

Evaluation of the Effects of the Woolsey Fire

on the Analysis in the Final Environmental Impact
Statement for Remediation of Area IV and
the Northern Buffer Zone of the Santa
Susana Field Laboratory

May 2019

Prepared for:

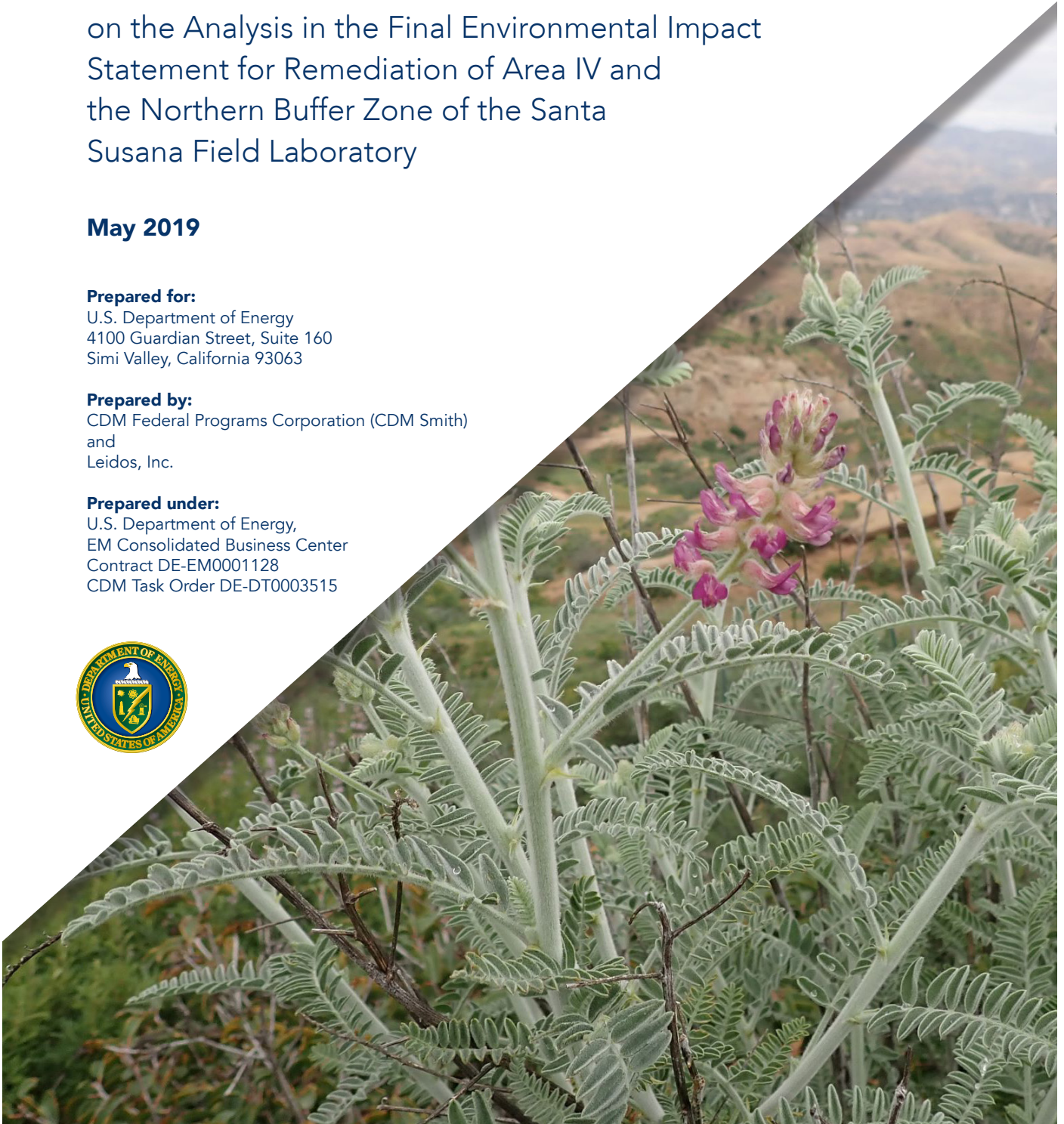
U.S. Department of Energy
4100 Guardian Street, Suite 160
Simi Valley, California 93063

Prepared by:

CDM Federal Programs Corporation (CDM Smith)
and
Leidos, Inc.

Prepared under:

U.S. Department of Energy,
EM Consolidated Business Center
Contract DE-EM0001128
CDM Task Order DE-DT0003515



Cover photo:

Braunton's milk-vetch in bloom in an unburned portion of the
Santa Susana Field Laboratory, Area IV – April 30, 2019

Table of Contents

1.0	INTRODUCTION.....	1
2.0	BACKGROUND	1
3.0	IMPACTS OF WILDFIRES ON SSFL.....	2
3.1	2005 Topanga Fire.....	2
3.2	2018 Woolsey Fire	4
4.0	COMPARISON TO FEIS ANALYSES AND DETERMINATIONS.....	18
4.1	Soil Remediation, Building Demolition, and Groundwater Remediation Alternatives.....	18
4.1.1	Soil Remediation No Action Alternative	18
4.1.2	Soil Remediation Action Alternatives.....	21
4.1.3	Building Demolition Alternatives.....	21
4.1.4	Groundwater Remediation Alternatives	22
4.2	Combination of Alternatives.....	22
4.3	Cumulative Impacts.....	22
5.0	CONCLUSIONS	24
6.0	REFERENCES.....	26

List of Figures

Figure 1.	Perimeter and Ambient Air Monitoring Stations at Area IV	7
Figure 2.	Area IV Approximate Burn Area	9
Figure 3.	Location of the Burned Portion of Area IV as Seen from Braunton’s Milk-Vetch Critical Habitat (looking northeast across Area IV from Milk-Vetch Hill)	10
Figure 4.	Conservation of Natural Resources Alternative – Open Space Option Remediation Areas in Relation to the Burned Area.....	11
Figure 5.	Recovery of Vegetation in Area IV	12
Figure 6.	Firefighting Equipment Track Marks at Milk-Vetch Hill.....	13
Figure 7.	Coast Live Oak Tree Burned during Topanga and Woolsey Fires.....	14
Figure 8.	Native Plant, Indian Warrior (<i>Pedicularis densiflora</i>) on Milk-Vetch Hill.....	14
Figure 9.	Exterior of Building 4029 after the Woolsey Fire	15
Figure 10.	Interior of Building 4029 after the Woolsey Fire	16
Figure 11.	Groundwater Plumes at Area IV.....	17
Figure 12.	Braunton’s Milk-Vetch in the Burned Portion of Area IV (the low-growing, grey-green plants on the hillside).....	25

List of Tables

Table 1.	Summary of Potential Changes in Impact Determinations as a Result of the Woolsey Fire from the Evaluations Presented in the FEIS	19
----------	---	----

Acronyms

AOC	Administrative Order on Consent
BMPs	best management practices
Boeing	The Boeing Company
CalEPA	California Environmental Protection Agency
DOE	U.S. Department of Energy
DTSC	California Department of Toxic Substances Control
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
GIS	geographic information system
LUT	Look-Up Table
MDA	minimum detectable activity
NASA	National Aeronautics and Space Administration
NBZ	Northern Buffer Zone
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
ppb	parts per billion
RCRA	Resource Conservation and Recovery Act
RMHF	Radioactive Materials Handling Facility
ROI	Region of Influence
SSFL	Santa Susana Field Laboratory
TPH	total petroleum hydrocarbons
VARs	values-at-risk
WERT	Watershed Emergency Response Team

1.0 INTRODUCTION

This document evaluates the effects of the November 2018 Woolsey Fire on the analyses, determinations, or conclusions of the *Final Environmental Impact Statement for Remediation of Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory* (FEIS) (DOE/EIS-0402) (DOE 2018). This document was prepared in response to comments on the FEIS that because the Woolsey Fire was not analyzed in the FEIS, the FEIS should be re-issued for public comment. DOE evaluated the fire's impact on the resource areas analyzed in the FEIS. That analysis is described in this report. DOE does not agree with these comments based on its assessment of the fire's impact on the analyses and determinations in the FEIS as described in this document.

2.0 BACKGROUND

The U.S. Department of Energy (DOE) is remediating Area IV and the Northern Buffer Zone (NBZ) at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. Area IV of SSFL had been used for nuclear research by DOE and predecessor Federal agencies, as well as commercial entities. Areas I through III of SSFL had been used for other applications including testing of rocket engines. Remediation of these latter three areas is the responsibility of The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA).

To guide and support remediation decisions for the portions of SSFL for which it is responsible, DOE prepared the FEIS (DOE 2018) in accordance with the National Environmental Policy Act and Council on Environmental Quality and DOE implementing regulations. Past activities caused chemical and radiological releases that impacted soil, buildings, and groundwater. Extensive soil sampling and analysis performed largely in support of the FEIS demonstrated that the chemical contamination is more widespread than the radiological contamination, and that contaminants are concentrated near certain facilities, rather than being evenly distributed across Area IV.

The FEIS analyzes the potential environmental impacts of alternatives for conducting cleanup activities in Area IV (290 acres) and the NBZ (182 acres). There are separate alternatives for soil remediation, building demolition, and groundwater remediation, described in more detail in the FEIS. For soil remediation, the FEIS analyzes the Cleanup to AOC LUT Values Alternative (cleanup to meet the Look-Up Table (LUT) values for residual concentrations of chemicals and radionuclides in soil established in accordance with the 2010 *Administrative Order on Consent for Remedial Action* [2010 AOC] between DOE and the California Department of Toxic Substances Control [DTSC] [DTSC 2010]); the Cleanup to Revised LUT Values Alternative, and the Conservation of Natural Resources Alternative that includes both a Residential Scenario and an Open Space Scenario. For the latter scenario the assumed receptor is a recreational user.

For buildings, DOE's action alternative is to demolish the 18 structures it owns in Area IV and transport the materials off site for disposition (Building Removal Alternative); the FEIS also analyzes a Building No Action Alternative which entails leaving the structures in place. To address groundwater contamination, the FEIS analyzes current levels of monitoring (Groundwater No Action Alternative), additional monitoring to better support natural attenuation (Groundwater Monitored Natural Attenuation Alternative), and active treatment of contaminated groundwater (Groundwater Treatment Alternative).

The FEIS informs Federal decisions about remediation of contaminated soil and groundwater, building demolition, restoration of the impacted environment, and disposal of chemical and radioactive materials. The FEIS was issued in December 2018 and its availability was announced by

the U.S. Environmental Protection Agency (EPA) in a December 28, 2018, *Federal Register* Notice (83 FR 67282).

The FEIS also responds to an order by the U.S. District Court for the Northern District of California, which permanently enjoins DOE from transferring possession or otherwise relinquishing control over any portion of Area IV until DOE has completed an environmental impact statement (EIS) and issued a Record of Decision. The order is the result of a lawsuit filed by the Natural Resources Defense Council, the Committee to Bridge the Gap, and the City of Los Angeles, which challenged DOE's 2003 *Final Environmental Assessment for Cleanup and Closure of the Energy Technology Engineering Center* (DOE 2003) and Finding of No Significant Impact for remediation of Area IV.

3.0 IMPACTS OF WILDFIRES ON SSFL

Southern California has long been vulnerable to destructive wildfires. Ventura County, for example, has experienced multiple large destructive fires during the last few decades. Recent wildfires that impacted Area IV at SSFL are the 2005 Topanga Fire and the 2018 Woolsey Fire.

3.1 2005 Topanga Fire

The Topanga Fire ignited on September 28, 2005, in the Chatsworth area (a City of Los Angeles neighborhood) and spread to brush in neighboring areas, ultimately affecting 24,000 acres, including 2,000 of the 2,850 acres of the SSFL site. Some brush was burned in Area IV. Ten structures at SSFL were damaged, and seven were destroyed. Facilities in Area IV and hazardous material storage facilities elsewhere on SSFL were not damaged by the fire. No anthropogenic radioactive materials were detected in air samples taken during and after the fire, and sampling showed that burned vegetation contained no radioactive contamination (Boeing 2005). A later report analyzed post-fire samples of rainwater collected at SSFL, onsite and offsite soil, and stormwater runoff from SSFL. Rainwater samples from SSFL showed dioxin concentrations exceeding SSFL permit limits for storm flows and mercury concentrations at or near SSFL permit limits. Regulated constituents (e.g., dioxin, metals) in soil samples from SSFL and off site were similar in magnitude and variability of constituent concentrations. Concentrations of metals and dioxins in stormwater runoff from SSFL were similar to (and often lower than) concentrations in stormwater runoff samples in other locations in the Los Angeles area (Flow Science 2007).¹

Surface water generated at SSFL flows through a number of regulated outfalls, including seven (Outfalls 2, 3, 4, 5, 6, 7, and 18) that receive surface water runoff from formerly operational portions of Area IV. As reported in the FEIS, in the years immediately following the 2005 Topanga Fire there were multiple exceedances of regulatory limits (for dioxin, cyanide, lead, mercury, copper, nickel, zinc, iron, total suspended solids, chloride, pH, gross beta, and nitrate). These exceedances diminished over time, with exceedances only for iron in 2011 and 2012. With minor exceptions, there were no exceedances for these outfalls from 2013 through 2017 (Boeing 2007, 2008, 2009, 2010, 2011a, 2012, 2013, 2014, 2015, 2016). There was an exceedance for iron and chronic toxicity at Outfall 2 in 2017 and an exceedance for iron in 2018 (Boeing 2017, 2018). However, since total metals are commonly associated with sediment particles, Boeing believes that the iron concentration observed in stormwater runoff in the Outfall 2 watershed was the result of high intensity rain events that caused erosion and total suspended solids consisted of native sediments and soil (Boeing 2017,

¹ Dioxins are of concern because they are created through the combustion of natural and man-made materials. Up to 80 percent of SSFL was affected by the fire, which impacted the ground surface of the site with ash or charred materials which are known to contain dioxins and other naturally-occurring constituents such as metals. Wildfires have also been shown to increase soil pH and to cause an increase in nitrate, ammonia, and other compounds (Boeing 2019).

2018). In addition, based on subsequent stormwater samples collected in January and February of 2017 that passed chronic toxicity requirements, the failed chronic toxicity test in 2017 was viewed as episodic.² Water quality control measures, including upgrades of outfall treatment controls; restoration of burned hillslopes; and best management practices (BMPs) contributed to the reductions in regulatory exceedances (DOE 2018).

Regulated Discharge of Surface Water from SSFL

SSFL operates under a National Pollutant Discharge Elimination System (NPDES) permit issued to Boeing by the Los Angeles Regional Water Quality Control Board. This permit allows the discharge of stormwater runoff and treated groundwater into the Bell Creek watershed to the south, as well as the discharge of stormwater runoff from the northwest slope into Calleguas Creek (Boeing 2011b). These surface discharges are at 20 NPDES outfall locations. Seven outfalls (Outfalls 2, 3, 4, 5, 6, 7, and 18) receive surface water runoff from portions of Area IV that were at one time operational. Multimedia filtration systems are used to filter the surface water runoff before it leaves SSFL. Outfalls 3, 4, 5, 6 and 7 are within Area IV or on the northern boundary of Area IV; Outfalls 2 and 18 are south of Area IV. Depending on the amount of rainfall, surface water intercepted at these outfalls is diverted to Silvernale Pond for treatment prior to discharge to the Bell Creek watershed. Outfalls 5 and 7 are lined settling ponds and are designed to retain surface water prior to transfer to Silvernale Pond. The retention structures at outfalls 3, 4, 5, 6 and 7 are designed to capture, contain, and divert a 1-year, 24-hour storm event to Silvernale Pond, which, depending on the outfall location, ranges from 50,000 to 207,000 gallons per day. Rainfall in excess of these volumes is allowed to flow undiverted past the outfall location. Discharges from these outfalls are monitored for compliance with the NPDES permit.

As discussed in the FEIS, the Topanga fire burned through most of SSFL. The fire bypassed portions of Area IV and the NBZ, leaving portions of vegetation intact near the western end of both areas. The vegetation communities at SSFL include those that have developed methods for adapting to fire, such as underground root crowns that allow them to re-sprout after fire or production of seeds that can remain in the ground for many years and germinate in response to smoke, heat, and ash (UCCE 2014). Thus, the plant communities are essentially “self healing.” Different portions of SSFL were burned with variable intensity, resulting in a variety of different types of communities. A few localized areas were not burned, including patches of oaks and chaparral in the NBZ and chaparral in the western corner of Area IV. The effects of the Topanga fire are still visible in some of the burned areas, woody species such as oaks, California black walnut trees, and shrubs are still recovering from the effects of that fire (DOE 2018).

Recovery from the effects of the 2005 Topanga Fire was delayed by vegetation manipulation. In 2010 and 2011, most of the aboveground vegetation was mowed or mechanically reduced to near ground level by EPA to facilitate a radiological survey of Area IV and the NBZ. Vegetation manipulation has continued to facilitate access for soil borings and other site characterization activities and for fire prevention (DOE 2018: 3-56).³ Except for the disturbed areas, the vegetation in Area IV and the NBZ has been gradually recovering, and generally has regained the characteristics of the pre-existing vegetation conditions. Vegetation in Area IV is primarily chaparral communities dominated by native species and grasslands dominated by nonnative species, with patches of coastal scrub and oak woodlands present in locations with favorable exposures and soil conditions. The understory of oak woodlands includes grasses and forbs. Disturbed areas exhibited a vegetative

² This was judged to be a single event rather than a chronic characteristic of the stormwater flow. A re-analysis of the sample resulted in it passing the chronic toxicity test as did samples taken on subsequent days.

³ Woody vegetation is avoided when clearing paths to well sites. No vegetation clearing has occurred within endangered species habitats. Vegetation management for purposes of fire prevention is much less extensive than that performed by EPA as part of its radiological survey.

cover dominated by both introduced and native species, many which are easily able to disperse to and establish in open habitats (DOE 2018: 3-59).

3.2 2018 Woolsey Fire

On November 8, 2018, a fire started on SSFL property in the Simi Hills near the boundary between Los Angeles and Ventura Counties. During the first day, strong Santa Ana winds pushed the fire in a southerly direction, and by the time the fire was contained, 96,949 acres of land and more than 1,600 structures had burned. At the same time, a second fire, called the Hill Fire, ignited at Hill Canyon Road and Santa Rosa Road near the community of Camarillo in Ventura County, and much farther to the west than SSFL. The fire burned 4,531 acres in Ventura County, and was fully contained on November 16, 2018, after destroying four structures and damaging four additional structures. The causes of the Woolsey and Hill Fires are under investigation (Calfire et al. 2018; Calfire 2019).

The Woolsey Fire affected up to 80 percent (about 2,280 acres) of SSFL's 2,850 acres, including about 39 percent (about 112.5 acres) of the 290 acres comprising Area IV. The NBZ was not affected. The fire impacted infrastructure such as telephone poles, electrical lines, stormwater conveyance lines, and 24-hour composite air sampling equipment and a substantial amount of vegetation and BMPs intended to control surface water runoff. The ground surface of the site was impacted with ash or charred materials that contain naturally occurring constituents such as dioxins and metals (Boeing 2019).

To reduce the impact of the ash and charred material on stormwater and to help establish vegetation growth, Boeing undertook numerous activities to help restore the natural, engineered, or institutional controls needed to minimize the erosion of surface materials and sediment migrating in stormwater. Boeing surveyed the site and repaired, replaced, or upgraded BMPs that were destroyed, and began installing additional BMPs across SSFL to reduce sediment and constituent runoff (Boeing 2019). Activities included installing wattles, removing ash and debris from stormwater outfalls, repairing or replacing piping used to transport collected stormwater around the SSFL site to detention ponds, repairing damaged equipment, hydro-mulching watersheds, and bringing temporary generators and pumps onsite to manage stormwater (Boeing 2019; DTSC 2018). NASA surveyed Area II and where needed replaced BMPs, including wattles, sandbags and silt fencing and also hydro-seeded burned areas to reduce the potential for soil or ash movement and to protect onsite drainages (Boeing 2019). Through its contractor, North Wind, DOE focused on maintaining air monitoring equipment in operation (see "Health and Safety Assessments," below). The fire did not impact the physical systems in Area IV for managing stormwater runoff. Nor did the fire damage any human-made structure in Area IV, except for telephone poles and a meteorology and air monitoring station (see "Health and Safety Assessments" below). The burned telephone poles are being removed and the meteorology and air monitoring station was repaired and is operational.

A 2.5-inch rain event in early December 2018, resulted in stormwater flow at three outfalls. On December 6-7, 2018, Boeing collected and analyzed samples of the water in accordance with its National Pollutant Discharge Elimination System (NPDES) permit. The results were reported in Boeing's Fourth Quarter, 2018, NPDES Discharge Monitoring Report to the Los Angeles Regional Water Quality Control Board (Boeing 2019). Boeing reported Fourth Quarter 2018 exceedances of Daily Maximum Benchmark Limits, Daily Maximum Permit Limits, or receiving water limits for various metals at Outfalls 2, 8, and 9. Outfall 2 potentially receives stormwater flow from Area IV, as well as from Areas II and III; outfalls 8 and 9 do not receive Area IV stormwater flow. At

Outfall 2, Daily Maximum Benchmark Limits were exceeded for copper, iron, lead, selenium, and zinc. Boeing believes that contact with native soil and sediments and ash contributed to the increased metals concentrations. In addition, stormwater samples for Outfalls 2 and 8 showed elevated levels of gross alpha concentrations. Boeing believes that these elevated levels were caused by the high levels of turbidity in the stormwater (Boeing 2019).

Health and Safety Assessments. The State, DOE, and others assessed the potential impacts on human health from the potential release of radioactive or chemical contaminants from SSFL as a result of the Woolsey Fire. Shortly after the start of the fire on November 8 and continuing until November 30, 2018, DTSC and a team from several Federal, California, and local agencies evaluated the impacts of the fire on conditions at the SSFL site and in nearby communities. Team members from Federal agencies, for example, included those from the EPA Emergency Response Team, DOE's Radiologic Assistance Program from Lawrence Livermore National Laboratory, and DOE's National Nuclear Security Administration (NNSA). Team members from California agencies included those from the California Environmental Protection Agency (CalEPA), the CalEPA Office of Environmental Health Hazard Assessment, the California Department of Health, and the 9th Civil Support Team of the California National Guard. Team members from other Los Angeles and Ventura County agencies included those from the Los Angeles County Department of Public Health Radiation Management Program and the Los Angeles Regional Water Control Board. The team also worked closely with the California Office of Emergency Services Incident Command, local law enforcement, and air quality agencies (DTSC 2018). Furthermore, on December 7, 2018 a team that included the U.S. Fish and Wildlife evaluated the impacts of the fire on designated Braunton's milk-vetch critical habitat in Area IV (see further details below).

The DTSC team concluded that the fire had not burned facilities in Area IV that had managed radioactive and hazardous materials. Power lines and poles, however, were down across much of the site. The DTSC team used portable instruments to take real-time readings of radiation and did not detect any radiation above normal background levels (DTSC 2018).

The DTSC team assessed the potential chemical and radiological hazards associated with SSFL and developed a list of potential contaminants of concern for sampling based on the historic activities at SSFL. The list included radionuclides, metals, volatile organic compounds, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls (PCBs). Using portable instruments, the team implemented rapid detection procedures to obtain real-time measurements of potential releases of radiation and hazardous compounds, and verified these results by collecting soil, ash, and air samples for laboratory analysis. In addition, NNSA performed a preliminary computer simulation to calculate a total potential inhalation exposure risk from radionuclides. Although the fire did not affect the Area IV locations with the highest concentrations of radionuclides in soil, NNSA assumed that the maximum SSFL soil contamination measurement for each radionuclide was present in the soil to estimate the amount released by the fire. With this conservative assumption, the simulation indicated that the offsite impacts would be extremely low. The simulation was also used to help guide the sampling program (DTSC 2018).

All the measurements and analyses indicated that no measurable radiation or hazardous materials associated with SSFL contamination were released by the fire. Soil and ash sample results showed no chemical constituents emanating from SSFL. The team did not find any data that would indicate a release of contaminants from SSFL, or a risk other than the risks normally posed by wildfires and wildfire smoke. All evaluations showed no offsite impacts other than those normally resulting from wildfires (DTSC 2018).

Additional measurements and analyses specific to the Woolsey Fire were obtained by DOE's contractor, North Wind, and the results of this effort are documented in the report, *Radioactive Particulate Air Sampling Results Associated with the Woolsey Fire, Santa Susana Field Laboratory, Ventura County, California* (North Wind 2019a). For this effort, DOE obtained samples for analyses at the four onsite perimeter air monitoring stations shown in **Figure 1**. The four stations were established and operating prior to the fire, and continue to operate after the fire, to collect baseline (pre-remediation) airborne radiological (gross alpha and beta and specific radionuclides), particulate matter, and volatile organic compound data; meteorological data are also collected at one of the stations. The locations of these air monitoring stations were selected based on the areas to be remediated, the winds in the area, topographic features, and accessibility, and were approved by DTSC. In addition, North Wind collected samples from ambient air samplers located at the Radioactive Materials Handling Facility (RMHF) and near Buildings 4462 and 4463, the Sodium Pump Test Facility. (The North Wind Report calls this location Area 20.) With the exception of perimeter air monitoring station DOE 4, all of the perimeter air sampling stations are north of the Area IV burn area. These stations operated continuously before the fire, and mostly during the fire, which burned portions of SSFL on November 8 and 9, and afterwards. One of the four perimeter air monitoring stations (DOE 4 on Figure 1) was damaged by the fire and subsequent heavy rain storms and became nonoperational. The fire rendered the meteorological tower inoperable along with units to measure airborne radiation and particulates. A new system for the meteorological tower and a new particulate measurement unit were installed on December 18 and 19, 2018, respectively, while the airborne radiation unit was replaced on January 21, 2019. Since then, DOE 4 has been fully operational. The other three perimeter air monitoring stations were operational during and after the fire except for some limited periods for some stations due to heavy rain storms. As noted, the four perimeter air monitoring stations collect baseline airborne contaminant data in anticipation of remediation activities at Area IV and the NBZ. Data collection began in April 2018 and continues after the fire. Except for a limited number of days when one of the air monitoring stations was damaged, the fire has had no effect on the ability of DOE to collect the needed baseline data. Baseline data are reported quarterly (North Wind 2019b).

The ambient air samplers at RMHF and at Buildings 4462 and 4463 were operational during the fire but were temporarily disabled after the fire because electric line power was lost. Battery-powered ambient air samplers were placed into service on December 10, 2018, at the RMHF and on December 17, 2018, at Buildings 4462 and 4463, with power supplemented by portable generators (North Wind 2019a). Subsequently, the damaged perimeter air monitoring station was repaired so that all four perimeter air monitoring stations were operational. By the end of March 2019 the RMHF ambient air sampler was back on line power, although the ambient air sampler at Buildings 4462 and 4463 remained on battery and generator power.⁴

Samples from the perimeter air monitoring stations and ambient air samplers were analyzed for gross alpha and gross beta radiation as well as for individual radionuclides. The results for gross alpha and gross beta radiation during and after the fire appeared to be no different than the results of measurements taken before the fire. Most sample results before, during, and after the fire were less than their minimum detectable activity (MDA). Plutonium-239/40 and strontium-90 were detected above their MDAs at perimeter air monitoring station DOE 3 (see Figure 1), and plutonium-239/40 was detected at the ambient air sampler at Buildings 4462 and 4463. These

⁴ Because the four perimeter air monitoring stations are powered by solar arrays and batteries, their operation does not depend on line power.

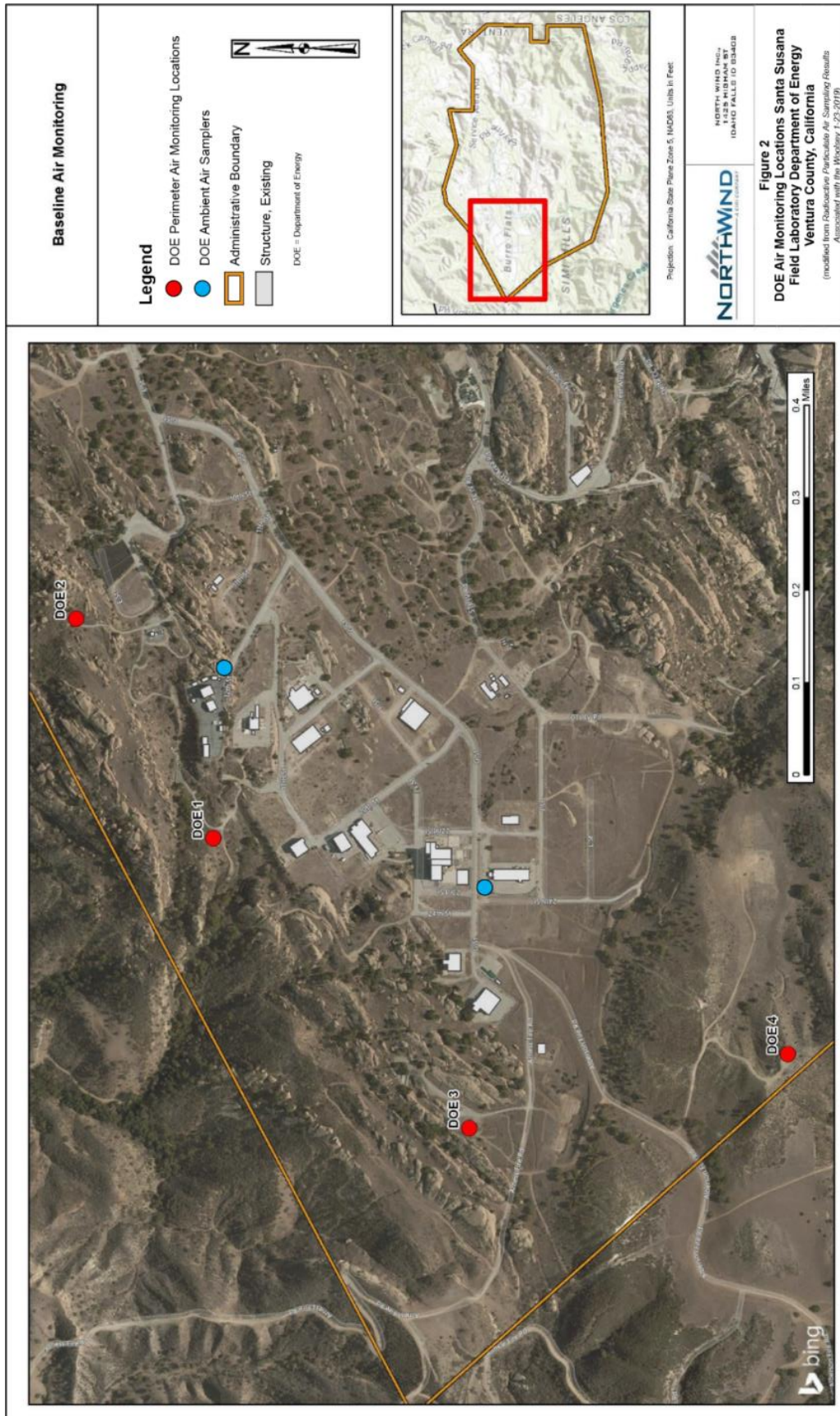


Figure 1. Perimeter and Ambient Air Monitoring Stations at Area IV

isotopes were not detected in air particulate samples before the fire. The detected concentrations were low, however, and did not exceed the DOE Derived Concentration Standard, which is an airborne concentration that would result in an effective dose of 100 millirem for continuous annual exposure (North Wind 2019a).

To evaluate the potential impacts of the detected plutonium-239/40 and strontium-90 on receptors outside of SSFL, the detected concentrations of these isotopes were compared with the airborne concentrations that were determined in the FEIS at the assumed offsite residential location under the Soil No Action Alternative (see Section 4.1.9 of the FEIS). The concentrations at this location were the maximums calculated assuming airborne mobilization (wind scour) of radionuclides from contaminated soil at Area IV. It was determined that the measured air concentrations of these isotopes both onsite and at the site perimeter (at DOE 3) were 1 to 2 orders of magnitude smaller than the concentrations that were calculated in the FEIS for an assumed offsite residential location under the Soil No Action Alternative. The calculated concentrations for these isotopes would result in an extremely small annual dose to a residential receptor of 5.5×10^{-8} millirem; the corresponding cancer incidence risk is less than 1 in 80 trillion.

Shortly after the start of the fire, the State of California assembled a team, called the Watershed Emergency Response Team (WERT) comprised of engineering geologists, civil engineers, hydrologists, foresters, and geographic information system (GIS) specialists. The WERT evaluated post-fire watershed conditions, identified potential values-at-risk (VARs)⁵ related to human safety and property, and evaluated the potential for increased post-fire flooding and debris flows. The team also recommended potential emergency protection measures to reduce risks. The WERT team covered the entire area impacted by the fire, except for SSFL. Based on years of testing and control of the discharge of stormwater from SSFL, the WERT team did not consider SSFL to be at significant risk from post-fire runoff (Calfire et al. 2018).

Physical Impact of the Fire on Area IV. Of the 290-acre extent of Area IV, 112.5 acres were affected by the Woolsey Fire, or about 39 percent of Area IV. **Figure 2** illustrates the affected area within Area IV. The NBZ was unaffected. Within Figure 2 are shown:

- The 18 structures that DOE proposes to remove under the FEIS Building Removal Alternative;
- G Street (the approximate northern boundary of the Woolsey Fire in Area IV;
- A perimeter air monitoring station location (DOE 4), and
- An area (Braunton's milk-vetch designated critical habitat referred to as Milk-Vetch Hill in Figure 2) that contains a significant concentration of Braunton's milk-vetch, a plant designated as endangered under the Endangered Species Act.

Figure 3 is a photograph of Area IV taken from the vicinity of the DOE 4 air monitoring station and looking northeast toward several undamaged structures including the Sodium Pump Test Facility (Buildings 4462 and 4463), the Radioactive Materials Handling Facility (Buildings 4021, 4022, and others), and the building used for testing reactor Systems for Nuclear Auxiliary Power (Building 4024). The foreground shows areas scorched and burned by the fire. As shown in the middle distance, the fire in Area IV did not burn north of G Street.

⁵ VARs are the values or resources at risk of damage or loss by post-wildfire geologic and/or hydrologic hazards. Life-safety and property are the primary VARs evaluated during the WERT process. The WERT process relies on a combination of modeling and best professional judgement to guide hazard determination (Calfire et al. 2018).

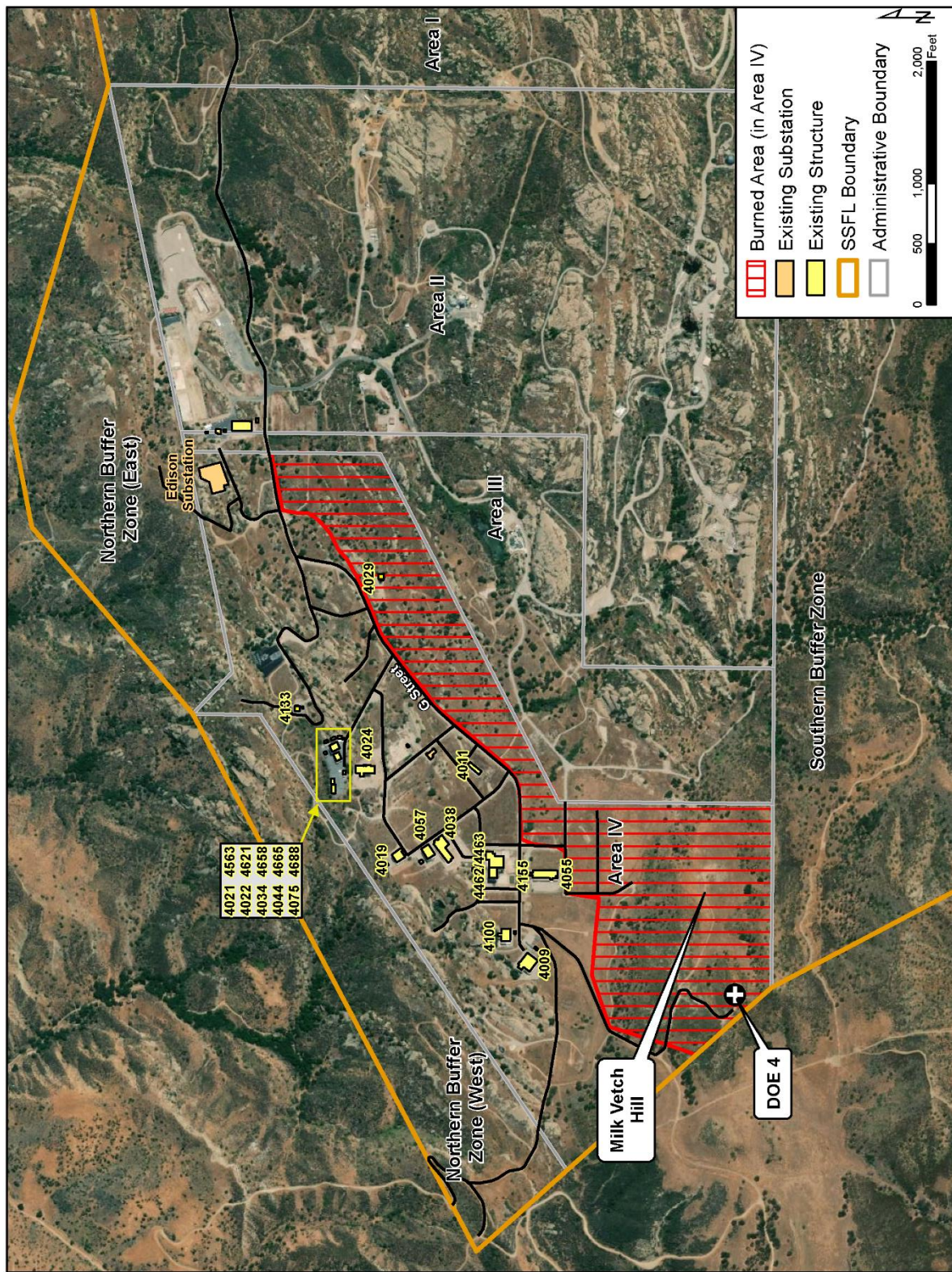


Figure 2. Area IV Approximate Burn Area



Figure 3. Location of the Burned Portion of Area IV as Seen from Braunton's Milk-Vetch Critical Habitat (looking northeast across Area IV from Milk-Vetch Hill)

Figure 4 shows locations in Area IV having soil with radiological and/or chemical constituents exceeding risk-based standards as evaluated in the FEIS for the Conservation of Natural Resources Alternative, Open Space Option. The Conservation of Natural Resources Alternative (Residential and Open Space Options) is consistent with the risk-based approach typically employed at sites cleaned up under the U.S. Environmental Protection Agency or DTSC regulatory authority. Within the 112.5-acre burn area, about 3.9 to 4.3 acres, or up to about 4 percent of the burn area, contain radioactive or chemical constituents that exceed the FEIS risk-based levels used to evaluate impacts from the Conservation of Natural Resources Alternative scenarios.⁶ Of this acreage, about 3.3 to 3.6 acres contain only chemical contamination and 0.6 to 0.7 acres contain a mixture of radioactive and chemical contamination.

Fire Impacts on Biological Resources. On December 7, 2018, and on February 26 and 28, 2019, biologists from Leidos, Inc., surveyed Area IV, concentrating on the impacts of the Woolsey Fire on biological resources (Leidos 2019a, 2019b). Within the burn area, the severity of the fire varied.

⁶ Under the Conservation of Natural Resources Alternative, DOE would clean up soil to a level that would protect human health and the environment by removing soil with concentrations of chemical or radioactive constituents that exceed criteria established using a risk assessment process. Under the Residential Scenario, cleanup levels would be based on a hypothetical onsite suburban resident. Under the Open Space Scenario, cleanup levels would be based on an onsite recreational user. Both scenarios would consider ecological risk. Chemically and radiologically impacted soil would be removed to achieve a cancer incidence risk of 1 chance in 10,000 to 1 chance in 1 million and a hazard index of 1.

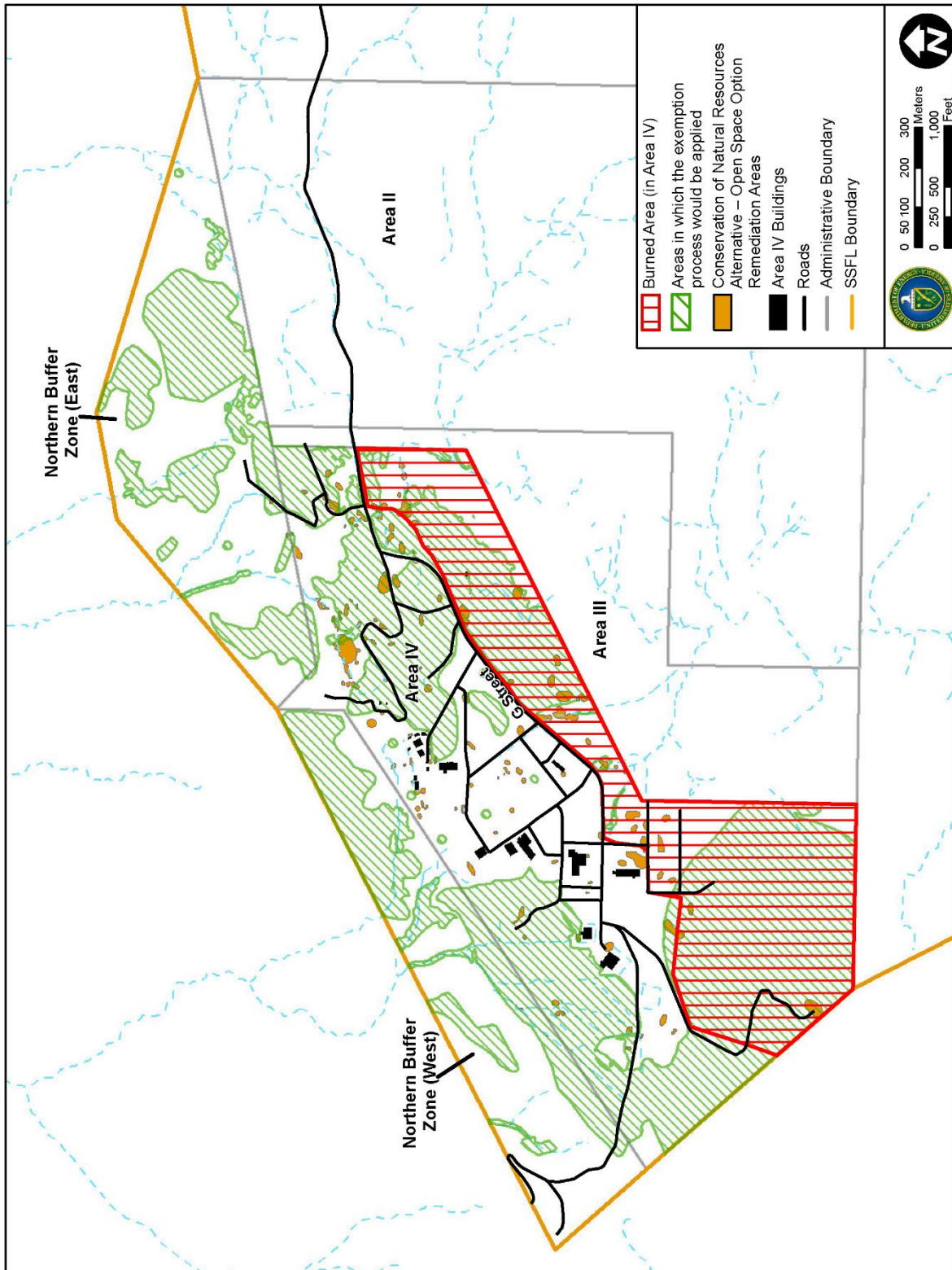


Figure 4. Conservation of Natural Resources Alternative – Open Space Option Remediation Areas in Relation to the Burned Area

Some portions of Area IV showed signs of high severity burn that resulted in complete consumption and mortality of entire individual plants whereas other localized areas showed signs of a low intensity burn where there was only slight modification to the vegetation structure and some mature individual plants survived. **Figure 5** shows photographs of Area IV taken from the same approximate location on December 7, 2018, February 26, 2019, and April 29, 2019. As shown in Figure 5, recovery of the burned area commenced shortly after the fire occurred.



Figure 5. Recovery of Vegetation in Area IV

Braunton's milk-vetch critical habitat or Milk-Vetch Hill in Area IV show a patchy burn pattern leaving remnants of unburned vegetation. Many of the known individual milk-vetch plants were burned or destroyed by the fire. Approximately 0.94 acres of Braunton's milk-vetch critical habitat was scarred with deep track marks from use of heavy equipment which damaged vegetation including individual plants. The track marks were sometimes up to 50 feet in width and extended down the hillside. **Figure 6** shows some of the track marks (Leidos 2019a). The heavy equipment was presumably used as part of fire control efforts. The biologists observed some erosion in this disturbed area and noted places where this erosion could be arrested by placement of BMPs such as fiber rolls (Leidos 2019a, 2019b).



Figure 6. Firefighting Equipment Track Marks at Milk-Vetch Hill

The fire burned into the canopy of a number of trees in Area IV. There were many coast live oak (*Quercus agrifolia*) trees still standing with green foliage present; however, despite the comparatively undamaged canopies, a large number of the trees in some areas had moderate to severe fire damage to the trunks near ground level (Leidos 2019a). Occasional trees had been completely consumed by fire, leaving holes in the ground where the base of the trunks had burned. In the northern portion of the burn area many coast live oak trees that were severely damaged by the 2005 Topanga Fire had not fully recovered and then were damaged by the Woolsey Fire (see **Figure 7**). How these trees may recovery will be determined in time. Many individual California black walnut trees (*Juglans californica*), a California Rare Plant Rank List 4 species due to its limited distribution and vulnerability to development) had their burls burned well down into the soil. Some of the habitat occupied by the Santa Susana tarplant (*Deinandra minthornii*), listed as rare by the State of California, had burned; however, surviving and resprouting tarplants were observed in some of the rocky outcrops. Many of the ephemeral streams and channels in the burn areas had water intermittently present during the February 2019 visit and there was no evidence of bank erosion at the time of the survey. Overall, the February 2019 biological surveys documented vegetation starting to emerge (see **Figure 8** and Figure 5), and future surveys are planned to document changes and the effects of fire on many of the biological communities with emphasis on sensitive species.



Figure 7. Coast Live Oak Tree Burned during Topanga and Woolsey Fires

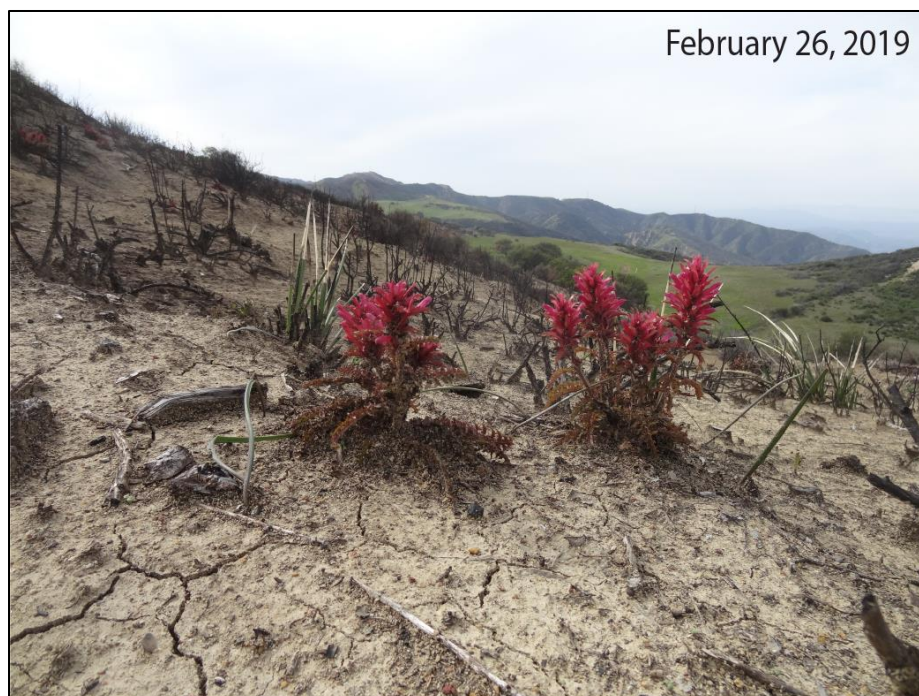


Figure 8. Native Plant, Indian Warrior (*Pedicularis densiflora*) on Milk-Vetch Hill

Fire Impacts on Area IV Buildings. None of the buildings identified in the FEIS for demolition were damaged by the fire. Figure 1 shows that except for Building 4029,⁷ all DOE-owned structures evaluated in the FEIS are in areas outside of the Woolsey Fire burn area. Although Building 4029 is within the burn area, it was undamaged except for scorch marks. The fire basically burned to areas outside (and to a certain extent within) a chain-link fence outside the structure, but did not impact the structure itself. **Figures 9 and 10** are exterior and interior photographs of Building 4029 taken after the Woolsey Fire. Although the fire burned to the asphalt road leading to Building 4029, the structure is undamaged and essentially empty. In addition, none of the Boeing-owned buildings in Area IV were damaged.



Figure 9. Exterior of Building 4029 after the Woolsey Fire

⁷ Building 4029 (Hazardous Waste Management Facility) was originally used for storage and use of radioactive source materials in below-grade concrete structures, subsequently for storage of reactive metal waste and contaminated equipment before shipment offsite, and then to treat and store nonradioactive chemical waste. The structures that housed the radioactive materials were excavated and disposed of. After operations in Building 4029 ceased in 1997, it was surveyed using the radiological health and safety requirements and procedures existing at the time of the survey. Although the structure is not considered to be radioactively contaminated, debris from its removal was included in the radioactive waste volume estimate for the Building Removal Alternative (DOE 2018).



Figure 10. Interior of Building 4029 after the Woolsey Fire

Fire Impacts on Groundwater Remediation. The Woolsey Fire will have no effect on DOE's proposals to remediate Area IV groundwater plumes containing chemical or radiological contamination, as documented in the FEIS and in a Resource Conservation and Recovery Act (RCRA) Corrective Measures Study (CDM Smith 2018). **Figure 11** shows areas of groundwater contamination within Area IV. The only groundwater plume within the burn area is the Metals Clarifier TCE plume. The fire impacted surficial material only; groundwater impacted by TCE is greater than 15 feet below ground surface. In addition, the concentration of TCE in this plume is approximately 11 parts per billion (ppb), which can be compared to the maximum contaminant level for TCE of 5 ppb. Because of the very low concentrations of PCB in this plume, DOE proposes to remediate the plume by continuing the current program of monitored natural attenuation (CDM Smith 2018; DOE 2018). There are three piezometers in the area of the plume that are used for monitoring contaminant concentrations. All wells at Area IV, however, have metal casings and the fire did not damage the piezometers.

All seeps and springs in Area IV and the NBZ are well north of the Area IV burn area.

Fire Impacts on Transportation Networks. The Woolsey Fire did not damage the road network within SSFL and its vicinity that would be needed to transport waste, backfill, or material to or from SSFL. As suggested in Figure 1, Area IV is networked with paved and unpaved roads. The roads needed for implementing the FEIS alternatives were unaffected by the fire. In addition, access to or exit from SSFL was unaffected. Woolsey Canyon Road is open from the SSFL site entrance to the intersection of the road with Valley Circle Boulevard. There were no impacts to the road and rail network outside of SSFL that DOE would expect to use to transport waste, backfill, and material to or from SSFL.

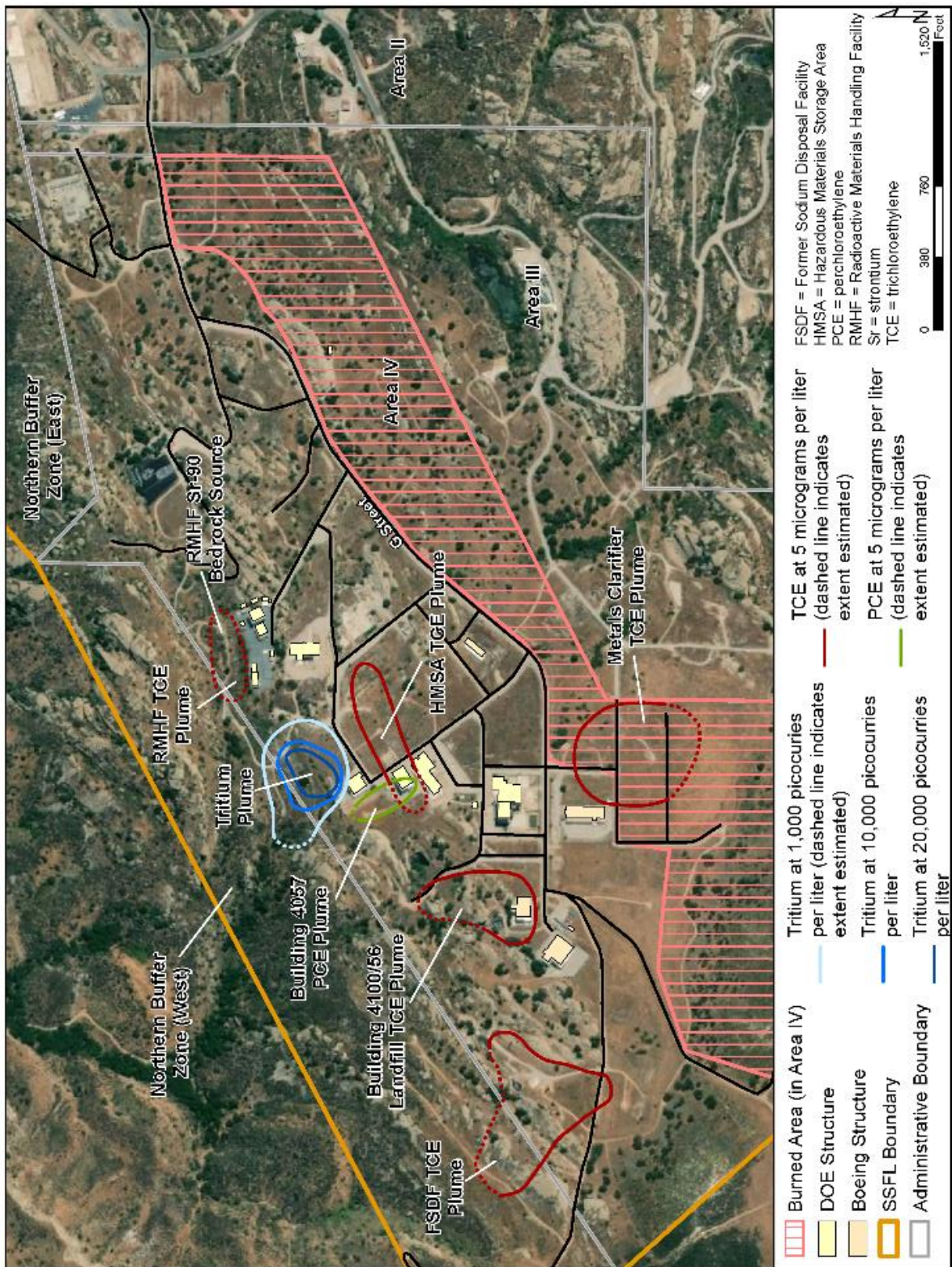


Figure 11. Groundwater Plumes at Area IV

4.0 COMPARISON TO FEIS ANALYSES AND DETERMINATIONS

4.1 Soil Remediation, Building Demolition, and Groundwater Remediation Alternatives

The Soil Remediation Alternatives consist of the Soil No Action Alternative and three action alternatives – the Cleanup to AOC LUT Values, Cleanup to Revised LUT Values, and Conservation of Natural Resources Alternatives (two scenarios). For the soil remediation alternatives, **Table 1** summarizes the potential for impacts relative to those evaluated in the FEIS for each resource area. As shown and as discussed below, there could be a minor increase in impacts under the No Action Alternative, compared to those evaluated in the FEIS.

4.1.1 Soil Remediation No Action Alternative

The most significant effect of the fire on the FEIS analyses is the increased impacts on biological resources. Within Area IV some areas showed signs of a high severity burn that resulted in complete consumption and mortality of entire individual plants whereas other localized areas showed signs of a low intensity burn where there was only slight modification to the vegetation structure and some mature individual plants survived, and some areas did not burn at all. Therefore, some degradation of vegetation and wildlife habitat and biota has occurred since preparation of the FEIS, as well as some degradation of threatened, endangered, or rare species or their habitat. While complete recovery of this degradation will require several years, recovery to pre-fire conditions is expected. The vegetation communities at SSFL include those that have developed methods for adapting to fire, such as underground root crowns that allow them to re-sprout after fire or production of seeds that can remain in the ground for many years and germinate in response to smoke, heat, and ash (UCCE 2014).

There are no wetlands in the Area IV burn area.

Under the No Action Alternative additional impacts of the fire are minor and temporary. The aesthetics and quality of views at the Area IV burn area have been temporarily affected, but will improve as new vegetation provides additional surface texture and color. As shown in Figure 5, recovery of the burned area commenced shortly after the fire occurred.

The fire and fire control measures have resulted in areas of exposed soil. This may result in an increased potential for erosion in the affected areas, as well as a potential increase in sediment in stormwater runoff. DOE is monitoring this situation and will employ BMPs to prevent this from occurring, until the vegetation recovers adequately to stabilize the soil.

Some additional minor impacts that are temporary occurred during the fire (only) and did not result in a relevant change in baseline conditions as evaluated in the FEIS. As stated in Section 3.2 (Health and Safety subsection), all of the measurements and analyses indicate that no measurable radiation or hazardous materials associated with SSFL contamination were released by the fire. Soil and ash sample results showed no chemical constituents emanating from SSFL. However, the fire released smoke, particulates, and greenhouse gases as it passed through SSFL and Area IV, which occurred during the initial two days of the fire. In any event, the contribution of these constituents from Area IV was small compared to that contributed by the entire acreage burned by the fire. During the fire, there was a temporary increase in traffic and traffic noise in the SSFL vicinity due to the presence of emergency response vehicles. There was also a temporary increase in noise from fire suppression aircraft.

Table 1. Summary of Potential Changes in Impact Determinations as a Result of the Woolsey Fire from the Evaluations Presented in the FEIS

Resource Area		Alternatives	
Resource Area	Resource	No Action Alternative – Baseline Conditions	Action Alternatives
Land Resources	Land use	No change from FEIS – the fire did not change the land use designation	No change from FEIS – the fire did not change the land use designation
	Access to recreational areas	No change from FEIS – Sage Ranch access restrictions occurred only during the time of fire	No change from FEIS – fire did not affect future access to Sage Ranch Park
	Electrical requirement	No meaningful change from FEIS – Temporary loss of power to Area IV from fire damage; power replaced by generators until restoration of line power	No change to remediation power requirements from those described in the FEIS
	Water requirement	No change from FEIS – No water usage at time of fire or for the No Action Alternative.	No change from FEIS – Fire did not affect remediation water requirements or sources
	Aesthetics and Visual Quality	Short-term degradation in visual quality from burned vegetation; vegetation recovery started with winter rains	No change from FEIS – Vegetation abundance at time of remediation will be similar to pre-fire conditions
Geology and soils	Paleontological resources	No change from FEIS – Paleontological resources not burned	No change from FEIS – Paleontological resources not burned
	Risks to workers from landslides	No change from FEIS – Fire did not burn in areas of landslide risk	No change from FEIS – Fire did not burn in areas of landslide risk
	Soil erosion	Short-term increase in erosion potential, vegetation recovery will stabilize slope	No change from FEIS – Vegetation recovery will stabilize slope
	Potential loss of soil function	No change from FEIS – Fire did not impact soil function	No change from FEIS – Fire did not impact soil function
	Backfill requirement	No change from FEIS – No backfill required for this alternative	No change from FEIS – Fire did not affect backfill volume requirements
Surface water resources	Stormwater runoff	Short-term potential increase for runoff, vegetation recovery will reduce that potential	No change from FEIS – Vegetation recovery is expected to restore baseline conditions by time of remedial actions
Groundwater resources	Groundwater quality and quantity	No change from FEIS – Groundwater and plumes were not affected by fire	No change from FEIS – Groundwater and plumes were not affected by fire
Biological resources	Vegetation and wildlife habitat	Temporary loss of vegetation and habitat, recovery initiated with winter rains	No change from FEIS – Recovery of vegetation expected by time of remedial actions
	Wetlands	No change from FEIS – Wetland areas were not affected by the fire	No change from FEIS
	Threatened, endangered, or rare species	Death or damage to individuals of various species. Recovery (including Braunter's milk-vetch) expected and started with winter rains; see Section 3.2 discussion of Fire Impacts on Biological Resources.	Recovery of plant populations anticipated by time of remedial actions
Air quality and climate change	Emissions of pollutants	Temporary effect – Short-term increase in particulates during time of fire	No change from FEIS
	Emissions of greenhouse gases	Temporary release of greenhouse gases during time of fire	No change from FEIS
Noise	Noise from operations	No change from FEIS – Noise from onsite fire-related activities was temporary	No change from FEIS
	Noise from truck traffic in the SSFL area	No change from FEIS – Fire fighting vehicles and aircraft produced temporary change in noise levels	No change from FEIS
Transportation	Radiological and nonradiological impacts	No change from FEIS – No change in transport of radiological or chemical materials during or after the fire	No change from FEIS – Fire had no effect on future transportation of radiological or chemical material

Resource Area		Alternatives	
Resource Area	Resource	No Action Alternative – Baseline Conditions	Action Alternatives
Traffic	SSFL-area traffic congestion	No meaningful change from FEIS – Emergency response vehicles produced temporary increase in traffic	No change from FEIS
Human health and safety	Impacts on members of the public	No meaningful change from FEIS – Contribution of smoke from Area IV very small compared to entire area burned by fire; contribution was temporary	No change from FEIS
	Valley fever	No meaningful change from FEIS – Temporary, but unknown effect on release of Valley fever spores on fire-mobilized particulates; very small contribution compared to entire area burned by fire	No change from FEIS
	Impacts on workers	No change from FEIS – No workers at SSFL put at risk due to the fire; no change in effect on post-fire workers	No change from FEIS
Waste management	Disposal facility capacity	No change from FEIS – No DOE-related waste generated by fire ^a	No change from FEIS
Cultural resources	Architectural resources	No change from FEIS – No structural architectural resources identified in Area IV	No change from FEIS
	Archaeological resources	No change from FEIS – No archaeological sites impacted by fire in Area IV	No change from FEIS
	Traditional cultural resources	No change from FEIS – No archaeological sites impacted by fire in Area IV	No change from FEIS
Socioeconomics	Employment	No change from FEIS – No site worker employment impacted by fire	No change from FEIS
	Traffic in the SSFL area	No meaningful change from FEIS – Temporary increase in emergency response vehicle traffic during fire	No change from FEIS
	Infrastructure and municipal services in the SSFL area	No change from FEIS – Local infrastructure and municipal services supporting SSFL not impacted by fire	No change from FEIS
	Housing in the SSFL area	No change from FEIS – Specialized housing not needed for firefighting personnel	No change from FEIS
	Local government revenue	No change from FEIS – SSFL contribution to local government revenue not changed by fire	No change from FEIS
	Truck traffic at disposal facilities	No change from FEIS – No change in transport of radiological or chemical materials during or after the fire	No change from FEIS
Environmental justice	Human health	No meaningful change from FEIS – Contribution of smoke from Area IV very small compared to entire area burned by fire; contribution was temporary	No change from FEIS
	Traffic in the SSFL area	No meaningful change from FEIS – Emergency response vehicles produced temporary increase in traffic	No change from FEIS
	Traffic at disposal facilities	No change from FEIS – There was no transportation of materials from Area IV to disposal facilities at the time of the fire	No change from FEIS
Sensitive-aged populations	Traffic in the SSFL area	No meaningful change from FEIS – Emergency response vehicles	No change from FEIS
	Traffic at disposal facilities	No change from FEIS – There was no transportation of materials from Area IV to disposal facilities at the time of the fire	No change from FEIS

FEIS = Final Environmental Impact Statement for Remediation of Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory

^a Independently of DOE, Boeing is removing the remains of telephone poles from Area IV that were burned in the fire.

4.1.2 Soil Remediation Action Alternatives

As shown in Table 1, DOE has determined that there are no fire-related changes to the FEIS analyses for the soil remediation action alternatives. DOE's plans or procedures for soil remediation as evaluated in the FEIS have not changed, and there are no changes for any action alternative to the quantities of soil to be removed, the quantities of backfill to be delivered, or the types of trucks to be used to haul soil, backfill, equipment, or supplies. Application of the exemption process to protect cultural and biological resources was identified in the FEIS and impacts the amount of soil that was to be removed under each alternative. While biological resources were damaged by the fire, history has shown that these resources will recover. Significant recovery of vegetation is expected by the time that soil remediation begins, which will include recovery of threatened, endangered, or rare plant species. Vegetation recovery will also eliminate any increased potential for runoff that resulted from the fire. The biological damage from the fire does not change DOE's estimate of the extent of the area that would be subject to the exemption process. However, as stated in the FEIS, the determination of the final exemption areas will be made in the Soil Remedial Action Implementation Plans. This also has not changed.

There are no changes to assumptions about personnel or infrastructure requirements for soil removal. The fire did not impact the road network within SSFL or the road and rail network outside SSFL, so there would be no restrictions on transport of waste, equipment, supplies or personnel. There would be no changes in the potential impacts from offsite transport of waste and material to or from the site, and no changes to traffic impacts caused by the presence on SSFL-area roads of trucks or other vehicles. Thus, potential impacts on these and other resource areas such as land resources, surface and groundwater resources, air quality, noise, human health and safety, environmental justice, and sensitive-age impacts are the same as those evaluated in the FEIS.

4.1.3 Building Demolition Alternatives

The Woolsey Fire had no effect on the FEIS analysis for the Building Demolition Alternatives. The Building Demolition Alternatives consist of the Building No Action Alternative and the Building Removal Alternative. None of the DOE-owned buildings at Area IV were damaged by the fire. Therefore, there are no changes in procedures for maintaining the buildings under the No Action Alternative, and no changes in operational plans for removal of the buildings under the Building Removal Alternative. There are thus no changes in personnel requirements for maintaining or removal of buildings, and no changes in infrastructure requirements such as electricity or water.⁸ There is no change in waste generation under either the Building No Action or Building Removal Alternative, and no change in the types or numbers of trucks required to remove waste from the site, or to deliver equipment, supplies or backfill to the site. As discussed in Section 3.2, the onsite road network at SSFL was unaffected by the fire, and the fire resulted in no restrictions to onsite transport of waste, material, or personnel within SSFL, on Woolsey Canyon Road, or in the road and rail network that DOE would use for transport of waste or backfill. Therefore, there are no changes in the potential impacts from offsite transport of waste and material to or from the site, and no changes in traffic impacts caused by the presence on SSFL-area roads of trucks or other vehicles. Thus, potential impacts to these and other resource areas such as land resources, soil and geology,

⁸ Water, natural gas, and telephone service were disconnected to Area IV prior to 2018. For the FEIS, it was assumed that electrical requirements for site remediation would be supplied by onsite generators. Potential air impacts from operation of these generators were evaluated in the FEIS. As evaluated in the FEIS and irrespective of the Woolsey Fire, water for site remediation activities (generally dust control) would be supplied by the Calleguas Municipal Water District.

surface and groundwater resources, biological resources, air quality, noise, human health and safety, environmental justice, and sensitive-age populations do not change from those evaluated in the FEIS.

4.1.4 Groundwater Remediation Alternatives

The Groundwater Remediation Alternatives consist of the Groundwater No Action, Groundwater Monitored Natural Attenuation, and Groundwater Treatment Alternatives. In the case of the Groundwater Treatment Alternative, the suite of groundwater treatment technologies to be implemented includes those described in the FEIS and the Corrective Measures Study prepared pursuant to RCRA (CDM Smith 2018) (see Chapter 2, Section 2.6, of the FEIS). The FEIS evaluated the potential impacts that could occur assuming the Corrective Measure Study technologies with the largest impacts would be implemented.

The Woolsey Fire had no effect on the FEIS analysis for the Groundwater Remediation Alternatives. The only groundwater plume beneath the Area IV burn area is the Metals Clarifier TCE plume which DOE proposes to remediate by continuing the current program of monitored natural attenuation. The three piezometers in the area of the plume that are used to monitor contaminant concentrations were undamaged by the fire and monitoring of the plume will continue. The other groundwater plumes evaluated in the FEIS are all north of the burn area. The five additional wells analyzed under the Groundwater Monitored Natural Attenuation Alternative will be installed and monitored outside of the burn area (north of G Street). Under the Groundwater Treatment Alternative, the FEIS analyzed impacts from installation and operation of two pump and treat systems as well as impacts from removal of bedrock contaminated with strontium-90. The projected locations of the pump and treat systems and the location of the contaminated bedrock are all outside of the burn area. Thus, there are no changes to the evaluated procedures for groundwater monitoring, well installation, installation and operation of pump and treat systems, or bedrock removal. There are no changes in personnel requirements under the alternatives and no changes in the minimal expected infrastructure requirements. There is no change in waste generation under any of the alternatives, and no change in the types or numbers of trucks required to remove waste from the site or, depending on the alternative, to deliver equipment, supplies or backfill. As discussed above, the fire did not cause any impacts to the road network within SSFL or the road and rail network outside SSFL that could restrict transportation activities. Therefore, there are no changes in the potential impacts from offsite transport of waste and material to or from the site, and no changes in traffic impacts caused by the presence on SSFL-area roads of trucks or other vehicles. Potential impacts to these and other resource areas such as land resources, soil and geology, surface and groundwater resources, biological resources, air quality, noise, human health and safety, environmental justice, and sensitive-age populations do not change from those evaluated in the FEIS.

4.2 Combination of Alternatives

As discussed in Section 4.1, the fire had no effect on the analyses performed in the FEIS for any of the action alternatives evaluated for soil remediation, building demolition, or groundwater remediation. Therefore, the fire had no effect on the analyses performed in the FEIS for any combination of action alternatives.

4.3 Cumulative Impacts

Cumulative impacts are evaluated in Chapter 5 of the FEIS and refer to effects on the environment resulting from the incremental impacts of the proposed action when added to the incremental

impacts of other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes such other actions. Reasonably foreseeable onsite actions at SSFL that were included in the cumulative impact analysis in the FEIS consist of ongoing and planned demolition, remediation, and waste transportation activities conducted by DOE, NASA, and Boeing. Additional activities in the SSFL Region of Influence (ROI) that were addressed included a variety of proposed residential, commercial, or industrial development projects in the SSFL ROI, as well as (for example) proposed modifications or improvements to recreation areas, infrastructure, and transportation networks. Future actions that are speculative or not well defined were not analyzed.

The fire affected a large area generally to the southwest of SSFL, including locations where many of the proposed residential, commercial, industrial development, or other projects would occur. Furthermore, as discussed in Section 3.2, shortly after the start of the fire, the State of California assembled the WERT. Covering the entire area impacted by the fire except for SSFL, the WERT evaluated post-fire watershed conditions, identified potential VARs related to human safety and property, and evaluated the potential for increased post-fire flooding and debris flows. The WERT identified 420 VARs resulting from increased debris flow hazard, rock-fall hazards, flood flows, and increased erosion and sediment delivery. The WERT identified 247 VAR points, generally associated with individual structures and/or drainage structures, and 163 VAR polygons, generally associated with larger debris/alluvial fans, road segments, and flood-prone areas. Thirty-two point VARs and 32 polygon VARs were classified as having a high hazard to life and safety. Fifty-three point VARs and 56 polygon VARs were classified as having moderate hazard to life and safety. The remaining VARs were classified as having a relatively low hazard to life and safety. The WERT also recommended potential emergency protection measures to reduce the risks to those values (Calfire et al. 2018). While it is to be expected that actions would be taken to address these VARs, along with other post-fire rebuilding activities, the degree of their effect on cumulative impacts would depend on how the proposed projects are ultimately implemented.

The fire could result in a minor effect on cumulative traffic impacts. Although the fire could result in delays to some of the residential, commercial, industrial development, or other projects, which would tend to temporarily reduce projected traffic levels in the SSFL Area, there would also be a temporary increase in traffic levels in the SSFL Area as remediation from fire-damage occurs such as repair or removal of structures. These temporary altered traffic patterns, however, are unlikely to significantly affect the FEIS analysis because most of the fire damage is to the southwest of SSFL while the principal road and rail transportation networks needed to implement the FEIS alternatives are to the east and north of SSFL. Similar to cumulative traffic impacts, there could be impacts on air quality, though it is uncertain when those impacts would occur. Fire cleanup and rebuilding activities could result in increased air emissions from disturbance of soil and ash and from vehicle emissions. However, if the fire causes some planned projects to be delayed, there could be a delay in the near-term generation of associated dust and vehicle emissions.

With respect to the combined impacts of SSFL remediation by DOE, Boeing, and NASA, the FEIS presented summaries of impacts by resource area for the three parties, and added the projected impacts by Boeing and NASA to those determined for DOE's combined action alternatives (minimum and maximum impacts). In general, the impacts projected for Boeing and NASA were determined in a conservative manner. As a prime example, it was assumed for analysis that Boeing's remediation would be completed in 2 years while NASA's remediation would be completed in 5 to 7 years. DOE believes that these assumptions have the effect of maximizing the cumulative impacts from remediation by the two entities. Also for analysis, it was assumed that site remediation by Boeing and NASA would occur at the same time as remediation by DOE, resulting for some years

in up to 96 daily heavy-duty truck round trips to transport waste and backfill to or from SSFL. Although the effects of the fire on Boeing's and NASA's plans for remediation are uncertain, DOE does not believe that remediation efforts by Boeing and NASA would be accelerated. To the extent that their remediation efforts would be delayed or unaffected, the FEIS analysis would remain conservative.

5.0 CONCLUSIONS

Ventura County has experienced multiple large destructive fires. Over the last few decades the wildfires having the largest direct impact on Area IV at SSFL were the 2005 Topanga Fire and the 2018 Woolsey Fire. The residual effects of the 2005 Topanga Fire were part of the baseline environmental conditions and therefore, were considered during preparation of the FEIS. This current document evaluates whether any of the FEIS analyses and determinations would require modification resulting from the effects of the Woolsey Fire.

Overall, the Woolsey Fire had very little effect on the FEIS analyses and determinations, and no effect on the comparisons of impacts among the action alternatives or the identification in the FEIS of DOE's preferred alternative. This is because for most aspects of most resource areas under the three groups of alternatives, the evaluated action would occur in the manner described in the FEIS irrespective of the fire.

The most significant effect of the fire on the FEIS analyses is the impact on biological resources under the Soil No Action Alternative. Within Area IV some areas showed signs of a high severity burn that resulted in complete consumption and mortality of entire individual plants whereas other localized areas showed signs of a low intensity burn where there was only slight modification to the vegetation structure and some mature individual plants survived. Therefore, some degradation of vegetation and wildlife habitat and biota occurred since preparation of the FEIS, as well as some degradation of threatened, endangered, or rare species or their habitat. Complete recovery of this degradation will require several years, but the vegetation is expected to recover to conditions comparable to those before the fire. Five and a half months after the fire, the endangered Braunter's milk-vetch is showing good signs of recovery (see **Figure 12**).

The FEIS analysis was also be affected to a minor, insignificant extent for some of the other resource areas under the Soil No Action Alternative. The aesthetics and quality of views of some at the Area IV burn area have been temporarily affected, but are improving as new vegetation provides additional surface texture and color. The fire and fire control measures have resulted in areas of exposed soil, which may result in an increased potential for erosion in the affected areas, as well as a potential increase in sediment in stormwater runoff. DOE is monitoring this situation and will employ BMPs to prevent this from occurring, until the vegetation recovers adequately to stabilize the soil.

Some minor and temporary impacts occurred during the fire (only) that did not result in a significant change in baseline conditions as evaluated in the FEIS. The fire released smoke, particulates, and greenhouse gases as it passed through SSFL and Area IV, which occurred during the initial few days of the fire. The contribution of these constituents from Area IV was small compared to that contributed by the entire acreage burned by the fire. During the fire, there was a temporary increase in traffic and traffic noise in the SSFL vicinity due to the presence of emergency response vehicles. There was also a temporary increase in noise from fire suppression aircraft.

The fire does not have any effect on the analyses performed in the FEIS for the Soil Action Alternatives or for any of the alternatives (no action as well as action) evaluated for the Building

Demolition and Groundwater Demolition Alternatives. Because of the lack of effect on any of the action alternatives, there is no change to the analyses performed in the FEIS for combinations of alternatives.



Figure 12. Branton's Milk-Vetch in the Burned Portion of Area IV (the low-growing, grey-green plants on the hillside)

With respect to cumulative impacts, the fire could result in delays in some of the proposed residential, commercial, industrial development, and other activities in the SSFL ROI as well as new activities associated with post-fire recovery. These activities affect traffic and air emissions, but the impact is expected to be inconsequential with respect to the analysis in the FEIS. Although the effects of the fire on Boeing and NASA plans for remediation are uncertain, DOE believes that the FEIS analysis would remain conservative.

6.0 REFERENCES

Boeing (The Boeing Company), 2005, Fact sheet: Boeing Santa Susana Field Laboratory Update The September 2005 Topanga Fire, Environmental Communications Office, November 8.

Boeing (The Boeing Company), 2007, *2006 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports_archives.page), March 1.

Boeing (The Boeing Company), 2008, *2007 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports_archives.page), February 28.

Boeing (The Boeing Company), 2009, *2008 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 27.

Boeing (The Boeing Company), 2010, *2009 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 26.

Boeing (The Boeing Company), 2011a, *2010 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 28.

Boeing (The Boeing Company), 2011b, *Site Environmental Report for Calendar Year 2010, DOE Operations at the Boeing Company Santa Susana Field Laboratory Area IV, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.etec.energy.gov/environmental_and_health/Documents/ASERS/ASER_2011.pdf), September.

Boeing (The Boeing Company), 2012, *2011 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 27.

Boeing (The Boeing Company), 2013, *2012 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Canoga Park, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 26.

Boeing (The Boeing Company), 2014, *2013 Annual NPDES Discharge Monitoring Report, Ventura County, California* (accessed on July 14, 2014, http://www.boeing.com/boeing/aboutus/environment/santa_susana/ents/monitoring_reports.page), February 26.

Boeing (The Boeing Company), 2015, *2014 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Ventura County, California*, February 15.

Boeing (The Boeing Company), 2016, *2015 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Ventura County, California*, February 15.

Boeing (The Boeing Company), 2017, *2016 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Ventura County, California*, February 15.

Boeing (The Boeing Company), 2018, *2017 Annual NPDES Discharge Monitoring Report, Santa Susana Field Laboratory, Ventura County, California*, February 15.

Boeing (The Boeing Company), 2019, Letter to Information Technology Unit, Los Angeles Regional Water Quality Control Board, from D. Dassler, Boeing, “Fourth Quarter 2018 NPDES Discharge Monitoring Report,” February 15.

Calfire (California Department of Forestry and Fire Protection), 2019, Incident Information (accessed on February 18, 2019, http://cdfdata.fire.ca.gov/incidents/incidents_details_info?incident_id=2282), January 4.

California Departments of Forestry and Fire Protection, Conservation, Water Resources, and Water Boards, 2018, *Watershed Emergency Response Team Final Report*, CA-VNC-091023 and CA-VNC-090993, December 14.

CDM Smith, 2018, *Draft Area IV Groundwater Corrective Measures Study, Santa Susana Field Laboratory, Ventura County, California*, September.

DOE (U.S. Department of Energy), 2003, *Final Environmental Assessment for Cleanup and Closure of the Energy Technology Engineering Center*, DOE/EA-1345, National Nuclear Security Administration Service Center, Oakland, California (available at <http://www.etec.energy.gov/Regulation/RegDocs/ETECEA.pdf>), March.

DOE (U.S. Department of Energy), 2018, *Final Environmental Impact Statement for Remediation of Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory*, DOE/EIS-0402, Washington DC, November.

DTSC (State of California Department of Toxic Substances Control), 2010, *The State of California Environmental Protection Agency, Department of Toxic Substances Control and the United States Department of Energy, In the Matter of: Santa Susana Field Laboratory, Simi Hills, Ventura County, California, Administrative Order on Consent for Remedial Action*, Docket No. HSA-CO 10/11-037, Health and Safety Code Sections 25355.5(a)(1)(B), 58009 and 58010, December 6.

DTSC (State of California Department of Toxic Substances Control), 2018, *DTSC Interim Summary Report of Woolsey Fire*, December.

Flow Science (Flow Science, Inc.), 2007, *Potential Background Constituent Levels in Storm Water at Boeing's Santa Susana Field Laboratory*, Pasadena, California, June 25.

Leidos, Inc., 2019a, Memorandum from T. Schoenwetter and T. Mulroy to J. Wondolleck, CDM Smith, Re: Woolsey Fire – Initial Post-Fire Assessment of Biological Resources in Area IV of Santa Susana Field Laboratory, January 7.

Leidos, Inc., 2019b, Personal communication (email), from T. Schoenwetter to J. Wondolleck, CDM Smith, Re: Woolsey Post-Fire Biological Activities/Assessments Overview, March 1.

North Wind (North Wind, Inc.), 2019a, *Radioactive Particulate Air Sampling Results Associated with the Woolsey Fire, Santa Susana Field Laboratory, Ventura County, California*, January.

North Wind (North Wind, Inc.), 2019b, *Report on Quarterly Air Monitoring, Area IV, Third Quarter 2018–2019, Santa Susana Field Laboratory Ventura County, California*, May.

UCCE (University of California Cooperative Extension), 2014, Fact sheet: *Climate, Fire, and Habitat in Southern California*, Sustainable and Fire Safe Landscapes, California Division of Agriculture and Natural Resources (accessed on January 1, 2015, http://ucanr.edu/sites/SAFElandscapes/Fire_in_Southern_California_Ecosystems/).