Nevada National Security Site

Protecting the NNSS from Wildland Fires

Introduction

At 1,375 square miles, the Nevada National Security Site (NNSS), formerly known as the Nevada Test Site (NTS), 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 six inches in the lower elevations, an ideal setting for the ignition of wildland fires.

Background

The NNSS Fire & Rescue (F&R) was established on October 9, 1951. Today, the F&R service provides fire suppression, emergency medical, hazardous materials (HAZMAT) mitigation, technical rescue response, incident command functions and fire prevention activities to the site on a 24-hour basis.

Prevention

Several strategies have been developed to mitigate the risks of wildland fires and provide protection for the surrounding public, personnel, and property at the NNSS.

Annual vegetation assessments are conducted at the NNSS to prioritize removal of vegetation near utilities and other critical infrastructure. This helps to reduce fuel sources for fires that are created by dried out plants. In the event of a fire, these areas act as fire breaks and defensible space for firefighter access and anchor points.

Equipment

In addition to the standard array of firefighting equipment, F&R utilizes specially equipped all-terrain vehicles (ATV's). The ATV's are equipped with compressed air foam systems, utilizing a water/foam mix supported by compressed air to produce 25 gallons of foam per one gallon of water.

Type 6 brush engines are also placed into service during a wildland situation utilizing class "A" firefighting foam, hose lines, hand tools, and chain saws.

Cadres of heavy equipment operators are trained annually in fire safety to work in, around, and near any wildland fire situation. These heavy equipment operators work under the direction of the Incident Commander and Staff. The dozers plow access roads and firebreaks as deemed necessary.

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Energy II is utilizing one of the NNSS F&R portable water sources. These tanks, called "pumpkins" are placed in-service during a wildland operation by the fire prevention staff. F&R has two -3,000 gallon, two -5,000 gallon and one -10,000 gallon tank for immediate deployment.

NNSS F&R has trained eight of its personnel as Helicopter Crew Members. These specially trained personnel can deploy a Heli-tack Team working directly with Energy II, and any support helicopters during aerial reconnaissance, water drops, cargo/equipment haul, and crew hauls.

Water Masters are utilized by the same group assisting with wetting the areas for anchoring points, and in support of helicopter bucket operations.

Technology

The NNSS is a leader in developing innovative technology, some of which is applied to site firefighting efforts. For example, helicopter pilot's assigned duties related to National Security can bring their skills and equipment to bear on wildland fires at the test site; performing water-drops in remote areas, and flyovers of burned areas with thermal-imaging cameras to pinpoint hot spots.

In addition, aerial imagery can assess vegetation growth, with is an important predictor in how fire may spread.

NNSS Fire & Rescue maintains an electronic version of the "NNSS Known and Potential Hazards Map" which enables firefighters to view different layers of the NNSS infrastructure; such as surface-laid cables, power lines, unexploded ordnance, bore holes, abandoned mine shafts, facilities storing hazardous materials, and radiological areas. This approach helps to protect firefighters during their mitigation efforts.

The Threat of Wildland Fires to Radiological Areas

Because of the high probability of fires at the NNSS, the release and migration of airborne radioactive particles re-suspended by wildland fire on and around the NNSS 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 NNSS, 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 NNSS aerial radiation survey. Many of these areas are in remote, hard-to-reach locations. All are fenced and access is prohibited. The areas with 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. Areas, 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 from 1992 through 2005, the NNSS 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. The Fire Chief stated "We must react to conditions as encountered, and plan based upon projected events."

NNSS Fire & Rescue personnel make every effort to fight fires up to an area where there is contamination. They apply firebreaks and back burning during these situations, but will not enter the area. Firefighters will position themselves upwind from the fire and monitor progress until they can safely resume mitigation efforts.

Methods of Re-suspension

If a wildfire does occur in one of the NNSS radiological areas, it could result in measurable airborne radiation on the NNSS, and very low levels of measurable airborne radiation outside the NNSS 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 fire event. Once desert areas have burned they are more susceptible to wind erosion. This then leads to the potential re-suspension of material.

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.

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. A network of existing air monitors are in place throughout the NNSS. 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

Government agencies use Memorandums of Understanding (MOU's) to define relationships between different local, state, and federal government entities. These agreements ensure smooth operation where there are shared resources or workflows.

MOU's create a platform for a clear understanding of each party's commitments/ purpose, and specify the expectations for a series of pre-determined responses. The U.S. Department of Energy, National Nuclear Security Administration, Nevada Field Office, maintains MOU's with the U.S. Bureau of Land Management, the U.S. Air Force, and the NNSS prime contractor to address specific wildland fire protection issues. Utilizing these agreements between outside agencies, provide procedures for quickly elevating the national priority in acquiring offsite resources to fight NNSS fires.

Conclusion

NNSS 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 NNSS 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 NNSS and distance to off-site populations, there is ample time to issue protective actions, should they be necessary.

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