



**FEDERAL RADIOLOGICAL MONITORING AND
ASSESSMENT CENTER (FRMAC), US RESPONSE TO
MAJOR RADIOLOGICAL ACCIDENTS**

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Abstract

**FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT CENTER (FRMAC),
U.S. RESPONSE TO MAJOR RADIOLOGICAL ACCIDENTS.**

During the 1960's and 70's the expanded use of nuclear materials to generate electricity, to provide medical benefits, and for research purposes continued to grow in the United States. While substantial effort went into constructing plants and facilities and providing for a number of redundant backup systems for safety purposes, little effort went into the development of emergency response plans for possible major radiological accidents. Unfortunately, adequate plans and procedures had not been developed to co-ordinate either state or federal emergency response assets and personnel should a major radiological accident occur.

This situation became quite evident following the Three Mile Island Nuclear Reactor accident in 1979. An accident of that magnitude had not been adequately prepared for and Pennsylvania's limited emergency radiological resources and capabilities were quickly exhausted. Several federal agencies with statutory responsibilities for emergency response, including the U.S. Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), Federal Emergency Management Agency (FEMA), Nuclear Regulatory Commission (NRC), and others provided extensive assistance and support during the accident. However, the assistance was not fully co-ordinated nor controlled.

Following the Three Mile Island incident 13 federal agencies worked co-operatively to develop an agreement called the Federal Radiological Emergency Response Plan (FRERP). Signed in November 1985, this plan delineated the statutory responsibilities and authorities of each federal agency signatory to the FRERP. In the event of a major radiological accident, the FRERP would be activated to ensure that a co-ordinated federal emergency response would be available to respond to any major radiological accident scenario.

The FRERP encompasses a wide variety of radiological accidents, not just those stemming from nuclear power plants. Activation of the FRERP could occur from major accidents involving radiological materials from:

- Nuclear Fuel Cycle Facilities
- Space Craft Launches
- Weapon (Department of Defence or DOE) Transportation
- Weapon Production Facilities
- Spacecraft Re-entry (domestic or foreign)
- Terrorist Incidents
- High-Level Waste Transportation
- Nuclear Power Plants

Key to the FRERP would be the establishment of the Federal Radiological Monitoring and Assessment Center (FRMAC). Development and implementation was assigned to DOE as the agency most capable of providing sufficient resources, assets, and support. In 1987, DOE subsequently assigned programmatic responsibility, with limited funding, to the Nevada Operations Office in Las Vegas, Nevada.

1. RECOGNIZED STATE RESPONSIBILITIES

Under the FRERP the states are clearly established as the recognised and primary decision-maker for any public protective actions required outside the boundaries of the facility ("off-site") experiencing the accident. FRMAC will provide the state(s) with the necessary radiological information so that educated and informed decisions can be made.

Additionally, the FRERP establishes an operational framework through the FRMAC for co-ordinating the radiological monitoring and assessment activities of all federal agencies during a response to radiological emergencies affecting the United States and its territories. The operational FRMAC is the designated federal technical centre for the "on-scene" co-ordination of federal monitoring and assessment activities. FRMAC assets and resources are intended to augment state resources.

FRMAC's purpose and objectives are to provide an organizational structure to monitor and analyse radiological data after a radiation accident and to provide rapid and accurate dose assessment for areas over which radiation has passed, or on which radiation has been deposited. FRMAC assessments and data are provided in total to both the Lead Federal Agency (LFA) and the state.

2. ACTIVATION

Most of the FRMAC response assets are located at the DOE Remote Sensing Laboratory (RSL), Nellis Air Force Base, Las Vegas, Nevada. RSL is operated by EG&G Energy Measurements, Inc. Upon notification, this equipment can be quickly loaded onto military C-141's or C-130's or commercial aircraft. For this reason, FRMAC would typically be located near a large airport. The FRMAC staging and operations facility should be capable of providing a minimum of 10,000 square feet of space.

3. OPERATIONAL FEDERAL ASSISTANCE

In addition to providing monitoring and assessment assistance to the state, FRMAC also provides a wide range of assistance from a number of federal agencies. Since FRMAC operations can employ some 400+ people during a major radiological emergency, federal assistance is designed to ensure that FRMAC activities impact local economies as little as possible.

The monitoring of radiological data from fixed wing and rotary aircraft is among the more sophisticated capabilities of the FRMAC. These state-of-the-art technical instruments can provide the clearest, most defined overall radiological picture of a contaminated area. These Aerial Measurements Survey (AMS) aircraft have already flown hundreds of routine surveys and detection missions. Aerial surveys are among the first and most important radiological survey work conducted by FRMAC during the initial phase of an accident. Existing AMS instrumentation and equipment can be affixed to U.S. military aircraft and foreign aircraft, if necessary.

Predictive fallout patterns are available to the FRMAC from the Lawrence Livermore National Laboratory (LLNL), Atmospheric Release Advisory Capability (ARAC) models. ARAC was instrumental in determining the fallout patterns associated with the Chernobyl accident in 1986. This capability is present and available during any FRMAC operation via a dedicated phone line to the LLNL computer. ARAC models can be augmented with the use of other radiological predictive models available from the NRC, the National Oceanic and Atmospheric Administration (NOAA), as well as utilities and states.

FRMAC assets include extensive communication equipment. The FRMAC can independently operate nearly 300 telephones with a satellite hook-up to the INMARSAT (International Maritime Satellite) system. As a result, this system would have no impact on the local telephone system. In time, FRMAC will ensure that direct microwave communication links are established between the FRMAC, the state's Emergency Operations Facility, and FEMA's Disaster Field Office.

4. FRMAC FIELD ORGANIZATION

Figure 1 depicts the FRMAC Field Organization. This organizational structure has been developed and adapted from those used in many exercises, including federal full-field, nuclear power plant, and FRERP exercises. The complete chart of key personnel, indicated on the figure, represents the requirements needed to implement FRMAC operations in the event of a large, full-scale deployment. In the event of a smaller incident, the FRMAC field organization would remain the same; however, some job functions might be combined, since fewer professionals and assets would be necessary to augment state resources and personnel. The FRMAC Director is a DOE/NV-appointed senior DOE official designated with the responsibility of managing a FRMAC. The FRMAC director co-ordinates and directs all FRMAC personnel who may be provided by any DOE Operations Office, contractor, or other federal or *state* agencies. It is the responsibility of the FRMAC director to provide information to both the state and the LFA, simultaneously.

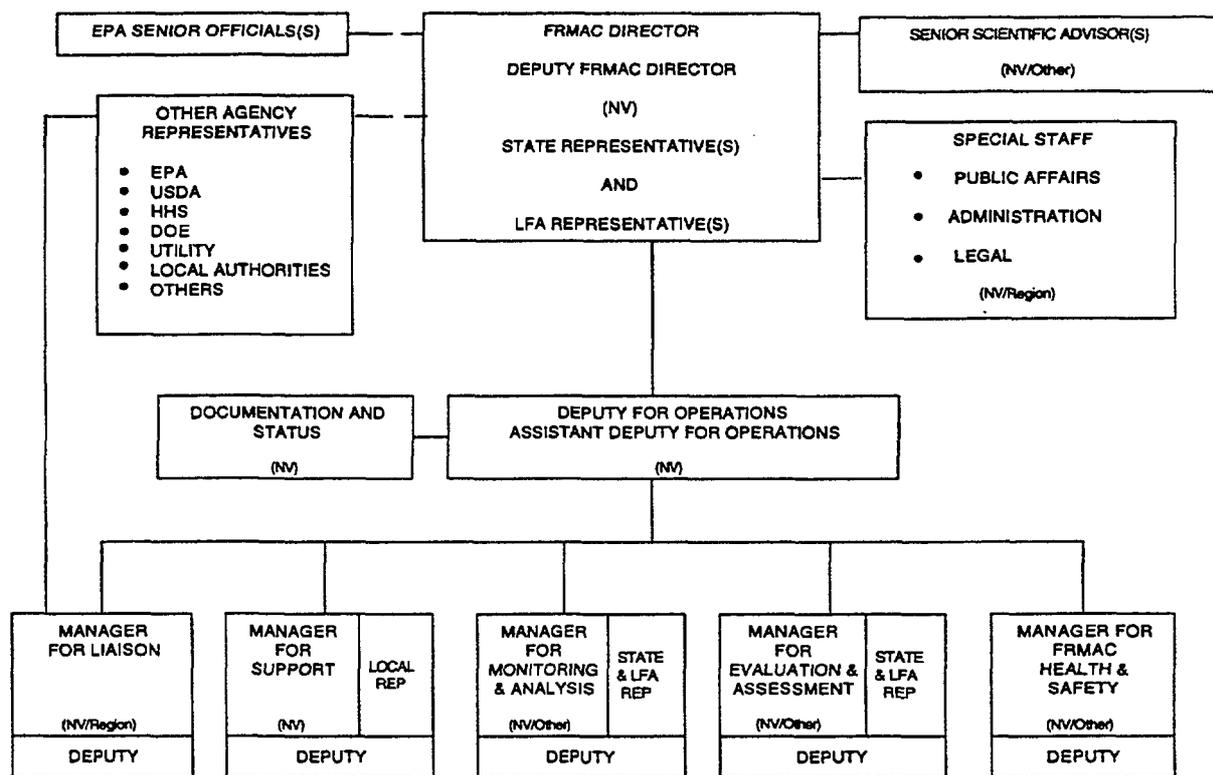


FIG. 1. FRMAC ORGANIZATION

Another key position within the FRMAC is that of the Senior Scientific Advisor, who provides the FRMAC Director with an independent overview of the radiological condition and environmental impact of the radiological accident. This individual would typically be highly respected expert in the field of radiation health and safety.

A host of high-level managers from a variety of federal agencies and associated contractors are available to provide operational support and logistics, monitoring and analysis, radiological evaluation and assessment, and radiation worker safety. FRMAC also provides a manager to ensure that proper liaison and co-ordination with other state, federal, and utility are open.

5. FRMAC TODAY

To ensure that FRMAC activities, documentation, science, and training needs are met, seven working groups and a management panel meet on a regular basis. These working groups oversee specific areas and guarantee that FRMAC stays as close as possible to the state of the science. Working groups are chaired by either DOE or DOE contractors. They are specialists from a variety of federal agencies, contractors, and the Conference of Radiation Control Program Directors (CRCPD).

The working groups are:

- Operations
- Evaluation and Assessment
- Monitoring and Analysis
- Health and Safety
- Training
- Exercises
- Post-Emergency

It is important that FRMAC be consistent in its use of equations, calibrations, sampling methods, and assessment techniques. For this reason, both the Evaluation and Assessment working group and the Monitoring and Analysis working groups have completed draft manuals which will provide standard procedures for FRMAC operations.

All environmental radiological data collected by the FRMAC will be accumulated in its data centre. This centre is designed to be comprehensive, and will contain all of the off-site environmental radiological data and associated details making the information traceable and accountable. The data will be traceable to individual teams, team leaders, measurement locations, instruments, calibrations, and standards. This data centre maintains a network of computers which provide immediate results of collected data to health physicists from both the state and federal government.

All radiological data can then be transferred directly to FRMAC's state-of-the-art Geographic Information System for display on a variety of maps. These maps contain information surrounding the accident scene, such as the locations of schools, hospitals, evacuation routes, land cover, hydrology, roads, and other valuable information regarding a site. Colour hard copy is available at the push of a button.

6. SUMMARY

The accident at Three Mile Island taught this nation an important lesson regarding radiological emergency response. Emergency response and the preparation for it is as necessary as the energy radiation provides. The implementation of FRMAC and the federal plan from which it was borne have become synonymous with co-operation among the many federal agencies and the states. It is a response mechanism which must be planned for and available if ever needed.