOC
	- Two sources, if possible, are desirable
	- One source should have auxiliary power (not dependent on public power)
	- Telephone is most widely available source
	- Radio could include RACES, CB or local governmental nets
Additional Use	- May be located in facilities serving as shelter or self-protection location
Instruments	- One set of radiological instruments per station
Monitors	- Recommend four monitors per station
	- Minimum of two monitors per station

GUIDE TO ESTABLISHING THE WEAPONS EFFECTS REPORTING NETWORK

This section is designed to assist you in developing your local Weapons Effects Reporting (WER) network which is a part of the Monitoring, Reporting and Assessment capability. This guidance assumes the existence of a properly staffed EOC to which the WER stations report data and from which they receive guidance. This section touches briefly upon actions required to develop the network, but it provides little detailed guidance on implementation. Part III of this guide contains additional information.

Overview

The requirement for numbers and locations of WER stations in any jurisdiction is based on the local situation. The WER Network should give both population and geographic coverage of the jurisdiction. The rule of thumb is that WER stations in rural areas should be located every 7 to 10 miles apart; i.e., at least one station for every 100 square miles. However, there will be some areas, such as remote wilderness areas, where there are no people and no facilities suitable for weapons effects reporting. These should be eliminated from consideration. If necessary, these areas could be surveyed by aerial monitoring. In urban areas with 50,000 or more population, reporting stations should be located every 2 to 3 miles apart; i.e., at least one station for every 9 square miles. (NOTE: These criteria apply to the minimum recommended WER Network. Additional radiological monitoring capability likely will be required to support local government emergency operations.)

Designing a WER network for your jurisdiction should not be a difficult task. Some of the implementation may be, but if you design your total system now, develop it as much as possible and include it in the plans, you will have greatly facilitated its further implementation in an Increased Readiness Period. Your jurisdiction will be much better prepared should a nuclear attack on our nation ever occur.

Establishing Requirements

Requirements of the WER Network

What is needed to begin:

County (and city) map

Computer printouts:

RADEF monitoring station listing (list of existing monitoring stations and instrument sets).

All-Facility List (listing of public fallout shelters surveyed).

Listing of locations with a self-protection RADEF monitoring capability (some may be included in the monitoring station listing above).

Reporting area map (or knowledge of how many Federal emergency reporting areas are contained in your jurisdiction).

Steps to follow:

Determine theoretical minimum requirement for WER stations. (NOTE: This first step is for establishing guidance only. If you are uncomfortable with it, go on to the following steps.) The term "theoretical" is used because the actual number of stations to be established will depend on such factors as population distribution, the availability of suitable facilities and the availability of communications.

Determine total rural and/or urban land area (in square miles).

Eliminate wilderness areas. This is a subjective evaluation you must make while striving for full population and geographic coverage. The wilderness area has few, if any, communities or settlements.

Divide the remaining area, in square miles, by 100 for rural areas or by 9 for urban areas.

Use the theoretical number of WER stations arrived at by this method only as a yardstick against which to estimate the overall minimum requirements.

Determine realistic requirements for WER stations.

Locate each existing WER station using the RADEF monitor station computer listing and plot each station's location on the map. (NOTE: If you have several existing WER stations within a small town or city, plot only one. The remaining stations may be dealt with later by converting them to self-protection locations, or utilizing them to expand the radiological reporting network to meet local needs.)

Circle all station locations which are approximately 7 to 10 miles apart in rural areas of 2 to 3 miles apart in urban areas. If you wish to establish a much closer arrangement of WER stations, keep in mind the span of control, i.e., there is a limit to the number of WER stations you can logically expect to deal with from the EOC.

Analyze geographic and population coverage to see where additional WER stations, if any, should be established.

Locate and plot on the map communities, settlements or installations in areas where additional reporting stations are required to meet the spacing criteria. These are areas where additional WER stations may possibly be located. A general rule to follow is to locate stations where the people are.

Make a list of WER stations showing both existing and proposed locations. The worksheet on Page 2-81, may be used. You should strive to have at least one WER station in each Federal Emergency Reporting Area contained in your county.

Assign a number to each WER station and provide a copy of the list to the State.

Purge the RADEF monitoring station computer listing by eliminating the excess stations from areas with a surplus and establishing new stations in deficit areas.

If you have more WER stations than required, either in total numbers or in the population centers, you can do any of the following with the excess:

Convert them into self-protection locations if appropriate since many of them are facilities of State Police, State Highway, local police or fire, and hospitals which require the capability for emergency operations in a nuclear emergency. (Remember, by order of priority a location could be a shelter, self-protection locations, WER station.)

Retain them as a local supplement to the WER network to provide backup for a more detailed picture of the fallout environment existing in the community.

Delete them from the inventory. (May not be advisable if they are active and have trained monitors and instrument sets.)

If you do not have enough WER stations to form a complete WER network, you should do the following:

Look at the following resources to make up the deficit.

Key governmental and industrial facilities, such as police or fire stations, highway maintenance facilities or dams (self-protection locations).

Public fallout shelters as identified in the All Facility List.

Other suitable buildings with a high degree of protection from radiation, i.e., large buildings, masonry or brick buildings or facilities with underground areas.

Farms or homes which have shelter (basements, most cellars, or other suitable shielded areas) and which are located in the areas where the deficit occurs.

Conduct a thorough on-site inspection to look for suitable facilities in areas where WER stations are required. Utilize the map developed previously.

Select facilities to complete the WER network. If adequate facilities cannot be found, you may have to plan to construct an improvised or expedient shelter location in the Increased Readiness Phase.

Coordinate with both existing and new locations to establish or update their agreements to participate in the WER network.

Make a list of the WER stations, giving the facility name and address for each. The worksheet on Page 2-81, may be used for this purpose. Provide this list to the State Instrument Maintenance and Calibration Facility. The instrument inventory for your jurisdiction will likely need to be revised and a new allotment of instrument sets made. Attach a copy of the list and a map showing the WER stations to the Radiological Plan or Annex.

Develop plans for improvising or constructing expedient shelter locations to serve as WER stations in areas where no suitable existing facilities were found.

Requirements of WER Stations

Fallout Protection

The WER network must be capable of functioning in a radiation environment. While it is desirable for each WER station to have a protection factor (PF) of 100 or greater, jurisdictions may, in many cases, have to select those facilities with the greatest available protection factor or those for which the protection factor can be readily increased to at least PF 40. Every effort should be made, especially in high risk areas, to select facilities with both a high protection factor and the best available protection from blast effects.

The most likely places to find fallout protected space is in public fallout shelters which have already been surveyed. It is permissible to use these as WER stations as long as the plan recognizes the multiple use of the facility.

Some self-protection locations, such as hospitals, police or fire stations, sewer treatment plants, etc., may also possess adequate fallout protection. While these may not be open to shelter the general public, they may be used as WER stations if the plan recognizes their multiple use.

In some locations it may be necessary to utilize basements or cellars of private residences or farms. These locations may have sufficient fallout protection or they may need to be upgraded. Prior agreement with the owners would be required for this use.

Communications

The WER network is an intelligence network. There must be a way for information gathered by monitors in each station to be forwarded to the local EOC and on to the State and Regional levels as appropriate.

Telephones may be your first and only source of communications. When selecting WER stations:

Look for locations that have telephone communications installed in the protected area.

Look for locations with a telephone close to the protected area that could be quickly moved to the protected area with a long extension cord or a quickly installed jack.

Talk to the local phone company about providing communications to preselected locations in an Increased Readiness Period. (Use with caution. Do not overload the company's capabilities.)

Radio backup of telephone communications should be included as a part of your planning. Possibilities include:

Make plans to utilize Citizens Band or RACES (radio amateurs) for weapons effects reporting. However, use caution. Citizens Band is considered by some to be inadequately controlled and with insufficient discipline for emergency use although some communities have developed an effective organization and working relationship. However, neither may be organized in your community; there may not be enough units to get the job done and they represent an untested resource that should not be relied on totally in a community.

Include the reporting stations in facilities which are manned by local emergency services, such as police and fire, and utilize their existing radio communications to provide reports to the EOC. However, keep in mind that their communication equipment may be dedicated to their emergency service function.

Purchase communications for radiological and weapons effects reporting utilizing the FEMA matching funds program for supporting materials. Approval of such purchases require development of an Emergency Communications Development Plan to outline the requirements. It is subject to the availability of funds and adherence to established criteria.

Instruments

Each facility selected as a WER station should be provided with one set of radiological instruments. It is important to note that the set of radiological instruments for WER stations differs from the sets for shelter or self-protection use. Therefore, you must make sure you request the proper instruments from the State RADEF Instrument Maintenance and Calibration Facility. The instruments should be stored in operationally ready reporting stations. However, they may also be stored in a local bulk repository: but you must develop a plan for distribution of those instruments in an Increased Readiness Period.

Staff (Trained Monitors)

WER stations require trained radiological monitors who can read the instruments and report radiological fallout conditions to the local EOC. In addition, they must be able to observe and describe weapons effects including sightings of distant detonations (by observations of a bright flash and/or mushroom cloud on the horizon) and damage resulting from closer detonations (such as glass breakage or structural damage).

A minimum of two radiological monitors are required for each facility selected as a WER station. Four monitors per facility should be trained and assigned to provide for backup and 24 hour coverage.

Amenities

A WER station is a specialized fallout shelter. Minimal amenities for the comfort and physical needs of the radiological monitors are required. As with any other sheltered persons, they need food, water and sanitation facilities. They also need cots and bedding. If personnel are expected to function for an extended period of time, they must have supplies and provisions for comfort and safety.

Planning and Implementation

Implementation

Whenever possible, identified WER stations should be made operationally ready: e.g., capable of functioning with little or no advance notice. This includes at least the following:

Agreement worked out with agency or owner for use of the facility as a WER station in a time of emergency.

Communications installed and available.

Instruments procured and stored in facility or bulk repository.

Monitors trained and assigned.

Fallout protection provided.

Reporting procedures prepared and included in local Standing Operating Procedures (SOP's).

If certain items listed above cannot be provided beforehand, plans should be developed for Increased Readiness activities to make the stations operational in an emergency.

Planning

The Monitoring, Reporting and Assessment Capability cannot be considered complete until operational plans and SOP's are developed which outline the operation of the EOC and the operation of the WER network including staffing, communications and reporting procedures.

CHECKLIST
FOR
WEAPONS EFFECTS REPORTING NETWORK PORTION OF THE MONITORING, REPORTING & ASSESSMENT CAPABILITY

Yes No

— — Have you selected all your required weapons effects reporting stations?

_____ How many do you require?

_____ How many currently exist?

_____ How many must be developed?

— — Do you have agreements for use of all facilities selected as weapons effects reporting stations?

— — Are RADEF instrument sets provided in the community for all weapons effects reporting stations?

_____ How many sets do you currently have?

_____ How many sets are stored in weapons effects reporting stations?

_____ How many sets are stored in bulk repositories?

_____ How many sets do you need to order?

— — Do you have communications from the EOC to all weapons effects reporting stations?

_____ How many stations have telephone communications?

_____ How many stations have radio communications?

_____ How many stations have both telephone and radio communications?

_____ How many stations need to develop a communications capability?

— — Do all weapons effects reporting stations have adequate fallout protection?

_____ How many stations have PF 100?

_____ How many stations have PF 40+?

_____ How many stations can be upgraded to provide adequate fallout protection (PF 40+)?

Yes No

— — Do you have four trained radiological monitors assigned to each weapons effects reporting station?

— — Do you have at least two trained radiological monitors assigned to each weapons effects reporting station?

_____ How many stations have four or more trained and assigned monitors?

_____ How many stations have (two or) three trained and assigned monitors?

_____ How many stations have two trained and assigned monitors?

_____ How many stations have only one trained and assigned monitor?

_____ How many stations have no trained and assigned monitors?

_____ How many monitors need to be trained and assigned to meet the minimum of two/station?

_____ How many monitors need to be trained and assigned to meet the recommended four/station?

— — Do you have a trained EOC RADEF staff that is prepared to process weapons effects reports?

— — Does your EOC have a space set aside for Disaster Analysis or RADEF operations?

— — Do you have written plans covering operation of the Weapons Effects Reporting Network?

— — Do you have written plans covering the operation of the RADEF staff in the EOC to process and assess the data from the WER stations and provide guidance to Direction and Control, and to shelter, and self-protection locations, and provide data to State and Federal and adjacent local EOC's?

WORKSHEET NO. 4
WEAPONS EFFECTS REPORTING NETWORK

Jurisdiction _____ Date _____

Prepared By _____

Rep't Area	Station No.	Station Iden.	Station Address	Instrument Sets			Monitors		Communications 2/		Shelter 3/	Status 4/
				No. Req'd	No. Avail.	Where Stored 1/	No. Req'd	No. Avail.	Phone	Radio		
	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											

1/ Stored: OS—Onsite, BR—Bulk Repository

2/ Communications: Telephone (if yes, give number), Radio - indicate type (F—Fire, L—Low, PW—Public Works, C—Citizen Band, R—Races, O—Other)

3/ Shelter: S—Surveyed(indicate PF), U—Upgradeable, E—Expedient

4/ Status: O—Operational, N—Non-operational (lacks some capability), E—Expedient (construct in IR period)

RADEF DECONTAMINATION CAPABILITY

Function - The radiological decontamination capability includes any countermeasures that would be used by the jurisdiction to reduce the radiation exposure (environment) due to radiation from fallout by moving or covering the fallout particles. Postattack recovery operations will require that certain essential facilities and industries become operational as rapidly as possible. Facilities and industries that have no, or little, physical damage could become operational if the radiation environment is reduced to allow operating personnel to return without subjecting them to prohibitive radiation exposures.

Certain vital facilities and industries, such as communication centers, emergency government facilities, essential public utilities and essential equipment could require early decontamination. However, it should be possible to defer many decontamination activities until the latter part of the Operational Recovery Phase.

The object of decontamination is to reduce radiation exposure rates to acceptable levels with the lowest feasible expenditure of labor and materials while limiting the radiation exposures of decontamination personnel to a minimum commensurate with the urgency of the task.

Radioactivity cannot be destroyed. But in the event of a nuclear attack, the fallout radiation hazards could be reduced by (1) removing radioactive particles from contaminated surfaces and away from the areas of immediate concern; (2) covering the contaminated surfaces with shielding materials, such as earth, or; (3) isolating contaminated objects and waiting for the radiation levels to decrease through the process of radioactive decay.

Facilities - Ideally, decontamination personnel should have the best shelter available to keep their exposure as low as possible since they will be receiving additional exposure during decontamination operations.

Equipment - Decontamination activities will require the use of street sweepers, fire hoses, bulldozers and earth moving equipment to remove or cover radioactive fallout in contaminated areas.

Instruments - Radiological instruments are not issued specifically for decontamination use. Decontamination operations will be conducted during the Postattack Period after the radiation levels have decayed to levels that will allow limited outside activities.

Instruments that were issued for use in shelters, for WER stations and for self-protection, will now be available for use in monitoring decontamination operations.

Dosimeters will be needed to measure the exposure of the workers. By the time decontamination is undertaken, the number of dosimeters needed for measuring shelter exposures can be reduced and the extras, together with the extras from WER stations and self-protection locations, can be used by the decontamination workers.

Communications - There must be a means of communication with the EOC to assign missions, monitor the decontamination activities and report the effectiveness of the operation. Communications used for the other capabilities can be used - emergency services radio network, CB, RACES, telephones, etc.

Staff - A decontamination specialist should be available in all but the smallest civil preparedness organization. The RDO, or RDO assistant, may be required to perform this function in small jurisdictions. The decontamination specialist responsible for planning and implementing decontamination capabilities should be an engineer, such as a city engineer, public works engineer, industrial safety supervisor, or other technically qualified person having some administrative capability. Personnel in the publics works or engineering departments who have a major assigned responsibility for decontamination operations should complete the RDO training.

Decontamination worker may include firemen, sanitation and construction workers and their auxiliaries. They should be assigned to perform the basic decontamination work. Personnel selected for performing decontamination operations should be those normally having special skills applicable to decontamination procedures (bulldozer and heavy equipment operators, firemen, etc.) and should be assigned to appropriate decontamination operations. Decontamination personnel would only be trained during an Increased Readiness Period. These personnel primarily need guidance on:

- How to measure and minimize their radiation exposure while performing decontamination operations.
- The objective of and order of performing decontamination operations - that is rapidly removing a minimum of material but nearly all of the radioactive particles.
- The disposal or relocation of the contaminated material

If additional time is available, they can be given an orientation on weapons effects and fallout distribution, radiation hazards and general protection methods so they could better understand the need for decontamination and how to most effectively accomplish decontamination. However, the primary emphasis needs to be placed on applying their specific skills to the decontamination operation they will be performing.

Plans - A decontamination annex to the basic emergency plan should be prepared listing the essential facilities and industries in the jurisdiction along with a priority ranking for returning them to an operational status. Contaminated facilities and industries that have little or no physical damage could become operational if the radiation environment is reduced to allow operating personnel to return without subjecting them to prohibitive radiation exposures. The annex should also contain a listing of the resources available within the jurisdiction for accomplishing decontamination. Such a listing of resources should include the various types of construction equipment, highway maintenance equipment, fire trucks with pumping capability and hose, etc., and the quantity and locations of each item.

A plan for each facility should be developed indicating the decontamination procedures that could be used. These plans would include the estimated types and quantity of resource equipment needed and the number of personnel work-hours required to accomplish the decontamination.

Each plan should include the use of radiological monitoring teams and survey equipment from shelters, WER stations and self-protection units to perform radiological surveys. These surveys will determine the need for decontamination and the adequacy of the decontamination procedures.

Additional Considerations

Responsibility for Decontamination - The Department of Public Works or other engineering departments of State and local governments should be assigned the major responsibility for developing plans for and executing decontamination operations. The radiological decontamination capability must be developed in consonance with the responsible department which should have a major role in the selection of facilities and industries for which decontamination is planned.

The RDO for the locality should provide technical guidance on radiological decontamination procedures and methods.

Radiation Monitoring and Exposure Control - A means of measuring radiation exposure rates and accumulated exposures should be provided and the radiation exposures of the workers should be recorded. The radiological monitoring required to support decontamination should be provided by teams from WER stations, self-protection radiological monitoring and shelters.

SUMMARY

RADEF DECONTAMINATION CAPABILITY

Location	- Wherever decontamination or other recovery operations are necessary.
Protection Factor	- Best available.
Communications	- Not necessary, except for direction and control of decontamination and recovery operations.
Additional Use	- Personnel and instruments from other RADEF capabilities should be made available for decontamination operations.
Instruments	- Recommend two dosimeters for every team of decontamination workers.
	- Recommend one charger for every 25 dosimeters.
Monitors (with survey equipment)	- As required by the situation.

GUIDE TO ESTABLISHING THE DECONTAMINATION CAPABILITY

This section is designed to assist in developing the local decontamination capability. It briefly touches upon actions required to develop the capability but it provides little detailed guidance on implementation. Part III, of this guide contains additional information.

Overview

The number of locations that may require decontamination will vary in each jurisdiction. Careful consideration should be given in establishing priorities for facilities to be decontaminated. Remember, the longer you can wait to start decontamination, the lower the radiation levels will be, due to radioactive decay. This would mean lower radiation exposures to the workers and quite possibly a smaller area that will need to be decontaminated. It should be possible to postpone many decontamination activities until later in the Operational Recovery Phase.

In developing priorities and requirements, the planner should constantly ask - "Does the expected benefit to the community that will result from the decontamination of this facility justify the radiation exposure to the personnel that may be required to perform the decontamination?"

Establishing Requirements

What is needed to begin:

County (city) map.

List of vital facilities (hospitals, water and sewage plants, food and pharmaceutical warehouses, telephone exchanges, electric substations, transportation centers).

List of essential industries (food processing plants - may depend on time of year, pharmaceutical plants) which are:

Necessary for the community survival and recovery.

Necessary for State.

National resource.

List of resources available for decontamination use - fire trucks, construction equipment - bulldozers, dump trucks, earth movers, graders, plows, etc.

List of personnel with special training in the use of decontamination resources - firemen, heavy equipment operators, sanitation workers, utility workers, essential industry workers.

Steps to follow:

List vital facilities and essential industries by order of importance for community survival and recovery. Consider alternative rankings if

a high priority facility, such as a power substation is damaged - Is there another substation that can be used in its place? The worksheet on Page 2-95, may be used for this purpose.

Determine the amount or extent of decontamination that may be necessary to make each facility/industry operational.

Consider the methods of decontamination that would be most effective for each facility. Consider the physical structure and adjacent land area. The presence of paved roads, railroad tracks, etc.

Consider a physical survey of each site to determine the areas in the facility where the operators will be located, where the fallout that would most likely contribute to their radiation exposures would accumulate and what methods of decontamination would be most practical.

Develop a tentative plan allocating resources and personnel to locations to be decontaminated.

Include in the plans the use of radiological monitors and equipment from shelters, WER stations and self-protection monitoring locations to survey facilities to be decontaminated before and after decontamination and to support exposure control of the workers.

Attach to the decontamination annex of the emergency plan any lists or plans developed. Coordinate decontamination activities with the radiological and emergency services annexes as appropriate.

CHECKLIST
FOR
DECONTAMINATION CAPABILITY

Yes No

___ ___ Do you have a list of essential facilities and industries within the jurisdiction that may require decontamination?

___ ___ Do you have a priority ranking for returning them to operational status?

___ ___ Do you have a list of the various resources available for use in decontamination activities?

_____ How many fire trucks?

_____ How many pieces of construction equipment (by type)?

_____ How many pieces of highway maintenance equipment (by type)?

___ ___ Do you have a listing of where the above resources are located?

Who should be contacted for their use (name, location, position, phone number)?

_____
_____
_____
_____

___ ___ Have the necessary agreements been made with private contractors for use of equipment?

___ ___ Have the necessary agreements been made with private contractors for the use of personnel to operate the equipment?

___ ___ Have you prepared a list of the decontamination procedures that could be used for each facility?

_____ Estimate of types and quantity of equipment needed.

_____ Estimate of work-hours needed to accomplish decontamination.

___ ___ Do you have a list of RADEF personnel and equipment that could be used to perform surveys and monitor the decontamination operation?

_____ How many from shelters?

_____ How many from WER stations?

_____ How many from self-protection locations?

Yes No

— — Do you have a plan to use dosimeters and chargers from shelters, WER stations and self-protection locations to limit the radiation exposure of workers?

— — Do you have a listing of decontamination specialists within the jurisdiction?

— — Have you considered other government agencies?

— — Private companies, etc.?

— — Does your plan provide for public works or some other named department to be responsible for and coordinate decontamination activities?

Who in the EOC is responsible for assigning decontamination missions?

WORKSHEET NO. 5
DECONTAMINATION STAFF

Jurisdiction _____

Date _____

Prepared By _____

Position	Number Required	Number Assigned	Number Trained	*Occupation	Name	Mailing Address
Decontamination Specialist						
Decontamination Personnel						

*PW—Public Works
GC—General Construction
S—Sanitation
F—Fire

Jurisdiction _____

WORKSHEET NO. 6
FACILITIES TO BE DECONTAMINATED

Date _____

Prepared By _____

Facilities			Resources		
Facility Name	Address	Priority	Equipment Required	Equipment Available	
				Yes	No

PART III

OPERATIONS OF LOCAL RADIOLOGICAL DEFENSE CAPABILITIES

OPERATIONS PLANNING FOR RADEF

Introduction - Emergency operations plans are important for all elements of a local civil defense capability. Each department of local government is responsible for developing plans for its assigned function or area of responsibility. Planning for radiological operations cannot be divorced from the context of local emergency operations planning within which it takes place. In the final product all of the separate plans must merge smoothly and be a compatible part of the whole community emergency operations plan. Thus, the individual responsible for radiological planning must be familiar with the larger setting of which his efforts are a part.

As a practical matter, operations planning is a necessity, particularly for a function like RADEF which has no day-to-day local counterpart. If properly developed, the local plan and/or annex will outline decisions that are made now when there is time to think about them. Then, in an emergency, there will be decisions already made and capabilities already developed when they are needed. The plan/annex will outline a division of labor, telling who does what and when they do it. Problems such as how to provide communications and control will be resolved if the plan is properly prepared.

Local plans/annexes must be realistic. A plan should be based on existing capability since it cannot be assumed any additional capability will suddenly appear in an emergency. If it is expected that monitors can be recruited and trained in an Increased Readiness Period, this should be indicated in the plan. Recruiting and training to upgrade a capability is a logical Increased Readiness activity. If it is known where additional WER stations are needed and it is possible to provide this capability in an Increased Readiness Period, it should also be included in the plan. However, if there is no communications equipment or the means to provide a capability somewhere, even if that capability is necessary or desirable, it should not be included in the plan. Emergency Operations Plans must be "capability" plans based on the real local situation. They should not be based on what local government would like to be able to do.

Functions of the Plan - The Emergency Operations Plan should outline the local concept of overall emergency operations. The RADEF portion should outline the specific concept of RADEF operations and define local responsibilities. It should show a breakdown of operations by time phase to include:

- What is completed?
- What operations are planned for the Increased Readiness Period?
- What will take place in the Attack and Recovery Periods?

It should also be broken down by RADEF capabilities (shelter monitoring; self-protection monitoring for emergency services, vital facilities and industries; monitoring, reporting and assessment; and decontamination support). Attached should be listings of the inventory and/or requirements for radiological instruments and Standing Operating Procedures for the following:

- Crisis training of radiological monitors in an Increased Readiness Period.

- Distribution of radiological instruments in an Increased Readiness Period.

- Crisis improvement of any deficient capability.

- Shelter monitoring operations.

- Self-protection monitoring operations.

- Weapons effects reporting.

- Decontamination operations.

- Internal EOC operations for RADEF and damage estimation.

Responsibility for Planning - The planning process begins with the development of a list of functions that must be performed in a disaster to minimize injuries and loss of life, and to preserve resources in the community. Then an assign ment of primary responsibility for each function is made to some department of local government. Common sense would suggest that primary responsibility for functions be assigned to someone who:

- Is under the direct control of local government.

- Controls resources that are appropriate to the task.

- Has training and experience that are relevant to the task.

This would seem to suggest that the regular departments of local government are the most appropriate organizations for this primary assignment. In some cases a local department may not have all the necessary resources or trained personnel to carry out the task. Where it cannot directly perform an emergency function, it can certainly coordinate the execution of that task for local government.

RADEF is an essential function for nuclear attack emergencies and there is no existing local department of government with an ongoing function in RADEF. RADEF is an operational responsibility of local civil defense. It is usually assigned to the Radiological Defense Officer, but in many cases the local Director/Coordinator will end up with the task.

Structure of the Plan - Normally States have formats that they want local governments to use when writing local plans. The general structure of a local emergency operations plan is as follows:

- Basic Plan (functional assignments, general). The basic plan provides the overall framework of authorities and operational concepts for emergency planning in the community. It also assigns to the departments of local governments responsibility for all functions that must be carried out in an emergency.

- Annexes (a little more specific). The next level of planning to the basic plan are the annexes written by each of the operating departments. They provide a statement of purpose, detail how the departments will carry out their functional assignments and tell how their resources will be used.

- Appendices, tabs and attachments to the annex contain further details on how personnel and resources will be managed by their respective operational services in responding to an emergency.

- Standing Operating Procedures (SOP's) provide detailed procedures on how operations will be conducted.

Radiological Defense may be contained throughout the various annexes of the operating departments or it may be covered in a separate annex. Generally it is preferable to cover radiological defense operations for attack emergencies separately from those for peacetime emergencies such as transportation accidents involving radioactive material or severe accidents at a nuclear power plant. This is because different instruments, concepts of operation, assessment methodologies and protective actions are involved.

The Product and the Process - The product of planning is the written plan. It documents the planning decisions which have been made, outlines the responsibilities and establishes the operational procedures. This is necessary because someone who did not write the plan may have to use it in an emergency. It must be complete enough that someone can pick up the plan and follow it without any previous background, if necessary. It is important that the product, the written plan, be complete and thorough.

The product is important; however, the process of planning is equally as important. Planning has to be an active rather than a passive effort. It is possible to sit in your office, think about the local organization and write a plan which, on paper, seems to be adequate for the community. However, it will not work in an emergency unless all the people affected by it are aware of the impact on them. If it has been decided that all fire stations in the county will be designated as WER stations, but this has not been coordinated with the fire department(s), there will be no operational WER network when an emergency occurs. It would be necessary to work with the fire department(s) to make sure they:

- Know they are part of the local weapons effects reporting network.

- Agree to assume specific responsibilities under the network.

- Know what they are responsible for under the network.

- Have communications with the EOC.

- Will train and assign radiological monitors.

- Will assist with decontamination operations and exercises.

If it is decided to establish all public utilities with a self-protection monitoring capability, it is necessary to coordinate with them to assure that they:

- Know they are going to receive RADEF instruments.
- Know how to use the instruments.
- Understand why they are being provided with this capability.
- Agree to assume responsibility.
- Will train and assign radiological monitors.
- Understand the principals of decontamination.

Local planning must involve and coordinate local people. Otherwise, the documented system that appears to be complete, will fail when fully implemented in an actual disaster situation.

Worksheet No. 7

PLANNING GUIDE
FOR
RADIOLOGICAL DEFENSE ANNEX

Radiological Defense (RADEF) Operations may be covered in an annex which is a document attached to the Basic Emergency Operations Plan or it may be included within other annexes such as Disaster Analysis or Reporting. Wherever RADEF is included, it must present the details relating to resources, personnel and actions necessary to accomplish the tasks assigned to RADEF in the Basic Plan. Checklists of actions to be taken during the various time phases and lists of resources or capabilities should be appended to the plan/annex. Each State has a standard format for local Operations Plans that should be followed. The following guide is offered to help order your thinking. It will need to be modified as necessary to conform to the State format when putting your plan/annex into final form.

I. MISSION (Describe here in a brief, concise statement the purpose and responsibilities for RADEF operations.)

II. CONCEPT AND ORGANIZATION (Describe here the concept of operations and organizational structure for RADEF operations.)

A. Concept of Operations (Describe the concept of RADEF operations: include who is responsible; what the essential components of RADEF are; operations by time phase; integration of RADEF capabilities; reporting to and from the EOC; monitoring and training activity and responsibility; RADEF instrument storage, distribution and use; and personnel exposure control. Use a separate paragraph for each.)

1.

2.

3.

4.

5.

6.

7.

8.

B. Organization (Describe here the organization and responsibilities for RADEF operations. Include the relationship of local government to State and Federal agencies; the RADEF staff (by function); and the responsibilities of the RADEF staff. An organizational chart should be included as an appendix.)

1.

2.

3.

4.

5.

6.

III. OPERATIONS (Describe here the RADEF responsibilities in preemergency planning; the operations policies applicable to RADEF personnel; and operations in the various time phases.)

A. Preemergency Planning (Describe the RADEF strategy for emergency actions. Answers to at least the following questions should be included: (1) What planning and training should be done? (2) What facilities, resources and auxiliary manpower should be identified? and (3) What equipment, supplies, and materials should be procured?)

1.

2.

3.

4.

B. Policies Governing Operations (Describe and clarify the operations policies which will guide the RADEF personnel during emergency operations such as decontamination priorities, exposure criteria and control of unprotected operations.)

1.

2.

3.

4.

C. Time-Phase of Operation (Describe here the actions to be taken in each time-phase by the RADEF staff.)

1. Increased Readiness Phase (Describe the activities necessary to arrive at full mobilization, including accelerated staff training; special instructions to the general public; reviewing and updating lists of personnel, resources; etc., and notifying the RADEF staff upon receipt of warning.)

2. Emergency Phase (Describe the concept of operations when an emergency occurs, including general methods or actions to meet the emergency; coordination; reporting, displaying, and analyzing data and exposure control of shelterees and emergency services personnel. Attach checklists, as appropriate.)

3. Recovery Phase (Describe the activities necessary to reduce suffering and restore vital facilities, including decontamination procedures, priorities and control; steps anticipated to promote maximum recovery of property and restore conditions to normal. Attach checklists, as appropriate.)

IV. DIRECTION AND CONTROL (Describe here the administration of RADEF resources, facilities and manpower for emergency use, including lines of succession of authority; locations from which RADEF operations will be conducted; capabilities, control and utilization of emergency communications; reporting system and procedures; public information procedures; and administration and logistics support. Attach checklists, as appropriate.)

A. Lines of Succession of Authority (Describe the line of succession for continuity of control within the RADEF service.)

B. Control Location (Describe the facility and room location for operations, including a description of displays to be utilized.)

C. Communications (Describe the communications available for RADEF operations, including types of communications, telephone and radio call numbers and internal EOC communications procedures.)

D. Reporting (Describe the report formats and procedures both from local sources to the EOC and from the EOC to State government. Attach appendices as appropriate.)

E. Public Information (Describe the guidelines for release of RADEF information to the general public including shelters.)

F. Administration and Logistics (Describe the RADEF service's role in supplying the EOC and the procurement, payment and record-keeping involved in the utilization of supplies, equipment, resources and manpower.)

V. List of Appendices (Appendices to the RADEF Annex should include action checklists for emergency operations and resource data, including personnel, facilities, equipment and supplies.)

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

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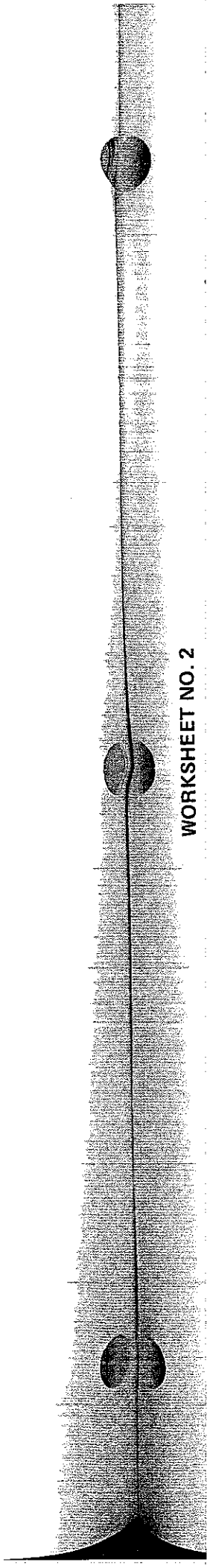


WORKSHEET NO. 2

WORKSHEET NO. 2

SHELETER RADEF CAPABILITY

Jurisdiction Primo County

Date February 1981

Prepared By John Doe

Facility Name	Facility Address	Total Spaces	Type 1/	Comm. 2/	Instrument Sets			Monitors	
					No. Req'd	No. Avail.	Stored 3/	No. Req'd	No. Avail.
Adm, Comm. Coll	Centerville	1350	S	T	2	1	BR	2	0
Fire Station	Centerville	150	S	TR	1	1	OS	2	2
Post Office	Big Bend	600	U	T	1	1	BR	2	0
Expedient Shelters									
Community College	Centerville	1000	E		2	0		2	0
City Pard	Big Bend	2000	E		3	0		3	0

1/ Type: S–Surveyed (PFCAT 4+ or PFCAT 2), U–Upgradeable (only PFCAT 1 and/or PFCAT 0), E–Expedient (to be constructed in IR)

2/ Communications: T–Telephone, R–Radio; not a prerequisite for shelter, but advantagious if available

3/ Stored: OS–Onsite, BR–Bulk Repository

WORKSHEET NO. 3

SELF–PROTECTION RADEF CAPABILITY

Jurisdiction Primo County

Date February 1981

Prepared By John Doe

Service/Facility Identification	Facility Address	No. Vehicles or Crews 1/	Instrument Sets			Monitors		Fallout Shelter	
			No. Req'd	No. Avail.	Where Stored 2/	No. Req'd	No. Avail.	Availaibe (Yes–No)	Address
Fire Station	Arsonville	3	4	2	OS	8	6	Y	In Station
Hwy. Dept.	Arsonville	2	2	1	OS	4	4	Y	Post Office
Police Station	Arsonville	5	6	3	OS	14	8	Y	In Station
County Sheriff	Centerville	8	8	8	OS	16	10	Y	Courthouse
Hospital	Centerville	3	5	4	OS	15	8	Y	Hospital
Telephone Co.	Centerville	7	7	1	BR	14	3	N	
State Police	Big Bend	10	12	6	OS	28	20	Y	In Station
Water Plant	Big Bend		1	0		2	1	N	
Sewage Plant	Big Bend		1	0		2	0	N	

1/ Emergency Vehicles or Work Crews only

2/ Stored: OS–Onsite, BR–Bulk Repository

WORKSHEET NO. 4

WORKSHEET NO. 4
WEAPONS EFFECTS REPORTING NETWORK

Jurisdiction Primo County

Date February 1981
Prepared By John Doe

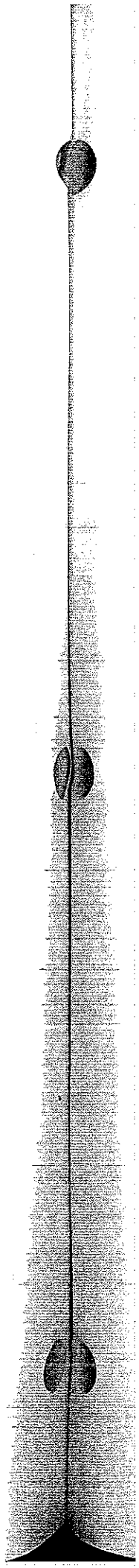
Rep't Area	Station No.	Station Iden.	Station Address	Instrument Sets			Monitors		Communications 2/		Shelter 3/	Status 4/
				No. Req'd	No. Avail.	Where Stored 1/	No. Req'd	No. Avail.	Phone	Radio		
19	1	Fire STA	Fire Dept., Arsonville	1	1	OS	4	2		F	S-40	O
	2	Hwy. Dpt.	204 Elm St., Arsonville	1	1	OS	4	4		PW	S-40	O
	3	Bank	Fire National, Centerville	1	1	BR	4	0			S-100	4
	4	USPS	Post Office, Big Bend	1	0		4	1			4	4
	5	USCG	Coast Guard, Anchor PT.	1	1	OS	4	5		0	E	E
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											

1/ Stored: OS—Onsite, BR—Bulk Repository

2/ Communications: Telephone (if yes, give number), Radio - indicate type (F—Fire, L—Low, PW—Public Works, C—Citizen Band, R—Races, O—Other)

3/ Shelter: S—Surveyed(indicate PF), U—Upgradeable, E—Expedient

4/ Status: O—Operational, N—Non-operational (lacks some capability), E—Expedient (construct in IR period)



Worksheet No. 8

Roster of Radiological Monitors and Assignments

Jurisdiction _____ Date _____

Prepared By _____

Type of Facility and Name	Monitors	Date Trained	Mailing Address	Home Telephone
Weapons Effects Reporting Stations				
1. Arsonville Fire Station	1. Ed Round	3/78	123 1st St., Arsonville	XXX-XXXX
	2. Sam Collins	3/78	38 S. Main, Arsonville	XXX-XXXX
	3. Ben Cummings		Rt. 1, Box 604, Arsonville	XXX-XXXX
2. Bigberg Elks Club	1. Lee Richards	1/76	810 Pine, Bigberg	XXX-XXXX
	2. Wayne Roberts	4/77	218 N. 1st St., Bigberg	XXX-XXXX
Self-Protection				
1. Arsonville Fire Station	1. John Williams	3/78	2118 Pine Blvd., Arsonville	XXX-XXXX
	2. Sam Allred		819 12th Street, Arsonville	XXX-XXXX
	3. Jim Silver		Rt. #3, Box 6, Arsonville	XXX-XXXX
2. County Sheriff	1. Chad Winton	3/78	811 Elm, Centerville	XXX-XXXX
	2. Bennie Wilkins	3/78	19 S. 18th, Centerville	XXX-XXXX
	3. Charles Gregory	4/77	2198 DesPlaines Way, Centerville	XXX-XXXX
	4. Tom Beamon	4/77	994 Excelsor Drive, Centerville	XXX-XXXX
	5. Tom Stanton	1/76	171 Pine Bluff Drive, Centerville	XXX-XXXX
	6. Gus Clancy		221 Merril Ave., Centerville	XXX-XXXX
	7. Wilbur Walker		1829 Unity Drive, Centerville	XXX-XXXX
	8. Homer Wilson	3/78	Rt. #2, box 88, Arsonville	XXX-XXXX

CHECKLIST FOR RADEF PLANNING

GENERAL - Does your RADEF plan include :

Yes	No	
—	—	A concise statement of the purpose and responsibilities for RADEF operations?
		A concept of operations to include:
—	—	Organization and leadership (who is responsible?)
—	—	What the RADEF capabilities and components are and how they are integrated
—	—	Operations by time phase (Increased Readiness, Emergency, Recovery)
—	—	Operations in the EOC (location, procedures)
—	—	Reporting to and from the EOC
—	—	Communications capabilities and requirements
—	—	Monitoring and training activity and responsibility
—	—	RADEF instrument storage, distribution and use
—	—	Decontamination operations
		A discussion of each RADEF capability and its operation:
—	—	Shelter RADEF
—	—	Self-protection RADEF
—	—	Monitoring, reporting and assessment (including weapons effects reporting network)
—	—	Decontamination
		A discussion of the RADEF organization
—	—	Relationship and roles of Federal, State and local agencies in RADEF operations
—	—	RADEF staff (by function)
—	—	Responsibilities of RADEF staff
		A discussion of RADEF operations by time phase:
—	—	Pre-emergency activities and responsibilities
—	—	Increased Readiness activities and responsibilities

Yes	No	
___	___	Emergency activities and responsibilities
___	___	Recovery activities and responsibilities
		A discussion of direction and control:
___	___	Line of succession
___	___	Location of Operations (EOC room number, phones, configuration, etc.)
___	___	Communications capabilities and procedures
___	___	Reporting, analyzing and displaying procedures
___	___	Public information
___	___	A discussion of administration and logistics support required for RADEF operation
		Attachments of resources and SOP's for the RADEF capabilities:
___	___	Shelter RADEF
___	___	Self-protection RADEF
___	___	Monitoring, reporting and assessment
___	___	Decontamination support

PRE-EMERGENCY - Does your RADEF plan provide for:

___	___	Testing and exercising the RADEF support system and capabilities
___	___	Provision of necessary supplies, materials and displays in the EOC
		Development of Standing Operating Procedures (SOP's) for:
___	___	EOC operations
___	___	Operations of weapons effects reporting stations (including reporting procedures)
___	___	Distribution of instruments in Increased Readiness Period
___	___	Crisis training of radiological monitors
___	___	Decontamination operations
___	___	Development of Resource Lists

INCREASED READINESS - Does your RADEF plan provide for:

Yes	No	
___	___	Review and update of the RADEF Annex
___	___	Alerting and warning of RADEF staff (including RDO's, EOC RADEF staff, RADEF monitors)
___	___	Accelerated staff training for RADEF operations
___	___	Crisis training of monitors for shelters and additional monitors needed for self-protection and Weapons Effects Reporting stations
___	___	Special instruction to the public
___	___	Review and update of resource lists (facilities, personnel, etc.)
___	___	Preparation of the EOC for RADEF operations
___	___	Upgrading and testing of RADEF instrument sets
___	___	Crisis distribution of RADEF instrument sets
___	___	Briefing of EOC staff on operational status of RADEF
___	___	Expedient upgrading of self-protection monitoring capability
___	___	Expedient upgrading of Weapons Effects Reporting network
___	___	Provision of supplies to Weapons Effects Reporting stations
___	___	Exercising the RADEF support system

EMERGENCY - Does your RADEF plan provide for:

___	___	Reporting of information to the EOC (from Weapons Effects Reporting stations, shelters and self-protection units)
___	___	Receipt, display and analysis of weapons effects data
___	___	Internal EOC operations (message control, routing, communications)
___	___	On-the-job training of EOC RADEF staff
___	___	Coordination with executives and department heads
___	___	Providing information on conditions to shelters, etc., via EBS or other means
___	___	Exposure control for emergency workers

Yes No

__ __ Mobile monitoring to supplement the Weapons Effects Reporting stations

__ __ Use of State aerial monitoring capability

__ __ Maintenance of personnel exposure records

RECOVERY - Does your RADEF plan provide for:

__ __ Use of instruments from Weapons Effects Reporting stations, shelters and self-protection units for recovery purposes

__ __ Providing support in developing decontamination priorities, procedures and means of control

__ __ Means of coordinating with local services personnel involved in recovery operations

__ __ Means of recruiting additional personnel for recovery operations

__ __ Means of establishing long term exposure limits for emergency workers

__ __ Maintenance of personnel exposure records

RADEF OPERATIONS IN THE EOC

Introduction - The effective conduct of survival operations following a nuclear attack emergency requires that governments be prepared to control and direct emergency operations, protect life and speed recovery. The number and nature of the problems resulting from an attack will be greater than those resulting from peacetime emergencies. It will be necessary to:

- Gather and evaluate essential information.
- Make decisions based on the fallout situation.
- Direct necessary actions from a location where key government officials could come together to coordinate their operations. This can be accomplished best in an adequately planned and protected Emergency Operating Center (EOC). An EOC is a facility having:
  - Adequate fallout protection.
  - Communications to field forces of local operating agencies.
  - Emergency supplies.
  - Space in which trained personnel and officials may function.

The EOC must have space for operation of a Disaster Analysis section which includes RADEF. It is the focal point for weapons effects and radiological assessment within the jurisdiction. The Disaster Analysis staff, based on information received from the State, and from neighboring jurisdictions, predicts the arrival of radioactive fallout in the jurisdiction. After fallout has arrived, exposure rate data are received from the individual WER stations and possibly from self-protection units and shelters. These data are analyzed to determine the radiation environment of the jurisdiction. Information on the radiation environment is forwarded to the State level and to adjoining counties in accordance with established procedures. At the local level information on radiation levels is combined with other information and used by the EOC staff to determine what protective measures or remedial actions are needed and how they may best be implemented.

Important considerations within the EOC includes the procedures to handle weapons effects and other RADEF message traffic and the understanding of its priority importance in the overall effort to save lives. The procedural aspect will involve developing forms, message handling procedures, analysis procedures, displays and briefing procedures. These will be used to record, analyze, display and report weapons effects data. The understanding aspect includes efforts to explain and instruct others who handle or must act on weapons effects data. This includes getting the attention of chiefs or others who must make manpower decisions for emergency operations. A significant effort in this same area

will be to assist the public information personnel to prepare plain language emergency public information for the public regarding the radiological hazards.

Disaster Analysis Staff - The EOC must have a trained staff including Radiological Defense Officers, recorders, plotters, analysts and decontamination specialists. In smaller jurisdictions these functions may be combined with one individual responsible for several. The Disaster Analysis staff is responsible for providing advice and assistance to the operating and executive staff in the EOC, the local field organization and the public on the full range of nuclear weapons effects, including the radiological hazard and fire and blast effects. They are particularly concerned with the impact that weapons effects have on operational activity throughout the community. They maintain close contact with the WER network, shelters, self-protection units, adjacent communities, higher levels of government and the military in order to receive reports of nuclear detonations, radiation intensities and other weapons effects.

The Disaster Analysis staff operates in the EOC during all phases of an emergency as follows:

Increased Readiness Phase - During this time period the staff will assist the Director/Coordinator in activating and expanding a WER network, and in training radiological monitors who will be located in shelters and the additional radiological monitors for WER stations and self-protection units.

The Disaster Analysis staff chief must:

- Ensure that all positions are filled.
- Assure that personnel assigned to the group are trained in their jobs and are thoroughly familiar with:
  - Internal operating procedures.
  - Analytical aids and displays.
  - Internal and external communications.
  - Report form content and distribution.
  - Analysis conducted with incoming data.
  - Means used to inform EOC staff of weapons effects information.
- Arrange for the recept of DF (upper winds) data and weather information at the EOC.
- Ensure that arrangements are made for the exchange of weapons effects information.

- Brief the EOC staff on the effects that nuclear weapons could have on the community and on the advice and assistance that the Disaster Analysis staff can furnish to the EOC staff during the emergency.

- Assure that the WER network is operational.

Emergency or Attack Phase - During this time period, the unique analytical skills of the Disaster Analysis staff are most needed. Upon receipt of reports of nuclear detonations and fallout arrival, the staff chief must immediately notify the staff in the EOC; the civil preparedness field organization, including shelter complexes and operational units; and the general public.

The Disaster Analysis staff must:

- Record and analyze all incoming reports of weapons effects and radiation intensities in order to predict or estimate fallout arrival time and any direct fire or blast effects that may affect the community. In the analysis, the radiation hazard outside the shelter must be determined in order to identify:

  - Areas of the community where outside activity should be avoided.

  - Areas where outside activity for limited time periods is possible with certain risks.

  - Areas where unrestricted activity is possible.

- Depict results of the analysis on both wall and desk displays and on maps so that they are available to the EOC staff sections.

- Provide advice and assistance to the Operations Group and resource officers regarding the hazards of conducting outside activity under fallout conditions. Operations such as remedial movement, or brief sorties for reconnaissance or supply purposes should be studied in advance by this section to ensure that undue risks are not taken.

- Prepare estimates for the operations staff on the projected time of shelter emergence for the general public. They must also act as an advisor to the EOC staff sections in preparing shelter-emergence plans.

- Collect and prepare assessments of the damage sustained by the community. These assessments will be derived initially from WER stations, operating units of fire, police and public works, and the shelter system, and from reports of nuclear detonations. When conditions permit, reconnaissance missions must be sent into affected areas to confirm and identify other damage. Damage assessments should include the effects on the population, the shelter system, roads and highways, vital installations, and public utilities. When available, resource personnel will make damage assessments with respect to the resources for which they are responsible.

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Recovery or Postattack Phase - The Disaster Analysis staff is needed most in this time period. There is still a need for their unique skills. They must:

- Provide advice and assistance to the EOC staff on the technical aspects of such operations as decontamination and debris clearance .

- Provide the public information officer with information on local areas that the public must avoid because of the radiological hazard or damage due to the attack.

Reporting to the State EOC - The local EOC must assure that the State Office receives weapons effects reports. Generally, these reports will use existing operational communications channels. The reports are formatted so that they may be transmitted by the civil preparedness teletype system or they may be read over any available telephone or radio channel. The reports include:

Damage Reports - The local EOC should relay damage reports to the State EOC as soon as possible. These reports consist of nuclear detonation (NUDET) sightings and structural damage and/or glass breakage reports.

Fallout Reports - The local EOC should analyze Fallout Reports received from WER stations and forward the worst fallout condition for each reporting area to the State EOC.

Civil Preparedness Guide, CPG 2-10, Emergency Operations Reporting System, describes the recommended reporting format and frequency. The State SOP will also contain instructions for preparing and making reports.

EXAMPLE OUTLINE OF AN EOC SOP FOR DISASTER ANALYSIS OPERATIONS

The Standing Operating Procedure (SOP) should provide specific details concerning WHO (by title), WHEN, WHERE, and HOW for the following functions, as applicable:

Personnel

- Identify the duties and functions of the EOC Disaster Analysis Staff and the personnel assigned. Include names, addresses, telephone numbers, functions (duties) and training.

- Outline training in EOC operations, if required postattack, to fill position vacancies or augment staff.

- Describe methods to be utilized to alert staff.

Facility Preparation

- Describe the required preparation of the EOC for operations including necessary arrangement of space, setting out special equipment, provision for additional maps and displays, and provision for required supplies (see attachment). Included here should be a discussion of the layout and function of the EOC for Disaster Analysis.

- List the displays, including a discussion of the purpose for and use of each and who will maintain display.

Operations

- Identify the WER stations. Include their location and the monitors assigned to each location. Give name, address, telephone number and training of monitors. (May be an appendix to SOP.)

- Describe the frequency and type of weapons effects and radiological information to be reported and the reporting procedures. (Both from reporting stations and to other levels of government.)

- Assign communications channels and outline the procedures for message and data handling operations. This must be in agreement with local emergency operations plans. Included here should be a discussion of the communications capabilities planned for RADEF and the use of message forms and other operational forms.

- Identify self-protection and shelter monitoring locations that could be used as backup or added to the WER network.

- Describe methods of interrogation to clarify reports or fill in gaps in the reports received at the EOC.

- Coordinate monitoring of weapons effects with other services, including self-protection units, based on changing radiological and operational situations.

- Reassign radiological monitors in support of recovery operations as required.

- Recommend exposure guidelines and procedures for maintaining individual exposure records.

- Plan for and assign mobile monitoring and survey missions and associated reporting systems and procedures.

- Coordinate with self-protection capabilities.

Display and Analysis

- Receive DF data (upper wind direction and speed), prepare wind vector plots and forecast fallout arrival and prepare local advisories.

- Present and display weapons effects and radiological information to EOC staff. (Included here would be a discussion of the EOC displays and how they would be used.)

- Discuss methods for plotting and analyzing weapons effects and radiological information.

- Evaluate and provide staff support concerning:

    - Relative hazards in various types of shelter.

    - Need for and feasibility of decontamination and/or remedial movement.

    - Shelter stay time.

    - Hazards associated with emergency operations (both proposed and in progress).

- Discuss radiological calculations in support of evaluation of:

    - Decay characteristics.

    - Estimation of future exposure rates and exposures.

ATTACHMENT 1 TO EOC SOP
SUPPLIES AND MATERIALS REQUIRED
FOR EOC DISASTER ANALYSIS OPERATIONS

Manuals and Handbooks

- Effects of Nuclear Weapons
- Monitor Handbook
- Aerial Monitors Handbook
- Shelter Managers Handbook
- Shelter Pamphlets
- Emergency Operations Reporting System

Wall Maps and Displays

- State Map
- County/City Maps
- Major Activity Log
- Shelter Log

Supplies

- Protractor, Compass and Ruler
- Nomograms and Templates
- Grease Pencils
- Lead Pencils and Ballpoint Pens
- Colored Pencils and Pens
- Thumbtacks and Pins
- Note Pads
- Graph Paper
- Flashlight and Batteries

Forms and Tables

- Reporting Forms
- Message Forms
- Shelter Forms
- Exposure Forms
- Exposure Tables

Desk Maps

- City and County Maps
- State, gion and U.S. Maps
- Reporting Area Maps

Listings

- Weapons Effects Reporting Stations
- Self-Protection Capabilities
- Shelters
- Trained Monitors

ATTACHMENT 2 TO SAMPLE EOC SOP
EXPOSURE GUIDELINES

EXPOSURE--PENALTY TABLE

Roentgen Exposure / Acute Effects	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 50%+ Deaths	450	600	Little or No Practical Consideration

Source: FEMA Attack Environment Manual, Chapter 1, Panel 13, and Chapter 6, Panel 15; Also, NCRP Report No. 42, Radiological Factors Affecting Decision-Making in a Nuclear Attack.

ESTIMATED SINGLE RADIATION EXPOSURES THAT WILL CAUSE 50 PERCENT INCIDENCE OF SYMPTOMS

Signs and Symptoms of Radiation Sickness	Single Exposure (Roentgens)	95 Percent Confidence Range (R)
Loss of Appetite	180	150-210
Nausea	260	220-290
Fatigue	280	230-310
Vomiting	320	290-360
Diarrhea	360	310-410

Source: FEMA Attack Environment Manual, Chapter 5.

SUMMARY OF RELATIONSHIP BETWEEN ACUTE EXPOSURE AND LEVELS OF RADIATION SICKNESS

Exposure Range (Roentgens)	Type of Injury	Probable Mortality Rate Within 6 Months of Exposure
0-50	No observable signs or symptons	None
50-200	Level I Sickness	5 percent or less
200-450	Level II Sickness	50 percent or less
450-600	Level III Sickness	50 percent or more
More than 600	Levels IV and V Sickness	100 percent

Source: FEMA Attack Environment Manual, CPG 2-1A, Chapter 5.

Level I Sickness - Less than half the persons exposed will vomit within 24 hours. There are either no subsequent symptoms or, at most, only increased fatigue. Less than 5 percent will require medical care for radiation injury. Others can perform their customary tasks. Deaths that occur are caused by complications such as blast and thermal injuries or infections and disease.

Level II Sickness - More than half the persons exposed will vomit soon after exposure and will be ill for several days. This will be followed by a period of one to three weeks when there are few or no symptoms. At the end of this latent period loss of hair will be seen in more than half followed by a moderately severe illness due primarily to the damage to the blood forming organs. More than half will survive with the chances of survival being better for those who received the smaller doses.

Level III Sickness - This is a more serious version of Level II Sickness. The initial period of illness is longer, the latent period shorter, and the ensuing illness is characterized by extensive hemorrhages and complicating infections. Less than half will survive.

Level IV Sickness - This is an accelerated version of Level III Sickness. All in the group will begin to vomit soon after exposure and this will continue for several days or until death, which occurs before the end of the second week, and usually before the appearance of hemorrhages or loss of hair.

Level V Sickness - This is an extremely severe illness in which damage to the brain and nervous system predominates. Symptoms, signs and rapid prostration come on almost as soon as the dose has been received. Death occurs in a few hours or a few days. Illness of this type would involve exposure to gamma radiation in excess of several thousand roentgens.

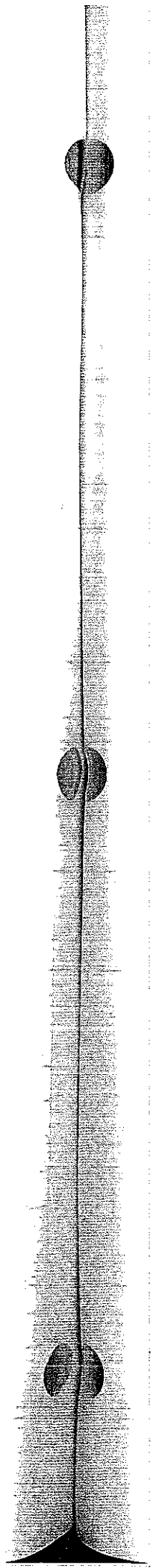
WORKSHEET NO. 9
RADIATION EXPOSURE RECORD

Name ______________________________ Name ______________________________

Mailing Address ____________________ Mailing Address ____________________

___________________________________ ___________________________________

Date(s) of Exposure	Exposure Received	Total Exposure to Date	Date(s) of Exposure	Exposure Received	Total Exposure to Date



WEAPONS EFFECTS REPORTING

Introduction - Weapons Effects Reporting (WER) is one of three parts of an overall Local-State-National civil preparedness emergency operations reporting system which is designed to:

- Provide local governments with information needed to operate in an emergency.

- Pass minimum required information to State Area, State and FEMA Regional EOC's for use in assessing the status of government and resources.

- Enable FEMA to provide information to other Federal agencies and National leaders.

All three parts of the reporting system are designed to provide concise reports as situations become known. The other two parts of the system are:

- The Increased Readiness Report (IRR), which is submitted preattack, provides a sampling and indicator capability. Only selected jurisdictions are asked to report (samplings). They report daily on preselected actions, which show either what the local government is doing or how citizens are responding to an increased international tension situation (indicators).

- The Operational Situation (OPSIT) Reports, which are submitted postattack, give the status of government, health of population, or status of key facilities; explains a critical shortage; or requests aid. They are based on confirmed local information which, in addition to weapons effects information, assists officials at all governmental levels to make operational priority decisions vital to effective early recovery actions.

The WER network consists of the EOC and strategically located WER stations. The stations are staffed with personnel trained in observing and reporting nuclear detonations and their related damage. Additionally, these personnel would monitor and report fallout radiation levels to the local EOC.

The information provided from the WER stations, as well as information from other sources, is passed within the reporting system through the local EOC where pertinent data is extracted and analyzed by the RADEF staff. This is the radiological defense monitoring, reporting and assessment capability. It allows for an assessment of the extent and magnitude of the weapons effects and radiological hazard throughout your community. The local EOC will provide weapons effects and radiation data to the State and State Area EOC. The State will, in turn, provide selected information to the FEMA Regional Office. This information allows all three levels of government to determine the location and severity of the weapons effects (blast, fire and fallout radiation). The reported information enables FEMA to inform national leaders to determine which communities or States require assistance--not only what type of assistance, but how much.

Reporting Areas - Each local jurisdiction will need a number of WER stations to meet local requirements for complete geographic and population

coverage in order to provide information to the EOC on the postattack situation. The accuracy and completeness of this information depends partially on the number and location of the local WER stations. In addition to the WER stations, the local EOC may also receive information from other sources such as shelters, self-protected/vital facilities or mobile crews. This information may overload the local capability to process it. In addition, it would overload State and Federal communications systems if it were all transmitted to higher levels of government.

To provide a means for summarizing weapons effects information, each State has been subdivided into geographic reporting areas. There should be at least one WER station in each reporting area. These WER stations provide reports to the local EOC where data is analyzed and summarized. Some reports, such as sightings of nuclear detonations or damage reports, are submitted immediately by the local EOC staff to the State EOC. The fallout reports are analyzed and the condition in each reporting area is forwarded to the State. This assures that vital information is passed quickly to State, Regional and National officials without overloading communications or staff capabilities. It also provides these officials with the means to discern and present a picture of the current and projected weapons effects situation.

Some States may have more reporting areas than they have counties; while others have fewer reporting areas than they have counties. This occurs when geographically larger counties are subdivided into two or more reporting areas or two or more geographically small counties are combined to form a single reporting area. However, reporting area boundaries do not cross a State boundary and only cross a county boundary when the entire county is combined with another entire county to form one reporting area. The reporting area does not have political or operational functions by virtue of the area being designated as a reporting area.

All reporting areas are numbered. This is done by starting in the northeast corner of each State, proceeding laterally to the west, then back to the east and across to the west in a snake-like fashion. This continues until the southern portion of the State is reached. All the land area within each urban area also is assigned a single reporting area number. See Page 3-43, for an example of the numbering sequence for State reporting areas. When operating personnel refer to a reporting area outside their State, the two-letter post office designation is used to prefix the reporting area number, e.g., OR 13 for Oregon reporting area 13 (which is Portland).

These numbered reporting areas also provide a readily usable identification scheme whereby State, Region and National headquarters can rapidly locate on a map any one of the reporting areas. This facilitates the exchange of information by limiting the communications time needed to transmit information. (Maps showing the reporting areas in your State are available from the FEMA Regional Office.)

Reporting Concept - WER is designed to provide for maximum sharing of essential information by EOC's at each level and for exchange of information between levels--both upward and downward--as well as laterally between similar jurisdictions at the same level.

Reporting must be brief but complete and provide the information that is essential to all concerned. Also, it must function in the interest of conserving staff time and communications capacity.

Exercise and disaster experience has shown that communications systems can quickly become overloaded and critical information is delayed or received too late to be effective. Communications overloading is reduced by following some of the basic actions listed below:

- Reporting limited but necessary information.

- Reporting appropriate information as soon as possible after the event occurs.

- Using standardized reporting formats.

- Limiting the number of stations reporting to the EOC.

Even in the best information reporting systems, reports are sometimes incomplete, garbled or do not arrive at all. If this happens, or if certain events do not occur logically within the developing pattern, or unexpected events are noted, analysts at the EOC should make special queries. The situation will be constantly changing and the analysts will have to apply their interrogation skills. Interrogation is used to:

- Acquire information expected but not received.

- Resolve conflicting information.

- Clear up garbled messages.

- Request additional required information.

- Establish that a reporting source or a circuit is actually inoperative and obtain as much needed information as possible from surrounding areas via other circuits.

The WER stations should have a Standing Operating Procedure (SOP) which outlines how they will function in an emergency. See Page 3-47, for a sample SOP.

Additional Local Reporting Capability - The process of selecting WER stations as described in Part II is sufficient for satisfying the minimum reporting network requirements. However, local government officials may require more detailed information about the emergency situation in their community. Much of this additional information could be made available by local operating departments as part of the self-protection capability or from shelters. Additional WER stations, however, may also be required to provide an increased weapons effects and radiological monitoring capability. The number of WER stations required may vary for each local government and most likely will depend upon such factors as the number of people and the size of the community. The specific number and locations of WER stations also should be based on the requirements as specified in the State and local emergency operations

plans. At all times the local span of control should be considered. If too many stations are reporting information to the EOC, the RADEF staff may be unable to process all the data received. If more than one WER station is needed in a reporting area, you should consider designating one station as the primary station which would report to the EOC. The other stations would report to the primary station and their data would be consolidated. This "fan" concept would help to prevent overloading the EOC's communications network. Remember, the EOC always has the option of contacting individual stations for more information.

Fallout Protection - The availability of sufficient protection from fallout is a major criterion that should be used in selecting WER station locations. While it is desirable for each WER station to have a protection factor (PF) of 100 or greater, jurisdictions will, in many cases, be required to select facilities with a PF less than 100. If so, select those facilities with the greatest available PF, or those for which the PF can be readily increased. Every effort should be made, especially in high risk areas, to select facilities with both a high PF and the best available protection from blast effects.

Communications - Local government officials will want the primary WER stations in each reporting area to provide information directly to the local EOC (including weapons effects and radiological information from State or Federal facilities serving as WER stations). In some cases, however, it may be practical to have WER stations report to both the local EOC and the State or State Area EOC. For example, if a WER station is located in a State agency or facility that has dedicated communications with both the local and State EOC's, then the station should report to both organizations. Reliable communications are essential. A WER station without communications has little operational value. In many instances, communications will be by means of landline telephones. It is vital that telephone lines be included in the local line-load control plans with the telephone company. However, the use of communications that do not depend on landlines and commercial power is strongly encouraged.

Training - Many individuals have already been trained as radiological monitors; however, it is necessary to also train them in other weapons effects reporting procedures. Mainly, they need to know the type of information to report and how to report it. This may be included as part of regularly required RADEF update or refresher training, or it may be made a new training session. Untrained individuals to be assigned to WER stations need both radiological training and weapons effects reporting training.

Reports - This section will briefly outline the voice reports made by the monitor in the WER station to the local EOC. For more detailed information, see Civil Preparedness Guide 2-10/5, Weapons Effects Reporting (WER) Station Handbook, June 1978.

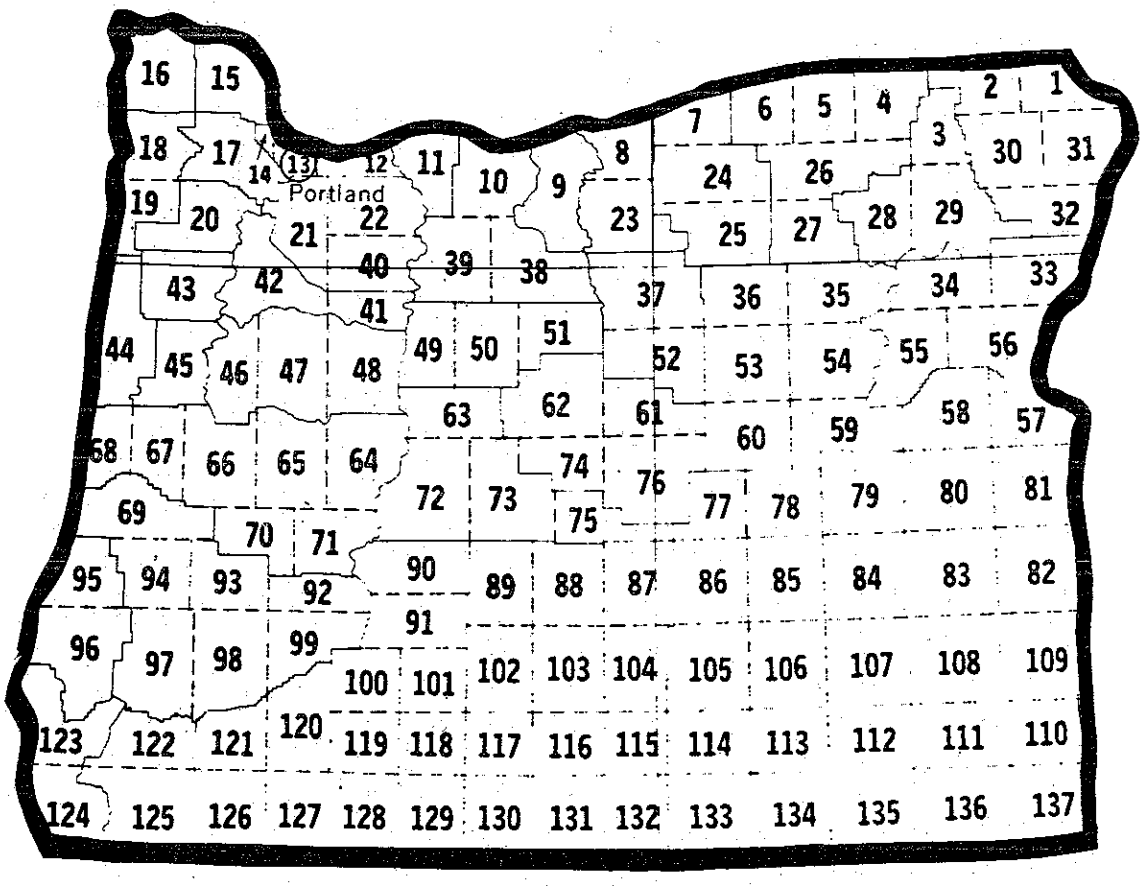
- Sightings of Nuclear Detonation (NUDET). Sightings are reported to the EOC whenever the monitor observes a bright flash or a mushroom cloud on the horizon. It is reported to the EOC in terms of the 16 points of the compass.

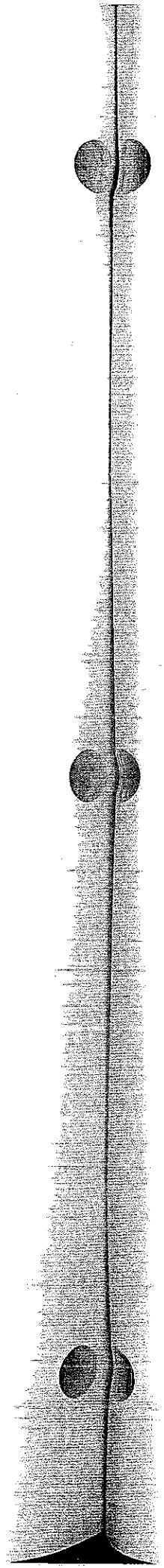
- Glass Breakage or Structural Damage. Whenever weapons-caused glass breakage or structural damage is observed in the immediate vicinity of the WER station, the monitor reports this fact to the EOC.

- Fire. WER station monitors will submit a Fire Report whenever large fires are observed in the immediate vicinity of the station.

- Radiation (Fallout) Reports. WER stations will report fallout arrival and subsequent radiation exposure rates in accordance with the local Standing Operating Procedures.

EMERGENCY REPORTING AREAS FOR OREGON





OREGON (OR) REPORTING AREAS IDENTIFIED BY NUMBER - 137 REPORTING AREAS

Rep. Area	County/Loc. Name	Rep. Area	County/Loc. Name
33, 34, 55, 56	Baker	87, 88, 89, 102, 103, 104, 114,	Lake
45	Benton	115, 116, 131, 132, 133	
21, 22, 40	Clackamas	64, 65, 66, 67	Lane
16	Clatsop	68, 70, 71	
15	Columbia	44	Lincoln
95, 96	Coos	46, 47, 48	Linn
61, 62, 74, 76	Crook	57, 58, 80, 81, 82, 83, 108, 109	Malheur
123, 124	Curry	110, 111, 136, 137	
63, 72, 73, 75	Deschutes	41, 42	Marion
69, 92, 93, 94 97, 98, 99	Douglas	7, 24, 25	Morrow
		12, 14	Multnomah
8, 23	Gilliam	13	City of Portland
35, 36, 53, 54	Grant		
59, 60		43	Polk
77, 78, 79, 84, 85, 86, 105, 106, 107	Harvey	9	Sherman
112, 113, 134, 135		18, 19	Tillamook
11	Hood River	4, 5, 6, 26, 27	Umatilla
120, 121, 126, 127	Jackson	3, 28, 29	Union
49, 50, 51	Jefferson	1, 2, 30, 31, 32	Wallowa
122, 125	Josephine	10, 38, 39	Wasco

Rep. Area	County/Loc. Name	Rep. Area	County/Loc. Name
90, 91, 100, 101, 117, 118, 119	Klamath	17	Washington
128, 129, 130		37, 52	Wheeler
		20	Yamhill

EXAMPLE

STANDING OPERATING PROCEDURE FOR WEAPONS EFFECTS REPORTING STATIONS

References

County Emergency Operations Plan and RADEF Annex
Weapons Effects Reporting Station Procedures, CPG 2-10/5

General

The primary functions of monitoring teams are to provide timely and accurate information to the RADEF Section in the Emergency Operating Center. The information is required for proper analysis and evaluation of fallout within the county. In addition, the monitoring teams provide a monitoring capability during emergency and recovery operations.

Organization

Monitoring operations during the shelter period will be conducted under the direct supervision of the RADEF Officer.

During emergency field operations, the team will provide monitoring support in coordination with the RADEF Officer.

Equipment and Supplies

Monitoring instruments. Each weapons effects reporting (WER) station has one set of radiological instruments. One set of serviceable batteries will be maintained on hand; however, the batteries will not be placed in the instruments during storage.

Administrative Supplies and Forms. An adequate supply of administrative supplies, such as paper, pencils, etc., and forms will be maintained in the monitoring station (could also be in a box with instrument set if in a bulk repository). Forms will consist of the following:

- Personnel Radiation Exposure Records
- Radiological Reporting Log

Amenities. Blankets and food supplies will be placed in the station if possible before an emergency occurs. If a surprise attack occurs, the monitors should bring as much as possible with them. There should be enough water trapped in the plumbing and water heater to meet drinking needs.

Communications

Telephone will be used in reporting weapons effects and radiological information to the EOC during periods of in-shelter monitoring. The telephone number of the EOC is XXX-XXXX.

The (city street department) radio net (XXX mhz) may be utilized for this purpose in the event telephone service is disrupted. During emergency operations monitoring, the department's radio net may be used for high priority reporting to the EOC. The call sign designation is listed on the card attached to each radio of the department.

Operations

Shelter Operations

Reporting for Duty. All assigned monitors will report to the WER station as soon as possible following alert by the Radiological Defense Officer or upon warning that an attack is imminent or has occurred.

Instrument Operability Check. The first monitor arriving at the station will perform an operational check on all survey meters and charge the dosimeters.

Operational Readiness Report. A report will be made to the EOC that "The Station is operational." When time permits, attempts will be made to contact missing monitors by phone.

Station Safety. Check to see that doors, windows or other openings are securely closed prior to the arrival of fallout.

Dosimeter Placement. After being charged, place at least one dosimeter inside the station at a location which is at least three feet high and located three feet from an outside wall.

Monitoring and Reporting Operations (See attachment for reporting format).

Sighting Reports. If a brilliant flash is detected on the horizon or the stem of a mushroom cloud is observed, a Nuclear Detonation (NUDET) Sighting Report utilizing the 16 points of the compass will be made to the EOC immediately.

Damage Reports. If weapons-caused glass breakage or structural damage is observed in the immediate vicinity of the WER station, a damage report will be made to the EOC immediately.

Fire Reports. If a large fire is observed in the immediate vicinity of the station, a fire report will be made to the EOC immediately.

Fallout Reports. Certain reports on fallout conditions will be made automatically to the EOC on occurrence of specified conditions. The report will indicate the type of condition and time of occurrence. In addition, the local EOC may specify that other reports (i.e., an hourly fallout status report) be made. The reports to be made on occurrence are for the following specified conditions:

- Initial fallout arrival - When an outside exposure rate reaches or exceeds 0.5 Roentgen per hour (R/hr).

- Exposure rate rising above 50 R/hr.

- Peak exposure rates to the nearest 25 R/hr (there may be subsequent peaks after the initial peak reading is reported).

- Subsequent fallout arrival (when a decreasing exposure rate starts to increase).

- Exposure rate decreasing below 50 R/hr.

- Exposure rate decreasing below 0.5 R/hr.

Reporting Station Log

A log will be maintained continuously from the time the station is initially manned. It will be a date/time ordered record of observations and of all communications, both received and transmitted. Additional notes on internal station operations will also be kept.

Monitoring in Support of Emergency Operations

When it has been determined, by the EOC, that radiation levels have decreased sufficiently to permit recovery operations, the monitoring team will provide radiological monitoring support to these operations as a primary mission. At this time reporting of radiological information will become a secondary mission.

The senior monitor will obtain the following information from the EOC and furnish it to the coordinator of operations:

- Assignment of a mission to a specific monitoring team.

- Number of monitors to perform the mission.

- The time when personnel may leave shelter to perform specific missions.

- The recommended allowable exposure for the complete mission from the time of departure until return to shelter.

- The exposure rate to be expected in the area of the mission.

- Procedure and schedule for reporting radiological information to the EOC.

When a senior monitor has assigned a monitor to accompany an emergency mission, the assigned monitor will:

- Advise members of the group on protective measures.

- Read the instrument frequently during each operation and advise the individual in charge of the mission on the necessary radiological protective measures and when the radiation exposure is approaching the planned maximum mission exposure.

- Determine the effectiveness of decontamination measures when supporting decontamination operations.

- Record monitored information on sheets attached to the Radiological Reporting Log in format appropriate to the mission. Report data to EOC, if required in mission directive.

- Assist in recording exposure of emergency team members on individual radiological exposure records.

Attachments

Personnel and Equipment List
Reporting Station Log
Reporting Format

Approved:

_____
Date

_____
Date

WORKSHEET NO. 10
WEAPONS EFFECTS REPORTING STATION, PERSONNEL & EQUIPMENT LIST

_____ County

Reporting Area _____

Station Number _____

Location:

Building _____

Address _____

Room _____

Communications:

Telephone Number of EOC _____

of this Station _____

Radio Frequency _____

Call Letters _____

Equipment and Supplies

RADEF instruments located _____

_____

Administrative supplies and forms stored _____

_____

Food and water available _____

_____

Cots and/or bedding located _____

_____

Monitors:

Senior Monitor (Name) _____ (Phone No.) _____

Assistant Monitors (Name) _____ (Phone No.) _____

(Name) _____ (Phone No.) _____

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WORKSHEET NO. 11
WEAPONS EFFECTS REPORTING STATION, EVENT LOG

Date/Time	Event	Time	
		Received	Sent

ATTACHMENT TO SOP
REPORTING FORMAT

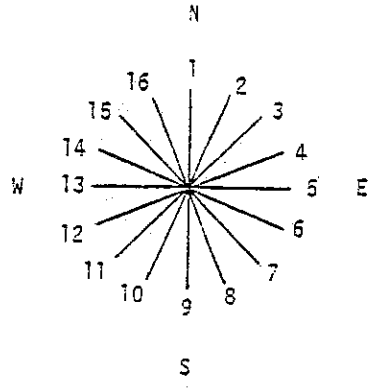
Make Weapons Effects Reports to "Unity County EOC" by calling XXX-XXXX (phone)
XXXXX (radio)

Begin each report with "Unity County EOC . This is Reporting Station 5 ."

When This Occurs	Use This Reporting Format to Complete Report
NUDET Sighting	NUDET (Direction) at (Time)
Structural Damage	Structure Damage at (Time)
Glass Breakage	Glass Breakage at (Time)
Fire	Fire at (Time)
Fallout Arrival	Fallout Point 5 and Rising at (Time)
Above 50 R/hr	Fallout 50 and Rising at (time)
Peak	Fallout Peak (Rate) at (Time)
Subsequent Arrival	New Fallout Arrival (Rate) at (Time)
New Peak	New Fallout Peak (Rate) at (Time)
Below 50 R/hr	Fallout 50 and Falling at (Time)
Below 0.5 R/hr	Fallout Point 5 and Falling at (Time)

Compass Points

1. North
2. North-Northeast
3. Northeast
4. East-Northeast
5. East
6. East-Southeast
7. Southeast
8. South-Southeast



9. South
10. South-Southwest
11. Southwest
12. West-Southwest
13. West
14. West-Northwest
15. Northwest
16. North-Northwest

RADIOLOGICAL MONITOR TRAINING AND OPERATIONS

Function of Radiological Monitors (RM's) - A radiological defense capability requires trained radiological monitors with radiation detection instruments. Radiological monitors for Shelter or Self-Protection need to be able to read the instruments to provide for their own safety. Based on the readings obtained, they can:

- Find the safest area within a shelter.

- Make recommendations on when to leave shelter.

- Determine how much radiation exposure they have received.

Radiological monitors in WER stations have the added requirement of reporting to the local Emergency Operating Center. Without trained monitors, the RADEF system is incomplete and will not function adequately.

Duties of the monitor include measuring, recording, and if in a WER station, reporting radiation exposures and exposure rates. During the Recovery Phase, the monitor may be required to provide limited field guidance on radiation hazards associated with the operations to which he is assigned. During peacetime he will perform routine inspection of radiological instruments.

Requirements for Monitors - The Federal Emergency Management Agency recommends that at least four monitors be trained and assigned to each WER station. This provides a higher probability of having the stations manned and operational during an emergency, and provides a broad base for monitoring in support of recovery activities. The number of radiological monitors trained and assigned to emergency services and vital facilities for self-support monitoring is determined by the operational requirements specified in the jurisdiction's emergency plan. It is recommended that a minimum of two, preferably four or more, monitors be trained and assigned for each instrument set issued to emergency services and vital facilities.

Updated/refresher training should be provided for monitors at least every two years and they should actively participate in tests or exercises every year.

Radiological monitors for shelters are trained during the Increased Readiness Period. The jurisdiction should have detailed (who, what, when, where and how) increased readiness plans for accelerated training of shelter radiological monitors during a crisis.

Selection and Assignment of Monitors - Monitors should be selected primarily from State and local government employees, providing this does not conflict with their emergency assignment. This will provide better unity and more effective span of control. It is suggested that to the extent practicable, all emergency services with a self-protection monitoring requirement such as firemen, policemen, State highway patrolmen, highway maintenance personnel, their augmenting forces and

their reserves be selected for monitor training. Further, radiation monitoring should be included as a part of the basic training for all new recruits in these services, and refresher monitor training should be routinely scheduled. To supplement this initial cadre of monitors, high school and college science teachers; selected State, county and municipal employees in the engineering, sanitation, welfare and health services; as well as other State and local employees as appropriate; should also be recommended for monitor training.

In areas where WER stations or self-protection locations have been established in industrial plants, hospitals, commerical buildings and other facilities, appropriate personnel who are normally employed at these facilities should be selected for monitor training. The planning for this will have to be properly staffed and coordinated in advance with the management staffs of private concerns.

In rural and suburban areas where a home shelter may have been designated as a WER station; members of the family who will occupy the shelter should receive monitor training.

Since a large number of monitors will be required, the selection of personnel for training should be fairly broad. Monitors should be assigned to a specific WER station or self-protection location before or during their training. Training has real value only when directed toward accomplishing specific job assignments. Generally, monitors should be assigned to facilities which are near where they normally work or reside. Each monitor should be directed to report to his assigned monitoring station in an emergency.

Radiological Monitoring Operations - In general, all monitors should receive the same training. Monitors are not trained specifically to man monitoring stations or to support emergency operations. Their training should allow them to be assigned to any of these activities and monitors should expect varied assignments. One exception to the above is the training of aerial monitors. They must receive additional specialized instruction to enable them to support aerial monitoring activities.

During peacetime, all monitors should participate in refresher training exercises and tests or other activities as required. Upon attack or warning of attack, radiological monitors will report to their assigned locations and perform the following list of operations in order:

- Perform an operational check on all survey meters.
- Charge dosimeters.
- Position dosimeters at predesignated locations in the shelter.
- Report to the shelter manager on the condition of the instruments and the positioning of dosimeters.
- Check to see that doors, windows and other openings are closed during fallout arrival.

- Begin radiological monitoring to determine the time of fallout arrival.

- Take periodic readings at selected locations throughout the shelter and record these on the shelter sketch.

- Furnish all radiological information to the shelter manager and recommend courses of action to reduce potential exposures.

Monitors assigned to WER stations are also responsible for reporting certain data to the Emergency Operating Center. Reports include sightings of nuclear detonations, reports of glass breakage and structural damage, fire reports, flash reports of fallout arrival, reports on the changes in fallout intensities, and exposure and exposure rate reports.

All monitors will receive technical direction and guidance from the RDO or other qualified civil preparedness personnel. However, under the conditions of nuclear attack, communications with the EOC could be disrupted. If this happens, an effort should be made to contact a neighboring shelter, WER station of self-protection location through which RADEF advice and guidance could be relayed. If this effort is unsuccessful, the monitor will be expected to provide guidance on:

- Permissible activities.

- Exposure criteria.

- Exposure and exposure rate calculations.

- Weapons effects, if applicable.

After radiation levels have decreased sufficiently to permit limited unsheltered operations, monitors should expect to be reassigned to provide monitoring services in support of recovery operations. When monitors are directed to support emergency operations or perform a mission, the RDO should furnish the following information:

- The purpose of the mission.

- The time when the monitor may leave shelter to perform the recovery operation or mission.

- The recommended allowable exposure for the complete mission; that is, from time of departure until return to shelter.

- The exposure rate to be expected in the area of the mission.

Monitors supporting emergency operations will:

- Read their instruments frequently during each operation and advise the individual in charge of the mission on radiation exposure rates, accumulated exposures and necessary radiological protective measures.

- Determine the effectiveness of decontamination measures, if supporting decontamination operations.

- If feasible, check all personnel and equipment on return to shelter, or base of operations, to determine if they are contaminated with fallout.

Mobile Monitoring - During the early period of high radiation levels, monitors must be in shelter like everyone else. As the operational objectives of the community change from "survival" to "sustaining survival," more detailed information on the radiation levels in specific areas or facilities will be required to properly reflect the radiological situation at locations of interest. Thus, the focus of monitoring activity may change to mobile monitoring.

In addition to providing a representative sampling of the fallout conditions of the community, the reason for geographically dispersing monitoring stations is to provide dispersed centers for the mobile monitoring activity. Mobile monitoring includes both surface and aerial monitoring. Each community should plan for a surface mobile monitoring capability. However, the responsibility for development of an aerial monitoring capability rests with the State government and will not be covered here.

Surface mobile monitoring is intended to provide detailed radiological information for a specific area or facility important to the recovery effort. It is not intended to provide data solely for the purpose of preparing a more comprehensive analysis of the fallout situation. The three elements common to most surface mobile monitoring are:

- Monitors. To the extent practicable, it is important to establish a mobile monitoring capability by utilizing existing monitoring personnel. This is primarily a reassignment of monitors, rather than a requirement for additional monitors.

- Instruments. The radiological instruments needed by the mobile monitor will be taken from those available at the monitoring stations and/or community shelters where the monitor is assigned.

- Transportation. Vehicles may be important only in transporting the monitor to the specific monitoring site or they may be important in the actual monitoring activity; e.g., rapid coverage of large areas to be monitored. If the monitoring can be accomplished on foot, vehicles may not be necessary. In most cases, vehicles will not be assigned specifically for mobile monitoring activities but will be obtained from most any available source. Two-way communications are desirable but not mandatory.

In developing the mobile monitoring capability the RDO must coordinate his plans with all participating government departments and agencies.

He must emphasize the responsibilities of each. He should conduct periodic tests and exercises to develop and maintain operational proficiency.

Training of Monitors - Qualifications of the monitor should include completion of high school or the equivalent. The radiological monitor training consists of:

- Completion of the home study course "Radiological Monitoring" (HS-3) and completion of eight hours of classroom training in "Practical Application and Use of Civil Preparedness Radiological Instruments" or an equivelent approved training.

- Update/refresher training and participation in test and exercises to maintain proficiency.

Before completion of his training, each monitor should receive a duty assignment and be furnished a copy of the local SOP's. These contain the detailed instructions for monitoring and reporting operations as well as special instructions concerning the monitors responsibilities and procedures for dealing with routine and emergency radiation conditions inside and outside of shelter.

Crisis Training of Radiological Monitors - The probability of any jurisdiction having all their required radiological monitors trained if a crisis should develop is remote. This is the result of:

- FEMA's policy to train shelter monitors only in an Increased Readiness Period.

- The turnover of monitors who have been trained.

Therefore, it is necessary for each local jurisdiction to develop plans for crisis training of radiological monitors in an Increased Readiness Period. The plan should include maximum use of the media. In addition, each jurisdiction should have one or more qualified Radiological Monitor Instructors (RMI) available to conduct crisis training of monitors. Instructors can be trained through the Radiological Defense training program.

RADIOLOGICAL DEFENSE INSTRUMENTS

Introduction - Following a nuclear attack the major threat to our population will be radioactive fallout. While fallout particles may be seen with the naked eye, radiation can only be detected and measured with specialized instruments. A number of such instruments were purchased some years ago by the Federal government. Most of them have been granted to the States. It is estimated that in most States about two-thirds of the instrument inventory has been issued to local governments. The remaining one-third is stockpiled in State warehouses for issue to local governments during the Increased Readiness Period. Each State has a distribution plan for these stockpiled instruments. This plan is based on county populations and geography and would provide for an equitable distribution of the total State inventory. This distribution, when completed, will reduce by one further step, the placement of instruments in the hands of the ultimate users, the radiological monitors.

Current emphasis is on determining realistic local requirements for instruments. Criteria has been developed for determining these requirements. It recognizes that:

- Population totals and distribution have changed since the last procurement of instruments.
- The original procurement of instruments was based primarily on the survival (in-shelter) phase of RADEF operations and did not adequately fulfill recovery phase needs.
- Requirements for reporting and for self-protection have changed due to recent studies and evaluations.
- Recommended use of the various instruments available in the inventory has changed with time.
- Therefore, a current instrument requirement must be developed to determine exact local needs.

Types of Instruments - The table on Page 3-71 provides a summary of the radiological monitoring instruments available as sets for use in fallout shelters, WER stations and self-protection monitoring by emergency services and vital facilities. All instruments use standard "D" batteries. A limited number of batteries is furnished with each instrument set. A brief description of each instrument follows:

Low Range Survey Meter (CDV-700) - The CDV-700 radiation survey meter is a sensitive, low-range instrument that can measure gamma radiation and detect beta radiation. It is recommended for:

- Use primarily in training programs to illustrate radiation detection and measurement procedures and may have application in peacetime radiological emergency response.

- Monitoring in the recovery period when radiation levels have decreased below the range of the CDV-715.

The low range survey meter has an effective range of 0 to 50 milliroentgens per hour. The instrument uses a geiger tube for detecting radiation. When the tube is shielded, it will measure gamma radiation only. When the shield is open, the instrument will detect both beta and gamma radiation. It can be operated with a loudspeaker unit (CDV-705) to improve its use in training.

This instrument is designed for radiation measurements at low intensity and thus is not useful in areas of high contamination. In RADEF operations during the survival and early recovery periods, the instruments would have little use. Its major operational application is for late postattack use for evaluating the effectiveness of decontamination procedures and personnel monitoring.

High Range Survey Meter (CDV-715) - This instrument is a high range survey meter for general use. It measures gamma radiation within a range of 0 to 500 roentgens per hour. It utilizes an ionization chamber for detecting radiation.

The instrument is the standard operational instrument for use in shelters, WER stations, emergency services and vital facilities and EOC's during the trans and postattack periods. It was designed for use by radiological monitors for the major part of their operation in the period during and following the attack. The instrument is intended for ground survey, but it can serve as substitute equipment for aerial measurements.

Dosimeter and Charger (CDV-742 and CDV-750) - Dosimeters are instruments designed to measure cumulative radiation exposure. The accumulated exposure can be read directly at any time. By recharging, these dosimeters can be used again. The dosimeter provided for general operational use is the CDV-742 which has a measurement range of 0 to 200 roentgens. Until these were available in sufficient quantity, the CDV-730 with a range of 0 to 20 roentgens and the CDV-740 with a range of 0 to 100 roentgens had been furnished. They are still usable. Dosimeters resemble a fountain pen in size and shape. The CDV-742 can be identified by its bronze or gold colored pocket clip.

The CDV-742 high range dosimeter is the standard for use in shelter, WER Stations, emergency service organizations and vital facilities. They would also be used by the millions of civil preparedness workers that would be needed for recovery operations during the postattack period when emergence from shelter is possible.

The CDV-750 dosimeter charger is the device utilized to recharge or "zero" dosimeters so they can be reused.

Remote Survey Meter (CDV-711 and CDV-717) - There are essentially two remote survey meters.

The CDV-711, remote sensor radiation meter, is a high range instrument for use in EOC's and other protected facilities. It has a detector that is blast resistant in excess of 50 psi overpressure for use in

conjunction with facilities that can withstand the high overpressures associated with nuclear weapons. It was designed to measure gamma radiation from 0 to 1000 roentgens per hour. The detecting element is an ionization chamber and can be located up to 300 feet from the readout.

The CDV-717, remote survey meter, is essentially a CDV-715 gamma survey meter with a remotable detector unit for making measurements at distances of up to 25 feet between the detector and the readout. The range of this instrument is 0 to 500 roentgens per hour. This instrument was designed for use by radiological monitors in WER stations during the early period following a nuclear attack. The purpose of the instrument is to decrease the radiation exposure to monitors by making it unnecessary for the monitor to leave his shelter in order to obtain an outside measurement.

Aerial Survey Meter (CDV-781) - The aerial survey meter is designed for general postattack surveying by light aircraft after fallout has been deposited. The instrument consists of an indicating unit, an interconnecting cable and detector unit. The instrument operates from a battery power supply. A tape recorder with associated throat microphone and a remote control switch permits inflight recording of necessary data. The unit also includes a means for simulating a radiation environment for use in training flights.

Instrument Sets - Radiological instruments are issued as sets comprised of several different types of instruments. There is a separate set configuration for each of the RADEF capabilities. The table on Page 3-71 provides in table form the composition of the various RADEF instrument sets. They are:

Shelter Radiation Set (CDV-777-2) - This set is composed of one CDV-715, high range radiological survey instrument; six CDV-742, radiological dosimeters and one CDV-750, dosimeter charger. A minimum of one set is needed for each public shelter specified for use in the community shelter plan.

Weapons Effects Reporting Station Set (CDV-777A) - This set is composed of one CDV-715, high range radiological survey instrument; one CDV-717, high range radiological survey instrument; six CDV-742, radiological dosimeters; and one CDV-750, dosimeter charger. This set is used in the WER station. One set is needed for each WER station established in the community.

Self-Protection Radiation Sets (CDV-777 and CDV-777-1) - There are two sets for self-protection.

The CDV-777 is composed of two CDV-715, high range radiological survey instruments; one CDV-700, low range radiological survey instrument; six CDV-742, radiological dosimeters, and one CDV-750, dosimeter charger. One set is issued to each self-protection location, such as emergency services, vital facilities and essential industries.

The CDV-777-1, alternate set, is the same as the CDV-777 except that it has only one CDV-715, high range radiological survey instrument.

These sets are used for self-protection monitoring by emergency services, vital facilities and essential industries. The CDV-777-1, alternate set, is issued when more than one set is needed at a location and for use on emergency service vehicles (police, fire, rescue, ambulances, etc.).

Storage - The preferred method of storing shelter RADEf sets is in bulk repositories located within the jurisdiction. In low risk areas, shelter sets may be stored in the shelter facility if proper secure storage is available. The self-protection RADEF sets should be prepositioned with self-protection and mobile monitoring units such as fire stations, police stations, hospitals or water pumping stations. The WER station RADEF sets should be prepositioned at each WER station. A sufficient number of additional self-protection sets and WER sets should be stored in local bulk repositories to allow for expansion, as necessary, of each capability during an Increased Readiness Period.

The use of bulk repositories has several advantages over storing all the RADEF sets in scattered facilities:

- Simple distribution plans can provide for their rapid distribution during an Increased Readiness Period for either shelter in-place or crisis relocation.

- Sets stored in bulk repositories are usually more secure against pilferage.

- The bulk repository can offer better storage conditions in respect to temperature and humidity.

- It is less costly to inspect and maintain sets in bulk repositories than in individual shelters.

Maintenance and Calibration - The States, under contract with FEMA, operate a 100 percent Federally funded Radiological Instrument Maintenance and Calibration Facility. Instruments are periodically inspected and cycled through the facility and are repaired and recalibrated as required.

Batteries - All civil preparedness survey meters use standard 1.5 volt "D" cell batteries. Bulk quantities of batteries are routinely furnished to local jurisdictions through the Maintenance and Calibration Facility. Until replaced, these batteries are to be reserved for exclusive use in RADEF instruments.

Peacetime Use of Instruments - Civil preparedness instrumentation is designed to measure the gamma radiation emitted by radioactive fallout. Some of these instruments will also detect high energy beta radiation if present in sufficiently detectable quantities. However, with the exception of the special CDV-700M with the modified end window probe, these instruments are not designed to detect or measure alpha and/or low-energy beta radiations. Although civil preparedness instruments do not adequately fulfill all of the requirements for peacetime radiological incident/accident monitoring, most of the instruments granted to the States could be useful in the event of peacetime incidents involving the accidental release of radioactive materials to the environment.

However, problems can arise when civil preparedness instruments are used for the measurement of radioactivity from peacetime incidents, because of the large number of diverse types of radioactive materials that may be released. These materials can vary considerably in their types and amount of radioactivity; thus, peacetime incidents result in more complex radiological measurement and interpretation problems than are expected for the radiological situation resulting from a nuclear attack. The complexity of measurement and hazard evaluation in a peacetime release of radioactivity to the environment occurs when contamination is airborne, either gaseous or particulate, and inhalation or ingestion may create an internal hazard greater than the external exposure hazard.

Other major differences between peacetime and attack contingencies would be the lower levels of radiation to be measured, requiring instruments having a compatible range of measurement, and the operating constraints which limit exposure of the populace to much lower levels in peacetime incidents than those acceptable in an attack situation where the primary mission is to prevent death or acute radiation sickness.

Radiological assistance in peacetime emergencies is available through State health agencies, or other designated agencies within the State, and also from the Regional offices of the U.S. Nuclear Regulatory Commission. These agencies have trained individuals and the specific radiation detection equipment necessary to measure and evaluate the existing type of radiation hazard.

The use of civil preparedness resources for emergency response to peacetime radiological incidents must be in accordance with State and local government emergency response plans and performed by properly trained and authorized personnel. States and localities must assume full responsibility for the proper use of civil preparedness resources for peacetime incidents.

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TABLE 3-1

COMMONLY USED CIVIL PREPAREDNESS RADIATION MONITORING INSTRUMENTS

MODEL NUMBER	DETECTOR	RANGE OF READINGS	DESCRIPTION AND USE
CD V-700	G-M Probe	0-50 mR/HR	Low range survey instrument for training and late post-attack recovery use. Measures gamma and detects beta radiation.
CD V-715	ION Chamber	0-500 R/HR	High range survey instrument. Gamma radiation only.
CD V-717	ION Chamber	0-500 R/HR	Similar to the CD V-715 but with a remote detector extending out to a distance of 25 feet. Gamma radiation only.
CD V-711	ION Chamber	0-1000 R/HR	Remote sensor instrument designed for the continuous measurement of radiation at an outside location and displaying this information up to 300 feet away. The ION detector unit is designed to withstand blast over-pressures up to 50 pounds per square inch. For use with EOC's. Gamma radiation only.
CD V-138		0-200 mR	Self-reading dosimeter for training and peacetime use. Uses CD V-750 charger. Gamma radiation only.
CD V-742 CD V-730 CD V-740		0-200 R 0-20 R 0-100 R	Dosimeter for use in shelter, WER stations, and for emergency workers during nuclear attack and postattack conditions. Uses CD V-750 charger. Gamma radiation only.
CD V-750	Battery-operated Charger	---	Dosimeter charger for use with the Model CD V-138, CD V-742, CD V-730 and CD V-740 dosimeters.
CD V-705	Pulse amplifier	---	Loudspeaker attachment for the CD V-700, GM survey meter. Used as a training aid.

MODEL NUMBER	DETECTOR	RANGE OF READINGS	DESCRIPTION AND USE
CD V-781	ION Chamber	0-25 R/HR	Provides a measurement system for use in low flying aircraft for aerial monitoring under nuclear attact and postattack conditions. Gamma radiation only.
CD V-700M (Modified)	Special End Window G-M Probe	0-30,000 counts/min	An end window probe assembly attached to a modified CD V-700. Detects alpha, beta and gamma radiation. May be used in connection with peacetime radiological incidents/accidents. Limited Distribution.

R - Roentgen

mR - Milliroentgen

R/HR - Roentgen per hour

TABLE 3-2

COMPOSITION AND RECOMMENDED USE OF RADEF INSTRUMENT SETS

SET TYPE	TYPE AND QUANTITY OF INSTRUMENTS IN SET					
	CD V-700 Low Range Survey Meter	CD V-715 High Range Survey Meter	CD V-717 High Range Survey Meter w/Remote Sensor	CD V-742[1/] Dosimeter	CD V-750 Dosimeter Charger	
CD V-777	1	2	0	6	1	Standard set use in self-protection monitoring by personnel in emergency services, vital facilities, and essential industries.
CD V-777A	1	1	1	6	1	Standard set for use weapon effects reporting stations.
CD V-777-1	1	1	0	6	1	Alternate set for use in self-protection monitoring.
CD V-777-2	0	1	0	6	1	Standard set for use in public shelters.

1/ RADEF instrument sets issued prior to 1978 contained two dosimeters per set. Some sets have CD V-730 or CD V-740 dosimeters. Starting in 1978, it was recommended that newlt assembled sets each contain six dosimeters and provision be made to systematically increase the number of dosimeters from two to six in all sets processed. Because of the delay involved in the 4-year set exchange cycle and the shortage of dosimeters, some sets may contain only two or four dosimeters.

COMMUNICATIONS FOR RADEF OPERATIONS

Introduction - Unlike communications for other emergency services, such as fire and law enforcement, there is no communications system already established that is designed exclusively for RADEF operations. Also, because of the locations from which weapons effects reporting will be done, there is a strong likelihood that little in-place capability exists or will be developed exclusively for RADEF. It may be undesirable to create an in-place communications system exclusively for RADEF for two reasons:

- Without regular in-service use of equipment, the system may fail when subjected to operational use. This may occur even where the system is tested regularly.

- As other changes and improvements take place in the overall communications system in the community, the RADEF communications system may not be similarly improved. This may be due to oversight, budget limitations, or neglect.

For these reasons, major consideration should be given to using existing communications systems to accomplish the RADEF mission.

Planning and Development - Now is the time to develop RADEF communications capabilities. In this way, the amount of communications activity necessary during the Increased Readiness Period will be minimized. It is necessary to:

- Analyze the RADEF program and define its communications requirements.

- List the requirements, indicating desired modes of communications between specific places.

- List the existing communications capabilities and determine how they will be used to meet the requirements.

- Prepare a plan for developing RADEF communications system during the Normal Period.

- Prepare a written plan for improving communications during the Increase Readiness Period.

- Train people.

Planning the RADEF communications system is an exercise in leadership which requires:

- Working closely with those who must plan overall emergency communications.

- Coordinating with suppliers of communications equipment and services.

- Training people in what communications for RADEF exist and how it is used.

- Writing plans and procedures for operating the communications systems.

- Exercising the communications system to identify additional requirements and resources and to determine what must be done to improve overall capability.

RADEF communications must be looked at in terms of the RADEF capabilities in the total radiological defense program. The requirement for weapons effects reporting is a key element and the one that poses the most problems for communications. The remainder of this discussion speaks specifically to communications requirements and problems of the weapons effects reporting network. However, the concepts may be applied to the shelter, and self-protection, requirements as well.

Communications Within the EOC - Communications requirements within the EOC will be determined by prior planning. The technical requirements are simple and straightforward. RADEF planning should have identified the locations and the radio system(s) planned for use in addition to the telephone. Equipment must be available at the EOC to operate these systems. There should be telephones at the RADEF/Disaster Analysis activity center in the EOC. The telephones may be either extensions from a switchboard, private lines, or whatever format best fits the EOC operation. Telephones may be those which another agency uses day-to-day or which would be used in an emergency and shared with the RADEF operations. They may be installed or stored units in the EOC awaiting the day of activation or they may be part of a formatted emergency order for telephone service for the EOC. There should be at least two lines for the RADEF/Disaster Analysis activity. The communications center or other location in the EOC must have radios to operate on the channel(s) selected for weapons effects reporting. It may be necessary to work with those who control each system and the local Communications Officer, to obtain EOC radio equipment on the channel(s) selected for weapons effects reporting.

Working with Communicators - RADEF communications planning will require working with those in local communities who understand communications such as:

- The Communications Officer of the local civil preparedness organization.

- The Operations Officer and Message Controller in the Emergency Operating Center.

- The lead dispatcher from each of the public safety agencies.

- The supervisor of the major or centralized communications center in the county if so organized.

- The radio maintenance technicians who maintain the local public safety radio systems.

- Leaders of amateur, citizens band and other radio-oriented groups.

- The district or division manager of the local telephone company.

In order to work effectively with these people, it is necessary to know the local RADEF operation thoroughly. Others will have to be educated as to what the RADEF operation can and cannot do and what it needs from them. This process will likely undo some of their misconceptions about RADEF. At the same time, it may clarify some concepts about RADEF communications or emergency operations that were not fully understood.

In order to plan a complete program, it will be necessary to identify and develop all of the details of RADEF communications. Time is valuable, so planning time should be used productively to:

- Identify the details.

- Get understanding and agreement on the details.

- Develop a specific plan.

- Develop the inventory lists necessary to support the plan.

Telephone Communications - The local RADEF needs for telephone service are a very important part of an overall package of requirements for emergency communications. Before approaching the telephone company, it is necessary to work with the local Communications Officer and others to develop the complete package of telephone needs. More than likely, the Communications Officer will be the one to work with the telephone company. In some circumstances, the Director/Coordinator or Radiological Defense Planner may have to work with the telephone company. The local telephone company office is just that--a local office of a larger corporation. It has many jobs to do and practices them according to organized procedures of the corporation. Some of the specific jobs the local telephone offices do which will be of interest to local civil defense planners are:

- Representing the corporation to the community and subscriber alike.

- Maintaining a telephone system in order to sell telephone service.

- Working to maintain a community in which to sell telephone service.

The person to work with is either the district manager or the division manager. Either has considerable latitude over local telephone company operations and procedures. He will need to know the specific local RADEF needs for telephone company assistance. Then he will be able to explain telephone service alternatives, advice, and opinions.

The telephone company is interested in survival of both its system and the local community. Personnel are likely to be interested in the overall ability and plan for the community to conduct emergency operations. Specifically, they will need to know about the local RADEF operation. The local manager will be well versed in telephone company emergency policy and procedures. He likely will not know much about local operations, particularly local RADEF operations, in any significant detail. He must know what these operations are, and what their requirements or restraints are, in order to provide communications assistance.

It is also necessary to work with the local telephone manager to learn if the telephone system has network configurations or other problems which weaken the RADEF system. Situations may occur where a weapons effects reporting station is in an exchange with a central office that interconnects to the central office serving the local EOC only be microwave or other systems. These systems may be wholly outside the county, possibly in an area of higher risk. If they are damaged, they are beyond the county's or local telephone manager's capability to repair. In short, the telephone system is subject to several factors beyond local control. It is necessary to work with the local telephone manager to work up the best emergency system for the county.

In some counties there will not be a local office of the telephone company. In this case it will be necessary to meet with the nearest district or division manager. Either will likely introduce the telephone company maintenance foreman, central office supervisor, or other person in charge of the technical aspects of the telephone system. These persons can be a great asset. However, the district or division manager is still the policy level person whose support is required.

Prior to meeting with the telephone company personnel, it would be well to determine if the telephone company needs a self-protection RADEF monitoring capability and if so, discuss this at the meeting.

Telephone service areas do not conform to county political boundaries, so it may be necessary to deal with two or more telephone company managers or telephone companies. Coordination should occur in the same manner. The telephone industry works together and realizes that local governments must work with each manager to do their job.

Planning for Telephone Communications - Planning for telephones at the weapons effects reporting stations starts with establishing a telephone inventory which identifies WER station locations. When first inventorying and selecting WER stations, it is important to find out what telephone service is available at each location. The availability of telephone service should be used as a part of the reason for selecting the final list

of WER stations. The following list illustrates the type of telephone service that should be looked for in the inventory. The list is in descending order of desirability:

- There is a telephone within the WER station from which radiological monitors (RM's) may call the EOC or receive a call from the EOC without the assistance of any switchboard or operator. Note the telephone number.

- There is a telephone in the immediate vicinity of the WER station from which RM's may call the EOC or receive a call from the EOC without the assistance of any switchboard or operator. It will be necessary to find out whether this telephone can easily be extended to within the WER station or whether its ring can be heard from within the station. Note the telephone number.

- There is a telephone service within a reasonable installation distance of the WER station. This includes evidence of any sign of telephone service such as telephones in nearby buildings, a building switchboard, or nearby roadside telephone lines either on overhead poles or underground. Time permitting, this level of telephone service may permit installation of a telephone in the WER station. Note the indicator of telephone service and the telephone number if any.

- If there is no telephone service of any kind, also note this. It will be necessary to find other solutions if these locations are retained as WER stations.

After the telephone inventory is complete, it is time to work with the telephone company. Their assistance will be needed to provide:

- Assurance that the telephone numbers assigned to each reporting station will be included in the line load control listings.

- Assistance in determining which potential WER stations can be provided private-line telephone service within 48 hours.

- Assistance in formatting an emergency order for telephone service for each potential WER station. Also, the best procedures for placing and expediting this order.

- Assistance in reviewing the WER station list in order to provide knowledge of any telephone service limitations and vulnerabilities that should be considered in the WER station site selection.

- Coordination so the the telephone company may be provided a capability for self-protection. They may need RADEF analysis from the EOC postattack to enable them to safely conduct emergency operations to restore telephone service.

Should attack come before further planning with the telephone company is possible, the information on the telephone inventory will serve as a guide in assigning WER stations, briefing RM's and knowing which WER stations must be provided a hasty assignment of radio equipment. For these reasons, the telephone information gathered in the inventory must be included on the weapons effects reporting station inventory or list included in the Emergency Operations Plan.

A last step in planning for telephone communications requires development of the final weapons effects reporting station list. On this list should be columns for both telephone and radio information. In the telephone column, the working telephone number for each WER station would be placed, if it is known. Each station for which an emergency order for telephone service must be placed, should be marked with an asterisk or other symbol noting that such an emergency order is necessary. A formatted emergency order for telephone service should be developed and placed in the communications annex, filed, or put in another safe location.

Radio Communications - All weapons effects reporting stations should have two-way radio capability to the EOC because telephones may not, or in some instances, cannot be in every WER station. Also, because of the technical vulnerability of the telephone system, part or all of it may not function in an emergency. An alternate method of communications is required in every WER station. This is not to say radio is better. Radio has its own set of good points and bad points. Radio just shares a different set of bad points than telephone service.

To start planning for radio communications at the WER station, make a priority list of which stations need radio more than others. In descending order of priority, the list should go as follows:

- Those WER stations for which no telephone service is feasible.
- Those WER stations for which telephone service must be provided by emergency order for telephone service.
- Those WER stations that the telephone company identifies as having vulnerable telephone service or service likely to be interrupted for any reason.
- Those WER stations not having some form of in-place radio communications which can be made available at the EOC.
- The remainder of the WER stations.

The radio system used is not as important as its ability to do the operational job of weapons effects reporting. This operational ability depends on five things:

- The radio at the WER station must be capable of reaching the EOC.

- The EOC must be capable of operating on the radio channel(s) being used by the WER stations.

- The radio system(s) selected for weapons effects reporting must be capable of handling weapons effects traffic as their priority traffic.

- People who own and operate the selected weapons effects reporting radio system(s) must be involved in the planning.

- the radio system(s) selected must be actively listened to in the EOC. If the channel is turned off, down, or otherwise left unmonitored, the EOC will not hear the WER station radio when called.

It is necessary to work closely with the local Communications Officer it identify the radio system(s) best suited to the weapons effects reporting needs. Likely, a combination of systems will be found to be essential. It is unlikely that a single-purpose RADEF radio system will or should exist. Whatever system(s) are selected, it is important to make sure that the person or agency that actually controls the equipment fully understands what the plan is. Without this understanding, local governments may end up in a fallout environment with no radio communications because someone didn't do what was expected.

It is necessary to get the full understanding and cooperation of local department heads to loan their equipment for use for at least a 2-week period. During this time it will be used for high priority RADEF messages and will be unavailable for their use. If this is not possible, it will be necessary to find another source.

The use of radio communications for RADEF operations must be based on an assessment of several limitations. They are:

Two-Week Operations - The type of radio installed in the EOC and WER stations is important. If a portable two-way radio (police, amateur, CB, etc.) is assigned to the WER station, the batteries in that radio will not function constantly for two weeks. Therefore, this radio must be turned off much of the time to conserve the batteries. Unless some planning is done, the EOC will not be able to contact the WER station unless the station contacts the EOC first. There are several options to be considered in the local plans:

- Supply a portable AM or FM broadcast radio with spare batteries to each WER station. The radiological monitors (RM's) in the station would monitor the EBS for news (public information) and for an alert to call the EOC. This option requires the EOC to have access to EBS.

- Supply several batteries for the two-way radio assigned to the WER station. This may be unlikely as the batteries are costly and many portable two-way radios do not work much beyound 8 hours on a fully charged battery.

- Have the WER station check in with the EOC at regular intervals. This may generate unnecessary radio traffic. However, it may be a good practice to have each station check in at least once a day just to assure that the station is operational and that the radio works.

- Have each WER station monitor its radio at specified times for calls to the stations from the EOC.

- Obtain an automobile battery to extend the operational time of the two-way unit. This is reasonable if the portable radios permit direct connection of an external battery; however, many do not.

- Supply a radio battery charger unit to operate the radio from the regular AC current supply. This will only work where there is AC power. The loss of AC power will eventually result in loss of radio unless emergency power is available and connected at the WER station. Also, it is unlikely enough chargers exist to operate all of the WER station radios in this manner.

Site Selection - In the site selection planning for the weapons effects reporting network, WER stations should be located in facilities that have a fixed radio base station available to the RM's. A variation of this would be to plan to relocate a radio base station to the WER station during an Increased Readiness Period. Consideration for this option include:

- The radio must operate on a channel available in the EOC.

- There must be emergency power available to the radio base station at the WER station facility.

- The radio must not be dependent on telephone lines to locations outside the WER station facility.

  Many "radios" are, in fact, remote control points connected by telephone line to a radio base station located at a distant point such as a hilltop, for better radio coverge, or even to the EOC itself. If the purpose of planning for radio is to overcome reliance on telephone circuits, it will do little good to plan on using a radio that relies on telephone lines.

Source of Equipment - RADEF communications should be built with equipment now on hand. Generally, the radio equipment industry does not have large stocks of equipment on inventory. It is frequently manufactured on order with a 90 to 180-day lead time before delivery. In addition, inventories in stock may require specialized component options in order to operate

in the local system. These components may have lead time difficulties also. In an Increased Readiness Period, the entire nation may try to procure additional radio equipment; thereby creating a shortage. The RADEF communications system should plan to use equipment available in the community. An exception to this situation is citizen's band radio equipment. Despite its limitations, it is generally available and can be useful. (Note: Limited transmitter power in citizen's band units generally restrict their use to distances of five miles or less.) If purchase of CB equipment is necessary, be prepared to purchase the equipment early before the public, being aware of an emergency, buys all available supplies.

Relocation or modification of communications equipment to meet the RADEF requirements will likely require qualified radio technicians. In time of emergency, the technicians will have many tasks to perform. In many instances, a technician may not be available. Unless it is certain that a technician will be available, the system should be planned around the radio equipment that is available in such a manner that technician assistance is not required.

Testing The System - The radio systems available, with the exception of amateur high frequency (commonly called shortwave), are essentially line-of-sight communications. Whenever planning to use radio of any kind for RADEF, it should be tested as it will be used in the WER station to make sure that it provides communication to the EOC. Be aware that some radio systems available from the EOC will be using remote base stations, repeaters, mobile relays or other equipment to provide improved coverage. The adequacy of those systems to sustain emergency operations must be verified or the WER station may be unable to communicate with the EOC.

Consider the following points when selecting radio systems for WER station use:

- If at all possible, select one system or at least a small number of systems for all WER station needs.

- Assign specific pieces of radio equipment to each WER station and test it to assure that it can actually reach the EOC.

- Power for two weeks is necessary. Portable radios need batteries or other power. Fixed base station radios need commercial or other power.

- Radios require trained people who know how to use them, and may have to be licensed operators.

- Many radios use remote repeater or base station sites which may be controlled by telephone wireline. As the idea of radio is to provide an alternate communications method to the telephone, check to see that any remote facilities have emergency power and other reliable features.

Radio Systems - There are several radio systems that are often available within a community. It is from these existing systems that two-way radio capability for RADEF should be developed. Its purpose will be to communicate two-way voice reports between the WER stations and the EOC. It will also provide communications with self-protection units and shelters, as necessary. A brief description of the systems follows:

Public Safety Radio - These are the several radio systems used in local communities by law enforcement, fire departments, emergency medical response units, road departments, schools, and a host of others. They are licensed and operated under various portions of FCC Rules & Regulations for Public Safety Radio Service. Technically, these systems operate on a wide variety of frequencies in three different bands. They are configured in many different ways so that the equipment serves the routine needs of the comminuty.

These radio systems should be selected for weapons effects reporting only if weapons effects reporting will be treated as top priority. If the system may be overloaded with other traffic or if the managers of the system do not concur in its use for weapons effects reporting, additional planning must be done to find another source. It is necessary to discuss and get the cooperation of the specific radio system license holder to use the system for RADEF. Keep in mind that the traffic for RADEF in no way precludes other priority uses of the system. Just remember that cooperation and understanding is necessary to see that vital RADEF information is forwarded from the WER station to the EOC as rapidly as possible.

Each emergency service will have extensive need of its system while an emergency response is actually in progresss. However, other traffic, especially RADEF traffic, can be incorporated in the traffic when good radio discipline is used. Also, the radio systems of some emergency services frequently operate on more than one channel. Plan to use these systems by using the channel(s) least likely to have emergency response traffic.

There are several points in favor of using public safety radio systems for weapons effects reporting:

- The equipment and people are available and knowledgeable in its operation.
- The equipment is generally well tested and reliable.
- Some, if not all, local public safety channels are usually available in the EOC or at least may be readily extended to the EOC with technician assistance.
- People associated with public safety radio use (i.e., law enforcement, fire, medical, engineering, etc.) may likely be assigned to some, if not all, of the weapons effects reporting responsibilities.

With the possible exception of citizen's band radios, public safety radios will normally be the largest inventory of radio equipment available. Each WER station should be equipped with a portable radio; however, the inventory of mobile radios from public safety vehicles makes them readily assignable to WER stations during at least the most critical, if not all, of the fallout period. Indeed, all public safety staff must take shelter along with all citizens during the fallout period. Local planning will make good use of the public safety resource by urging the respective emergency service chiefs to disperse their staff and communications equipment to assist the communications task for weapons effects reporting or for shelter communications.

Business/Industrial Radio - Licensed under various sections of the FCC Rules & Regulations for the Land Mobile Radio Service, business radio systems are in use by firms in many communities. They are technically similar to public safety radio systems except that they operate on frequencies allocated exclusively for business. Specific system may be owned by the business firm or radio vendor who leases radio service to one or more business users.

Use of business radio systems has the advantage that it does not compete with emergency service traffic. If it is possible to acquire the cooperation of a business to use its radio system to support RADEF, it should certainly be done. Several of the factors of public safety radio systems apply to business radios also. However, use of business radio systems must be capable of supporting the RADEF requirements. Keep the following factors in mind:

- Business radio systems are seldom built to the same performance standards as public safety radio systems. The quality and reliability of these systems may not be comparable to similar public safety systems.

- It is difficult to license a station in the EOC on a business radio system. Availability of the system at the EOC,. of course, is essential.

- Be sure the business user is really capable of offering the use of its system. The business user may have need of its radio system to perform emergency operations under contract or at the direction of the EOC. Examine the use of business systems carefully and plan accordingly.

Amateur Radio - Amateur radio may provide extensive communications assistance to civil preparedness activities through the Radio Amateur Civil Emergency Services (RACES) under provision of FCC Rules & Regulations governing the Amateur Radio Service. RACES, where organized to assist civil preparedness, can supply two services:

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- A unique ability to provide high frequency (HF or sometimes called shortwave) radio capable of point-to-point long distance communications without the use of remote sites, radio repeaters, or other external hardware. This is an especially useful feature for the local EOC to remain in contact with the State EOC, State area EOC, and the EOC's of neighboring counties. High frequency radio may also have some application from weapons effects reporting stations that are remotely located in the county or for which no other radio system is adequate.

- RACES organization may be able to provide a more local radio service known as two-meter radio. Two-meter radio is technically similar to public safety radio except that it operates on channels reserved to amateur operations. Two-meter radio is capable of meeting requirements for RADEF communications with several considerations.

RACES must be organized and tasked to support civil preparedness within the county. It may be necessary to actively seek out and recruit interested amateurs to organize and participate in a RACES program to support requirements for emergency operations, including RADEF. This must be a continuing effort to accommodate attrition and other losses of RACES personnel. If RACES personnel are recruited to provide RADEF radio communications, be aware that they will represent two added persons at each WER station for 24-hour coverage. This congestion may be relieved by encouraging the RACES organization to train for and accept assignments as radiological monitors for WER Stations.

While we have mentioned only high frequency and two-meter radio equipment for RACES use, amateur radio also has several other radio systems equally usable. These include 10, 6, and 1 1/4 meter radio systems. They are all technically and operationally comparable. The preponderance of amateur activity on high frequency and two-meter makes these systems the most likely to plan for use to support emergency operations including RADEF. If RACES is planned for use, RACES radio equipment must be available in the EOC. Two-meter remote equipment, if used, must be provided emergency power. RACES personnel possess radio equipment suitable for hasty relocation to assigned reporting stations.

Citizens Band (CB) - Citizen's Band is operated under FCC Rules & Regulations governing the Citizens Radio Service. There is no provision in FCC rules that CB will remain in service during a national emergency. Should local plans provide for use of CB in any capacity to support emergency operations, be aware that no sanction covers this activity. However, the very availability of CB makes it a communications resource that should be considered if there are no other practical alternatives.

CB is frequently available in large numbers, both through organized volunteer groups such as REACT, or through outright purchase of equipment to meet local needs. CB equipment may be readily made operable from the

WER stations. However, the small transmit power of CB equipment limits their effective range to about five miles. Each WER station must be tested with the type of CB actually intended for that location to communicate to the EOC. Again, the EOC must be equipped with CB radio equipment in order to use this system. A final limitation of CB, which must be considered in RADEF planning, involves radio discipline. In time of national emergency, there will be little capability to enforce CB regulations. For the many people who have CB radio equipment, it may be their sole method of conversing. Even in the best of circumstances, RADEF use of CB will be but one of many users generating heavy traffic on CB channels. It may be necessary to share these channels or even be at their mercy.

Other Radio Systems - There are a host of radio resources that may be applicable. Indeed, any two-way system of radio communications may be available and pressed into use in an emergency. Marine, aeronautical, military, broadcast, and several other radio services may have a unique application in the community's RADEF communications. The same factors apply as with other systems.

- The system must be available in the EOC.
- Remote sites external to the EOC must have emergency power.
- The system must be realistically field tested from the reporting station to the EOC.
- The reporting station radio equipment must be readily available for use at the station.

EBS - Although not a radio system per se, EBS can be a valuable resource in the EOC. It can be used to provide RADEF as well as other emergency information to the general public in shelters. It could also broadcast general type information to emergency services, etc. Keep in mind though that EBS broadcast would be received by everyone; therefore, descretion should be used in the information broadcast over EBS.

RADIOLOGICAL SUPPORT OF DECONTAMINATION OPERATIONS

Introduction - If this country is subjected to a massive nuclear attack, it is estimated that two-thirds or more of the nation will be blanketed with radioactive fallout. Potentially harmful quantities of radioactive fallout mostly in the form of visible dust particles, will begin to accumulate within hours of the nuclear detonations. Weather conditions such as wind or rain can significantly affect the distribution of these fallout particles. The particles will cover virtually everything, including buildings, land, equipment, and persons who are not under cover. The objective of decontamination is to remove or cover the fallout particles or otherwise reduce radiation exposure to an acceptable level. The objective is to do this with the least amount of labor and materials while limiting the exposure of personnel to a minimum. The guiding principle must always be: Does the expected benefit justify the risk?

Radioactivity cannot be destroyed; however, the fallout hazard may be reduced by:

- Removing radioactive particles from a contaminated surface and safely disposing of them.
- Covering the contaminated surface with shielding material such as earth.
- Isolating the contaminated objects in storage until the radioactivity has decreased through decay.

Decontamination may be partial or complete. Partial decontamination usually involves the rapid, partial removal or covering of contamination to reduce the radiation exposure rate as quickly as practicable to a point where priority work can be accomplished with reasonable safety. Complete decontamination would be accomplished subsequently as required to further reduce the radiation hazard. Actual on-site monitoring is the best way to be certain that decontamination has been effective. Because decontamination procedures are relatively expensive, only the most vital facilities should be selected for this activity. These could include:

- Emergency facilities.
- Communications centers.
- Essential public utilities and related facilities.
- Food processing and distribution facilities.
- Medical facilities.
- Other vital industries.

Developing a Capability - Having a RADEF staff member who has specialized in decontamination would be ideal; however, the RADEF Officer may be required to supervise this function in most jurisdictions. The individual in charge of decontamination operations should be responsible for planning and implementing all decontamination activities. He could be a city engineer, public works engineer, industrial safety supervisor, or other technically qualified person having some administrative capability. He should complete the Radiological Defense Officer training to find out how to develop and implement decontamination plans and operations.

Field supervisors selected for the on-site supervision of decontamination activities should, generally, be people skilled in the supervision of earthmoving and firehosing operations. Decontamination workers (such as firemen, sanitation and construction workers, and their augmenting forces) should be assigned to perform the basic decontamination functions. Persons having special skills applicable to decontamination procedures (bulldozer and heavy equipment operators, etc.) should also be be assigned to decontamination operations. The worker should be given a brief orientation on weapon effects and fallout distribution, radiation hazards, and general protection methods. They should be drilled in the application of their specific skills for decontamination operations. They should know the safety rules and procedures so that they will avoid needless entry into hazardous areas.

A means of measuring radiation exposure rates and accumlated exposures should be provided, and individual radiation exposures should be recorded.

Personnel should be instructed concerning the wearing and reading of dosimeters, the allowable exposure for the mission, and reporting of the mission exposure. The person in direct charge of a decontamination operation should examine the exposure records of the decontamination personnel to assure that the calculated mission exposure will not cause any individual to receive a total exposure in excess of established standards.

Decontamination units should have a radiological monitoring capability. The radiological monitors and equipment may be from weapons effects reporting stations, self-protection units or shelters. The monitors should be briefed on acceptable exposure rates, personnel exposures and decontamination levels.

Decontamination Procedures - All decontamination procedures should be delayed as long as possible to allow for decrease in exposure rates due to natural decay. Different procedures must be used for decontamination of various objects. Remember, fallout is radioactive particles. Any procedure that will remove the particles without damaging the object will remove the contamination. Proceed from the simple to more complex procedures.

Personnel Decontamination - Individuals performing emergency functions (such as police, fire, rescue, ambulance services, etc.) will

be directly exposed to both radioactive fallout particles and the radioactivity emitted from these particles. These individuals must exercise precaution to avoid contamination of their person. Personnel contamination may result through carelessness, improper use of protective clothing and equipment, or by accident. Remember that fallout behaves like dirt or dust and would accumulate on the body like any other dirt. Fallout particles can be removed from the exposed body by brushing or by washing.

Land Area Decontamination - Water hoses may be used to wash down radioactive particles from buildings, houses, etc., to reduce the overall level of radiation exposure. This could concentrate the fallout in runoff areas and create hot spots which are highly radioactive and therefore would have to be removed or covered at some time during the postattack recovery period. Contaminated earthen materials can be removed and trucked to isolated areas. Radioactive earth can be plowed, buried, or mounded by bulldozer (bunkered) to serve as a radiation shield to reduce radiation exposures.

Water Area Decontamination - Radioactive fallout particles will settle to the bottom of bodies of water such as ponds, lakes, etc. The water itself will act as a shield.

Most of the radioisotopes will not become dissolved in the water. However, the radioactive iodines, such $I-^{131}$, may be a special problem especially in drinking water. They tend to dissolve in water and are not removed by normal water processing procedures. Special procedures such as ion exchange are necessary to remove radioiodines. However, the radioiodines decay rather rapidly. If possible, avoid the use of open water sources for drinking water during the first few weeks. Use wells or water stored in closed containers such as holding tanks.

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY OF TERMS

Aerial Monitoring - See Radiological Monitoring.

All-Facility List - A computer printout of facilities which have been surveyed to estimate their fallout protection.

Alpha Particle - See Radiation.

Annex - A section of the Emergency Operations Plan which outlines the operations of a particular emergency function or service.

Attack Phase - See Phases.

Beta Particle - See Radiation.

Bulk Repository - A central storage facility for radiological instruments within a local community.

Calibration - A procedure, utilizing radioactive sources, for establishing the accuracy of radiological instruments.

Citizens Band (CB) - Two-way radio restricted to low power capability and operated on the low frequency transmission band.

Civil Preparedness Guide - Publications of the Federal Emergency Management Agency which describe civil defense programs and provide guidance to State and local civil preparedness director/coordinators for developing programs within their communities.

Community Shelter Plan (CSP) - A plan for sheltering the population within the community (shelter-in-place).

Contaminant (Radioactive) - Radioactive debris (fallout) from a nuclear explosion whose emitted radiation can be harmful to persons if the debris is not removed or covered.

Contamination (Radioactive) - Radioactive material (fallout) deposited on the surface of structures, areas, objects, or persons following a nuclear explosion.

Countermeasures - Protective actions to reduce the effects of nuclear detonations upon the population.

Crisis Relocation - Movement of people on the threat of a nuclear attack to an area less threatened by the direct weapons effects.

Decay - See Radioactive Decay.

Decontamination (Radioactive) - The removal (or covering) of radioactive Contamination from a structure, area, object or person.

Director/Coordinator - The individual who has responsibility for a local civil defense or emergency preparedness program.

Disaster Analysis - A review and determination of the extent of damage suffered by a community from a nuclear attack.

Dosimeter - An instrument used for measuring and registering total accumulated exposure to radiation.

Electromagnetic Pulse (EMP) - Energy in the medium-to-low frequency range, radiated by a nuclear detonation, that may affect or damage electrical or electronic components and equipment.

Emergency Broadcast System (EBS) - A network of AM and FM radio and TV stations linked to State or local EOC's that would remain on the air during an emergency to provide emergency information to the public.

Emergency Communications Development Plan (ECDP) - A documented procedure to meet the communications requirements and capabilities for emergency operations, and used as a planning tool for developing emergency communications capability.

Emergency Operating Center (EOC) - A protected site from which civil government officials can exercise direction and control of operations in an emergency.

Emergency Operations Plan - A documented procedure which describes the local concept of emergency operations, assigns responsibilities for emergency response, and outlines emergency operating procedures. It normally contains a Basic Plan of general applicability, several annexes for more specific operations of services or functions, and attachments, tabs, and SOP's (Standing Operating Procedures) for more detailed operations.

Emergency Phase - See Phases.

Emergency Workers - Individuals who are responsible for life saving or recovery operations.

Essential Industries - The industries that are necessary to provide critical goods and services which would enable the community to survive and recover from a nuclear attack.

Expedient Shelters - See Public Shelters.

Exposure (Radiation) - The total or accumulated quantity of radiation that an individual experiences, usually expressed in roentgens.

Exposure Control (Radiation) - Procedures taken to minimize the radiation exposures of individuals or groups commensurate with the accomplishment of essential survival activities.

Exposure Rate (Radiation) - The amount of radiation to which an individual is exposed per unit of time, usually expressed in roentgens per hour.

Fallout (Radioactive) - Airborne particles containing radioactive material which settle to the surface of the earth following a nuclear explosion; also, the deposition on the surface of the earth of radioactive substances resulting from a nuclear explosion. Early fallout, also called local fallout, is that fallout which settles to the surface of the earth during the first 24 hours after a nuclear explosion; delayed fallout, also called worldwide fallout, is that fallout which settles to the surface of the earth at some time later than the first 24 hours after a nuclear explosion. Early fallout produces most of the fallout radiation.

Federal Communications Commission (FCC) - The Federal agency responsible for the licensing of radio users and control of the Nation's airwaves for radio broadcast.

Gamma Rays - See Radiation.

Home Fallout Protection Survey (HFPS) - A mail survey, conducted in the late 1960's, to identify fallout protected spaces in private homes.

Hot Spots - An area on a contaminated surface where the level of radiation is greater than neighboring areas.

Improvised Shelter - See Public Shelters.

Increased Readiness Phase (IR) - See Phases.

Line Load Control - A procedure which allows telephone companies to disconnect telephone service to all except essential users in a major emergency.

Mobile Monitoring - See Radiological Monitoring.

Mobilization Designee (MOBDES) - A member of the military ready reserve who is assigned to a local, State or Federal civil preparedness office for mobilization.

Mobile Monitoring - See Radiological Monitor.

Monitoring - See Radiological Monitoring.

National Warning System (NAWAS) - The Federal portion of the civil defense warning system used to disseminate warning and other emergency information from the National Warning Center or Regions to warning points in each State.

Normal Phase - See Phases.

Nuclear Attack - Warfare against this country involving the use of nuclear weapons.

Nuclear Regulatory Commission (NRC) - The Federal Agency responsible for the safety of nuclear power facilities and regulation of the possession, use, and disposal of radioactive materials. Formerly a part of the Atomic Energy Commission.

NUDET - A nuclear detonation.

PF CAT - Protection Factor Category. A designation of the relative protection from fallout radiation provided by a facility. There are four official categories as follows: PF CAT X - protection factor of 1 to 9; PF CAT 0 - protection factor of 10 to 19; PF CAT 1 - protection factor of 20 to 39; PF CAT 2-3 - protection factor of 40 to 99, and PF CAT 4 - protection factor of 100 or better

Phases - The various times and operations based on the envisioned environment of a nuclear attack.

Normal Phase - The pre-emergency time frame when there is no abnormal world tensions and normal peacetime day-to-day operations are possible. During this period plans for emergency operations should be developed.

Increased Readiness Phase or Surge Phase - The pre-attack time frame when world tensions are high and crisis preparations for protection of the population and government are undertaken. During this period, civil defense systems are upgraded from the minimum level of operational readiness toward the total preparedness level required by the jurisdiction.

Emergency Phase - The attack phase when nuclear attack is imminent or is occurring. It begins with attack warning and lasts until radiation levels have decreased sufficiently to allow performance of urgent short-term unprotected operations and initiation of post-attack recovery actions.

Recovery Phase - The post-attack time frame when operations are conducted to return the community as nearly as possible to the pre-emergency level. It begins when radiation levels have decreased and unprotected operations are possible and lasts until recovery is complete and the community has returned to near normal operations.

Post-Attack Phase - See Phases.

Protection Factor (PF) - A theoretical value that defines the ratio of the exposure rate from fallout gamma radiation to be expected in a protected location compared to the exposure rate expected with the same amount of radiation in a completely unprotected idealized location. PF values result from calculations that take into account building design, the types of building materials and the locations of the areas within the building. PF values should only be used for planning purposes.

Public Shelters - Facilities which have been surveyed and meet minimum requirements for protecting occupants from fallout radiation.

Expedient Shelter (or Improvised Shelter) - Facilities which are constructed in an Increased Readiness Period to provide fallout and blast protection.

Upgraded Shelters - Facilities which have additional mass such as earth or bricks added to increase their fallout protection.

RACES - Radio Amateur Civil Emergency Service. An amateur radio resource licensed by the Federal Communications Commission to remain on the air during a national emergency in support of civil defense operations. When organized locally, it provides high freguency communications capable of operating over long distances without the use of repeaters or wireline controlled equipment.

RADEF - See Radiological Defense.

RADEF Communications - The communications required within a jurisdiction to link local reporting stations, shelters, and emergency services workers to the local EOC and on to State EOC's for weapons effects reporting and self-protection operations.

RADEF Plans and Annexes - A description of the local plan of action for establishing, maintaining, and operating a RADEF System within the community.

RADEF Program - The means by which RADEF Systems are developed, implemented, exercised, and maintained. It provides the plans, trained personnel, facilities and instruments combined into a complete operational RADEF System.

RADEF Support System - An emergency response capability or group of emergency response capabilities with a common mission. The RADEF Support System should function in an organized manner in an emergency to provide responsible authorities with information on the radiation environment so they can make decisions and initiate actions that will minimize the effects of the radiation hazard. It does this by 1) detection, measurement, evaluation and assessment of the radiation hazard, 2) selective reporting of radiological information to higher authorities, 3) providing guidance on exposure control of personnel and 4) recommending application of appropriate countermeasures.

Radiation (Nuclear) - High-speed particles and electromagnetic radiation spontaneously emitted from the nucleus of unstable (radioactive) atoms.

Alph Particle - A charged particle of relatively large mass emitted spontaneously from the nuclei of certain radioactive atoms. It can penetrate only the epidermal layer of skin. It is primarily only an internal radiation hazard.

Beta Particle - A charged particle of very small mass emitted spontaneously from the nuclei of certain radioactive atoms. It can penetrate the skin and may cause severe skin and tissue damage. It is both an internal and external hazard.

Gamma Ray - Electromagnetic radiation of high energy originating in atomic nuclei and accompanying many nuclear reactions. It is identical with an X-ray of high energy. It can penetrate dense materials. It is a serious external hazard.

Radioactive Decay - The decrease with the passage of time in the amount of radiation being emitted by radioactive material.

Radiological Defense (RADEF) - A program, including plans, procedures, and systems to monitor, report, and evaluate the radiological hazard resulting from a nuclear attack. It supports preventive and remedial measures to minimize the effect of nuclear radiation on people and resources.

Radiological Defense Officer (RDO) - The principal technical advisor within the Emergency Operating Center on matters pertaining to RADEF.

Radiological Defense Planner (RDP) - The individual responsible for planning and developing the local Radiological Defense System. He may also be the RDO, if trained to operate in the EOC.

Radiological Emergency Response Plan (RERP) - A plan for conducting emergency operations in the event of a peactime nuclear incident. (NOTE: RERP pertains to peacetime incidents - RADEF pertains to nuclear attack.)

Radiological Monitor (RM) - An individual trained to measure, record, and report radiation exposure and exposure rates, and provide limited field guidance on radiation hazards associated with his assigned operation.

Radiological Monitoring (RAMONT) - The process of utilizing radiological instruments to determine radiation exposure and exposure rates.

Aerial Radiological Monitoring (ARM) - The utilization of aircraft and radiological instruments to acquire radiation exposure rate data on large areas and at or between locations of special interest.

Self-Protection Radiological Monitoring - Monitoring by emergency workers and personnel of essential facilities and industries who must conduct emergency operations under fallout conditions.

Shelter Radiological Monitoring - Monitoring in public shelters to detect, measure, and assess the radiation hazard from fallout.

Mobile Radiological Monitoring - Monitoring operations conducted on foot or by vehicles in areas where specialized knowledge of the fallout situation is required.

Radiological Monitoring Instructors (RMI) - Individuals qualified to train radiological monitors.

Radiological Monitoring Instruments - Special instruments designed to detect and measure radiation exposure rates or accumulated exposure.

Recovery Phase - See Phases.

Remedial Movement - Movement of people following an attack to a less contaminated area or a better protected location.

Reporting Area - A geographic area of a State or County designated for Local-State-National reporting in an emergency.

Roentgen (R) - A unit of exposure to X-ray or gamma radiation.

Self-Protection Radiological Monitoring - See Radiological Monitoring.

Shelter - See Public Shelter.

Shelter Manager - An individual responsible for the operation of a public fallout shelter in an emergency.

Shelter Radiological Monitoring - See Radiological Monitoring.

Standing Operating Procedure (SOP) - A detailed plan covering emergency operational procedures for a facility or activity.

State Instrument Maintenance and Calibration Facility - An operation in each State which is funded 100 percent by FEMA to repair, maintain and calibrate radiological monitoring instruments.

Surge Phase - See Phases.

Survey Meter - A portable instrument used to detect nuclear radiation and to measure the exposure rate.

Vital Facilities - Facilities at fixed locations which are essential to the conduct of emergency operations, National security, or National recovery.

Weapons Effects Reporting (WER) Station - Formerly Fallout Monitoring or Fixed Monitoring Station. A facility with fallout protection, reliable communications, instruments and trained monitors that is designated for the collection and reporting of weapons effects and radiological data to the EOC.

Weapons Effects Reporting (WER) Network - Formerly RADEF Monitoring and Reporting Network. A network of stations strategically located throughout the jurisdiction to provide the local EOC RADEF operation or Disaster Analysis Section with data on weapons effects damage and fallout radiation.

APPENDIX B

REFERENCES

REFERENCES

Standards for Local Civil Preparedness
Civil Preparedness Guide 1-5, April 1978

Attack Environmental Manual
Civil Preparedness Guide 2-1A, June 1972

- Chapter 1 - Nuclear Emergency Operations
- Chapter 2 - Blast and Shock
- Chapter 3 - Fire Ignition and Spread
- Chapter 4 - Electromagnetic Pulse
- Chapter 5 - Initial Nuclear Radiation
- Chapter 6 - Fallout
- Chapter 7 - Shelter Environment
- Chapter 8 - Post-Shelter Environment
- Chapter 9 - Emergency Operations Planning

Radiological Defense Preparedness
Civil Preparedness Guide 2-6.1, April 1978

Radiological Defense Manual
Civil Preparedness Guide 2-6.2, June 1977

Civil Defense Emergency Operations Reporting System
Civil Preparedness Guide 2-10 Series, June 1978

- CPG 2-10/1 System Description
- CPG 2-10/2 Local Increased Readiness Reporting Procedures
- CPG 2-10/3 State Increased Readiness Reporting Procedures
- CPG 2-10/4 Procedures for Developing Weapons Effects Reporting Networks
- CPG 2-10/5 Weapons Effects Reporting (WER) Station Procedures
- CPG 2-10/6 Local EOC Weapons Effects Reporting (WER) Procedures
- CPG 2-10/7 Sample Local Government Operational Situation Reporting Procedures
- CPG 2-10/8 State and/or State Area EOC Reporting Procedures

NCRP Report No. 42, Radiological Factors Affecting Decision-Making in a Nuclear Attack, November 1974, National Council on Radiation Protection and Measurements.

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