Nevada Test Site

Protecting the NTS from Wildland Fires

Introduction

At 1,375-sqaure miles, the Nevada Test Site is a wide expanse of land with mountain ranges, dry lake beds, and a variety of plant and animal life. The climate is arid, with an annual rainfall of approximately six inches in the lower elevations - leaving it vulnerable for wildland fires.

Background

The NTS Fire & Rescue (F&R) was established on October 9, 1951. Today, the F&R service provides fire suppression; emergency medical services; hazardous materials (HAZMAT) mitigation; technical rescue response; incident command functions; and fire prevention activities to the Nevada Test Site (NTS) on a 24-hour per day, 7-day per week basis.

Firefighters use state-of-the-art equipment to prevent and fight fires at the NTS.

Prevention

NTS F&R developed several strategies to mitigate the risks of wildland fires and provide protection for the surrounding public, personnel and property at the NTS.

Annual vegetation assessments are conducted at the NTS to prioritize removal of vegetation near utilities and other critical infrastructure. Removal reduces fuel sources for fires that are created by dried out plant life. In the event of a fire, prior removal of this vegetation also provides access for firefighters and creates fire breaks and defensible space where firefighters may operate.

The majority of wildland fires caused in the NTS region are started by lightning. As a result, weather predictability and tracking play an important role in preparing for and responding to a wildland fire. NTS F&R receives twice daily NTS forecasts, and alerts to weather conditions that indicate increased fire hazards, such as severe lightning. When electrical storms approach the NTS, they are tracked and each lightning strike is plotted in a real-time database.

Equipment

In addition to standard firefighting equipment, firefighters employ all-terrain vehicles (ATVs) and light-duty brush vehicles. The ATVs are equipped with compressed air foam system (CAFS) using water, foam and compressed air to produce 25 gallons of foam per one gallon of water

To assist in firefighting efforts, a cadre of heavy equipment operators are fire-trained. Under the direction of the Incident Commander, these operators become incorporated into the incident response by using bulldozers to plow access roads and firebreaks, and watermasters to soak at-risk areas.

Cameras with zoom capabilities are positioned throughout the NTS. During a wildland fire, this real-time imagery is provided to emergency centers involved in firefighting efforts. The cameras are also used during and after thunderstorms for early lightning detection.

A contract with a commercial helicopter company provides access to helicopters and pilots equipped to provide fire reconnaissance and fire suppression services. This support provides the ability to make pinpoint air drops of several hundred gallons of water on identified hot spots.

Specially equipped all-terrain vehicles are used in fire prevention and fire fighting at the NTS.

Technology

The NTS is a leader in developing innovative technology, some of which is applied to site firefighting efforts. Pilots from the NNSA/NSO Remote Sensing Laboratory can perform flyovers with thermal-imaging cameras to pinpoint hot spots in burned areas, allowing firefighters to enhance monitoring efforts. In addition, aerial imagery can assess vegetation growth, which is an important predictor in how fire may spread.

NTS Fire & Rescue maintains an electronic 'NTS Known and Potential Hazards Map,' which enables firefighters to view different layers of the NTS infrastructure, such as surface-laid cables, power lines, unexploded ordnance, bore holes, abandoned mine shafts, facilities storing hazardous materials, and radiological areas. This approach protects firefighters from known hazards during firefighting efforts.

The threat of wildland fires to radiological areas

Because of the high probability of fires at the NTS, the release and migration of airborne radioactive particles re-suspended by wildland fire on and around the NTS has been studied and tracked for decades. Just over seven percent (7%) or 100.3 square miles of the 1,375 square miles of the NTS, as identified through the *Radionuclide Inventory and Distribution Program*, has radioactive surface contamination. These areas are well known and have been characterized and mapped through a NTS aerial radiation survey. Many of these areas are in remote, hard-to-reach locations. All are fenced and access is prohibited. The areas with the highest levels of soil contamination and of concern are:

- Smoky site, Area 8
- Buggy site, Area 30
- Danny Boy, Little Feller I & II, Area 18
- Plutonium Valley, Area 11
- Sedan site, Area 10
- Cabriolet and Schooner sites, Area 20
- Wilson site, Area 9.

These sites combined represent just over 2%, or 30.8-square miles, of the site with high soil contamination, that is, an area where if disturbed, could result in the re-suspension of radioactive material that might be measured off-site.

Based on the results of NTS annual environmental compliance reports (NESHAP) from 1992 through 2005, the NTS has never experienced a wildland fire that spread into an area of high soil contamination.

Preventing re-suspension

If a wildland fire occurs near one of the identified contaminated areas, fire personnel begin early preparations for possible expansion of the fire. Although radioactivity made airborne by a fire is not expected to result in significant health concerns to either on-site personnel or off-site members of the public, firefighters still take an aggressive posture to prevent the fire from crossing into one of those areas. As each fire is different firefighters cannot take a “one-size-fits-all” approach. They must react to conditions as encountered, and plan based upon projected conditions.

NTS firefighters will make every effort to fight the fire up to an area where there is contamination. They apply firebreaks and back burning, but will not enter the area. Firefighters will position themselves upwind from the fire and monitor progress until they can safely resume firefighting efforts.

The policy of mitigating vegetation growth and creating defensible space around both critical infrastructure and, where accessible, around those areas where radioactively contaminated soils exist is an important prevention. All NTS fire prevention actions serve to mitigate the possibility of wildland fires in radiological areas.

Methods of re-suspension

If a wildfire does occur in one of the NTS radiological areas, it could result in measurable airborne radiation on the NTS, and very low levels of measurable airborne radiation outside the NTS boundaries. The re-suspension of radioactive materials during a wildland fire could be caused two ways. The first is through the burning of the plants within the contaminated area. The second means is by windstorms following a burn. Once desert areas have burned they are more susceptible to wind erosion. This then leads to the re-suspension of material.

Helicopters are used during wildland fires at the NTS to make 120-gallon water drops on hot spots.

What are the dangers to the public?

In 1994 a detailed radiological aerial survey was conducted of the entire test site. This data provides a basis from which to create dose calculations. Extremely conservative estimates of dose received from burning contaminated vegetation project the highest dose to on-site workers was calculated to be one (1) millirem at two-point-five miles (four kilometers) downwind. The highest dose to an off-site member of the public was calculated to be 0.1 millirem.

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In an event that radiological contamination is re-suspended due to a fire, on-going continued monitoring would occur to detect any re-suspension from wind erosion or other forms of soil disturbance that might occur. A network of existing air monitors are in place throughout the NTS. Additionally, air samplers would be established downwind from the site where radioactive soil contamination exists. The U.S. Environmental Protection Agency (EPA) would also establish air monitors in public areas down wind from where a fire might be burning. The EPA would report their findings to the public, and work with communities, counties, and the state on the appropriate protective actions that would be required, if any.

Memorandums of Understanding (MOU)

Government agencies use MOUs to define relationships between different local, state, and federal government entities. These agreements ensure smooth operations where there are shared resources or workflows. MOUs create a platform for a clear understanding of each party's commitments/purpose and specify the expectations for a series of pre-determined responses. NNSA/NSO maintains MOUs with the U.S. Bureau of Land Management, the U.S. Air Force, and the NTS prime contractor to address specific wildland fire protection issues. MOUs between these agencies provide procedures for quickly elevating the national priority in acquiring offsite resources to fight NTS fires.

NTS Fire & Rescue equipment includes an engine containing a 1,250 gallon-per-minute pump and 1,000-gallon tank.

Conclusion

NTS Fire & Rescue experts take extreme preventative measures to reduce the risk of wildland fires. In the event that a significant wildland fire occurs, emergency personnel are well-trained and well-equipped to contain the fire before it can damage NTS infrastructure or reach a radiological area. If a wildland fire does reach a radiological area, there is no evidence that indicates harmful levels of radiation may be re-suspended and transported to off-site populations. While it may be possible to detect minute amounts of re-suspended radioactivity, due to the remoteness of the NTS and distance to off-site populations, there is ample time to issue protective actions, should they be necessary.

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