



Air Resources Laboratory

Special Operations & Research Division

Las Vegas, Nevada

Improving the understanding of atmospheric transport, dispersion and boundary layer processes

The Special Operations and Research Division (SORD), part of NOAA's Air Resources Laboratory, is located in Southern Nevada, at both the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) Complex in North Las Vegas and on the DOE/NNSA's Nevada National Security Site (NNSS). The NNSS is an expansive outdoor laboratory and experimental area that conducts hazardous chemical spill testing, emergency response training, conventional weapons testing, waste management, and environmental technology studies with a focus on national security. Through a long-standing Inter-Agency Agreement with DOE and its predecessors, SORD's highly skilled and experienced professional and technical staff provide research support and applied meteorological activities to the DOE, including atmospheric characterization and atmospheric transport and dispersion. SORD also hosts and provides routine maintenance for several other NOAA measurement networks, including a Surface Radiation (SURFRAD) site and a Climate Reference Network site.

Our Research

SORD's work in meteorology and atmospheric transport and dispersion is used by decision-makers, primarily at the NNSS, to protect the atmosphere and human health, to reduce weather related injuries and fatalities, and to keep people safe during disasters. By providing key atmospheric information, necessary to protect lives and property, SORD has supported essential activities at the NNSS to improve national security. On-site weather observations and predictions protect NNSS staff and facilities—especially for activities dealing with radioactive, explosive, or toxic materials should an incident occur. SORD weather observations and modeling also support improved weather predictions and warnings for the entire region. Predictions of atmospheric transport and dispersion of hazardous materials and air pollution provide essential information for mitigating risks for NNSS staff, first responders, and the public.



*One of the SORD meteorological towers located on the NNSS.
Photo: NOAA*



SORD sodar located at the Desert Rock Weather Observatory, Nevada National Security Site, in Mercury, NV. The NOAA SURFRAD site instruments are located in the background. Photo: NOAA

Data Collection, Operations, Safety and Environmental Applications

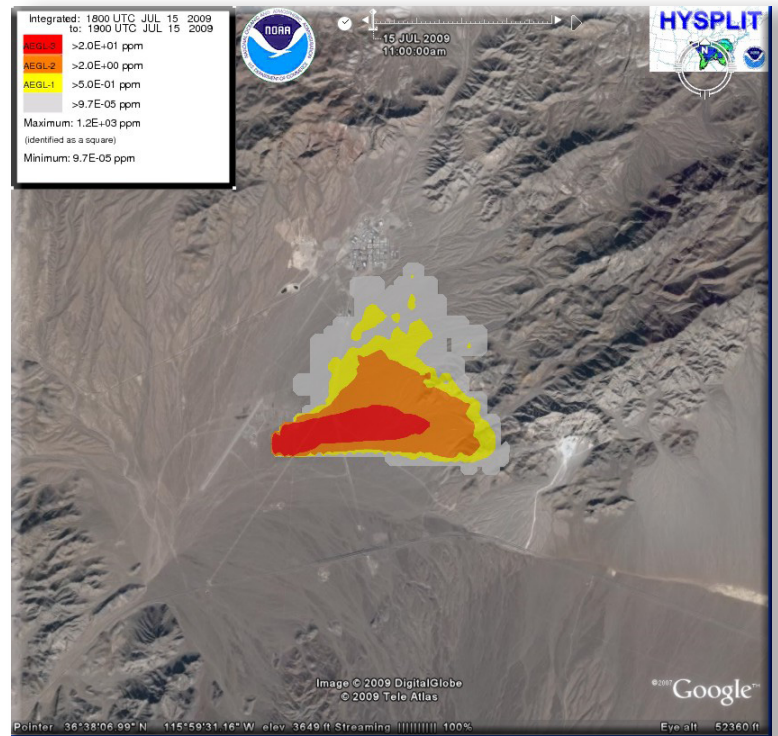
To support safe operations at the NNSS, SORD collects meteorological data, develops localized daily weather forecasts, provides weather surveillance for weather-related safety advisories, and conducts wind flow studies over complex terrain. Data collected by SORD are also used to develop climate information for the NNSS to update annual environmental reports, to provide information for engineering and operational decisions and planning, and to produce critical weather products required for annual National Emission Standards for Hazardous Air Pollutants compliance reports. The meteorological data come from a network of weather towers across the NNSS operated and maintained by SORD technicians.

SORD also operates and maintains a sodar (a meteorological instrument used to determine wind profiles by measuring the scatter of sound waves), a rain gauge network, and a lightning

strike detection network in southern Nevada. In addition to these fixed weather stations, SORD deploys surface and upper air meteorological equipment on and off the NNSS to collect data during emergencies and for scientific experiments. For example, at the request of DOE, SORD deployed technicians to New Mexico to release weather balloons and provide data in response to a fire at DOE's Los Alamos National Laboratory. These data were used by ARL and DOE modelers to provide information about the potential radiological contamination in the atmospheric plume and to support fire-fighting aircraft operations.

Mesoscale Forecast and Atmospheric Dispersion Modeling

SORD conducts mesoscale weather forecast modeling for the southern Nevada region to provide local (NNSS) predictive capabilities. Research studies center on improvements to the Weather Research Forecast (WRF) model with a focus on improving model representation and forecasting of the desert environment. SORD also applies atmospheric dispersion models to provide assessments of impacts following the atmospheric release of real or simulated radiological or chemical materials. This information is provided to emergency managers who use it to determine how best to safeguard people and property. SORD meteorologists also apply regulatory models using data from SORD weather stations to support the development of environmental reports and state air permit applications.



Example of a Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model air concentration plot for a hypothetical pollutant release using the SORD WRF model for winds. Colors represent different concentrations as the pollutant plume moves away from the source.

Our Partners

- U.S Department of Energy
- NOAA's National Ocean Service
- National Nuclear Security Administration
- U.S. Department of Homeland Security
- U.S. Department of Defense, Defense Threat Reduction Agency
- National Weather Service Forecast Office, Las Vegas, NV
- Academic Institutions: University of Utah and Southern Methodist University

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*Desert Weather Observatory located on the NNSS.
 Photo: NOAA*



*Department of Energy Complex.
 Photo source: NNSA/NFO*

