Science.

Technology.

Innovation.

Radiological Science and Engineering Group

Emergency Planning and Management

Experience counts in emergency management. The Radiological Science and Engineering Group (RSEG) brings the wide range of expertise necessary for effective emergency management. We have extensive experience in the critical areas of planning, exercises, field assessments, and event characterization.

Dependability and Know-How in Emergency Management

We are experts in:

- Developing consequence assessment models
- Integrating risk and process assessments
- Developing chemical hazard matrices
- Applying or developing geographic information systems (GIS) with hazardous material dispersion calculations and displays
- Performing assessments using the latest models, including the Emergency Prediction Information Code (EPICode), Complex Hazardous Air Release Model (CHARM), Emergency Information System (EIS), and radiological material dispersion codes such as HOTSPOT and GENII for comprehensive assessments of hazardous materials
- Developing or upgrading emergency plans
- Installing or developing emergency management software
- Developing or evaluating emergency exercises and drills.

In addition, RSEG staff can provide:

- Emergency response training courses as well as planning and procedures documentation
- Expert help in dealing with regulatory requirements and agency interfaces
- Facility design for emergency management
- Organizational and communication consultancy
- Protective action recommendations
- Consequence and dose assessments
- Hazards analysis of radioactive and toxic plume projections.

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Critical Capabilities in Emergency Management

Emergency Assessment In-Depth Experience. The RSEG team manages and contributes to the emergency response activities of the Unified Dose Assessment Center (UCAC) at the Hanford Site. RSEG also provides technical and radiological control support for the Hanford Emergency Decontamination Facility.

Emergency Management Response Resources. The RSEG team has a history of developing general emergency-response preparation, consequence, and assessment tools. These manuals have included single-source information on site-specific, process, evacuation, and emergency responses. For example, we assisted the U.S. Department of Energy (DOE) in developing *Emergency Management Guides* to prepare DOE personnel and contractors; supported the U.S. Nuclear Regulatory Commission (NRC) in developing *Response Technical Manuals* for fuel-cycle facilities; and helped develop the *Emergency Assessment Resource Manual* for the NRC Materials Staff.

Atmospheric Dose Assessment. PNNL and RSEG staff have developed APGEMS, now used as the consequence assessment modeling tool used for emergency response applications at two DOE sites. APGEMS models pollutant dispersion in simple to complex terrain environments at source-to-receptor distances that can range from 100 meters to several hundred kilometers. APGEMS is designed to support the needs of both inexperienced first-responders and highly trained meteorologists, hazard analysts, and consequence assessment personal.

RSEG staff and PNNL also contributed to the *Radiological Assessment System for Consequence Analysis (RASCAL)*, used by the NRC to calculate atmospheric transport, dispersion, and deposition of radiological materials (using a Gaussian model) and external doses (using finite and semi-infinite cloud models).

Dose Estimation for Emergency Management. The GENII software tool, developed by PNNL staff, estimates internal doses of radionuclides released to the environment. GENII uses the world standard of internal dosimetry models and is a proven tool for response-planning scenarios. In addition, we can provide information from the MEPAS *(Multimedia Environmental Pollutant Assessment System)* modeling software to simulate chemical and radioactive exposures from multiple sources over a wide variety of terrain and conditions.

Commercial nuclear reactors. We have performed emergency preparedness inspections and assessed training exercises at every commercial reactor and fuel-cycle facility in the U.S. RSEG staff designed the NRC's emergency operations centers for NRC Headquarters and five regional NRC offices. Our team has also provided technical assistance to NRC in observing over 800 annual exercises and over 250 inspections and appraisals of emergency preparedness programs at nuclear power plants. We have also developed emergency response manuals for enrichment plants, including consequence assessment and protective actions, and performed accident analyses for reactor decommissionings.

EPCRA and RMP preparation. We can assist your organization in complying with the Emergency Planning and Community Right-to-Know Act (EPCRA) and EPA's Risk Management Program (RMP) regulations, which require all companies dealing with regulated substances to prepare a hazard analysis.

Training. We have developed training manuals and courses (online, video, and in person), and conducted emergency preparedness drills and classes for the U.S. Department of Homeland Security, DOE sites, and local government agencies. For the U.S. Department of Defense, we support training for state-level responders in counter-terrorism and response to nuclear, chemical, and biological weapons.

New technology assessments. For the Federal Emergency Management Agency (FEMA), we recently conducted a study to identify the latest in new protective equipment for emergency responders. For another client, we have assessed the use of satellite photographs for assessing the damage from natural disasters, such as floods, hurricanes, and earthquakes.