



U . S . D E P A R T M E N T O F E N E R G Y

REAC/TS

RADIATION EMERGENCY ASSISTANCE CENTER/ TRAINING SITE (REAC/TS)

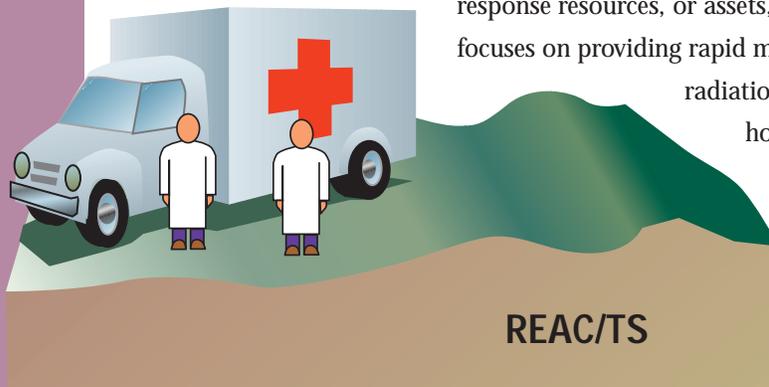


The Department of Energy (DOE) has the world's leading scientists, engineers and technicians from over 50 years of managing the nation's nuclear weapons program. When the need arises, DOE is prepared to respond immediately to any type of radiological accident or incident anywhere in the world with the following seven radiological emergency response assets.

AMS (Aerial Measuring System) detects, measures and tracks radioactive material at an emergency to determine contamination levels. **ARAC** (Atmospheric Release Advisory Capability) develops predictive plots generated by sophisticated computer models. **ARG** (Accident Response Group) is deployed to manage or support the successful resolution of a U.S. nuclear weapons accident anywhere in the world. **FRMAC** (Federal Radiological Monitoring and Assessment Center) coordinates Federal radiological monitoring and assessment activities with those of state and local agencies. **NEST** (Nuclear Emergency Search Team) provides the nation's specialized technical expertise to the Federal response in resolving nuclear/radiological terrorist incidents. **RAP** (Radiological Assistance Program) is usually the first DOE responder for assessing the emergency situation and deciding what further steps should be taken to minimize the hazards of a radiological emergency. **REAC/TS** (Radiation Emergency Assistance Center/Training Site) provides treatment and medical consultation for injuries resulting from radiation exposure and contamination, as well as serving as a training facility.

INTRODUCTION

The Radiation Emergency Assistance Center/Training Site (REAC/TS) is one of the emergency response resources, or assets, administered by DOE. REAC/TS focuses on providing rapid medical attention to people involved in radiation accidents. REAC/TS is on call 24 hours a day to provide direct or consultative help with medical and health



physics problems from local, national, and international incidents. REAC/TS also provides medical support to other DOE emergency response assets.

TREAT ADVISE TRAIN



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REAC/TS, located in Oak Ridge, Tennessee, was started in 1976 and has assisted in more than 1,000 incidents involving radiation. REAC/TS handles many calls for assistance each year from all over the world. These calls come from state health departments, commercial nuclear power facilities, Federal agencies, hospitals, the World Health Organization (WHO), the International Atomic Energy Agency, foreign governments, and physicians in private practice.

MISSION

REAC/TS' mission is to maintain an around the clock response center to provide direct support, including deployable equipment and personnel trained and experienced in the treatment of radiation exposure, to assist Federal, state, Tribal and local organizations, and DOE Radiological Emergency Response Assets. REAC/TS provides medical advice, specialized training, and the unique capability of on-site assistance for the treatment of all types of radiation exposure accidents.

STEPS IN THE REAC/TS RESPONSE

REAC/TS' radiation experts are on call 24 hours a day for consultations or to give direct medical and radiological advice to people at the REAC/TS facility or accident site. If needed, additional REAC/TS physicians and other team members can be deployed to the accident scene. This highly trained and qualified team can



Physicians, nurses, paramedics, and physicists receive training in the treatment of radiation exposure.

provide advice regarding assessment and treatment of contamination, conduct radiation dose estimates, diagnose and provide prognosis of radiation-induced injuries, conduct medical and radiological triage, perform decontamination procedures and therapies for external and internal contamination, and calculate internal radiation doses from medically induced procedures.

REAC/TS RESOURCES AND EQUIPMENT

REAC/TS has physicians, registered nurses, EMT-paramedics, health physicists, radiation biologists, nuclear medical technicians, coordinators, and support staff on its emergency response team. Sophisticated state-of-the-art laboratory facilities are among REAC/TS' resources. Facilities include a health physics laboratory; numerous laboratories for chemical, radiological, and cytogenetic analysis; clinical and diagnostic imaging laboratory services; equipment for radiation assessment and treatment; a whole body counter capable of detecting extremely low levels of internal contamination; and a dual-detector counter, capable of measuring low to extremely high levels of radioactivity, designed for patient use in emergencies.

REAC/TS maintains a Radiation Accident Registry System and conducts medical follow-up of radiation accident patients. Information from the REAC/TS Registry System is used to track treatment procedures and trends in radiation-induced medical conditions. A cooperative agreement with a local 300-bed regional medical facility with more than 130 staff physicians representing 33 specialties and access to complete diagnostic and treatment facilities also adds to REAC/TS' resources. Among the advanced specialty departments are an emergency department on call 24 hours a day, intensive care units, a cardiac surgery unit, a laser surgery center, a magnetic resonance imaging center, and a radiation oncology center.

TRAINING CENTER

The REAC/TS facility is also a central training and demonstration facility where national and foreign medical, nursing, paramedical, and health physics professionals receive intense training in the treatment of radiation exposure. REAC/TS conducts regularly scheduled courses for the occupational health physician and nurse, the emergency physician and nurse, physicians and nurses involved in long term patient care, and health and medical physicists. Training courses are conducted in the handling of radiation accidents by emergency staff;

treat
advise
train



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REAC/T'S



medical planning and care in radiation accidents; health physics in radiation accidents; occupational health in nuclear facilities; occupational internal dosimetry; and radiopharmaceutical internal dosimetry.

In addition to providing radiological medical assistance, REAC/TS is ideally suited to provide medical emergency response training. REAC/TS has been working with state and local groups to train medical providers. In 1996, REAC/TS became involved in the Weapons of Mass Destruction First Responder Training Program with the objective of preparing the United States for responding to a terrorist attack involving nuclear, biological or chemical weapons of mass destruction. In a "train-the-trainer" approach, DOE RAP personnel assist in the training of medical personnel in their communities. REAC/TS' unique qualifications make it an integral partner in the success of this program.

REAC/TS training programs are available for offsite presentation, and REAC/TS also conducts radiation accident management training courses at the request of the WHO. In addition, REAC/TS conducts a series of international conferences titled, "The Medical Basis of Radiation Accident Preparedness."

COLLABORATING WITH THE WORLD HEALTH ORGANIZATION

In August 1980, REAC/TS was named a WHO Collaboration Center for Radiation Emergency Assistance. As a WHO Collaborating Center, REAC/TS is prepared to serve as a central point for advice and possible medical care in cases of radiation injuries; set up a network of available equipment and staff specializing in radiopathology; develop medical emergency plans in the event of a large-scale radiation accident; develop and carry out coordinated studies on radiopathology; prepare radiation documents and guidelines; and provide consultation or direct medical assistance to foreign governments if an actual radiation accident occurs.



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ARAC

ATMOSPHERIC RELEASE ADVISORY CAPABILITY (ARAC)



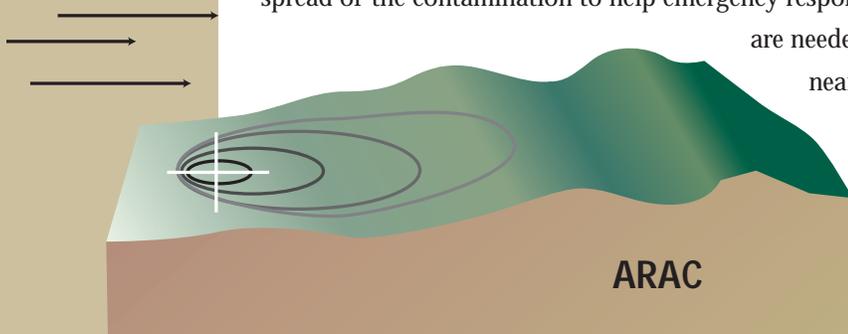
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INTRODUCTION

The Atmospheric Release Advisory Capability (ARAC) is one of the emergency response resources, or assets, administered by DOE. ARAC's role in an emergency begins when a nuclear, chemical, or hazardous material is accidentally released into the atmosphere. ARAC, operated by the University of California's Lawrence Livermore National Laboratory, maps the probable spread of the contamination to help emergency response officials decide what response measures

are needed. ARAC's main function is to provide near real-time assessments of the consequences of accidental or potential radiation releases by modeling the movement of hazardous plumes. This centralized, worldwide emergency response service provides emergency officials the vital immediate information they need to



PREDICT SIMULATE MODEL



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rapidly evaluate airborne and ground contamination projections and thus effectively protect people and the environment.

Since 1979, ARAC has responded to more than 150 alerts, accidents, and disasters, and has supported more than 800 emergency response exercises. In addition to accidental radiological releases, ARAC has assessed natural disasters such as volcanic ash cloud and earthquake-induced hazardous spills, manmade disasters such as the Kuwaiti oil fires, and toxic chemical releases from a wide spectrum of accidents.

MISSION

The ARAC mission is to provide timely and accurate real-time assessment advisories to Emergency Managers from actual or potential hazardous, nuclear, or chemical material releases into the atmosphere. ARAC's computer-based system provides realistic plots, or maps, of potential radiation dose and exposure assessments, and estimates of the path of nuclear contaminants released into the atmosphere. For ARAC-supported sites — sites with computers and software for direct interactive service — the time to deliver these first plots can be as short as 10 to 15 minutes after the accident information is received. For non-supported sites, or sites without such computer equipment, the time to deliver these first plots would be no longer than one to two hours.

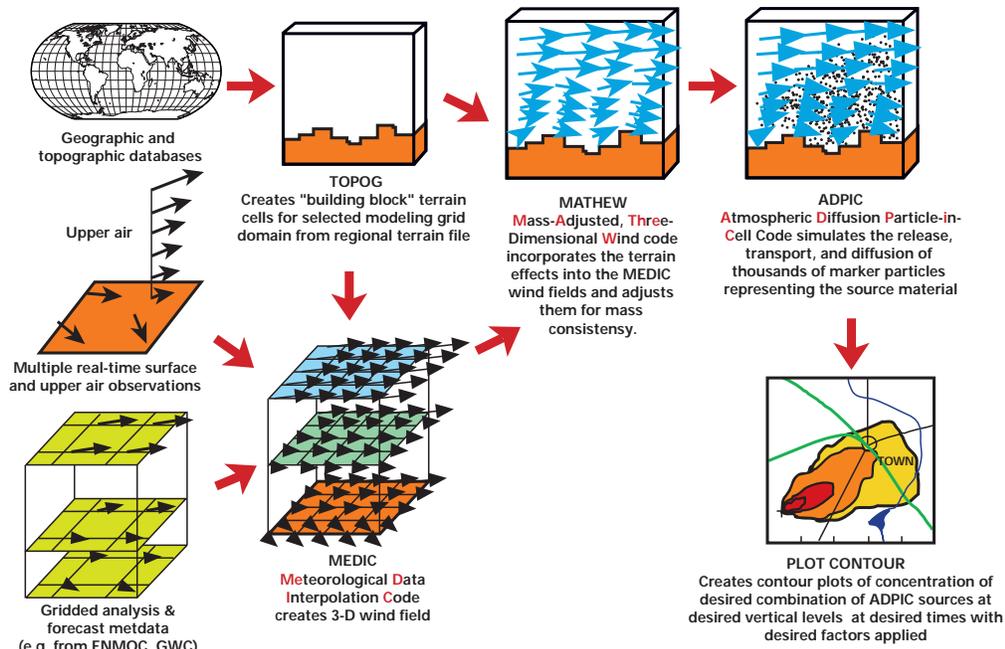
STEPS IN THE ARAC RESPONSE

Upon receiving a request for support, ARAC's staff begins downloading the most recent regional and site weather data for input into the model calculations. Information is automatically received from a link to the U.S. Air Force Global Weather Center and from the National Oceanic and Atmospheric Administration by satellite broadcast. This information is sent hourly for surface meteorological data and twice-daily for upper air data. Emergency scene officials provide critical information such as the time and exact location of the release and the type of accident or incident causing the emergency.

After ARAC team members have downloaded the regional weather information and received site input, computer codes simulate the release from the explosion, fire, vent or spill with dispersion models which show the spread of the material. These dispersion models take into consideration the effects from the local terrain or topography and complex meteorology. ARAC staff scientists prepare graphic contour plots of the contamination overlaid on the local maps; ARAC models also include the actual or estimated amount and rate of release of the material. These



Responders study an ARAC plot.



The steps in developing an ARAC plot.

plots can be widely distributed to emergency response officials and will be provided to the AMS, ARG, FRMAC, RAP, REAC/TS, NEST advance elements (frequently even prior to deployment) and on-scene leaders. ARAC continues to refine calculations as measurements are taken until all airborne releases have stopped and the hazardous threats are mapped and impacts assessed. This information is a valuable early aid to emergency managers in determining the scope and potential impact of accidents.

ARAC'S RESOURCES

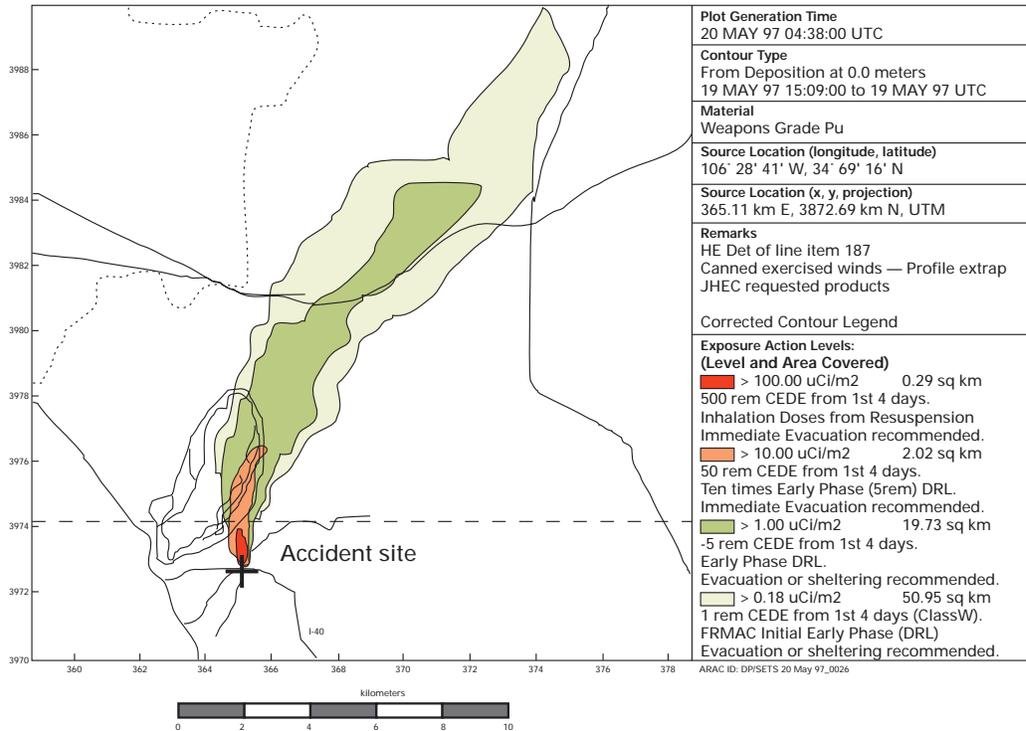
ARAC's specialists are trained in such areas as atmospheric science and modeling; computer science, operations and software development; electrical engineering; health physics; and industrial hygiene. In responding to the emergency, ARAC staff have vast databases at their fingertips. Database files are maintained for all ARAC-supported sites and a worldwide library of potential accident sites is available, including locations such as nuclear power plants and fuel-cycle facilities. A terrain database covers most of the world at a resolution of one-half kilometer. The geographic databases provide mapping information on scales ranging from site-specific buildings and streets to entire countries. ARAC's meteorological database and data services provide data for all standard weather data reporting locations of the world; computer-supported sites provide additional special local weather data for ARAC. ARAC staff can immediately analyze all of this available information and incorporate additional information received from the scene about the emergency event.

predict
simulate
model



SET 5: Total Deposition — Early/Arid

ARAC Notes for Exercise Digit Pace



A sample ARAC plot.

3-D MODELING

ARAC's transport and diffusion models simulate the release and predict the extent of the hazard. The 3-D modeling system ARAC uses has a regularly-spaced grid with terrain represented as "building block" cells. This grid can readily be selected anywhere in the world and easily scaled to the size of the problem. Mathematical calculations are used to arrive at wind representations which are adjusted over the grid to produce a mass-consistent flow in the terrain setting. Releases of hazardous material are simulated using thousands of "marker particles," each carrying the unique properties of its released material. ARAC team members can model many sources of nuclear or chemical material at the same time. These source "particles" are transported and dispersed in the atmosphere and deposited to the ground. The ARAC program is developing and implementing advanced models which provide state-of-the-art dispersion assessments and forecasts for a broad spectrum of complex accident situations.





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RAP

RADIOLOGICAL ASSISTANCE PROGRAM (RAP)



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INTRODUCTION

The Radiological Assistance Program (RAP), established in the late 1950's, is one of the emergency response resources, or assets, administered by

DOE. RAP is DOE's first-responding resource in assessing the emergency situation and advising decision-makers on what further steps could be taken to evaluate and minimize the hazards of a radiological emergency. Specific areas of expertise include assessment, area monitoring, and air sampling, exposure and contamination control.



RESPOND ASSESS ADVISE



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MISSION

The RAP mission is to provide a flexible, around the clock response capability to Federal agencies, state, Tribal, and local governments, and to private businesses or individuals for incidents involving radiological materials. RAP provides around the clock response capability to radiological emergencies.

CAPABILITIES

RAP is capable of providing assistance in all types of radiological incidents. Requests for assistance may relate to facility or transportation accidents involving radiation or radioactive material. The accident may involve fire, personal injury, contamination, and real or potential hazards to the public. RAP's support ranges from giving technical information or advice over the telephone to sending

highly trained people and state-of-the-art equipment to the accident site to help identify and minimize any radiological hazards.

RAP is implemented on a regional basis and has eight Regional Coordinating Offices (RCOs) in the U.S. The eight RAP regional offices (Regions 1 through 8, respectively) are: Brookhaven, NY; Oak Ridge, TN; Savannah River, SC; Albuquerque, NM; Chicago, IL; Idaho Falls, ID; Oakland, CA; and Richland, WA. RAP teams from one region can integrate into and assist RAP teams from other regions. Each RCO has a minimum of three RAP teams. A full RAP team consists of seven members: a team leader, a team captain, four health physics support personnel, and a public information officer. RAP teams may deploy with two or more members; one member is the DOE team leader.



Survey equipment is used to detect and measure radiation.

STEPS IN THE RAP EMERGENCY RESPONSE

If an emergency occurs, RAP team members normally arrive at the scene within four to six hours after notification and conduct the initial radiological assessment of the area. A RAP response is tailored based on the scale of the event and additional RAP teams and resources can be deployed as necessary. RAP



team members are trained in the hazards of radiation and radioactive materials to provide initial assistance to minimize immediate radiation risks to people, property, and the environment. RAP may utilize other DOE assets, such as AMS, ARAC, or REAC/TS in their response. RAP is able to quickly assess the affected area and advise decision-makers on what actions to take and determine if additional resources are necessary to manage the emergency.

ABOUT THE EQUIPMENT

RAP's highly trained teams have access to the most advanced radiation detection and protection equipment available. The RAP teams' capabilities and resources include portable field radiation monitoring instrumentation (alpha, beta, gamma, and neutron), generators, mobile laboratories, air sampling and decontamination equipment. Communications and personnel protective equipment and supplies are also available to support the response.

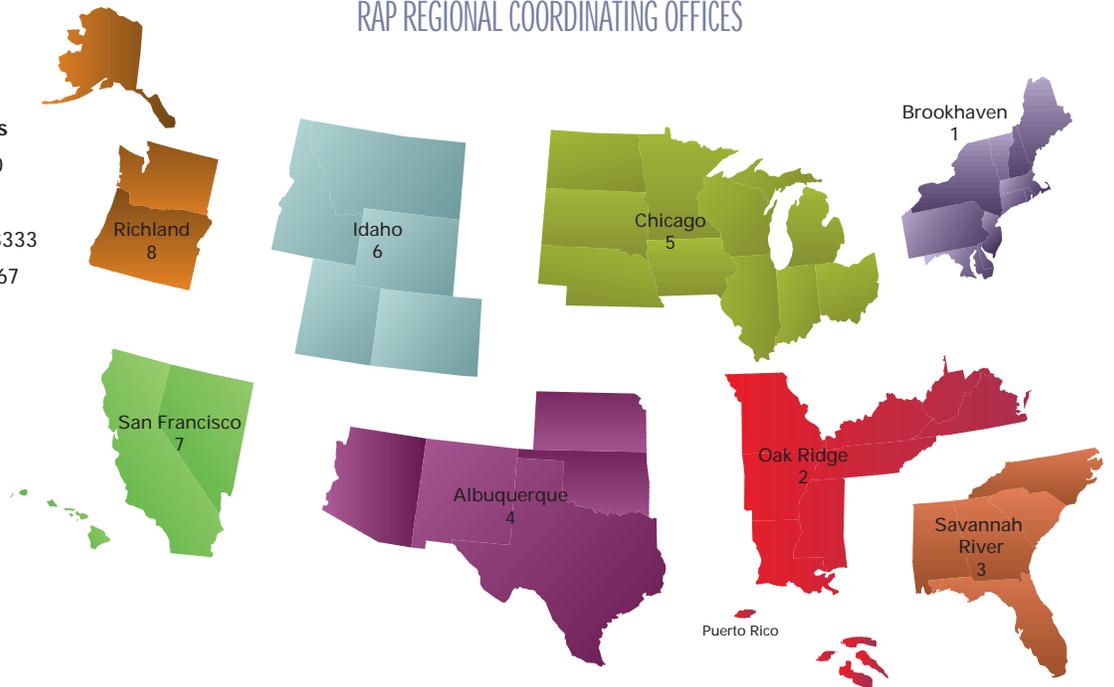
respond
assess
advise



RAP REGIONAL COORDINATING OFFICES

Regional Offices — 24 hour numbers

- 1. Brookhaven, NY — (516) 344-2200
- 2. Oak Ridge, TN — (423) 576-1005
- 3. Savannah River, SC — (803) 725-3333
- 4. Albuquerque, NM — (505) 845-4667
- 5. Chicago, IL — (630) 252-4800
- 6. Idaho Falls, ID — (208) 526-1515
- 7. Oakland, CA — (510) 637-1794
- 8. Richland, WA — (509) 373-3800



WHEN THE JOB IS DONE

RAP’s mission is complete when the need for assistance ends or when there are other resources (state, local, Tribal, or commercial services) able to handle the situation. The primary responsibility for an emergency involving radioactive materials remains with the party responsible for the material. Assistance provided by RAP teams does not preempt state, Tribal, or local authority.

OTHER RAP ACTIVITIES

In addition to providing radiological emergency assistance, RAP is ideally suited to providing emergency response training to state and local first responders. In 1996, RAP became involved in the Weapons of Mass Destruction First Responder Training Program with the objective of preparing the United States for responding to a terrorist attack involving nuclear, biological or chemical weapons of mass destruction. In a “train-the-trainer” approach, DOE RAP personnel assist in the training of additional responders, such as fire fighters, police officers, and emergency medical providers in their communities. RAP’s unique qualifications make it an integral partner in the success of this program.



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ARG

ACCIDENT RESPONSE GROUP (ARG)



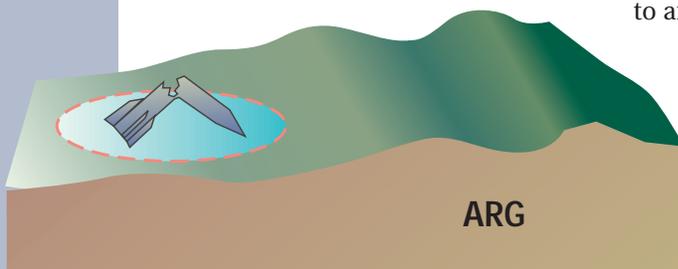
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INTRODUCTION

The Accident Response Group (ARG) is one of the emergency response resources, or assets, administered by DOE. DOE is steward of the nation's nuclear weapons program, and can call upon the world's premiere nuclear scientists, technicians, and nuclear weapon's designers to respond to an emergency involving U.S. nuclear weapons.

The ARG is managed by the DOE Albuquerque Operations Office and is supported by the Nevada Operations Office, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Sandia National Laboratory, Bechtel Nevada, and Pantex.



ASSESS STABILIZE RECOVER



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MISSION

The ARG mission is to develop and maintain readiness to efficiently manage the resolution of accidents or significant incidents involving nuclear weapons that are in DOE's custody at the time of the accident or incident. The ARG will also provide timely, worldwide support to the Department of Defense (DoD) in resolving accidents and significant incidents involving nuclear weapons in DoD's custody.



Through years of practical experience and conducting joint emergency response exercises, DOE and DoD have developed a system to manage and support each other's efforts during an emergency. Scientists, engineers, technicians, health physics and safety professionals from DOE's national laboratories and production facilities make up the ARG team. These skilled professionals from 30 different areas of technical expertise are ready to respond within two hours of notification. ARG members will deploy with highly specialized, state-of-the-art equipment that will be used in monitoring, assessing or removing nuclear weapons, components or debris.

ARG members focus on weapons recovery, health and safety evaluations of response personnel, and independent safety reviews during weapons recovery operations.



STEPS IN THE ARG RESPONSE

If an accident or incident involving a U.S. nuclear weapon were to occur, all appropriate Federal, state, Tribal, and local organizations are notified of the nuclear weapons accident. ARG deploys on military or commercial aircraft using a time-phased approach. ARG advance elements focus on initial assessment and providing preliminary advice to decision-makers. Once the follow-on elements arrive at the emergency scene, health and safety specialists perform evaluations for the safety and health of emergency response personnel, the public, and the environment. The ARG will also focus on weapons recovery and independent safety reviews during weapons recovery operations.

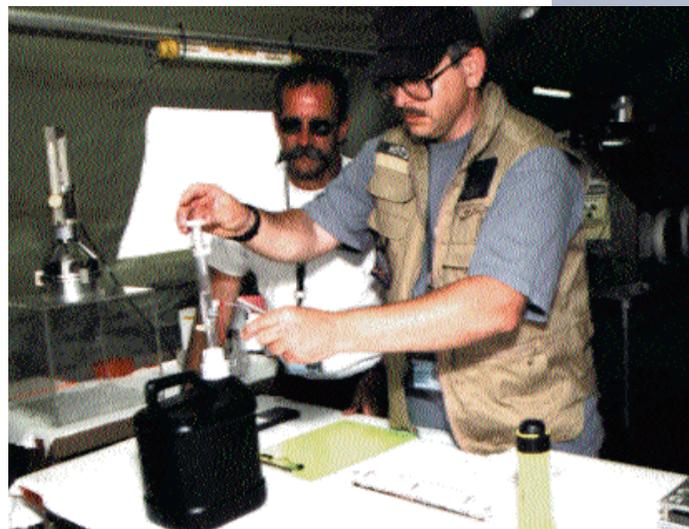


ASSESSING AND RECOVERING THE WEAPON

DOE and DoD work as a team throughout the entire response to an incident involving a nuclear weapon. Recovery of the damaged weapon or weapon components begins with locating the weapon and gaining access to it, with safety the prime consideration. Team members assess the configuration, or structural arrangement, of the damaged weapon so that they can make it safe to

work on and pack in special containers. Since nuclear weapons contain chemically reactive materials and radioactive elements, great care must be taken in gaining access to them. Understanding the internal structure of a damaged weapon in detail is necessary before recovery operations may begin.

Radiography can be used to examine the weapon's internal structure. If there is damage to the weapon or weapon's components, special techniques may be used to stabilize internal components. Team members can use specialized equipment to cut away wreckage, open shipping containers or to cut apart the weapon itself. All separate components are recovered and evaluated. The weapon is rendered safe prior to any packaging and shipping. The ARG has special containers for holding weapons and devices, and hardware stabilizers, such as foaming



assess
stabilize
recover



Specialized techniques, such as radiography, are used to examine the weapon's internal structure.

materials. Special containers can be constructed at the accident site for packing damaged weapon parts and debris.

When the weapons recovery operations are completed, the primary mission of ARG has been accomplished. At that time, the agency (DOE or DoD) responsible for the weapon involved in the accident leads the site restoration operations, and the role of ARG is to support the onsite radiological monitoring, analysis, and assessment.

Once the weapon leaves the site, the ARG mission is complete. DOE's role turns to monitoring and assessment activities conducted by other DOE assets, such as AMS, ARAC, FRMAC, RAP, and REAC/TS.



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FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT CENTER (FRMAC)



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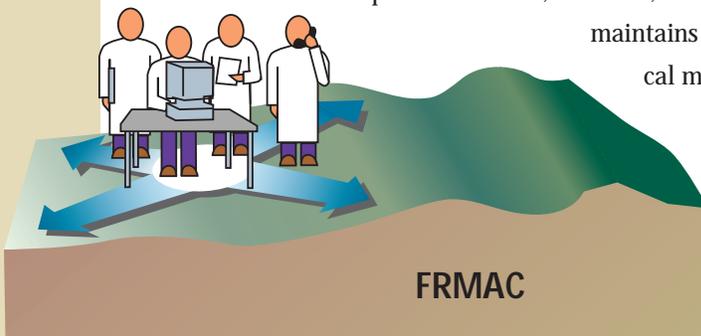
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INTRODUCTION

The Federal Radiological Monitoring and Assessment Center (FRMAC) is one of the emergency response resources, or assets, administered by DOE. The Federal government

maintains an extensive response capability for radiological monitoring and assessment. In the unlikely

event of a major radiological incident, the full resources of the U.S. government can support state, local and Tribal governments. These Federal capabilities need to be effectively coordinated to support state and local response efforts. The efforts of



COORDINATE MONITOR ASSESS



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17 Federal agencies are coordinated under the Federal Radiological Emergency Response Plan (FRERP) to integrate the Federal response to a radiological emergency. The FRERP assigns to DOE the responsibility to set up and initially manage a FRMAC.

MISSION

The FRMAC mission is to coordinate and manage all Federal radiological monitoring and assessment activities during major radiological emergencies within the United States in support of state, local and Tribal governments through the Lead Federal Agency (LFA). The LFA is the agency that is responsible for leading and coordinating all aspects of the Federal response.

STEPS IN THE FRMAC RESPONSE

DOE may respond to a state or LFA request for assistance by deploying a Radiological Assistance Program (RAP) team. If the situation requires more assistance than RAP can provide, DOE will alert or activate a FRMAC. The FRMAC utilizes a phased approach. The FRMAC response begins with deployment of a Phase I team of technical and management personnel who depart from Las Vegas within four hours of notification, and can reach any location in the United States normally within 6-10 hours. This team meets with the LFA and state to review what has occurred and how serious it is, what FRMAC can do to help and how to do it, and to find the best location for a working FRMAC. The team initiates all technical components of a FRMAC response, and is reinforced soon after by additional personnel who enable the FRMAC to operate around

the clock. If required, the full FRMAC deploys as soon as possible after the initial phases, to bring the FRMAC to full capability within 24-36 hours after the LFA or state has asked for help. A FRMAC may consist of as few as 60 or as many as 500 people, depending upon the needs of the emergency situation.

A FRMAC field team collects water and soil samples.





FRMAC ACTIVITIES INCLUDE:

- Coordinating Federal offsite radiological environmental monitoring and assessment activities
- Maintaining technical liaison with state, local and Tribal governments
- Maintaining a common set of all offsite radiological monitoring data
- Providing monitoring data and interpretations to the LFA, state, local and Tribal governments

The initial monitoring is focused on the protection of the public and the investigation of the type, amount, and extent of the radiological release. Monitoring continues until all of the area where radioactivity was released is fully evaluated and the effects are known. Any monitoring results that show an immediate threat to public health are promptly reported. All raw data coming into the FRMAC from field teams is quickly reviewed and given to the LFA and state representatives. Then the raw data is processed, evaluated and summarized, and approved by the FRMAC Director for distribution outside the FRMAC. This evaluated technical information is given officially to the LFA and state at the same time.

At some mutually agreeable time following the emergency phase, DOE will transfer responsibility of managing the FRMAC to the Environmental Protection Agency. DOE and other Federal agencies will continue to provide resources for as long as is necessary to complete the Federal response to the emergency.

FRMAC PRODUCTS

The FRMAC will present the environmental radiological data to the LFA, state and local authorities in a usable format and in a perspective understandable by managers and decision-makers.

FRMAC products include:

- Predictive plots of plume dispersion and dose rates prepared using ARAC

coordinate
monitor
assess



- Aerial survey data provided by AMS
- Reviewed raw data including data from samples of water, air particulates and reactive gases, soil, vegetation, food products, and any other sample media consistent with potential health hazards
- Summarized data such as external exposure rate data taken in certain sectors, districts, or population areas over a given time period



- Radiation contours showing where the contamination is located and the associated radiation levels, the contour levels may be in exposure rates or isotopic concentrations
- Contour levels applicable for protective action guidance, such as contours of the projected four-day, one-month, first-year, second-year, and fifty-year whole body dose equivalent from external radiation for outdoor locations and/or for sheltered locations
- A comprehensive and traceable compilation of all environmental radiological data
- A geographic information system which provides for the capture, storage, retrieval, analysis and display of spatial data

A FRMAC facility is set up to coordinate monitoring and assessment activities.

A GROUP EFFORT

The main DOE emergency response assets that supplement and are integrated into FRMAC capabilities are: RAP, ARAC, AMS, and REAC/TS. These assets are used to detect and monitor radiation, measure the concentration of radiation in the air and on the ground, and to evaluate current weather conditions and forecasts which may affect the radiation impacts. Other Federal agencies provide key professionals specializing in technical areas of importance to the Federal monitoring assessment activities. In addition, state, local and Tribal emergency personnel are invited to work directly with the FRMAC.



FRMAC utilizes specialized equipment to conduct radiological monitoring.



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AMS

AERIAL MEASURING SYSTEM (AMS)



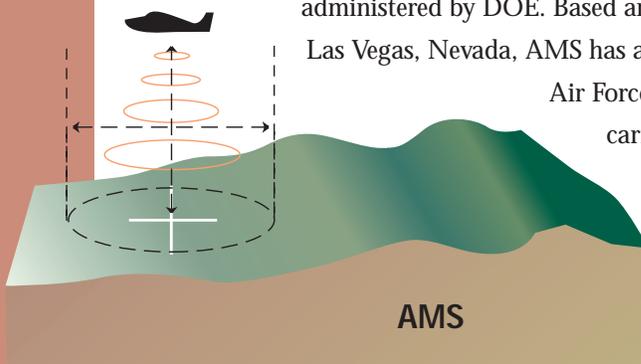
The Department of Energy (DOE) has the world's leading scientists, engineers and technicians from over 50 years of managing the nation's nuclear weapons program. When the need arises, DOE is prepared to respond immediately to any type of radiological accident or incident anywhere in the world with the following seven radiological emergency response assets.

AMS (Aerial Measuring System) detects, measures and tracks radioactive material at an emergency to determine contamination levels. **ARAC (Atmospheric Release Advisory Capability)** develops predictive plots generated by sophisticated computer models. **ARG (Accident Response Group)** is deployed to manage or support the successful resolution of a U.S. nuclear weapons accident anywhere in the world. **FRMAC (Federal Radiological Monitoring and Assessment Center)** coordinates Federal radiological monitoring and assessment activities with those of state and local agencies. **NEST (Nuclear Emergency Search Team)** provides the nation's specialized technical expertise to the Federal response in resolving nuclear/radiological terrorist incidents. **RAP (Radiological Assistance Program)** is usually the first DOE responder for assessing the emergency situation and deciding what further steps should be taken to minimize the hazards of a radiological emergency. **REAC/TS (Radiation Emergency Assistance Center/Training Site)** provides treatment and medical consultation for injuries resulting from radiation exposure and contamination, as well as serving as a training facility.

INTRODUCTION

The Aerial Measuring System (AMS) is one of the emergency response resources, or assets, administered by DOE. Based and operated out of Nellis Air Force Base in Las Vegas, Nevada, AMS has additional operational capability at Andrews

Air Force Base near Washington, DC. The AMS aircraft carry radiation detection systems which provide real-time measurements of extremely low levels of ground and airborne contamination. AMS can also provide detailed aerial photographs and multi-spectral imagery and analysis of an accident site.





U . S . D E P A R T M E N T O F E N E R G Y

MISSION

The AMS mission is to provide rapid response to radiological emergencies with helicopters and fixed-wing aircraft equipped to detect and measure radioactive material deposited on the ground and to sample and track airborne radiation. The AMS team of scientists, technicians, pilots, and ground support personnel combine their talents and expertise to keep AMS in a constant state of readiness to respond to a major radiological emergency.

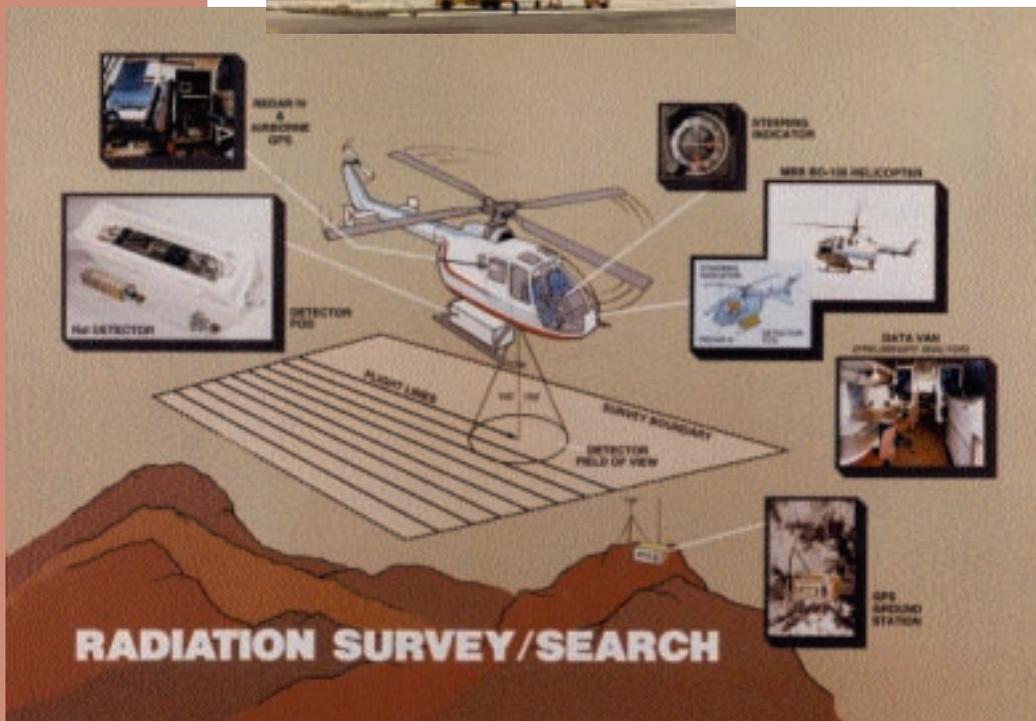
AMS uses a sophisticated radiation detection system to gather radiological information and store it on computers. These computers are used to produce maps of radiation exposure and concentrations. Detecting, tracking, and modeling of radiation is one of the first tools used to decide where to send state, DOE, or other Federal agency ground monitoring teams.



STEPS IN THE AMS EMERGENCY RESPONSE

In the event of an accident or incident involving radiological materials, DOE in consultation with state and/or other Federal partners will deploy AMS immediately to the accident site. The fixed-wing aircraft will normally arrive first.

Helicopters perform detailed surveys of ground contamination at low altitudes.



The fixed-wing aircraft is used to determine the path of the radioactive plume and to determine the location of any ground contamination. The helicopters are used to perform detailed surveys of any ground contamination. A four-wheel drive vehicle-based radiation detection system, named KIWI, can be used to develop highly detailed maps of any ground contamination.

The DOE scientists are then able to rapidly develop maps of the airborne and ground hazards. This enables the scientists to determine ground deposition of radiological materials and to project the radiation dose to which people and the environment are exposed. This information gives officials the information they need to effectively respond to the emergency.

ABOUT THE AIRCRAFT

Each type of aircraft has its own specialization. Fixed-wing (Beechcraft B-200 or Cessna Citation) aircraft are faster, so they can arrive at the emergency scene sooner. They provide rapid mapping of the extent and levels of contamination.

Helicopters (BO-105 or Bell 412) are slower and are able to travel at lower altitudes, typically 150 feet. This allows more detail to complete the picture than with fixed-wing aircraft. They provide detailed and highly sensitive quantitative ground data mapping of contamination. Helicopters may be brought in to the

emergency scene after the fixed-wing aircraft have gathered the qualitative data to get a closer assessment.



Fixed-wing aircraft provide air sampling and ground surveys.



measure
detect
track



WHEN THE JOB IS DONE

After measurements of radioactive material depositions and plume tracking and sampling have been completed, the role of AMS in the emergency response is accomplished. At that time, the Manager of the DOE Nevada Operations Office, in charge of activating, deploying, and deactivating AMS elements, as directed by DOE Headquarters, authorizes deactivation of AMS.



OTHER AMS ACTIVITIES

In addition to responding to emergencies, AMS operates on a multi-year survey schedule developed by the DOE Nevada Operations Office. This schedule includes surveys of DOE sites, participation in interagency exercises, and work for other Federal agencies, such as baseline surveys for the Nuclear Regulatory Commission. These activities are coordinated through DOE Headquarters.

Specialized equipment detects and monitors radiation levels.

AMS conducts regularly scheduled surveys to create a baseline of radiological, multi-spectral analysis, thermal imagery, and other remotely sensed data. AMS has performed baseline radiation surveys of most nuclear facilities in the country. In an emergency situation, this baseline information can be compared to current emergency data to help in assessing the amount of contamination. The AMS capability can also be used to locate lost or stolen radiological materials.