FIGHTING WILDLAND FIRES AT INL

Wildland fire terminology

CONTAINED: a fuel break has been completed around the fire perimeter
CONTROLLED: complete extinguishment of the fire, including spot fires, or the fire line has been strengthened such that flare-ups from within the perimeter of the fire will not break through the line
OUT: the fire has been completely extinguished with no remaining hot spots

INL approach to fighting wildland fires

INL's approach to wildland fires is to fight them aggressively. The top priorities in fighting a fire, in order of importance, are to protect *people, property and cultural and natural resources.* Our priorities parallel those of other federal wildfire fighting agencies.

Each year, officials apply lessons learned from previous years' firefighting efforts at INL and other DOE sites, assess current conditions and equipment, and make improvements in processes and systems where necessary to ensure INL can safely, quickly and effectively respond to wildland fires.

INL maintains maps and other documents that are used by firefighters and emergency command centers to ensure responders are aware of any potential radiological or hazardous materials they may encounter while fighting a fire. The maps and documents clearly identify and reflect current known INL areas of radiological, chemical and unexploded ordnance concerns.

The nature of fires and contamination

All wildland fires occurring anywhere in the world will release some naturally-occurring radioactivity from the vegetation that burns. Radionuclides released into the air during a fire can cause air monitors to register slightly elevated contamination levels. These elevated levels are expected during a range fire anywhere in the world. All wildland fires also release water vapor and other types of contaminants, typically particles and gases.

Contamination from an INL range fire

All individuals annually receive about 360 millirem of **background radiation**. A millirem is a unit of measurement of the dose to an individual. Background radiation comes from the soil, radon, sources inside our bodies, cosmic radiation, the materials we use to build our homes and offices, medical procedures, etc.

INL radiation control and environmental management experts have done a thorough assessment of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites (soil-contaminated areas) to determine potential releases and effects of fire-borne and wind-borne contaminants.

As the result of a wildland fire, the hypothetical maximum additional radiological dose that might be received by an individual on the INL desert Site is 0.33 millirem. This

would be to a firefighter exposed to smoke and dust during a fire at the Auxiliary Reactor Area (ARA-23), which includes the SL-1 site. This level of dose compares to the DOE's worker occupational exposure limit of 5,000 millirem per year.

The maximum potential radiological dose to a member of the public would be 0.05 millirem to an individual exposed on U.S. Highway 20/26 for one hour to dust blown directly to the highway following a fire at the Auxiliary Reactor Area 23 site (southeast of the Central Facilities Area). Doses from all other sites and scenarios would be less.

This level of dose compares to the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation's 10 millirem exposure limit to any member of the public from a single airborne radioactivity source. Again, these maximum hypothetical doses are much less than current health standards allow.

In developing these calculations, conservative soil-to-plant uptake fractions and plant biomass were used to estimate radionuclide concentrations in plants growing on the sites. Doses to firefighters from dust raised by firefighting vehicles on the sites were estimated from very conservative assumptions. Fire releases and post-fire contaminated dust releases during a windstorm were modeled to downwind receptors, using Environmental Protection Agency-approved computer codes. These include firefighters or other personnel near or on the contaminated sites and members of the public on U.S. Highways 20/26 and 33, on the INL Site, at the INL boundary and on Big Southern Butte. Maximum doses occur within 100 meters (109 yards) of contaminated areas and decrease with distance.

Air monitoring activities

The INL air monitoring systems are intended to measure and verify levels of airborne radioactivity from a wildland fire. Based on past monitoring, knowledge and analysis of what is on the Site and from historic information collected over many years of sampling, we expect to see some slight elevation of airborne radioactivity during a fire. The INL uses three types of air sampling, each providing an increasingly more sensitive analysis of airborne contaminants. The INL air monitoring systems are:

- ***"Grab" Samples*** – These are taken during the fire by emergency response field monitoring teams stationed at a safe distance downwind from a fire and in locations based on wind direction and other fire conditions. Teams collect air samples for 15 minutes then take the samples to a nearby INL lab for analysis. The results are typically available 1 to 2 hours after testing.

  This information gives emergency personnel a quick way of determining if there is greater than expected airborne contamination levels. Unexpectedly high readings in grab samples would give an early warning of an unusual event and would allow the INL to alert public officials. Equipment used for grab samples is sensitive enough to detect radioactivity that is above natural background levels (called environmental levels).
- ***Event-Specific Monitoring*** – These high-volume samplers, operated by the INL Environmental Monitoring organization, collect airborne contamination from a specific event, such as a fire, over a 24-hour period. The samplers can be remotely

activated from Idaho Falls. Results are typically available within 4 to 5 days for gamma-emitting radionuclides, and 6 to 8 days for gross alpha and beta activity.

These screening measurements help technicians determine if further tests are needed to identify specific types and amounts of alpha and beta emitters. This analysis takes 4 to 5 weeks. The longer analysis times enable detection at levels less than the 10 millirem NESHAP off-site standard. This would give an indication of any potential public or environmental radiological dose.

- ***Routine Monitoring Networks*** – The INL Environmental Monitoring organization operates a permanent network of 24 fixed-location, low-volume, continuously operating air samplers. (The State of Idaho INL Oversight Program and the S.M. Stoller Corp. also operate independent on- and off-site air monitoring networks). The monitors are used to determine and document the nature and quantity of airborne radioactive material on and around INL. Samples are collected continuously for a full week and screened for total radionuclides present on filters. Results are typically available in 3 weeks. Data on specific radionuclides are available quarterly. The data are reported in the Annual Site Environmental Report. With these monitors and analyses techniques, we are capable of detecting radioactivity at less than background levels.

Type of Analyses

Analysis of air samples takes time, and analysis times cannot be accelerated, regardless of the laboratory that performs the work. In general, the more sensitive and the lower the levels of detectablity for the measurement, the longer it takes to analyze.

- ***Gross Alpha/Beta Analysis*** — This analysis gives an early total radionuclide screening to determine if specific radionuclide analysis is needed. After natural background radioactivity decays away, technicians can see if lower environmental levels of man-made radionuclides are present in the samples. Fallout and other non-INL events could indicate radioactivity from INL operations.
- ***Gamma Analysis*** — Gamma analysis is done to identify specific gamma-emitting radionuclides and amount of radioactivity being emitted. This analysis measures for smaller quantities of radioactivity, so it takes longer to get results.
- ***Specific Alpha/Beta Analysis*** — Identifying specific alpha-/beta-emitting radionuclide levels of a sample can’t start until all the other analyses are complete because the filters are destroyed during the analysis. The filters are put through a number of complex chemical processes that each require a set amount of time to complete. To detect the presence of radionuclides at the low levels intended in these analyses takes longer.

Definitions

There are a number of terms used by firefighters and the emergency command centers to identify areas Site personnel should be aware of. These areas may be referred to in news releases and briefings. The following definitions will help news reporters and the public understand the terminology used by INL employees.

CERCLA*:* Comprehensive Environmental Response, Compensation and Liability Act (commonly known as the Superfund Law). CERCLA covers contaminant releases to the

environment that occurred before 1980. Most of these release sites are no longer actively operated.

***Contaminated CERCLA Site Areas**:* Areas with historical contamination ranging from the garbage dump at a homestead site to past surface spills inside the INTEC fence.

***RADCON Posted Soil Contamination Areas**:* Areas where hand-held instruments indicate some radiation readings above background levels from the soil in the area. If a radiation reading above background is obtained with a hand-held instrument, the area is posted with signs or access restricted with barriers.

***No Action and No Further Action CERCLA Site Areas**:* CERCLA site areas, which have been characterized and analyzed using the Environmental Protection Agency CERCLA criteria and models, and which require "no action" or "no further action" to be considered available for another use. These determinations are documented in Records of Decision that are signed by the DOE, EPA and Idaho Department of Environmental Quality. A CERCLA site can also contain no contamination, for instance, the site of construction rubble.

***Live Ordnance Areas**:* There are five ordnance areas on Site. These are areas where large amounts of unexploded ordnance from naval weapons testing activities during World War II have been left scattered on the ground. Generally, firefighters are kept out of these areas for safety reasons. Ordnance has been cleared from several of the areas. The decision on how the remaining ordnance will be disposed of are expected to be presented with the proposed Waste Area Group 10 remediation plan.

***Cleared or Assessed Ordnance Areas**:* Ordinance areas requiring no further action because personnel have walked through the areas to locate shells and picked them up. Firefighters are allowed in these areas.

***Down-Range Ordnance Area**:* This is a larger area where ordnance potentially exists from previous test firing from naval weaponry on the desert during World War II. However, no live ordnance has ever been found in this down-range area.

***Live Unexploded Ordnance**:* These are individual pieces of ordnance identified on site and still there. They have been given global positioning system (GPS) coordinates and marked on a map. These are shells that have not been armed by being fired from a weapon, but firefighters are instructed to stay away from any shells they find to avoid possible injury.

Background Radiation or Environmental Levels (of contamination): This is the range of activity that defines the "normal" or baseline radiation for a given area. Background radiation is different for different parts of the country and is based, in part, on elevation and geology. Results of surveys are compared to the area's normal level of radiation to help determine if higher radioactivity has been detected.