

# Wildland Fire Management Plan for Brookhaven National Laboratory

2017

**Environmental Protection Division**

**Brookhaven National Laboratory**

Operated by

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## **PREFACE**

The Wildland Fire Management Plan (FMP) for Brookhaven National Lab (BNL) is written to comply with Department of Energy (DOE) Integrated Safety Management Policy; Federal Wildland Fire Management Policy and Program Review; and Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide. This current plan incorporates changes resulting from new policies on the national level as well as significant changes to available resources and other emerging issues, and replaces BNL's Wildland FMP dated 2014.

The DOE policy for managing wildland fires requires that all areas managed by DOE and/or its various contractors which can sustain fire must have a FMP that details fire management guidelines for operational procedures associated with wildland fire, operational, and prescribed fires. FMPs provide guidance on fire preparedness, fire prevention, wildfire suppression, and the use of controlled "prescribed" fires and mechanical means to control the amount of available combustible material. Values reflected in the BNL Wildland FMP include protecting life and public safety; Lab properties, structures and improvements; cultural and historical sites; neighboring private and public properties; and endangered, threatened, and species of concern. Other values supported by the plan include the enhancement of fire-dependent ecosystems at BNL. The plan will be reviewed periodically to ensure fire program advances and will evolve with the missions of DOE and BNL.

This Fire Management Plan is presented in a format that covers all aspects specified by DOE guidance documents which are based on the national template for fire management plans adopted under the National Fire Plan. The DOE is one of the signatory agencies on the National Fire Plan.

This FMP is to be used and implemented for the entire BNL site, including the Upton Reserve, and has been reviewed by the New York State Department of Environmental Conservation Forest Rangers, DOE, and, as appropriate, BNL emergency services, and fire protection personnel.

The BNL Fire Department is the lead on wildfire suppression on site. However, the BNL Natural Resource Manager will serve as technical resource advisor for all wildland fires on the BNL property resulting in the activation of the BNL Emergency Operations Center.

**Selected Acronyms (See also Appendix A, Definitions and Acronyms)**

Burning Index (BI)	Estimate of the potential difficulty of containing a fire, related to the flame length at the head of a fire. BI divided by a factor of 10 indicates approximate flame length. Used for determining initial resource needs.
BNL	Brookhaven National Laboratory
CWPP	Community Wildfire Protection Plan
DOE	Department of Energy
Emergency Fire Rehabilitation/ Burned Area Emergency Rehabilitation (EFR/BAER)	Emergency actions taken during or after wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire. The scope of EFR/BAER projects is unplanned and unpredictable, requiring funding on short notice.
Energy Release Component (ERC)	Number related to the available energy (per square foot) in the flaming front at the head of a fire, from predictions of 1) rate of heat release per unit area during flaming combustion, and 2) duration of flaming.
Fire Management Plan (FMP)	Strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. Supplemented by operational procedures: preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.
Fire Management Unit (FMU)	Area where there are common fire management goals, objectives, and fuels, and where resource uses have been defined. The size of the unit is not important; however, the FMU should relate well to the strategies for managing wildland and prescribed fires that are defined in the FMP.
FMIS	Fire Management Information System, a computer database.
IC	Incident Commander
Incident Command System (ICS)	Combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure with responsibility for managing assigned resources to effectively accomplish specific objective(s) pertaining to an incident.
Keetch-Byram Drought Index (KBDI)	Soil/duff drought index that ranges from 0 (no drought) to 800 (extreme drought), based on soil capacity of 8 inches of water. Index factors are maximum daily temperature and daily and annual precipitation.
LCES	"Look Outs, Communications, Escape Routes and Safety Zones" (a fire safety policy, also the title of a training course)
LINWRC	Long Island National Wildlife Refuge Complex
NFDRS	National Fire Danger Rating System – a system that yields a wildfire damage index based on weather and other factors.
Normal Unit Strength (NUS)	Amount of non-capitalized firefighting equipment needed to meet 70 percent of suppression needs.
National Wildfire Coordinating Group (NWCG)	Interagency operational group to coordinate fire management programs of the participating agencies. The group provides a platform to agree upon policy, standards of training, equipment, aircraft, suppression priorities, and other operational considerations.
NYSDEC	New York State Department of Environmental Conservation
Resource Advisor (RA)	Resource specialist responsible for gathering and analyzing information concerning natural resources and their uses that may be affected by a fire or by fire suppression activities.
Spread Component (SC)	Rating of the forward rate of spread of a head fire.
Wildland Fire Management Program (WFMP)	Full range of activities and functions needed for planning, preparedness, emergency suppression, emergency rehabilitation, and prescribed fire operations. Includes managing fuels to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA)	Decision-making process that evaluates management strategies against selected safety, environmental, social, economic, political, and resource management objectives as selected criteria.
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# I – Introduction

## 1.1 Purpose of a Fire Management Plan

A Fire Management Plan (FMP) provides background, guidelines, standards, and recommendations when dealing with natural fires, human-caused fires (accidentally or intentionally set), operational fires, and prescribed fires. BNL's Wildland FMP provides guidance on the conditions present in the current forest habitat on site, ways to improve upon means for detecting and reacting to fires, and methods for preventing wildland fires from occurring. When implemented, this plan will: 1) safeguard the research mission, life, and property by reducing the risk of widespread fire through reduction of available fuels, and 2) improve habitat for native flora and fauna.

## 1.2 Site Characteristics

### 1.2.1 Location and Topography

Brookhaven National Laboratory is a 5,265-acre site located in the heart of the Central Pine Barrens on Long Island, New York, approximately 60 miles east of New York City and 60 miles west of Montauk Point. Long Island is approximately 120 miles long, east–west, and 20 miles wide at its widest point. The terrain on Long Island is relatively flat and low except along the north shore. Elevation ranges from sea level to 405 feet, with the highest points occurring on east–west moraines along the north shore and the midsection of Long Island. Topography south and east of the moraines is generally flat with a south-facing slope.

Roughly 1,815 acres of the BNL site are developed, leaving about 3,450 acres as undeveloped woodland. The neighboring communities are predominantly residential developments scattered among wooded acreage. Many of the neighborhoods are virtually hidden by screens of overgrown, vine-covered woodland that lines most of the roads and highways. The majority of the woods is not maintained and contains significant amounts of combustible surface litter.

### 1.2.2 Geology and Soils

Six major stratigraphic units that underlie most of Long Island have been identified in test drilling on site (BNL 1977). From the deepest level to the surface, these units include: the Pre-Cretaceous bedrock, the Raritan formation (with two members), the Magothy formation, the Gardiners clay, and the upper Pleistocene deposits. The upper Pleistocene deposits consist primarily of glacial sand and gravel, as well as associated local silt and clay. This unit represents the outwash and moraine deposits of the Wisconsin period. At BNL, the thickness of the highly permeable upper Pleistocene deposits varies between 120 and 250 feet (BNL 2016). The sandiest soil is found on the eastern third of the island. On the south shore coastal plain, soils are typically moister. On the north shore, the soil is typically finer than elsewhere on the island.

### 1.2.3 Vegetation

The vegetative pattern of Long Island is the result of two main processes, fire, and substrate (soil) composition. When explorers and colonists arrived on Long Island during the sixteenth and seventeenth centuries, the vegetative patterns were dominated by pitch pine forest types and warm season grasslands (Villani 1997). Covering most of the central portion of what is now

Nassau County at the west end of the island, the first major vegetative type was the Hempstead Plains—a large and unique grassland dominated by little bluestem, big bluestem, and switch grass. Bordering the Hempstead Plains to the east and extending to present-day western Suffolk County was the oak-brush plains. This area was dominated by a shrubby growth of oak; particularly scrub oak, mixed with other oak species and pitch pine. The next major vegetative group extending from the oak-brush plains eastward to the end of the island was a mix of pitch pine, pine-oak, and oak-pine forests. In the central portion of this region (now the Eastport and Westhampton areas) are the dwarf pine plains, dominated by pitch pine less than 10 feet high, scrub oak, and heath vegetation. On the south shore's coastal plain, pine barrens vegetation also existed. Only on the north shore of Long Island were there hardwood trees of any size. There, the vegetation typically consisted of oak forest without the pitch pine component. Except for the Hempstead Plains, which have been greatly reduced by development, most of the original Long Island ecosystems still exist in varying degrees. A large portion of the eastern half of the island is protected habitat within the Central Pine Barrens.

**Pine Barrens Ecology.** Pine barrens have evolved over hundreds to thousands of years in the presence of frequent fires. As a result, plant and animal species of the pine barrens have become adapted to conditions created by periodic fires. For example, pitch pine seeds germinate and grow best on mineral soil in full sunlight, conditions created when fire burns off surface litter and competing vegetation.

As the pine barrens are found on well drained sandy soils with low nutrients and high acidity, many of the plants in the pine barrens produce waxes, resins, or volatile compounds in their leaves to help retain moisture. These substances tend to be highly flammable. Additional plant characteristics that favor fire include decay-resistant litter of low water-absorbing capacity that accumulates on the soil surface, and abundant dead branches and twigs. Pitch pines are able to survive most fires due to thick, insulating bark and to their unusual ability to rapidly sprout from buds in the trunk and root collar. Shrubs and herbs in the pine barrens also rapidly sprout from underground roots and rhizomes.

Some research asserts that pine barrens species alter their environment to favor their own perpetuation (Noble and Slatyer 1977). Fire-tolerant species promote ignition with their volatile foliage. Fire then consumes the available litter that would otherwise decompose and enrich the soil making it more hospitable for less fire-tolerant species. Reduced nutrient levels favor species that tolerate fire and poor soil, and the presence of these species favors recurring fire. This feedback loop may be destabilized when fires are suppressed or prevented, when nutrients are added to the soil, or by prolonged wet weather. With prolonged fire exclusion (through active wildfire suppression and fire prevention efforts), plant succession ultimately could result in the replacement of pine barrens with oak forests.

At BNL, fire has been aggressively suppressed for at least 75 years and as a result there has been a large buildup of fuels in the forest understory in the form of leaf litter and branches. This fuel buildup could ultimately lead to the spread of a catastrophic wildfire which would not only adversely impact the existing ecology, but potentially endanger structures and human life.

**Unique Role.** What would be lost if pine barrens were converted to oak forests through fire exclusion? We would lose an endangered ecosystem that is an integral part of the natural environment of Long Island and one of only three Atlantic coastal pine barrens ecosystems in the world. We would lose many of the rare species of plants and animals found in the pine barrens. We would lose a landscape element that has historically contributed to the scenic,

cultural, and environmental diversity of Long Island. In sum, we would lose biological, environmental, and scenic diversity.

#### 1.2.4 Hydrology

BNL is situated on the western edge of the relatively undeveloped Peconic River watershed (BNL 2016). The Peconic River, which crosses the site from approximately its northwest to southeast corners, is characterized by a low-gradient streambed and slow flow. The entire Peconic drainage area is considered a Class 1 wetland. Depending on the position of the water table with respect to the riverbed, this shallow river may either receive water from or recharge to the aquifer system underlying Long Island (BNL 2016). During periods of drought, the river is generally recharging to groundwater. During periods of normal to above-normal precipitation, the aquifer is supplying water to the river. In general, little direct runoff from precipitation feeds surface streams on Long Island; about half of the annual precipitation is lost to evapotranspiration and most of the remainder passes readily through the highly permeable glacial sand and gravel to recharge the groundwater.

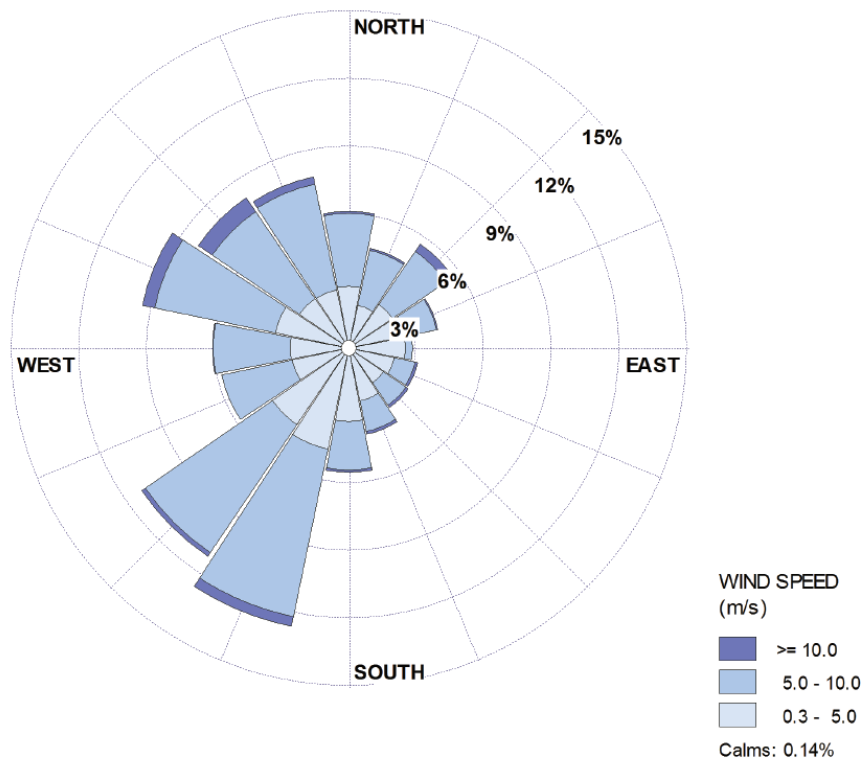
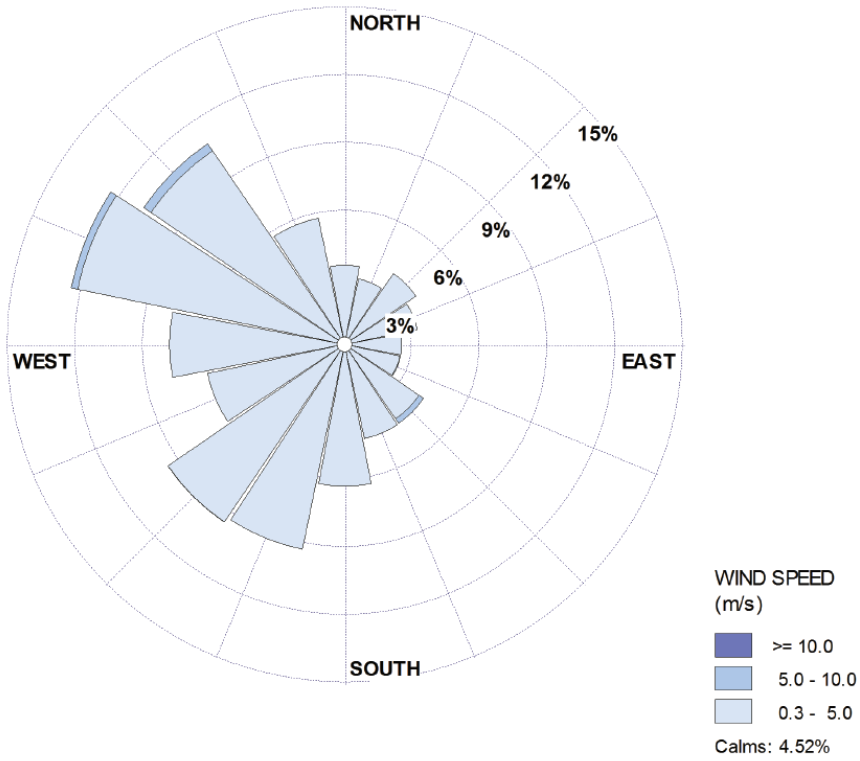
According to the *2015 Site Environmental Report*, BNL draws approximately 1.34 million gallons of groundwater each day to meet its potable water and heating and cooling needs. About 75 percent of this water is returned to the aquifer via on-site recharge basins. The remaining water is either consumed or lost through evaporation or sewer line leaks. Remediation wells are the source of an additional 4.2 million gallons per day of groundwater that is returned to the aquifer using recharge basins (BNL 2016).

In addition to numerous small pocket wetlands that hold water on a seasonal basis, six major regulated wetlands (including the Peconic River drainage area) are also located on site (BNL 2016). The distribution of wet and dry areas on site is well correlated with differences in topography and depth to the water table.

#### 1.2.5 Climate

The climate of Long Island is greatly influenced by the Atlantic Ocean and is categorized as humid continental. The climate is dominated by continental influences, but the proximity of the ocean produces a significant maritime influence. Temperatures are highest in July and August and coldest in January and February. Winds occur from all directions, although winds with a westerly component are most common (BNL 2016). A sea breeze is a common local occurrence at BNL. The hurricane season and tropical storm season is from August through early October. The average total rainfall for BNL is about 48 inches annually.

Wind Roses for 2015



(BNL 2016)

### 1.2.6 Wildlife

Past and ongoing biological inventories of the BNL property have documented numerous wildlife species that permanently reside on or migrate through the site on a seasonal basis (BNL 2016). These include 85 species of nesting birds (as well as an additional 130 species that are not known to nest on site but have been observed there), 15 mammal species, 9 amphibian species, 10 reptile species, 9 species of fish, and hundreds of species of invertebrates. The relatively high number of bird species that are documented for BNL can be attributed to the site's location within the Atlantic flyway and to the scrub/shrub habitats present on site that provide food and shelter to migrating songbirds.

There are a number of species of particular concern residing on site. Chief among these are the rusty-patched bumblebee (*Bombus affinis*) and the northern long-eared bat (*Myotis septentrionalis*), which the US Fish & Wildlife Service has listed as endangered and threatened, respectively; under the Federal Endangered Species Act. These are the first federally listed species that has been documented at BNL. In addition, there are populations of the NYS endangered eastern tiger salamander (*Ambystoma tigrinum tigrinum*), and the NYS threatened banded sunfish (*Etheostoma obesus*), swamp darter (*Etheostoma fusiforme*), and frosted elfin (*Calophrys iris*) (BNL 2016). There are 15 confirmed breeding sites on BNL property for the eastern tiger salamander in vernal ponds and recharge basins. The banded sunfish is known only from the Peconic River system and has been observed in the section of the river on site, while the swamp darter is known to be present at only one location on site. The frosted elfin has not been documented on site within the recent past, but known habitat for this small butterfly remains at the original locations of historic occurrence. Other NYS species that are either found at BNL or are expected to be present include the endangered persius duskywing butterfly (*Erynnis persius persius*), threatened pine barrens bluet (*Enallagma recurvatum*), and the threatened northern harrier (*Circus cyaneus*) (BNL 2016).

### 1.2.7 Cultural Resources

BNL is subject to provisions of both the National Historic Preservation Act and the Archeological Resource Protection Act, which require it to “identify, evaluate, and protect historical and archeological sites eligible for listing in the National Register of Historic Places” (BNL 2016). Thus far, three structural complexes or features on site have been identified as eligible for inclusion on the register: the Brookhaven Graphite Research Reactor Complex, the High Flux Beam Reactor Complex, and the networks of trench warfare training trenches that remain from the days of the U.S. Army's Camp Upton in World War I. BNL has developed a formal Cultural Resource Management Plan that provides guidance for the identification and management of cultural resources including those mentioned above, as well as two archeological sites identified during the plan development.

Of course, BNL's scientific research mission is the primary, albeit intangible, cultural resource on site—it would be directly threatened by widespread wildfire and the resultant damage to invaluable facilities.

## 1.3 **Natural and Historical Role of Fire**

Wildfire has been an important process in shaping the terrestrial vegetative pattern of North America (Pyne 1997a, b). Many habitats in the Northeast belong to fire groupings and regimes that are characterized by “long” (100- to 300-year) return intervals or “very long” (more than 300-year) return intervals between fires (Barbour and Billings 1988, Heinselman 1981). In the

pitch pine barrens of Long Island, both light and severe surface fires as well as stand-replacement crown fires occur at “short” (25- to 50-year) return intervals (Olsvig et al. 1979). In fact, both surface and stand-replacement fires may have occurred every 10 to 40 years. Most of the fires on Long Island prior to European settlement are believed to have been the result of Native American activities relating to land management and hunting. With the construction of the Long Island Railroad in the mid-19<sup>th</sup> century fire frequency and intensity increased (Kurczewski and Boyle 2000). Lightning-sparked fires are less frequent than in the western United States, because lightning strikes on Long Island usually occur in the rainy season and the combustible materials are usually somewhat damp, given the normal annual rainfall. Historically, the warm season grasslands (Hempstead Plains), oak-brush plains, and dwarf pine plains had the highest fire frequencies. Fires also occurred frequently, but not to the same extent as the preceding group, in pitch pine, pine-oak, and oak-pine stands. Fires also were common in the pine barrens vegetation along the south shore. Fires were less common in the forests north of the moraines, on the island’s north shore.

## 1.4 Current Fire Environment

Because of aggressive fire suppression over the past 75 years, a large amount of natural fuels (leaf litter and branches) has built up in the forest understory at the Lab and in surrounding areas. Results of a fuels inventory conducted at the Lab and in other areas of the Pine Barrens in 2016-2017 have indicated that fuel loading is unnaturally high and may create an unacceptable fire hazard. Other serious disturbances such as Superstorm Sandy in October 2012 and a blizzard in February 2013 increased the amounts of coarse woody debris present and thus increased dead fuel loading. Additionally, infestations of the southern pine beetle (*Dendroctonus frontalis*) were discovered throughout the site and are expected to become more widespread. If fuels management is not implemented this may significantly impact the dead fuel loading in the short term as trees die and come down, and may increase live fuel loading in the long term as the opened canopy allows more sunlight to reach the understory causing a flush of new growth. In addition, the increase in downed, dead, heavy fuels creates access issues for firefighters and becomes a safety hazard. Fires ignited in these fuels, under extreme conditions, will be more intense, more difficult to control, and could cause great damage to the forest and structures both at BNL and in the surrounding communities.

### 1.4.1 Wildfire Seasons

On Long Island, wildfires typically occur during two main seasons. Most wildfires occur in the spring—from early March through late May (generally, before leaf out is complete). Fires in these months typically burn just the surface fuels with some localized torching. An exception to this occurred in April 2012 when extreme fire conditions occurred (drought, low relative humidity, and high winds) and an intentional fire was set resulting in running crown fire. The total area burned was estimated at 1,000 acres. The second fire season occurs during the late summer (late July) through early autumn (early October), particularly during drought years. Wildfires during this period are not as frequent, but have the capacity to become larger and more intense.

### 1.4.2 Fuels and Potential Fire Behavior at BNL

Most of the vegetation at BNL consists of pine-oak or oak-pine forest with a dense understory of flammable blueberry and huckleberry. Leaf litter provides a “flashy” fuel: the twigs and branches in the shrub layer ignite easily. Except during spring, leaves of most shrub species will readily burn. The leaves and stems of the shrubs sustain fire and can carry heat and flames

upward to the canopy. In most stands, the dense shrub layer provides a continuous horizontal and vertical source of fuel. Flames three times the height of the shrub layer are common under extreme wildfire conditions. *Crowning* (burning in the tops of trees) and *spotting* (isolated patches of fire spread by wind carrying brands) are a danger when pitch pines are present, because volatile resins in the needles support intense fires during the growing season. High accumulations of standing dead vegetation and coarse woody debris aggravate this situation. Under extreme conditions, the rate of spread, flame height, and intensity under wildfire may exceed the capability of firefighters to carry out a direct attack.

### 1.4.3 Special Hazards

With only about 35 percent of the Laboratory area developed, BNL research facilities can be seen as an island in a forest of fire fuel. Extreme wildfires equivalent to the Rocky Point and Sunrise fires of August/September 1995, which burned approximately 7,000 acres cumulatively, would seriously jeopardize employee safety and Lab facilities. According to an assessment conducted in 2001 using a nationally recognized model for rating wildland fire risk, the hazard severity at BNL is “moderate”. Adequate precautions are in place to minimize the hazards for most major facilities at BNL. Several necessary physical improvements were identified in two analyses performed in 2001 and 2002, outlined in the *BNL Wildland Fire Assessment* and *Wildland Interface Survey* (Appendix F). This FMP is, in part, a response to that analysis.

An initial issue of concern was the possibility for a wildfire to release radioactive contaminants into the air, via smoke. Although some areas at BNL contain small amounts of radioactive contamination in the soil, the majority of these materials are found within the developed area of the Laboratory, which would not be subject to catastrophic wildland fire. Naturally-occurring radioactive materials are present within the soils and vegetation on Long Island, but to become airborne those radionuclides would have to first be present in plant material that burns. Surveys carried out by the Environmental Protection Division at BNL indicate that almost non-detectable amounts of radionuclides are taken up by plants. If such plants were to burn, particles containing trace amounts of radioactive material would be diluted when the column of smoke mixed with air. The hazards just from non-contaminated smoke would outweigh any possible additional dangers from smoke containing traces of radioactive material.

On the BNL site, only one area historically contained levels of radioactive contamination within the soils significant enough to require management actions. In the event of a wildland fire, this area would be managed administratively to protect equipment from contamination. Analysis of a release situation within a fire scenario indicates little or no health risks associated with this incidence, and this scenario has greatly improved due to environmental cleanup and restoration of the area.

Radionuclide sources for research have numerous layers of protection. Sources are sealed and within shielding; there are security alarms and physical barriers in place; there are administrative controls in place; and consequence assessment studies have been conducted. Buildings that contain sources are typically constructed of noncombustible materials, are equipped with fire detection systems, and/or are equipped with fire suppression systems. These measures severely limit the frequency of events and the potential to release radioactive material. BNL also has a Fire Department that is staffed 24 hours a day, seven days a week, with arrival times of less than 5 minutes after an alarm, further limiting fires to small sizes.

## 1.5 Fuel Removal

Paradoxically, a management policy that prevents and suppresses wildland fires could result in catastrophic wildfires that destroy property, and threaten public safety. Such wildfires could occur if there were an unusually large amount of fuel accumulation and a weather pattern involving prolonged drought. If sustained high winds with low humidity (much as in 1995 and 2012) were also to occur in this scenario, the outlook could be grim.

To counter this danger, it is necessary to remove the potential fuels. Removal can be done “mechanically” using heavy equipment and/or skilled labor using hand tools. Fuel removal can also be accomplished by prescribed burning under conditions that are more moderate. In areas where ecological or safety issues are critical, burn areas are carefully selected. The goal of mechanical fuel reduction is the same as burning and the results are often similar, but the difference is the cost because mechanical fuel reduction is often more expensive than prescribed burning. However, when the risks of a burning operation are too high, mechanical fuel reduction may be more appropriate.

## 1.6 Collaboration

BNL routinely works in collaboration with several other organizations involved in wildland fire management including the New York State Department of Environmental Conservation, the U.S. Fish & Wildlife Service, and local volunteer fire departments. BNL annually hosts the New York Wildfire and Incident Management Academy and works collaboratively in development of curriculum and instruction at the Academy.

In collaboration with the Central Pine Barrens Commission, the Ridge and Manorville Fire Departments, and other state and local land management agencies a Community Wildfire Protection Plan (CWPP) has been developed for the Ridge-Manorville-Calverton areas and includes portions of BNL. One of the goals of the CWPP is the implementation of prioritized fuel reduction through mechanical treatments of the forest and prescribed fire. BNL has been identified as a priority site for fuel reduction activities in part because of the fuel loading data that have been collected for the forested areas adjacent to the communities on the northern portion of the Lab and because prescribed fire activities have already been planned for these areas.

## 1.7 Link to Policy

BNL's Wildland Fire Management Plan is a detailed program of action to carry out fire management policies. This plan fulfills the requirements of DOE Order 420.1c (DOE 2012) to protect site resources from wildland and operational fires. Fire management policies discussed in this document are intended to agree with and link to the overall policies of the National Fire Management Plan.

## 1.8 Authorities

Authority and guidance for implementing this plan are found in the following documents:

- DOE Order 420.1c: Facility Safety. Mandates the development of a fire management plan in accordance with NFPA 1143, Standard for Wildland Fire Management.



- Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C.594): Authorizes the Secretary of the Interior to protect from fire, lands under the jurisdiction of the Department directly or in cooperation with other federal agencies, states, or owners of timber.
- Economy Act of June 30, 1932: Authorizes contracts for services with other federal agencies.
- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856 a and b): Authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency lands in suppressing fires when no agreement exists.
- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121): Authorizes federal agencies to assist state and local governments during emergency or major disaster by direction of the President.
- Wilderness Act of 1964: Provides guidelines for minimum tool use in administering wilderness areas.
- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C.2201): Provides for reimbursement to state or local fire services for costs of firefighting on federal property.
- Wildfire Suppression Assistance Act of 1989. (Pub. L 100-428, as amended by Pub. L 101- 11, April 7, 1989).
- National Environmental Policy Act of 1969: Regulations implementing the National Environmental Policy Act (NEPA) encourages the combination of environmental comments with other agency documents to reduce duplication and paperwork (40 CFR 1500.4(o) and 1506.4).
- Clean Air Act (42 United States Code (USO) 7401 et seq.): Requires states to attain and maintain the national ambient air quality standards adopted to protect health and welfare. This encourages states to implement smoke management programs to mitigate the public health and welfare impacts of wildland and prescribed fires managed for resource benefit.
- Endangered Species Act of 1973.
- Federal Fire Management policy of 1995 (2009 Review and Update): Establishes a national policy for all agencies involved with wildland fire.

## II – WILDLAND FIRE MANAGEMENT STRATEGIES

The term *wildland fire* includes natural or “wild” fires, and fires caused by man, both accidental and prescribed fires (intentionally set for ecological and/or fuel management purposes) that occur in undeveloped land or at the interface between undeveloped and developed land (the *wildland–urban interface*). *Wildland fire management* includes the suppression of wild fires in the wildland and the use of prescribed fires to meet wildland management goals.

### 2.1 Fire Management Goals

The goals of the fire management program include:

- Ensure protection of life.
- Ensure protection of property and research programs.
- Improve overall health of BNL forests and ecosystems.
- Reduce fuel loading to lessen incidence of catastrophic fire through prescribed fire and mechanical treatment.

## 2.2 Wildfire Suppression

The suppression strategy for wildfires occurring at BNL and the Upton Reserve will be based on the appropriate management response. Minimum Impact Suppression Techniques (MIST) will be used whenever possible. Natural and human-made barriers will be used to the fullest extent possible in suppressing wildfires. However, fires occurring in the wildland–urban interface with high potential for causing damage to property or threatening human life and health will be aggressively suppressed using the most appropriate means. Suppression strategies included the following measures:

- When possible, suppress wildfires through indirect attack by use of fire/fuel breaks.
- Limit wildfires to the smallest acreage loss possible.
- Minimize ecological damage by limiting use of vehicles in forest.
- Conduct prescribed fires to improve or maintain wildlife habitats and remove fire fuel; specifically, to maintain forest openings and pine barrens vegetation, to reduce fuel loads and remove exotic/invasive nuisance vegetation, and to manage for insect pests appropriately.
- Monitor fire weather conditions daily and base management decisions on current and predicted fire conditions.

## 2.3 Limits on Suppression Actions

Wildfire suppression activities are limited by the following considerations:

- Accessibility to certain areas by vehicles.\*
- Equipment may limit response or suppression options and timing\*
- No impact to water resources may occur, such as significant water drawdown of ponds.\*
- Aerial and foam retardants will not be used within 300 feet of open water, waterways, and wetland areas.
- Plow lines must be rehabilitated to avoid unnecessary erosion and habitat fragmentation.

\*Note: These are not major concerns for BNL.

## 2.4 Limits on Prescribed Fires

Prescribed fire activities are limited by the following considerations:

- All prescribed fire operations will be conducted in accordance with federal and state laws and regulations.
- Prescribed fire will not be used in areas with known environmental contamination (Appendix F).
- Prescribed fire will not occur in a fire management unit until vegetation monitoring has occurred.
- Prescribed fire will not be conducted without full concurrence of BSA and DOE management.

## 2.5 Fire Management Units

BNL will be managed as two Fire Management Units (FMUs) with specific fire management goals and objectives. These two FMUs will be the Upton Reserve (FMU 1) and the rest of BNL

(FMU 2). Each unit may be divided into smaller sub-units to facilitate development of prescribed or mechanical treatment management plans. The two units have similar fuels and expected fire behavior, but have different operational objectives.

### 2.5.1 Fuels

A quantitative basis for rating fire danger and predicting fire behavior is based on mathematical models that require descriptions of fuel properties as inputs. The collections of fuel properties have become known as fuel models and can be organized into four groups: grass, shrub, timber, and slash. A custom fuel model has been developed for BNL based on down woody fuel (dwf) transects and harvest plots. The principal fuels of the forest stands throughout BNL are the leaf litter, portions of the woody understory, and downed woody material. The understory is dominated primarily by ericaceous species like blueberry (*Vaccinium spp.*) and black huckleberry (*Gaylussacia baccata*), which produce waxes and oils that not only serve to protect the plant from insects and drought, but make these species flammable and burn hot (Joint Fire Science Program 2008).

A fuels inventory was conducted in 2016-2017 in stands located in the northeast portion of the Lab, and it was determined that fuel loading was fairly high in most of the area and could result in more intense fire behavior. Data from this fuels inventory suggest that though the Crescent Bow Fire in 2012 significantly reduced fuel loading in the burn units impacted by it, it is rapidly rebounding and continual monitoring must be conducted to determine when fire risk increases to the point where management will be required. An assessment of fuels in other portions of the Lab needs to be conducted to determine fuel loading and to plan for additional prescribed fire and mechanical treatments. Current Prescribed Burn Plans will have more specific fuels information by area, as well as predicted fire behavior.

### 2.5.2 Wildland Fire Management Strategies

**Table 1. Fire Management Strategies**

<b>Management Options</b>	<ul style="list-style-type: none"> <li>▪ Fire Suppression</li> <li>▪ Prescribed burning</li> </ul>
<b>Resource Management Goals</b>	<ul style="list-style-type: none"> <li>▪ Protect life and natural resources/property (wildland–urban interface) from the effects of catastrophic wildfire.</li> <li>▪ Limit smoke impacts to the surrounding communities and BNL facilities.</li> </ul>
<b>Unit Objectives</b>	<ul style="list-style-type: none"> <li>▪ Suppress wildfires using the appropriate management response commensurate with firefighter and public safety and values of the natural resources and properties at risk.</li> <li>▪ Use minimum-impact fire suppression tactics (MIST) as appropriate.</li> <li>▪ Employ aggressive mop-up tactics to prevent smoldering fires and minimize smoke production and impacts.</li> <li>▪ Use prescribed fire and mechanical treatments to reduce hazardous fuel loadings where/when appropriate.</li> <li>▪ Use prescribed fire with other methods to maintain habitat and control encroachment of invasive species.</li> </ul>
<b>Unit Strategies</b>	<ul style="list-style-type: none"> <li>▪ Identify areas of concern and develop response plans and tactics to expedite the initial attack and full suppression of the fire.</li> <li>▪ When possible, use natural barriers other than line construction as holding lines during suppression operations.</li> <li>▪ Develop a prescribed fire plan, as necessary, for identified fuel and ecosystem management objectives.</li> <li>▪ Use federal assets when fire goes to an extended attack situation.</li> </ul>

<b>Limits on Actions</b>	<ul style="list-style-type: none"> <li>▪ Mechanical equipment should only be a last resort during extreme drought to halt the spread of a wildfire or to protect life and natural resources or property, and under the recommendation of the Natural Resource Manager.</li> <li>▪ Limit use of aerial retardants within 300 feet of open water or waterways.</li> <li>▪ Soil conditions may make access difficult.</li> </ul>
<b>Special Concerns</b>	<ul style="list-style-type: none"> <li>▪ Smoke may impact public health, traffic, BNL scientific facilities, and adjacent developments.</li> </ul>

## III – PLANNING

### 3.1 Annual Planning

Wildfire preparedness plans for BNL are periodically reviewed and updated by BNL Emergency Services, Facilities and Operations, and the Natural Resource Manager. Updates are distributed to affected parties and record copies are filed at Building 599. The national wildland fire strategies include *Annual Operations Plan*, *Detection and Dispatch Plan*, *Communications Plan*, and the *Pre-Attack Plan*. BNL has adapted the elements of the national plan to fit local conditions. These adaptations are explained below. Although it is not exactly a “fire preparedness” plan, *Prescribed Burn Plans* (maintained by the Natural Resource Manager), are reviewed yearly and are part of the overall fire management strategy.

#### 3.1.1 Annual Operations Plan

The *Annual Operations Plan* requires the following actions under the leadership of BNL Fire/Rescue with input from the Natural Resource Manager, when necessary:

- Review Suffolk County Mutual Aid Agreement. (Fire Chief)
- Update the detection and dispatch elements contained in BNL Fire Rescue Group’s “*Wildland Fire Response Procedure*.” (Appendix E - Fire Chief)
- Review the communication plan elements and assigned radio frequencies in the “*Brushfire Response Plan*.” (Appendix E - Fire Chief)
- Review staffing and availability for prescribed fire planning. (Burn Boss of each prescribed fire)
- Review firebreak needs and identify the need for maintenance to Facilities and Operations. (Fire Protection Engineering)
- Complete any needed updates to *Prescribed Fire Plans* and submit for review following Appendix D – Sample Prescribed Fire Plan, so they can be approved by the spring of each year. (Natural Resource Manager and Burn Boss)
- Carry out site preparation for prescribed burns. (Natural Resource Manager)

#### 3.1.2 Detection and Dispatch Plan

Because BNL resides in a suburban area, it relies on internal area patrols by the BNL Police Group along with cooperators/neighbors, staff, and visitors to detect and report fires. Beyond that reliance on the general public for detection, there is no further detection plan in place. The national wildland fire “*Detection and Dispatch Plan*” requirements for dispatch are represented in BNL’s “Wildland Fire Response Procedure” Standard Operating Procedure (<http://intranet.bnl.gov/lpd/emgsvcs/FRSOP.asp>). This procedure is reviewed and updated

tri-annually. Copies are forwarded to the Suffolk County Fire/Rescue communication center. Emergency Services maintains all of their standard operating procedures (SOP) on the web (<http://intranet.bnl.gov/lpd/emgsvcs/FRSOP.asp>).

### **3.1.3 Communications Plan**

The national wildland fire standard for a *Communications Plan* specifies the means for firefighters to maintain contact. The conditions are inherent in the way business is conducted on Long Island and within the fire departments of Suffolk County. It is also part of the standardized training offered within Suffolk County. Therefore, a separate Communication Plan document does not exist. The following list highlights these conditions and explains how they are implemented:

- *Intra -Complex* - The BNL high band VHF radio system is the primary communication link for Lab operations involving BNL entities. Each piece of apparatus is assigned a mobile radio with BNL frequencies. Each firefighter and key person is assigned a portable with BNL frequencies. This is augmented by the use of cellular telephones for management personnel and key resources within the BNL emergency responder system.
- *Fire Operations* - Radios are issued to key positions and at least one per group while on fire operations. Local tactical frequencies are assigned during fire operations. As a back-up, cellular telephones are provided and tested to assure communications.
- *Interagency* - Suffolk County has a system of assigned low-band VHF radio frequency based on usage. The county is broken into divisions, with corresponding radio frequency channels assigned to groups of divisions. Mutual aid frequencies are established to facilitate responses involving large numbers of departments. However, departments often have adjacent divisions' frequencies within their radio units for smaller interagency operations. In the event of an incident needing Suffolk County interaction, BNL moves their radio operations to the Suffolk County frequencies (all BNL mobiles have low-band VHF Suffolk County radios). A limited number of extra BNL high-band VHF radios are also maintained by the Lab to provide to Suffolk County and allow them to operate on BNL government frequencies, if needed.

### **3.1.4 Pre-Attack Plan**

Pre-attack planning is outlined in BNL's "Wildland Fire Response Procedure". This SOP is updated tri-annually. Pre-attack resources are posted on the web and provided in the Command Vehicle. Pre-attack planning resources include:

- Response map(s): structures, restricted areas, boundaries, roads, gates, trails, and water sources;
- Mutual aid zones/fire coordinators' districts (includes map with boundaries);
- Hazard/Risk map: contaminated areas/zones, rivers and streams, power lines, main ditches, canals, and trenches;
- Natural and Cultural Resources map: sensitive zones, non-sensitive zones, restricted vehicle access areas;
- Structure use list.

### **3.1.5 Prescribed Burn Plan**

The Prescribed Burn Plans are described in Section VI of this document.

### 3.2 Fire Weather and NFDRS Indices

The Central Pine Barrens Joint Planning and Policy Commission maintains an automated weather station. Throughout the fire season, the Natural Resource Management staff monitors the NFDRS indices, drought severity (on the KBDI scale, see Appendix A), 1000-hour fuel moisture, and associated weather trends that may contribute to limits of acceptable fire control.

Fire weather is provided to Suffolk County Fire Rescue and Emergency Services (SCFRES) on a daily basis. SCFRES communicators announce the fire weather on the dispatcher frequency (46.46) each day at approximately 1400 hours. An alert is issued by BNL Fire/Rescue during High or Extreme fire weather.

Additionally, BNL maintains a series of atmospheric weather sensors for measurement of real time weather conditions and publishes that data, including local KBDI, in one-minute intervals for use by emergency response staff.

### 3.3 Wildland–Urban Interface

As urban/suburban development continues, cooperative planning with the NYSDEC Forest Rangers will be necessary to ensure public and resource protection and safety. BNL must plan for an increasing wildland–urban interface. Wildland–urban interface planning includes:

- Identify and map facilities, resources, and adjacent public and private property that need protection.
- Use mechanical (and potentially chemical) means and prescribed fire to reduce fuels and create/maintain firebreaks and fire access roads.
- Participate in public information and education programs provided by the Wildfire Task Force of the Central Pine Barrens.

In collaboration with the Central Pine Barrens Commission, the Ridge and Manorville Fire Departments, and other state and local land management agencies a Community Wildfire Protection Plan (CWPP) has been developed for the Ridge-Manorville-Calverton areas and including portions of BNL. One of the goals of the CWPP is the implementation of prioritized fuel reduction through mechanical treatments of the forest and prescribed fire. BNL has been identified as a priority site for fuel reduction activities in part because of the fuel loading data that have been collected for the forested areas adjacent to the communities on the northern portion of the Lab and because prescribed fire activities have already been planned for these areas. Implementation of a CWPP may make the Lab eligible for funding for these activities, which has been a limiting factor in the implementation of our fuel reduction program.

### 3.4 Normal Unit Strength (NUS)

#### 3.4.1 Staffing, Qualifications and Physical Fitness

The table located in Appendix D indicates the adequate staffing for the BNL fire program. These positions should be identified and available for assistance from within BNL staff and cooperators.

Cooperators for the fire program at BNL include several local volunteer fire departments, the BNL Fire Department, and the NYSDEC Forest Rangers.

All fire personnel involved in federal fire management activities must meet the fitness standards established by their agency. All personnel will have as a minimum in training the fire courses S130/S190 (or equivalent). Physical requirements will include a score of “arduous” (or equivalent) for the pack test for hand crews and a score of “moderate” (or equivalent) via the work capacity test for members of engine crews. (Note: State Agencies have similar requirements for qualifications that are considered appropriate for fire management and prescribed fire.) BNL’s Fire Rescue Group adheres to NFPA fitness standards, which includes an annual test of aerobic capacity using a US Department of Labor Physical Demand Level (PDL) scale. A PDL of “heavy” is typically required for firefighters and those who wish to participate in prescribed fire activities at the Lab will be held to this standard. Those who cannot perform to this standard will not be permitted to participate in prescribed burns.

Anyone practicing for a physical fitness test or actually taking a physical fitness test must first read and sign the PAR-Q health-screening questionnaire and an informed consent form. If a person who is being tested to achieve a “moderate” or “arduous” rating answers “yes” to any of the questions in the PAR-Q health screening questionnaire, the test administrator recommends a physical examination prior to training or the test. Furthermore, an exam is required for individuals over 40 years of age. A trained and qualified American Red Cross Responder (or equivalent) that can recognize symptoms of physical distress and administer appropriate first aid procedures must be on the site during the fitness test. Fitness tests shall not be administered to anyone who has obvious physical conditions or known heart problems that would place them at risk.

#### **3.4.2 Equipment**

The BNL Fire Department is supplied and staffed and is capable of handling initial response to all emergencies on site. In addition to the resources of the BNL Fire Department, the following supplies are available through interagency mutual aid if conditions warrant:

1. Slip-on units are loaded and fully functional. The engine is outfitted to a type VII standard, as described in the *NWCG Fire Line Handbook*.
2. The fire cache is adequately supplied.
3. A dozer and fire plow are available for all critical fire activity periods.
4. All portable pumps are functional, and pump kits are complete. Pump fuel is mixed and available.
5. All chainsaws are functional and available.
6. Hand tools are adequately maintained and safe to use.
7. 3,000 gallon water tanker - filled and on standby.
8. 1100 gallon water trailer - filled and on standby
9. Wildland sprinkler trailer is functional and available

#### **3.4.3 Firefighting Water Supply**

The central campus of the BNL site is supplied with high volume fire hydrants throughout for structural fire protection; however, those hydrants do not extend into the remote areas of the site. Experience has shown that round trip, water re-supply runs are lengthy and a plan was developed to make water available in the remote areas of the site. BNL has a series of groundwater sampling wells throughout the site and 19 shallow wells in 10 areas have been designated for firefighting use. These wells supply water at a rate of approximately 40 gpm using electric powered submersible pumps

stored on the aforementioned sprinkler trailer. A high volume (750 gpm) drafting well was also installed on the East Fire Break. Additionally, the Groundwater Protection Group has developed a procedure for the use of the groundwater remediation wells along the south boundary as a high volume (750 gpm) source of water for fire suppression.

#### **3.4.4 Personal Protective Equipment (PPE) – Prescribed Fire Only**

All firefighters will be issued the required personal protective equipment from the NYSDEC fire cache if needed. This includes Nomex pants and shirts, gloves, helmet, field pack with complete fire shelter, and a personal first aid kit.

#### **3.4.5 Engine**

BNL engine 3 (Brush truck) is the primary initial attack resource on wildfires. Engine 2 is the secondary pumper, which can carry water but has a limited ability to go off hardpan. These resources are staffed 24 hours a day, all year round.

#### **3.4.6 Annual Training and Refresher**

The goal of BNL fire training is to maintain fully qualified individuals to meet the objectives of this plan. Employee development training is a secondary priority, depending on budget limitations. To reduce training costs, BNL takes advantage of training programs offered locally through the annual NY Wildfire and Incident Management Academy held at BNL and the Suffolk County Fire Academy.

All personnel involved in prescribed fire management activities are required to participate in 8 hours of fire management refresher training annually to be qualified for fire management activities in that calendar year. Refresher training concentrates on local conditions and factors; the Standard Fire Orders; “Look Outs, Communications, Escape Routes and Safety Zones” (LCES); “18 Situations and Common Denominators;” NWCG courses: Standards for Survival, Lessons Learned, and Look Up, Look Down, Look Around; and others to meet the firefighter safety requirements. Efforts are made to vary the training and use all or portions of other NWCG courses to cover the required topics. Annual training also includes practice on how to deploy and use a fire shelter under simulated adverse conditions, a review of BNL’s fire procedures, and the operation of all BNL fire equipment as applicable to specific duties.

## **IV – SUPPRESSION OPERATIONS**

### **4.1 Suppression Planning**

With careful planning, land managers can reduce the damage resulting from wildfires and wildfire suppression in all areas of BNL. This is especially important in developed facilities, critical research areas, contaminated areas, habitat crucial to threatened and endangered species, and cultural or historical sites. Areas susceptible to wildfire risk have been identified and methods have been implemented to reduce the probability of a damaging fire. These actions are included in the *Pre-Attack Plan* for each Fire Management Unit. These actions are communicated to suppression forces through annual training and through briefings in times of actual fire.



Road access to the forested areas was evaluated in 2016 and efforts are underway to improve the fire access road conditions including removing downed trees, cutting back encroaching brush, regrading, and adding signage to indicate location.

## **4.2 Initial Attack**

For any wildfires occurring at BNL, the BNL Fire Department is in charge of all suppression activities. An *initial* attack is a response that does not exceed 24 hours' duration, threaten persons or property off site, or require additional forces from outside BNL. Due to the nature of the BNL site and its proximity to two outside fire districts, wildland fires are occasionally detected and responded to by outside fire departments. These departments inform the BNL Fire Department of their actions. This type of situation would be included as an "Initial Attack" classification.

## **4.3 Resource Advisor**

A resource advisor (RA) is someone who is responsible for gathering and analyzing information concerning critical areas and natural resources that may be impacted by fire or fire suppression activities. At BNL, the Natural Resource Manager is the RA. This person is a crucial link between the fire suppression forces and the Lab. This person reports to the Planning Chief as a technical resource.

## **4.4 Extended Attack**

An *extended* attack is required when a fire is likely to last longer than 24 hours, threatens adjacent public or private lands, or exceeds the capabilities of the BNL Fire Department assisted by on-site fire-trained personnel. The DOE Site Area Manager or designate is notified upon extended attack actions, and may coordinate with appropriate BNL officials. Actions may include:

- Completing a Delegation of Authority form (Appendix C), if needed;
- Completing a Wildland Fire Situation Analysis (WFSA) and holding a daily review of that plan with the necessary parties;
- Notifying DOE to request additional state and federal resources.

# **V – PRESCRIBED BURNS**

Each prescribed burn has a unique set of goals or objectives. After each prescribed burn is completed, a report is produced (generally as part of the Annual Report on activities associated with the Natural Resource Management Plan), documenting the amount of fuel reduction, extent of invasive species reduced, and so on. If the goals were not achieved, the report will also state what could have been done differently to achieve the objectives. Some goals require pre- and post-fire vegetation monitoring for accurate evaluation; post-fire monitoring can extend for up to 5 years.

## 5.1 Program Overview

The Central Pine Barrens of Long Island is a fire-adapted vegetative type that, in the absence of fire, will change in composition and structure and adversely affect other natural resources. The purpose of the BNL/Upton Reserve Prescribed Fire Program is 1) to use fire as a controlled, management tool for reducing available fuel, 2) to maintain fire-dependent communities such as pine barrens habitats and warm-season grasslands, and 3) to reduce or eliminate exotic nuisance vegetation. The Natural Resource Manager is the lead for developing and implementing the Annual Prescribed Fire Program, working in cooperation and coordination with BNL Fire Rescue and NYSDEC.

## 5.2 Limits on Prescribed Burning

Most prescribed burning will be low to moderate in complexity. Only wildfire-qualified persons with training and the skills necessary to plan, execute, and evaluate the burn program will be used. Usually a burn crew consists of a qualified Burn Boss (RxB2) and additional fire-qualified individuals. Additional team members may be requested as required from the New York State Forest Rangers, BNL Fire Department, and/or other qualified cooperators and partners, and local volunteer fire departments.

The following limits have been identified for the Prescribed Fire Program:

- Public safety must not be endangered by the location or extent of a prescribed burn.
- The prescribed fire must not negatively impact the wildland–urban interface.
- Staffing requirements must be met, despite transfers of fire-trained individuals.
- A qualified Burn Boss (minimum RxB2) must be available.
- DEC, BNL, or cooperator burn crews must be available.
- Appropriate pre-fire vegetation sampling characterization or analysis data must be done.
- No known radioactively contaminated soils/vegetation may be involved.
- Personnel must establish and review safety criteria.
- Area to be burned must be within fuel breaks or appropriate fire lines established for each burn.
- Go/No Go checklist must be completed and approved by DOE and BNL designated managers.

## 5.3 Smoke Management

To minimize negative impacts to visibility and to maintain air quality, plans for prescribed burns must provide for aggressive action to manage smoke. Visibility and clean air are primary natural resource values and the protection of these resources is given full consideration in fire management planning and operation. BNL complies with all applicable federal, state, interstate, and local air pollution control requirements, as specified within Section 118 of the Clean Air Act, as amended (42 USO 7418). That Act establishes Class I, II, and III areas where emissions of particulate matter and sulfur dioxide are to be restricted. The restrictions are most severe in Class I areas in wilderness areas exceeding 500 acres. However, BNL contains no federally designated wilderness areas.

New York State has developed several implementation plans to administer the Clean Air Act. An approved burn plan is required to conduct prescribed fires in NY State. Since BNL is a federal facility, the NYSDEC does not need to approve the burn plan; however, as a best management practice and because a NYSDEC Ranger may act as the burn boss at BNL, they review and comment on BNL burn plans. In addition, a technical review is conducted by an outside agency/organization, such as the USFWS.

A section on smoke management is included in each prescribed fire, detailing specific actions to be taken to mitigate the impacts of smoke. Aggressive mop-up must be initiated on wildfires that have the potential to produce levels of smoke that may impact human health or safety.

## 5.4 Approvals

BNL's Natural Resource Fire Management Specialist, working with the expertise of the NYS Forest Rangers and others, will annually formulate the prescribed burn program and assign a burn boss. The burn boss will review the *Prescribed Burn Plan* (see blank version in Appendix D), which is then submitted for review to the NYSDEC Forest Rangers.

The NYSDEC reviews, provides comments, and approves the burn plan in lieu of a formal permit because, as a state agency, it has no regulatory authority over a federal facility. There are currently no air quality permits required; however, careful monitoring of changing state regulations is necessary to ensure any open burning is done in compliance with regulations. All prescribed burning restrictions or notifications imposed at the state, regional, or national level, as determined by preparedness level, shall be adhered to.

The technical review of a prescribed burn plan serves as both the safety review and work planning documentation. The final authorization and approval for any prescribed fire at BNL comes from the DOE Site Area Manager (Cognizant Field Element).

Work associated with the preparation of a prescribed fire unit must be covered under the BNL Work Planning and Control permit process and documentation.

## 5.5 Burning Season

Ideally, growing season burns will be conducted; however, weather conditions, opportunities, or objectives may allow burns to be conducted any time during the year. A Prescribed Burn Plan (Appendix D) is a thorough document that details who, what, when, where, and why the burn will be done.

## 5.6 Complexity

Complexity for individual burns is calculated using the National Wildfire Coordinating Group (NWCG) *Prescribed Fire Complexity Rating Guide*. This guide requires planners to consider the following factors:

1. Potential for escape
2. The number and dependence of activities
3. Values of property at risk
4. Fuels/Fire behavior

5. Size of prescribed burn team
6. Magnitude of oversight/political activities
7. Fire treatment objectives
8. Environmental constraints
9. Safety
10. Ignition procedures/methods
11. Interagency problems
12. Project logistics
13. Special features inside fire area
14. Smoke management
15. Fuel breaks

The overall rating is assigned as Low, Moderate, or High, based on the potential risk, potential consequence, and technical difficulty of each element. This in turn helps to establish the degree of difficulty that is involved, suggest whether the personnel resources available can execute the planned fire, and identify specific elements or characteristics of a planned burn that pose special problems or concerns. In short, it can be thought of as a “Go, No Go” checklist to a planned event before the fire is ignited.

Once the complexity of a proposed burn has been calculated, that index is stated in the *Prescribed Burn Plan*. Many of the planned burns at BNL would ordinarily be in the Low complexity category. However, air quality considerations and BNL’s proximity to developments and busy highways may elevate some burns to the Moderate complexity level.

## 5.7 Preparation and Implementation

Site preparation needs are identified and specified within the *Prescribed Burn Plan*. These will be carried out prior to ignition, and approved by the Burn Boss. The Burn Boss may impose additional site preparation needs or request additional holding requirements based on potential escape and risk involved. No prescribed burning will occur when a wildfire is in progress within BNL, when fire danger indices are above “moderate,” or when New York State or Suffolk County has issued a burning restriction.

## 5.8 Monitoring and Evaluation

All prescribed burning performed at BNL is documented by BNL personnel. Additional monitoring needs for fuel reduction and habitat response consist mainly of photos that show whether the burn objectives and resource objectives have been accomplished. No special equipment is necessary for monitoring fire behavior. Most burns are of low to moderate intensity and easily measured through rate of spread and flame-length observations. Should more conclusive fire behavior and effects information be necessary, it will be documented within the Annual Prescribed Burn Planning process.

## 5.9 Guidelines for Prescribed Burns at BNL and Upton Reserve

For the type of prescribed burning occurring at BNL, follow these guidelines:

- Conduct the burn according to the terms and conditions of the approved burn plan.

- Burn only when existing wind speed, wind direction, and atmospheric conditions (such as inversions or when stagnant air conditions are evident) will not create any nuisance conditions. Burn on days when wind directions will carry smoke away from sensitive areas.
- Conduct burning only when visibility exceeds 4 miles and when the fire weather forecast indicates that mixing heights are greater than 1500 feet and any unstable air mass is at least that distant.
- Burn when fuels are reasonably dry, at least 2 days after a significant precipitation event.
- Reduce residual smoke by mopping up stumps and snags quickly.
- Use backing and flanking fires, when possible, to minimize particulate emissions. (Backing and flanking fires emit 3 to 5 times less particulate matter than head fires.)
- Inform media and other public affairs offices of fire and smoke dispersal conditions throughout the burn.
- Ensure proper approvals – BNL Management, BNL Fire Chief, DOE Site Area Manager (no prescribed fire action will be conducted without BNL and DOE approval on Go/No Go checklist).

## **VI – COMMUNITY FACTORS**

### **6.1 Public Safety**

Safety of wildland firefighters, prescribed fire burn crews, and the general public is the priority goal. This section deals with the safety of the visiting public and BNL's neighbors. In several sections of this plan, references have been made regarding the safeguarding of human life. The references have been in two forms: 1) reducing fuel loadings to lessen the intensity of wildfires, and 2) managing wildfires and prescribed burns in such a manner as to reduce the likelihood of accidents or injuries. The following actions will be taken to safeguard human life:

- The fuels in the wildland-urban interface will be managed in a manner that is designed to reduce fuel loading near human habitation.
- All prescribed fire operations will be conducted in accordance with an approved plan.
- All prescribed fire operations will be conducted in accordance with all applicable federal and state laws, regulations, and policy statements.
- Specific actions to be taken during prescribed burns will be indicated in prescribed burn plans.

The greatest concern is the safety of all suppression personnel and the public when a wildland fire or prescribed burn is in progress. Only properly trained and qualified personnel shall be assigned. Unqualified individuals at the incident should be relieved from suppression duty or be reassigned to a non-fireline function when adequate initial attack forces arrive. The fire scene must be secured from the public for their own protection. Depending on the complexity of the incident, access may have to be controlled.

### **6.2 Public Information and Education**

The BNL Stakeholder and Community Relations Office, working with the NYSDEC Forest Rangers and the Long Island Pine Barrens Commission will use existing prevention and public education programs regarding fire on wildlands. Additional public education materials on fire

may be developed and shared with BNL's employees and stakeholders. Public education is necessary to garner support and understanding for any fire management program.

Within the Incident Command System, a Public Information Officer position is identified. This person is responsible for formulating and releasing information about an incident to the news media, incident personnel, and other agencies. Communications to the news media, other non-regulatory agencies, and so on are presented through the BNL Media and Communications group. Prescribed burns will be communicated through the BNL Community Involvement program. The *BNL Wildland Fire Hazard Severity Analysis, Issues and Needs* document (Appendix F) is a detailed document that covers specific issues concerning community factors.

## VII – REFERENCES & SUPPORTING LITERATURE

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## APPENDIX A: DEFINITIONS AND ACRONYMS

Agency Administrator	Appropriate-level manager with organizational responsibility for managing an administrative unit. Varies with the group but includes: BLM - Director, State Director, District Manager, Field Manager DOE - Area or Site Office Manager FWS - Director, Regional Director, Complex Manager, Project Leader NPS - Director, Regional Director, Park Superintendent, Unit Manager BIA - Director, Office of Trust Responsibility, Area Director, Superintendent
Anchor Point	Advantageous location, generally a fire barrier, from which to start constructing a fire line; used to minimize the chance of being outflanked by the fire while the line is being constructed.
Appropriate Management Action	Specific actions taken to implement a management strategy.
Appropriate Management Response	Specific actions taken in response to a wildland fire to implement protection measures and meet fire-use objectives.
Appropriate Management Strategy	Plan or direction, selected by an agency administrator that guides fire management actions to meet protection and fire-use objectives.
Appropriate Suppression	Selecting and implementing a prudent suppression option to avoid unacceptable impacts and provide for cost-effective action.
Backing fire	Predetermined strategy for setting a fire along the inner edge of a fire line to consume fuel in the path of a wildfire and/or change the direction or force of the fire's convection column.
Bureau	Bureaus, offices, or services of the Department of the Interior.
Burning Index (BI)	Estimate of the potential difficulty of containing a fire, related to the flame length at the head of a fire. BI divided by a factor of 10 indicates approximate flame length. The BI traces seasonal trends reasonably well and is used by the agency for determining initial action resource needs (Step-Up Planning) <i>based on fire potential only</i> .
Burning out	Setting fire inside a control line to consume fuel between the edge of the fire and the control line. Used to widen control lines during line construction or to eliminate unburned fuels inside the control lines after containment.
Chain (ch)	Unit of measure equal to 66 feet. 80 ch equals 1 mile; 10 square ch equals 1 acre. Commonly used to report fire perimeters and calculate fire size.
Class (size of wildland fire)	Class A - ¼ acre or less Class B - more than ¼ but less than 10 acres Class C - 10 acres to 100 acres Class D - 100 to 300 acres Class E - 300 to 1,000 acres Class F - 1,000 to 5,000 acres Class G - 5,000 acres or more
Cold trailing	Method of confirming what appears to be a dead fire edge by careful inspection and feeling with the hand to detect any fire, and extinguishing it by digging out every live spot and trenching any live edge.
Confine/Contain/Control	These terms, when used in the context of suppression strategies, are confusing because they also have tactical meanings. <i>Confine</i> is to keep within bounds or to restrict. For fire reporting purposes, <i>containment</i> implies the completion of a fire line around a fire and any associated spot fires; this can reasonably be expected to stop the fire's spread. <i>Control</i> is a point in time where fire suppression actions have removed any threat of fire spread.

Convection column	Rising air generated by a fire.
Duff	Accumulated leaf litter and decaying vegetation on a forest floor.
Emergency Fire Rehabilitation/ Burned Area Emergency Rehabilitation (EFR/BAER )	Emergency actions taken during or after wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire. The scope of EFR/BAER projects is unplanned and unpredictable, requiring funding on short notice.
Energy Release Component (ERC)	Number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. The National Fire Danger Rating System, a computer model of fire weather and its effect on fuels, generates the ERC. The ERC incorporates thousand-hour dead fuel moistures and live fuel moistures. Day-to-day variations are caused by changes in the moisture content of the various fuel classes. The ERC is derived from predictions of 1) the rate of heat release per unit area during flaming combustion, and 2) the duration of flaming.
Extended attack	Fire response where initial attack forces are reinforced by additional forces, or an attack lasting longer than one 24-hr period.
Fire break	Natural or constructed barrier used to stop or slow the spread of a fire or to provide a control line from which to work.
Fire effects	Any consequences to the vegetation or the environment resulting from fire, whether neutral, detrimental, or beneficial.
Fire hazard	Fuel complex—defined by volume, type, condition, arrangement, and location—that determines the degree and ease of ignition and/or resistance to control.
Fire intensity	Amount of heat produced by a fire. Usually compared by reference to the length of the flames.
Fire line	Removal or alteration of fuel from a narrow area of a control line by the use of hand tools and power equipment to control a fire. It implies mineral soil exposure.
Fire Management Plan (FMP)	Strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The FMP is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.
Fire Management Unit (FMU)	Area where there are common fire management goals, objectives, and fuels, and where resource uses have been defined. The size of the unit is not important; however, the FMU should relate well to the strategies for managing wildland and prescribed fires that are defined in the <i>Fire Management Plan</i> .
Fire management	All activities related to prudently managing people and equipment to prevent or suppress wildland fire and to use fire under prescribed conditions to achieve land and resource management objectives.
Fire prescription	Written direction for the deliberate use of fire to treat a specific piece of land. A fire prescription specifies the acceptable range of the various fire-related indices (temperature, humidity, wind direction and speed, fuel and soil moisture) and the limit of the area to be burned.
Fire-suppression activity damage	Damage to lands, resources, and facilities directly attributable to the fire suppression effort or activities, including: dozer lines, camps and staging areas, facilities (fences, buildings, bridges), fire lines, and roads.
FMIS	Fire Management Information System, a computer database.
Fuel break	Natural or constructed barrier used to stop or slow the spread of a fire or to provide a control line from which to work.
Fuel loadings	Amount of burnable fuel on a site, usually given as tons/acre.

Fuels	Materials that are burned in a fire: primarily grass, surface litter, duff, logs, stumps, brush, foliage, and live trees.
Hazard fuels	Vegetative fuels that, when ignited, threaten public safety, structures and facilities, cultural and natural resources, and natural processes.
Hazard reduction	Manipulation or removal of fuels to reduce the likelihood of ignition and lessen potential damage of wildfire. Normally done to reduce the chance of a major fire but can also be done to protect the resource or facility.
IC	Incident Commander
Incident Command System (ICS)	Combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure with responsibility for managing assigned resources to effectively accomplish specific objective(s) pertaining to an incident.
Indirect attack	Method of fire suppression in which the control line is located a considerable distance from the fire's edge. Often used when a fire has a rapid rate of spread or high intensity, to utilize natural or constructed firebreaks or fuel breaks and favorable breaks in topography. Fuel between the control line and fire front is usually removed by deliberate burning, but sometimes the main fire is allowed to burn to the control.
Initial attack	Aggressive suppression action consistent with firefighter and public safety and values to be protected, usually limited to ~ 24 hours.
Keetch-Byram Drought Index (KBDI)	Soil/duff drought index that ranges from 0 (no drought) to 800 (extreme drought), based on soil capacity of 8 inches of water. Index factors are maximum daily temperature and daily and annual precipitation.
Ladder fuels	Fuels that provide vertical continuity between strata. Convection moves the fire from surface fuels into the crowns with relative ease.
LCES	"Look Outs, Communications, Escape Routes and Safety Zones" (a safety policy and also the title of a fire training course).
Maintenance burn	Fire set by agency personnel to remove debris; i.e., leaves from drainage ditches or cuttings from tree pruning. Such a fire does not have a resource management objective.
Mixing height	Height that smoke will rise in atmosphere.
Mop-up	The act of making a fire safe after it is controlled.
Mutual aid	Free assistance from one fire agency to another during an emergency, based on prearrangement between them and generally at the request of the receiving agency.
Natural fire	Fire of natural origin, caused by lightning or volcanic activity.
NFDRS	National Fire Danger Rating System
NFDRS Fuel Model	One of 20 mathematical models used by the NFDRS to predict fire danger. The models were developed by the US Forest Service and are general rather than site specific.
NFFL	Northern Forest Fire Laboratory, at Missoula, Montana
NFFL Fuel Model	One of 13 mathematical models used to predict fire behavior within the conditions of their validity. US Forest Service personnel at NFFL developed the models.
Normal Unit Strength (NUS)	Amount of non-capitalized firefighting equipment needed to meet 70 percent of suppression needs.

National Wildfire Coordinating Group (NWCG)	National interagency operational group authorized by the Secretaries of Agriculture and the Interior, designed to coordinate fire management programs of the participating agencies. The group provides a platform to agree upon policy, standards of training, equipment, aircraft, suppression priorities, and other operational considerations.
Preparedness	Activities that lead to safe, efficient, and cost-effective fire management in support of land and resource management objectives through appropriate planning and coordination. Preparedness actions taken seasonally include hiring and training personnel; making ready vehicles, equipment, and facilities; acquiring supplies; and updating agreements and contracts.
Prescribed burn, prescribed fire	Fire ignited by agency personnel in accord with an approved plan and under prescribed conditions, designed to achieve measurable resource management objectives. Such a fire is designed to produce the intensities and rates of spread needed to achieve one or more planned benefits to natural resources. Its purpose is to employ fire scientifically to realize maximum net benefits at minimum impact and acceptable cost. A written, approved prescribed fire plan must exist and NEPA requirements must be met, prior to ignition. NEPA requirements can be met at the land-use or fire management planning level.
Prescription	Measurable criteria that guide the selection of appropriate management response and actions. Prescription criteria may include safety, economic, public health, and environmental, geographic, administrative, social, or legal considerations.
Prevention	Activities directed at reducing the number or the intensity of fires that occur, primarily by reducing the risk of human-caused fires.
Rehabilitation	Actions to mitigate the adverse effects of suppression of a wildland fire on the vegetation-soil complex, watershed, and other features.
Resource Advisor	Resource specialist responsible for gathering and analyzing information concerning natural resources and their uses that may be affected by a fire or by fire suppression activities.
Spread Component (SC)	Rating of the forward rate of spread of a head fire.
Slip-on pump unit	Firefighting pump that is lifted onto a flatbed truck or utility vehicle. Equipped at a minimum with pump, hose reel, and water tank.
Smoke-sensitive area	Area, including designated wilderness areas, where smoke from outside sources is intolerable, for reasons such as heavy population, existing air pollution, or intensive recreation or tourist use.
Strategy	Overall plan of attack for fighting a fire, considering the most cost-efficient use of personnel and equipment in relation to values threatened, fire behavior, legal constraints, and objectives established for managing natural resources. Actual decisions on tactical use of personnel and equipment are left to the assigned Incident Commander.
Suppression	Management action intended to protect identified values from a fire, extinguish a fire, or alter a fire's direction of spread.
Tactics	Planned operational actions that determine specific fire suppression measures to extinguish a fire. They must be consistent with the strategy established for suppressing the fire.
Unplanned ignition	Natural fire that is permitted to burn under specific conditions, in certain locations, to achieve defined resource objectives.
Wildland Fire Management Program (WFMP)	Full range of activities and functions needed for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations. Includes managing non-activity fuels to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA)	Decision-making process that evaluates management strategies against selected safety, environmental, social, economic, political, and resource management objectives as selected criteria.
Wilderness	Area established by the federal government and administered by agencies in order to conserve its primeval character and influence for public enjoyment, under primitive conditions, in perpetuity.
Wildfire	Unwanted wildland fire.
Wildland	Undeveloped land, <b>not</b> necessarily a designated "wilderness."
Wildland fire	Any non-structured fire, other than prescribed fire, occurring in wildland.
Wildland-urban interface fire	A wildland fire that threatens or involves structures.

## APPENDIX B: DELEGATION OF AUTHORITY – EXTENDED ATTACK

**Name of Incident Commander** is assigned as Incident Commander of the **Name of Incident**, for Brookhaven National Laboratory (BNL) effective **Time and Date**.

The Incident Commander has full authority and responsibility for managing the fire suppression activities within the framework of the law and BNL policy and direction as provided by this office. The Resource Advisor will provide habitat Management Plans and other appropriate documents.

**Names of Resources Advisors and contact Information** are assigned as Resource Advisors. They or the Area Manager will be consulted in situations where natural resource decisions or tradeoffs are involved unless life safety issues require immediate attention and those actions will be documented.

Specific direction and fire suppression priorities for the **Name of Incident** are as follows, and are in priority order:

1. Provide for firefighter and public safety.
2. Use of minimal impact techniques should be employed to reduce habitat damage. Use natural barriers, fuel breaks, and roads if possible for burnout operations.
3. Use of dozers or tractors requires approval of the Area manager or their designate (resource advisors) prior to implementation. **Include other Standards or conditions as needed.**

### Turn-Back Standards

1. All **Name of Incident** contracts, agreements, bills, medical problems, equipment repairs, and fire cache re-supply shall be closed out prior to team being released.
2. Road damage during suppression efforts will be repaired prior to the team's departure.
3. Fire perimeter mopped-up **Specify** and all lines checked for heat and integrity.
4. Rehabilitation Plan will be completed in Coordination with the BNL Resource Advisors.
5. Fire perimeter mapped by GPS and loaded into the GIS Database.
6. Tort claims reviewed by Area Manager or their designee.

The Deputy Area Manager will represent the Area Manager on any occasion where Manager is not immediately available.

Area Manager, \_\_\_\_\_, Brookhaven National Laboratory

Date and Time, \_\_\_\_\_.

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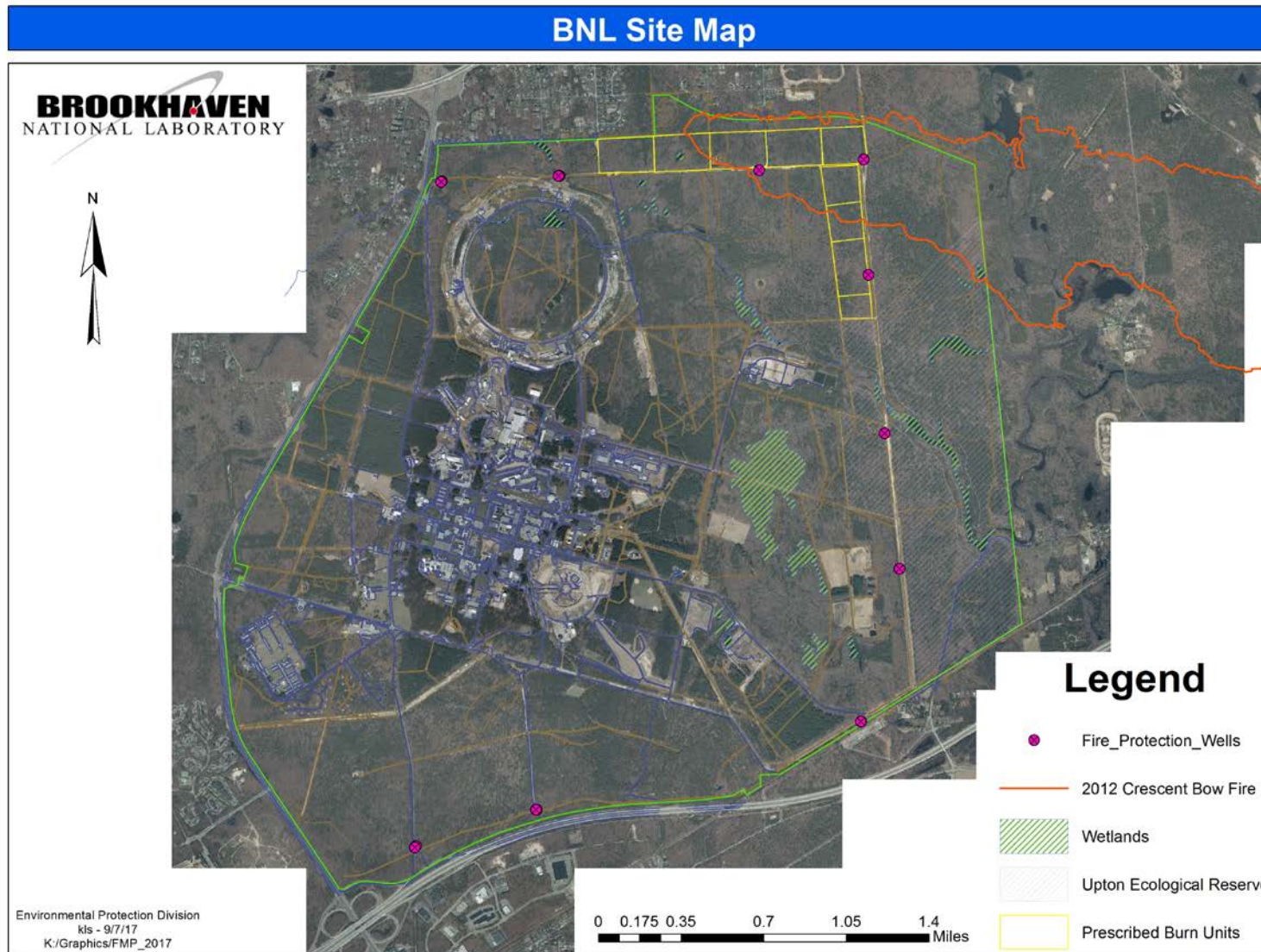
## APPENDIX D: DETECTION AND DISPATCH PLAN, STAFFING TABLE

Alarm	Definition	BNL Resources	SC FRES Dispatch and Notification	
<b>First Alarm</b>	Incipient stage fire, well within the resources of BNL FD to extinguish; or a moderate fire in which BNL FD & immediate mutual aid will extinguish. No other resources are needed.	<ul style="list-style-type: none"> <li>▪ BNL Brush 3 &amp; Command</li> <li>▪ BNL Security</li> <li>▪ Pager notification for information</li> </ul>	As requested BNL Incident Command: 1 Stump Jumper from Ridge, 1 Stump Jumper from Manorville, and/or 1 Stump Jumper from Yaphank	
<b>Second Alarm</b>	Fire(s) are clearly on BNL property and beyond BNL FD resources.	<ul style="list-style-type: none"> <li>▪ Implement Brush Fire SOP</li> <li>▪ Site Maintenance D7 Dozer</li> <li>▪ Fuel Truck</li> <li>▪ Pager notif. for IH, HP monitoring</li> <li>▪ BNL Security</li> <li>▪ PE puts wells on full supply</li> <li>▪ Call in 2 off-shifts</li> <li>▪ Activate EOC</li> <li>▪ Hazmat trailer to Bldg. 30</li> <li>▪ Occupational Medicine Clinic</li> </ul>	Summon an additional: 4 Stump Jumpers 3 Tankers 2 Engines (1 for BNL Coverage*) 1 Heavy Rescue*(BNL Coverage) 1 Ambulance* (BNL Coverage) 1 Rehabilitation Unit	<ul style="list-style-type: none"> <li>▪ SC Fire Coordinator</li> <li>▪ SC EMS Coordinator</li> <li>▪ Brookhaven Town Tank retriever</li> <li>▪ SCPD Helicopter</li> <li>▪ SEMO (518) 457-2200 (information only)</li> <li>▪ US Forest Service (610) 557-4146 (Information only for NYS Forest Ranger)</li> </ul>
<b>Third Alarm</b>	Fire(s) require additional resources for relief and for structural protection on site.	<ul style="list-style-type: none"> <li>▪ BNL Housing</li> <li>▪ BNL Cafeteria</li> <li>▪ Vehicle Repair</li> </ul>	Summon an additional 7 Stump Jumpers 3 Tankers 4 Engines 1 Ambulance 1 Rehabilitation Unit 1 Heavy Rescue	<ul style="list-style-type: none"> <li>▪ SC Command Vehicle</li> <li>▪ NYS Forest Rangers</li> <li>▪ Fire Island National Seashore Rangers</li> <li>▪ Air guard / Army Helicopters (Bambi Buckets)</li> </ul>
<b>Fourth Alarm</b>	Fire(s) require additional resources for structural protection on site that are threatened by fire.		Summon an additional: 6 Stump Jumpers 1 Tanker 5 Engines 4 Ambulances 1 Rehabilitation Unit	<ul style="list-style-type: none"> <li>▪ Brookhaven/Riverhead Town Heavy Equipment</li> <li>▪ LIPA</li> <li>▪ Verizon</li> </ul>
<b>Emergency Medical Services</b>	<p>The EMS response by Incident Command will consider the following:</p> <ol style="list-style-type: none"> <li>1) Medical aid for Firefighters &amp; other Emergency Response Personnel working the incident</li> <li>2) Rehabilitation of the Firefighters &amp; Emergency Response Personnel</li> <li>3) Normal EMS response to BNL employees</li> <li>4) Normal EMS response to surrounding Departments (Ridge &amp; Manorville), such as, MVA at Main Gate or on William Floyd Parkway, emergencies in the immediate vicinity of BNL, in which the resources are available to respond from BNL</li> </ol>			

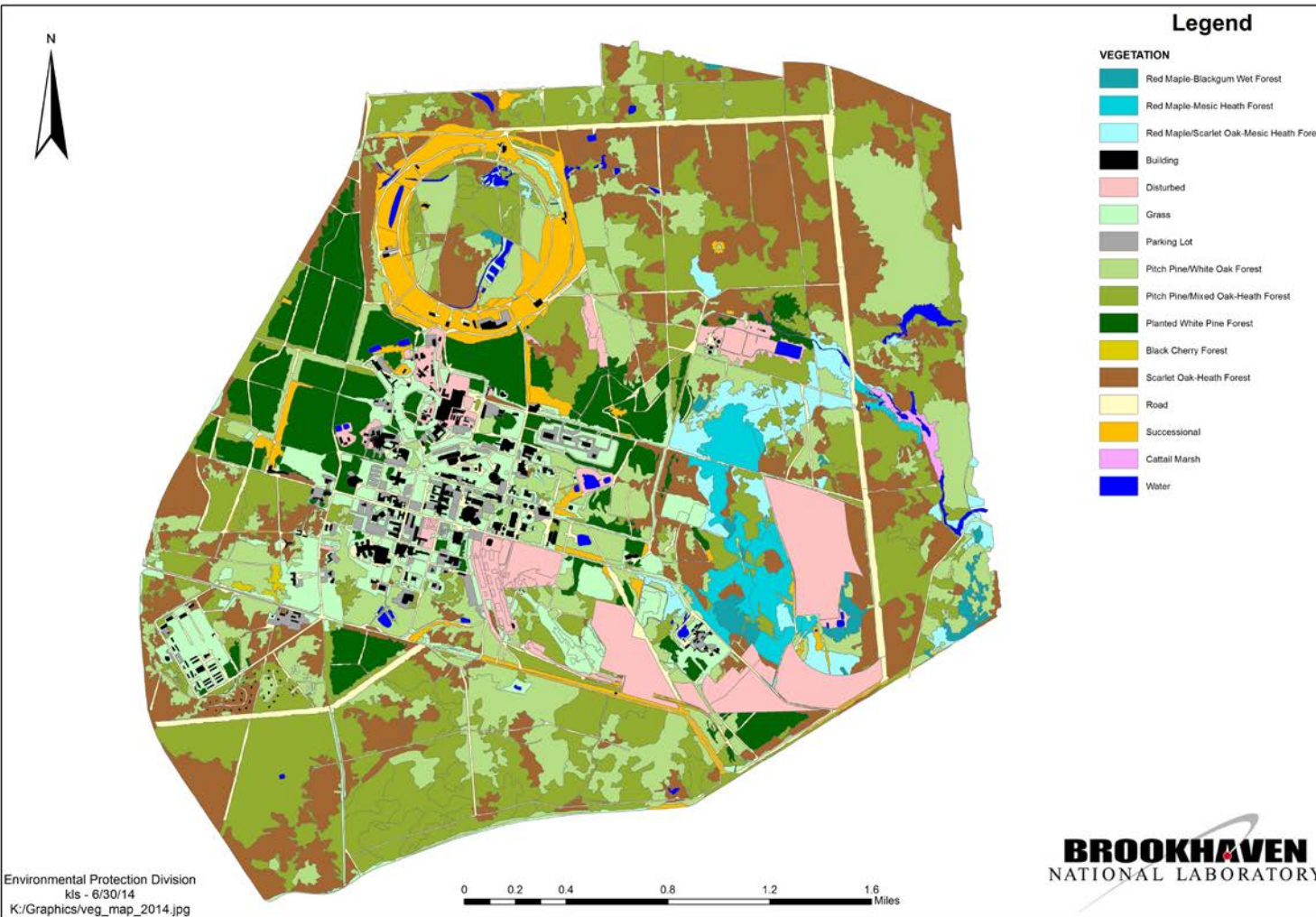
\*Coverage for BNL facilities shall stage @ Bldg. 599 (BNL Firehouse) with the following complement: 1 engine (1250 gpm minimum), 1 Heavy Rescue, 1 Ambulance

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## **APPENDIX E: MAPS**



# BNL Vegetation Map



## **APPENDIX F: WILDLAND INTERFACE SURVEY**

Note: If this final section is missing from your document, you may go to

<http://intranet.bnl.gov/proteng/Wildland-fire/files/pdf/2011%20Wildland%20Interface%20Survey%20Final.pdf>

and download the PDF file.