Annual Fire Protection Program Summary
for Calendar Year 2017

UNITED STATES DEPARTMENT OF ENERGY

Summary Provided by:

Office of Environmental Protection and ES&H Reporting

Office of ES&H Reporting and Analysis

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Office of Environment, Health, Safety and Security

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Foreword

The submission of this 2017 Annual Fire Protection Summary Report is required by the Department of Energy (DOE) Order 231.1B, *Environment, Safety and Health Reporting.* This summary report is the primary source for quantifying fire and fire-related monetary losses to facilities, property, and equipment across the DOE complex.

This report for calendar year (CY) 2017 was summarized from information submitted by 27 reporting elements representing approximately 99 percent of DOE's facility and property valuation. (Most DOE facilities report into the Fire Protection Database, except for the Power Marketing Administrations and Headquarters offices.) Headquarters, and Field/Area/Site abrreviations are identified in the Glossary, and fire protection, valuation, and rate terms are listed in the Definitions.

The fire protection data for 2017 were extracted from the DOE Fire Protection Reporting Database, with the following organizations reporting:

Ames Laboratory
Argonne National Laboratory
Brookhaven National Laboratory
East Tennessee Technology Park
Fermi National Accelerator Laboratory
Idaho National Laboratory
Kansas City Plant
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
National Renewable Energy Laboratory
Nevada National Security Site
Oak Ridge National Laboratory
Office of River Protection
Pacific Northwest National Laboratory
Paducah Gaseous Diffusion Plant
Pantex Plant
Portsmouth Gaseous Diffusion Plant
Princeton Plasma Physics Laboratory
Richland Operations Office
Sandia National Laboratory
Savannah River Site
Stanford Linear Accelerator Laboratory
Strategic Petroleum Reserves
Waste Isolation Pilot Plant
West Valley Demonstration Project
Y-12 Plant

Organizational elements are required to input their fire protection data by April 30th of each year; however, the Office of Environment, Health, Safety and Security (AU) accepts data through the end of May.

The Fire Protection Reporting System is located at:
http://energy.gov/ehss/policy-guidance-reports/databases/fire-protection-database. [Password required]

AU continues to work with the DOE Fire Safety Committee to improve the data submission system and the content of the annual report to improve its utility.

Glossary

Headquarters Organizational Elements

AU	Environment, Health, Safety and Security
EE	Energy Efficiency & Renewable Energy
EM	Environmental Management
FE	Fossil Energy
LM	Legacy Management
NE	Nuclear Energy
NNSA	National Nuclear Security Administration
PMA	Power Marketing Administrations
SC	Science

Field/Area/Site Organizational Elements

CAO	Carlsbad Area Office
CH	Chicago Operations Office
GFO	Golden Field Office
GJO	Grand Junction Office
DOE-ID	Idaho Operations Office
KCSO	Kansas City Site Office
LSO	Livermore Site Office
LASO	Los Alamos Site Office
NETL	National Energy Technology Laboratory
NPR	Naval Petroleum Reserves
NSO	Nevada Site Office
ORO	Oak Ridge Operations Office
ORP	Office of River Protection
PXSO	Pantex Site Office
RL	Richland Operations Office
SSO	Sandia Site Office
SRO	Savannah River Operations Office
SPR	Strategic Petroleum Reserve Office
YSO	Y-12 Site Office

Site Abbreviations and Acronyms

ALA	Ames Laboratory
ANL	Argonne National Laboratory
AEMP	Ashtabula Environmental Management Project
BAPL	Bettis Atomic Power Laboratory
BNL	Brookhaven National Laboratory
ETTP	East Tennessee Technology Park
FNAL	Fermi National Accelerator Laboratory
FEMP	Fernald Environmental Management Project
INL	Idaho National Laboratory
ID-EM	Idaho Cleanup Project
KAPL	Knolls Atomic Power Laboratory
KCP	Kansas City Plant
KSO	Kesselring Site Operations
KAFB	Kirtland Air Force Base
LBNL	Lawrence Berkeley National Laboratory
LLNL	Lawrence Livermore National Laboratory
LANL	Los Alamos National Laboratory
MOAB	Moab Uranium Mill Tailings Remedial Action (UMTRA) Project
NBL	New Brunswick Laboratory
NETL	National Energy Technology Laboratory
NREL	National Renewable Energy Laboratory
NRF	Naval Reactors Facilities
NNSS	Nevada National Security Site
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
ORP	Office of River Protection
TWPC	TRU Waste Processing Center
PAD	Paducah Gaseous Diffusion Plant
PTX	Pantex Plant
PGDP	Paducah Gaseous Diffusion Plant
PNNL	Pacific Northwest National Laboratory
PORTS	Portsmouth Gaseous Diffusion Plant
PPPL	Princeton Plasma Physics Laboratory
RL	Richland Operations Office
SLAC	SLAC National Accelerator Laboratory
SNL-NM	Sandia National Laboratories, New Mexico
SNL-CA	Sandia National Laboratories, California
SRS	Savannah River Site
TJNAF	Thomas Jefferson National Accelerator Facility
WIPP	Waste Isolation Pilot Plant
WVDP	West Valley Demonstration Project
Y-12	Y-12 Plant
YMP	Yucca Mountain Project

Note: GJO, KAPL, MOAB, NBL may have property valuations in FIMS and/or PIDS, but do not report into the Fire Protection Database. TJNAF reports into the database, but there are no property valuations in PIDS and FIMS. Therefore, these sites are not included in the overall DOE fire protection calculations.

Definitions

For reference information only, the following definitions are provided from the archived DOE Manual (M) 231.1-1, *Environment, Safety, and Health Reporting Manual*, and the archived DOE Order (O) 5484.1, *Environmental Protection, Safety and Health Protection Information Reporting Requirements*, to clarify key concepts. Section references to these documents are given at the end of each definition.

Property Value/Valuation: The approximate replacement value of all DOE-owned buildings/facilities and equipment. Included are the cost of all DOE-owned supplies and average inventory of all source and special nuclear materials. Excluded are the cost of land, land improvements (such as sidewalks or roads), and below ground facilities not susceptible to damage by fire or explosion (such as major water mains and ponds). (APPENDIX C, DOE M 231.1-1)

Total Valuation: Obtained by combining information from the Facility Information Management System (FIMS) and the Property Information Database System (PIDS). FIMS is the Department's official repository of real property data, whereas PIDS provides the means for reporting DOE and contractor held property for sensitive items and equipment ($5– $25K and greater than $25K).

Estimated Loss: Monetary loss determination is based on all estimated or actual costs to restore DOE facility and equipment to pre-occurrence conditions irrespective of whether or not such restoration is performed. The estimate includes: (1) any necessary nuclear decontamination; (2) restoration in areas that received water or smoke damage; (3) any loss reductions for salvage value; and (4) any lost revenue experienced as a result of the accident. The estimate excludes: (1) down time; and (2) any outside agency payments. Losses sustained on private property are not reportable, even if DOE is liable for the damage and loss consequences resulting from the occurrence. (APPENDIX C, DOE M 231.1-1)

Fire Loss: All damage or loss sustained as a direct consequence of (and following the outbreak of) a fire shall be classified as a fire loss. Exception: the burnout of electric motors and other electrical equipment through overheating from electrical causes shall be considered a fire loss only if a self-sustained combustion exists after power is shut off. (APPENDIX C, DOE M 231.1-1)

Fire Loss Rate: Unit of comparison in *cents* loss per $100 of valuation (facilities and equipment) as a consequence of fire events.

Fire Protection Loss: All damage or loss sustained as a consequence of fire events, or non-fire events involving fire protection systems; including leaks, spills, and inadvertent releases.

Non-Fire Loss: All damage sustained as a consequence of non-fire events involving fire protection systems; including leaks, spills, and inadvertent releases.

Executive Summary

In calendar year 2017, DOE sites reported no fire or fire-protection related fatalities. There were three personnel injuries reported (page 2): at LANL, a small pyrophoric event caused by a chemical reaction resulting in one employee sustaining burns to four fingers; at RL, an employee was struck by a moving vehicle during the response to flooding from a broken fire pipe; and at NTS, a paramedic was injured while riding an all-terrain vehicle in the burn area of a wildland fire.

In 2017, there were 94 fire or fire protection-related occurrences reported into the DOE Occurrence Reporting and Processing System (page 2), a 2% increase from the 92 in 2016. Of the 94 events, there were 2 Operating Emergencies, 1 Significance Category 1 (major impact), and 9 Significance Category 2 (moderate impact) occurrences. The remaining 82 occurrences resulted in "minor" or "some" impact.

There were 101 total fire protection events reported into the Fire Protection Reporting Database in 2017 (page 4); an increase of 16% from the 87 in 2016, resulting in $1,070,080 in monetary losses, up 34% from $798,438 in 2016. Of these, 64 resulted in monetary losses, up 28% from the 50 in 2016.

Of the 64 events resulting in monetary losses, 52 were fire loss events (directly attributable to fire or smoke), up 33% from the 39 in 2016, and 12 were non-fire loss events (leaks, spills, and inadvertent releases), up 9% from the 11 in 2016. There were an additional 37 events with no reported costs.

The 52 reported fire loss events in 2017 resulted in $1,008,295 in fire losses, a 48% increase from the $679,619 in 2016. The 12 non-fire losses (leaks, spills or inadvertent releases) resulted in $61,786 in losses, a 48% decrease from the $118,819 in 2016.

In 2017, there were 15 major fire losses at 10 sites costing $10,000 or more, compared with 15 losses at 9 sites in 2016 (page 6).

It is worth noting that while nearly half of all sites reporting into the Fire Protection Database reported some fire protection losses in 2017, some of the larger sites did not report any losses at all. DOE might benefit from a closer look at these larger sites with no reported losses, as their fire protection systems, strategies, and procedures may offer an opportunity to reveal and share best practices with other sites.

Loss comparisons among DOE sites are performed by normalizing data against total facility and property valuation as reported in the FIMS and PIDS databases. Total DOE valuation for sites reporting into the Fire Protection Database increased roughly 6% in 2017 to $150.2 billion (page 8). The overall 2017 fire loss rate for reporting sites was 0.07 *cents* for each $100 in total site valuation, a 40% increase over the 2016 rate of 0.05 (page 9).

Recurring costs for fire protection activities were $231,430,722 in 2017, a 26% decrease from $311,927,586 in 2016 (page 13). As a ratio of cost to total valuation, in 2017 DOE spent approximately 15 cents per $100 of valuation for recurring fire protection activities at the sites reporting into the Fire Protection Database, compared with 22 cents in 2016, a 32% decrease.

In 2017, DOE reported 5,860 Fire Department responses, which is a 4% decrease from the 6,082 reported in 2016 (page 17).

Personnel Injuries

There were three fire protection-related personnel injuries reported by DOE during 2017, (compared with 2 in 2016), only one of which was directly attributable to fire.

LANL	On April 19, 2017, a pyrophoric chemical reaction occurred involving materials in a small container that released heat and a small amount of smoke. One employee sustained burns to four fingers (blistering).
RL	On August 26, 2017, a waterline broke. Over 230,000 gallons of water flooded the area before the water main could be isolated. During initial facility response, an employee struck another employee with a vehicle.
NTS	On September 2, 2017, a paramedic was injured while riding an All-Terrain Vehicle (ATV) in a burn area. The ATV hit a large rock and rolled onto the paramedic fracturing his lower leg.

Notable Occurrences Reported in ORPS

There were 94 fire or fire protection-related occurrences reported into the DOE Occurrence Reporting and Processing System (ORPS) in 2017, a 2% increase from the 92 in 2016. Of the 94 events, there were 2 Operating Emergencies, 1 Significance Category 1 (major impact), and 9 Significance Category 2 (moderate impact) occurrences. The remaining 82 occurrences resulted in "minor" or "some" impact.

Table 1 displays the summaries of the fire protection-related events that were rated as Operating Emergency, Significance Category 1, and/or Significance Category 2 occurrences. (Some events occurring in late 2017 were reported into ORPS in early 2018.)

Table 1

Summaries of Notable Fire Protection ORPS Occurrences

Site	Description
Operating Emergency Events	
ICP (SC 1, 2, OE)	EM-ID--FID-AMWTF-2018-0001 On December 21, 2017, a fire occurred in the Waste Management Facility when an operator opened a bag that had been stored in an overpack drum. As soon as the bag was breached, the operator observed a flash and saw a fire start in the waste. Available carbon dioxide extinguishers did not extinguish the waste, so the INL fire department recommended allowing the fire to burn itself out.
LBNL	SC--BSO-LBL-OPERATIONS-2017-0006 On August 2, 2017, a wildfire was observed near Berkeley Lab. Power was shut off and the site was evacuated.
Significance Category 1 Event	
ANL	SC--ASO-ANLE-ANLENOD-2017-0002 On November 11, the ANL Fire Department notified the Radioactive Waste Storage Facility Manager (FM) that there was a smoke detector failure on level 3 of the facility. There was a designated four-hour requirement for establishing Fire Patrol from time of discovery. Instead, the Nuclear Operations Manager directed the FM to enter a LCO for the facility, LCO 3.4 Fire Protection and Alarm System Actions, initiating a two-hour fire patrol, until maintenance repair was completed and tested on the 14th, which was determined to be a Technical Safety Requirement violation.

Summaries of Notable Fire Protection ORPS Occurrences (continued)

Site	Description
Significance Category 2 Events	
ANL	SC--ASO-ANLE-ANLEFMS-2017-0007 On November 27, 2017, a storage vault caught fire. Fire damage was limited to the metal cabinet, and materials contained within the cabinet. The ANL Fire Department placed the now identified uranium metal involved in the fire into a 30-gallon steel drum and packaged and covered with an additional extinguishing agent. A site-wide extent of condition for other containers of uranium fines is ongoing.
LANL	NA--LASO-LANL-FIRNGHELAB-2017-0001 On April 5, 2017, the Explosive Applications and Special Projects group conducted a thermal test of components from SNL and LANL. On April 13, SNL notified LANL that the test assembly contained material that potentially released toxic chemicals when heated, specifically methylene diphenyl diisocyanate and methylenedianiline, which both have routes of exposure through the air and the skin and can affect the eyes, lungs, skin, and liver. Forty personnel were referred to Occupational Medicine as a result and to date, all test results for exposure to these chemicals have returned negative results.
LANL	NA--LASO-LANL-TA55-2017-0015 On April 19, 2017, there was a chemical reaction involving materials in a small container that was opened for disposal that caused heat and a small amount of smoke. One employee sustained burns to four fingers (blistering). The reaction was extinguished with a metal-x fire extinguisher and the employee was transported for medical treatment.
PTX	NA--NPO-CNS-PANTEX-2017-0059 On August 13, 2017, a severe weather system caused a power outage that affected a pump house. The power outage caused the high-pressure fire loop to go to a single pump and tank system. An inspection showed one of the pumps lost power due to the weather conditions.
PORT	EM--PPPO-FBP-PORTSDD-2017-0016 On September 9, 2017, Fluor-BWXT identified a new battery pack that had failed during its initial conditioning charge/cycle, which included an explosive rupture/failure of an individual D-cell sized battery.
SRS	EM-SR--SRNS-CPWM-2017-0003 On July 22, 2017, a fire occurred at a heavy equipment parking area. Four pieces of heavy equipment were damaged and approximately 40 gallons of diesel fuel burned, none of which reached the outfall.
TJNAF	SC--TJSO-JSA-TJNAF-2017-0007 On October 12, 2017, a fire occurred in the C6 Motor Control Center of Central Helium Liquefier (CHL)1, Building 8.
WIPP	EM-CBFO--NWP-WIPP-2017-0017 On July 19, 2017, Nuclear Waste Partnership LLC discovered a potential issue with the pressure rating of fittings used in the manual portion of the Fire Suppression System installed on an underground waste transporter. The transporter did not meet all the requirements for a pre-engineered system as defined by National Fire Protection Association 17, and it had been used to transport waste, which was a Technical Safety Requirement violation.
WIPP	EM-CBFO--NWP-WIPP-2018-0001 On December 28, 2017, there was a strange smoke/burning odor in a trailer bathroom, resulting from a failed transformer in a water heater.

Fire Protection Losses

There were 101 fire protection events reported into the Fire Protection Reporting System in 2017; an increase of 16% from the 87 in 2016, resulting in $1,070,080 in monetary losses, a 34% increase over the $798,438 in 2016. Of these, 64 resulted in monetary losses (up 28% from the 50 in 2016).

Of the 64 events resulting in monetary losses, 52 were fire loss events (directly attributable to fire or smoke), up 33% from the 39 in 2016, and 12 were non-fire loss events (leaks, spills, and inadvertent releases), up 9% from 11 in 2016. There were an additional 37 events with no reported costs.

The 52 fire loss events in 2017 resulted in $1,008,295 in reported fire losses, a 48% increase from $679,619 in 2016. The 12 reported non-fire losses (leaks, spills or inadvertent releases) resulted in $61,786 in losses, a 48% decrease from $118,819 in 2016.

The 37 events with no reported costs were typically small incidents that are resolved quickly by local staff, or events where all associated costs were absorbed by the Fire Department. They are not included in the counts presented in this report, except as part of the number of water-based and non-water-based system actuations.

Table 2

DOE 2017 Fire Protection Loss Events

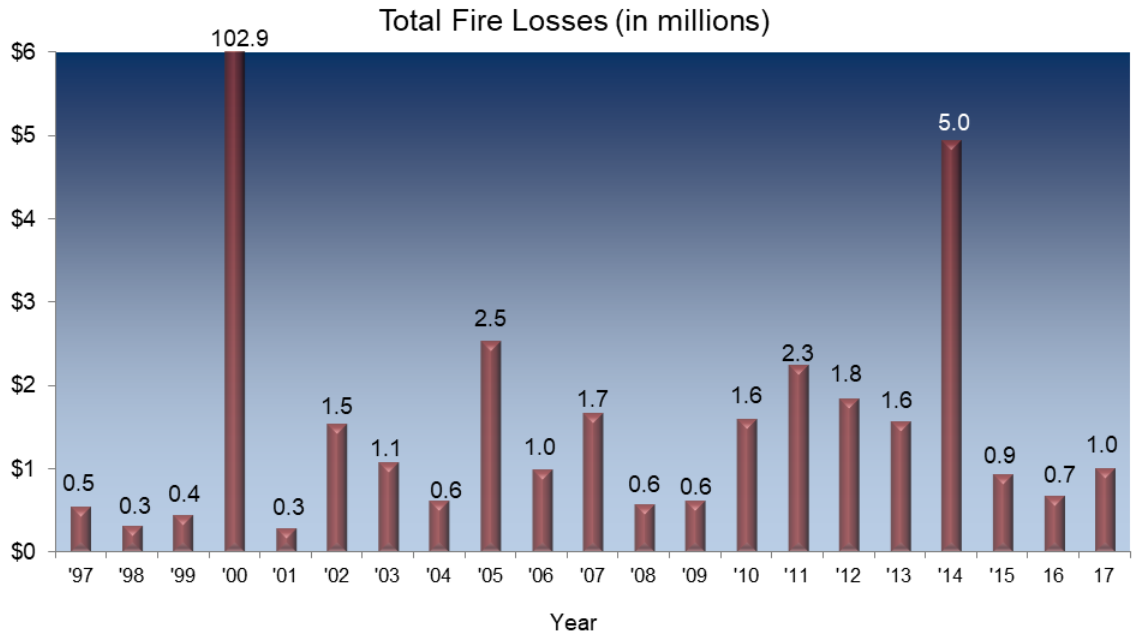
Loss Category	Fire Loss Type	Number of Events*	Property Loss Amount
	Fire/Smoke – Brush	4 Events	$66,952
Fire Loss Events	Fire/Smoke – Vehicle	3 Events	$190,600
	Fire/Smoke – Other	16 Events	$81,850
	Fire/Smoke – Building	29 Events	$668,892
	Total Fire Loss Events:	**52 Events**	**$1,008,295**
Non-Fire Loss Events	Leaks, Spills, Releases	12 Events	$61,786
	Total Fire Protection Loss Events:	**64 Events**	**$1,070,080**

* Fire events recorded in the database with no associated costs are not counted in the number of events.

It is worth noting that while roughly 40% of all sites reporting into the Fire Protection Database reported some fire protection losses in 2017, some of the larger sites did not report any losses at all. DOE might benefit from a closer look at these larger sites with no reported losses, as their fire protection systems, strategies, and procedures may offer an opportunity to reveal and share best practices with other sites.

Figure 1

DOE Property and Facility Fire Loss Amounts since 1997*



Note: 2000 figure includes the $100 million LANL range fire loss, and the 2014 total includes the $2.4 million WIPP vehicle fire event.

* In the *Annual Fire Protection Summary* reports from 2011-2014, Fire Protection Loss figures included both fire losses and non-fire losses, such as fire-protection system leaks, spills and unintentional releases. From 2015 forward, fire losses and non-fire losses are separated, as they were in reports prior to 2011, with fire losses including only losses resulting from actual fire events. Non-fire loss events are detailed in the Water-Based Fire Suppression System Actuations and Non-Water-Based Fire Suppression System Actuations sections of this report.

Major Fire Loss Events

A review of the fire loss data indicates that a small proportion of incidents constitute the majority of the $1,008,295 total fire protection losses reported by DOE sites for 2017. Of the 52 events resulting in financial losses (Table 2), 15 resulted in losses of $10,000 or more per event. These 15 events (29%) represented $931,427, or 92% of the total 2017 fire losses for the entire DOE Complex.

Table 3 provides descriptions of the five costliest (≈ $50,000 or greater) fire losses. These incidents represented $734,827 which contributed 76% of the total DOE fire protection losses for the year.

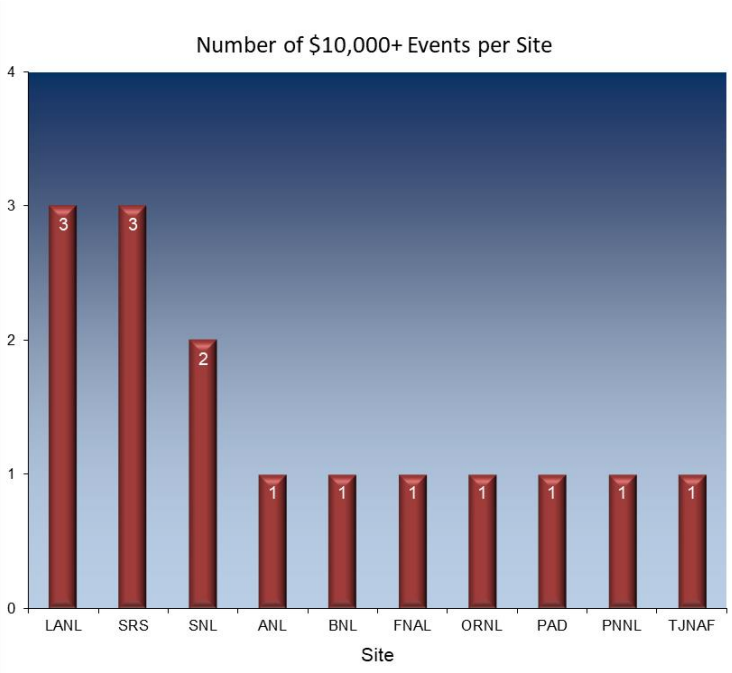
Table 3

Summaries of Fire Events with Losses of ≈ $50,000 or Greater

Loss Type	Location	Description	Dollar Loss
Fire/Smoke (Building)	ANL	A fire began in samples of natural uranium metal located in a storage vault. Firefighters used a thermal imaging camera to see through thick smoke and observed flames coming from a cabinet across the room.	$200,000
Fire/Smoke (Brush)	ORNL	During an experiment at the Powerline Conductor Accelerated Test (PCAT) facility, an automatic shutdown system did not open the DC supply to the test line as it was designed to do. The malfunction resulted in elevated temperatures and visible smoke from the transmission line. The transmission line failed and dropped to the ground, igniting ground vegetation and extending into the woods and burned two to three acres of land.	$49,702
Fire/Smoke (Building)	SNL	A fire at SNL Oliktok Point Alaska burned down a wooden shed that housed two diesel-powered generators. Firefighter response required snow removal and security to respond to protect fire fighters from polar bears. The shed was burned to the ground and the ignition source could not be identified since it was covered with ice from the 500 gallons of water used to extinguish the fire.	$235,125
Fire/Smoke (Vehicle)	SRS	Multiple pieces of heavy equipment were involved in a fire. An armored vehicle caught on fire.	$170,000
Fire/Smoke (Building)	TJNAF	A building caught fire after a conductor in an electrical panel ignited nearby combustibles in the area of the electrical panel.	$80,000

Figure 2

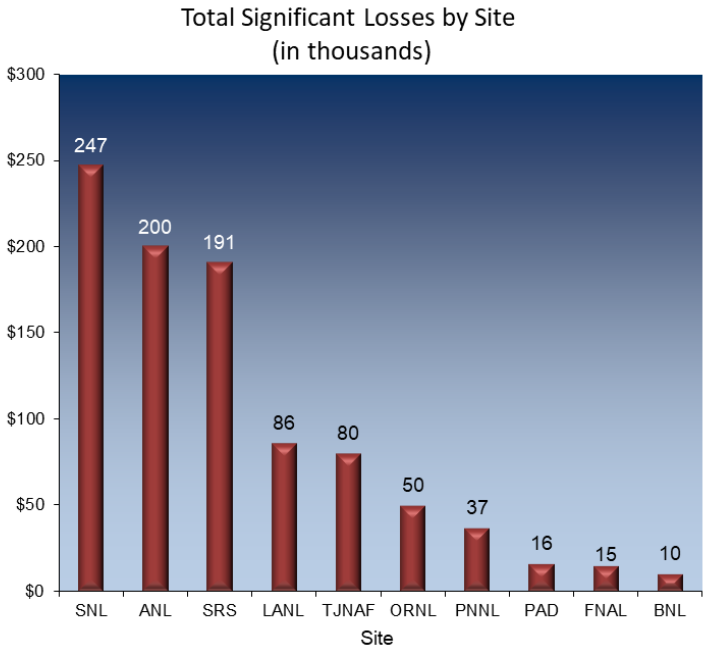
Significant Fire Loss Events by Site



The 15 fire loss events that resulted in losses of $10,000 or greater were reported at 10 sites.

Figure 3

Significant Fire Loss Amounts by Site



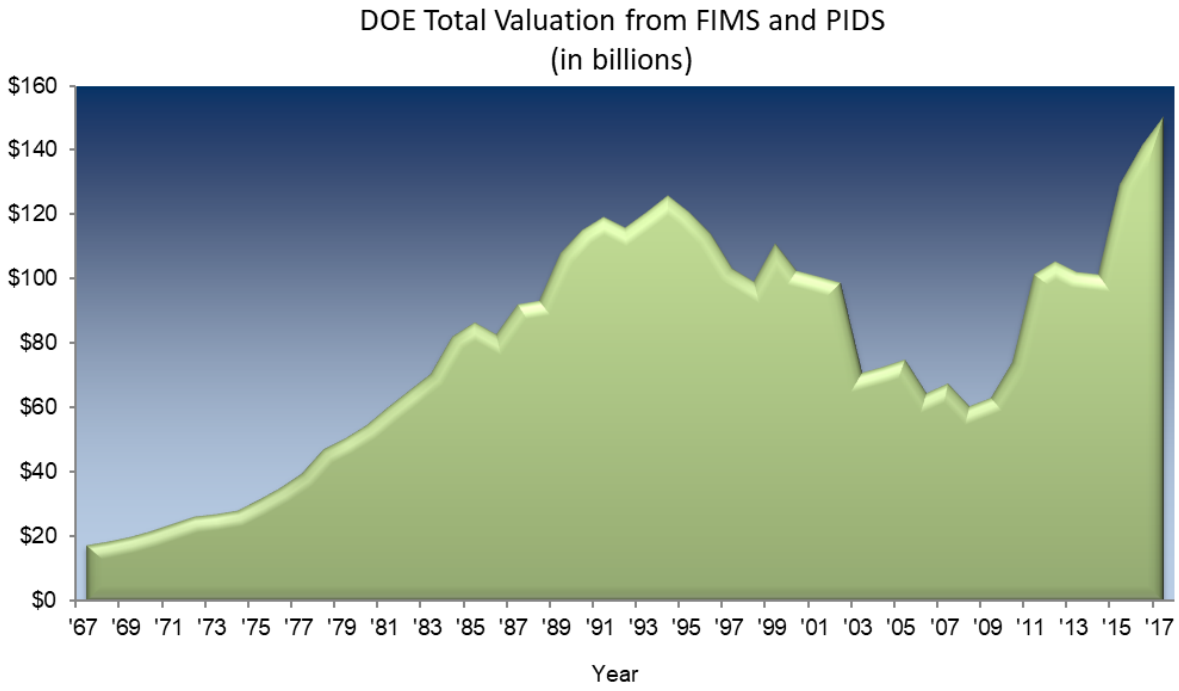
Total losses from the 10 sites with fire events resulting in losses of $10,000 or greater.

Fire Loss Rates (based on property valuation)

Facility and property valuation estimates serve as a common denominator for normalizing and calculating fire loss rates. In 2017, the total DOE valuation for sites reporting into the Fire Protection Database increased 6% from 2016, to roughly $150.2 billion.

Figure 4

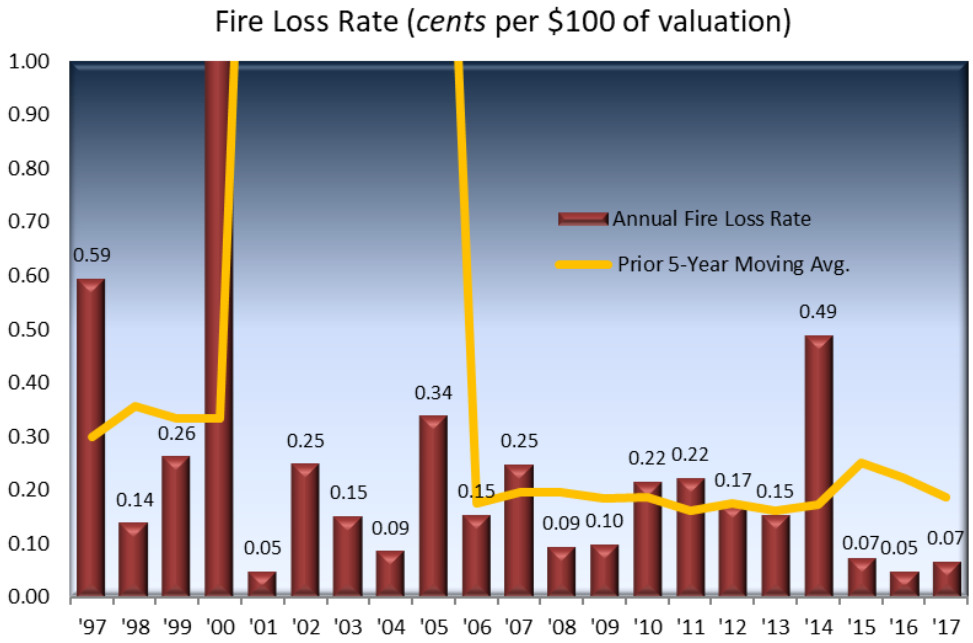
DOE Total Valuation since 1967



Facility and property valuation estimates serve as a common denominator for normalizing and calculating fire loss rates. In 2017, the total DOE valuation for sites reporting into the Fire Protection Database increased 6% from 2016, to roughly $150.2 billion.

Figure 5

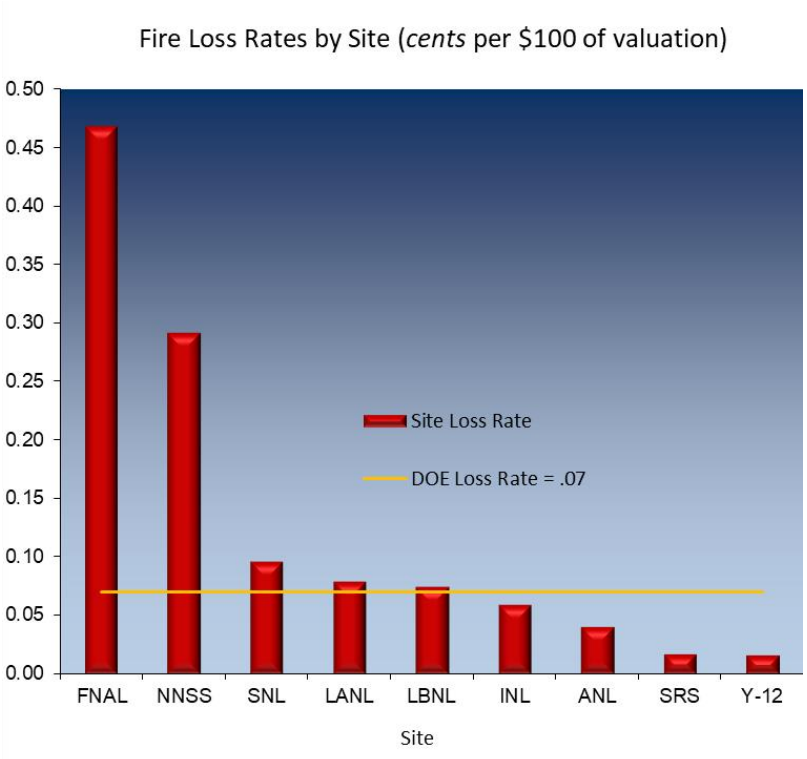
DOE Fire Loss Rates since 1997



DOE's calculated 2017 Fire Protection Loss Rate for sites reporting into FIMS, PIDS, and the Fire Protection Reporting Database System, was approximately 0.07 *cents* per $100 of total valuation, a 40% increase from the 2016 rate of 0.05. (Losses attributed to leaks, spills and releases are not included in this figure.)

Figure 6

2017 Fire Loss Rates by Site



Fire loss rates for the nine DOE sites with *total* fire protection losses of $10,000 or greater are displayed in Figure 6. (The tenth site, TJNAF, is not displayed because there is no FIMS and PIDS data available for the calculation.)

DOE Fire Loss History from 1950 to the Present *

Table 4

Year	Valuation (Millions of Dollars)	Fire Loss (Dollars)	Fire Loss Rate (Cents per $100 Valuation)	Previous 5-Year Average (Cents per $100 Valuation)
1950	1,800.00	496,439	2.76	–
1951	2,177.10	356,115	1.64	–
1952	3,055.10	805,707	2.64	–
1953	4,081.00	575,572	1.41	–
1954	6,095.90	375,874	0.62	–
1955	6,954.20	455,788	0.66	1.81
1956	7,364.10	3,147,423	4.27	1.39
1957	7,973.20	1,476,599	1.85	1.92
1958	8,102.50	751,825	0.93	1.76
1959	10,301.80	1,197,901	1.16	1.67
1960	10,708.60	1,401,051	1.31	1.77
1961	11,929.90	5,856,055	4.91	1.91
1962	12,108.80	3,313,364	2.74	2.03
1963	13,288.90	1,376,054	1.04	2.21
1964	14,582.80	1,351,035	0.93	2.23
1965	15,679.30	3,850,069	2.46	2.18
1966	16,669.00	856,973	0.51	2.41
1967	17,450.90	2,782,934	1.59	1.53
1968	18,611.90	869,083	0.47	1.31
1969	20,068.30	28,054,334	13.98	1.19
1970	22,004.30	1,700,792	0.77	3.80
1971	24,155.80	1,936,049	0.80	3.47
1972	26,383.50	920,651	0.35	3.52
1973	27,166.70	2,375,688	0.87	3.27
1974	28,255.50	1,179,877	0.42	3.36
1975	31,658.30	5,252,349	1.66	0.64
1976	35,512.70	2,292,576	0.65	0.82
1977	39,856.10	3,613,984	0.91	0.79
1978	47,027.10	17,477,979	3.72	0.90
1979	50,340.80	2,541,023	0.50	1.47
1980	54,654.70	8,545,935	1.56	1.49
1981	59,988.80	4,643,488	0.77	1.47
1982	65,360.40	4,200,968	0.64	1.49
1983	70,484.40	10,497,062	1.49	1.44
1984	82,166.90	6,467,320	0.79	0.99
1985	86,321.84	4,129,297	0.48	1.05
1986	82,787.52	5,295,292	0.64	0.83
1987	91,927.20	3,010,829	0.33	0.81
1988	92,998.00	8,303,120	0.89	0.74
1989	107,948.00	7,505,551	0.70	0.63
1990	115,076.00	17,470,746	1.52	0.61

DOE Fire Loss History from 1950 to the Present * (continued)

Year	Valuation (Millions of Dollars)	Fire Loss (Dollars)	Fire Loss Rate (Cents per $100 Valuation)	Previous 5-Year Average (Cents per $100 Valuation)
1991	118,868.68	2,428,805	0.20	0.81
1992	118,267.06	3,653,554	0.31	0.73
1993	119,826.25	3,018,534	0.25	0.72
1994	124,350.29	3,403,650	0.27	0.60
1995	120,321.68	1,632,466	0.14	0.51
1996	113,471.00	6,025,832	0.53	0.23
1997	102,947.24	6,112,887	0.59	0.30
1998	99,127.79	1,378,788	0.14	0.36
1999	110,858.47	2,911,040	0.26	0.33
2000	102,514.01	103,174,122	10.06	0.33
2001	103,215.56	505,586	0.05	2.32
2002	98,779.44	2,461,847	0.25	2.22
2003	70,812.80	1,075,309	0.15	2.15
2004	72,601.95	622,613	0.09	2.16
2005	74,951.25	2,537,565	0.34	2.12
2006	64,547.05	997,805	0.15	0.17
2007	67,382.01	1,674,515	0.25	0.20
2008	60,576.55	573,161	0.09	0.20
2009	63,569.89	623,299	0.10	0.18
2010	74,417.99	1,608,762	0.22	0.19
2011*	101,351.17	2,250,744	0.22	0.16
2012*	105,238.57	1,840,121	0.17	0.18
2013*	101,940.69	1,572,342	0.15	0.16
2014*	101,437.21	4,953,200	0.49	0.17
2015	129,041.10	929,879	0.07	0.25
2016	141,386.52	679,619	0.05	0.22
2017	150,206.75	990,080	0.07	0.19

* As previously noted, in the *Annual Fire Protection Summary* reports from 2011-2014, Fire Loss figures (column 3 in Table 4 above) included both fire and non-fire losses such as fire-protection system leaks, spills and releases. The calculated Fire Loss Rate and Previous 5-Year Average (columns 4 and 5) also reflected those values. From 2015 forward, the figures reflect only actual fire losses.

Recurring Fire Protection Program Costs

Yearly recurring fire protection costs for 2017 were $231,430,722 for those sites reporting into the Fire Protection Program database, a 26% decrease from 2016. When fire protection costs are compared with total property valuation (from FIMS and PIDS), in 2017, DOE spent approximately 15 *cents* per $100 of property valuation for recurring fire protection activities. This represents a 32% decrease from the 22 *cents* per $100 in 2016. Figure 7 shows the 2017 recurring cost distribution by activity type.

Figure 7

Recurring DOE Fire Protection Program Costs by Activity

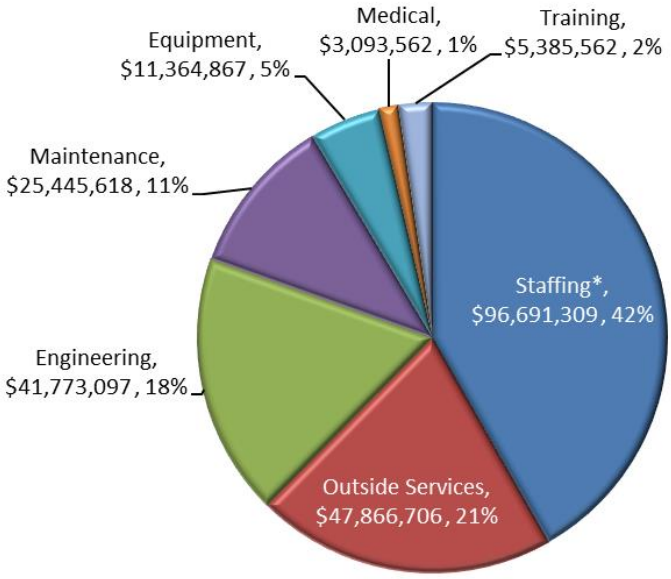
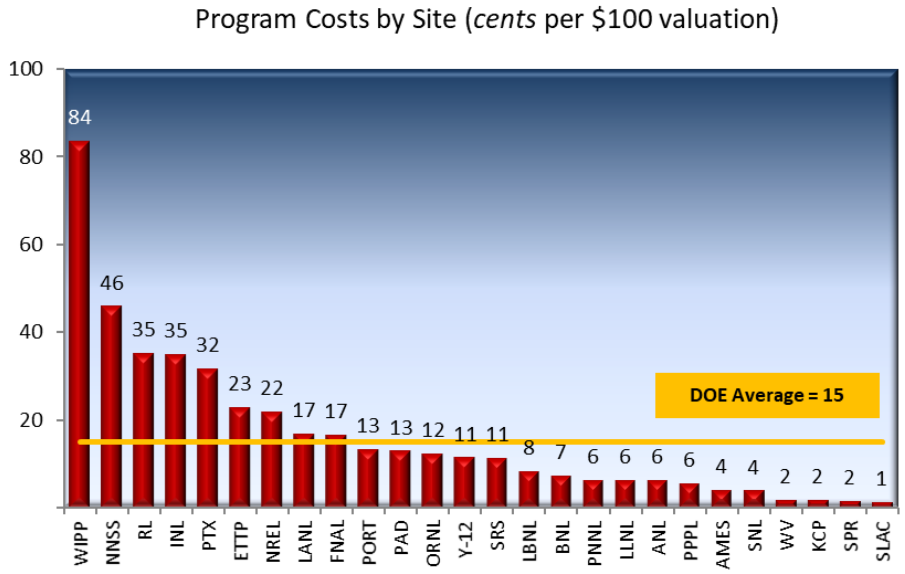


Figure 8

Recurring Fire Protection Program Cost Rates by Site

Figure 8 displays the recurring cost rates in *cents* per $100 of valuation at DOE sites. It should be noted that not all recurring cost activities are consistently reported, such as outside contracts and maintenance activities. For comparison, the DOE-wide figure of 15 cents per $100 is displayed as a line.



Water-Based Fire Suppression System Actuations

In 2017, DOE facilities reported actuations of 19 wet-pipe suppression systems, 12 of which resulted in financial losses totaling $76,689. (Five events had no costs associated with them.) The distribution of the 19 events is displayed below.

Cause	No. of Events
Weather	4
Procedure	4
Other	4
Design/Material	3
Employee Error	2
Electrical	1
Unspecified	1
Total:	19

The three costliest events ($10,000 or greater), representing $49,074, or 64% of the total water-based suppression system costs, are summarized in Table 5.

Table 5

Water-Based Fire Suppression System Actuations

with Losses of $10,000 or Greater

Loss Type	Location	Description	Dollar Loss
Leaks, Spills, Releases	INL	During a 480-volt UPS Battery Annual Rundown Surveillance Test, a Load Resistor Bank developed enough heat to actuate a fire sprinkler head mounted directly above.	$10,000
Leaks, Spills, Releases	PNL	During a construction project, a fire sprinkler head was broken when a man-lift handrail impacted the sprinkler head in a radiological area.	$27,074
Fire/Smoke (Building)	SNL	A fire sprinkler head was activated most likely due to mechanical/fatigue failure.	$12,000

Non-Water-Based Fire Suppression System Actuations

Chlorofluorocarbons, including Halon, are regulated under the 1991 Clean Air Act because of their detrimental impact on the ozone layer. The Environmental Protection Agency has published implementation regulations to prohibit Halon production, establish container labeling requirements, impose Federal procurement restrictions and Halon taxes, issue requirements for the approval of alternative agents, and list essential areas where Halon protection is considered acceptable.

DOE policy, as stated in the May 5, 1993 Memorandum, DOE F 132S.8, *Managed Phase Out of Halon Fixed Fire Suppression Systems*, does not allow the installation of any new Halon systems. Field organizations have been requested to aggressively pursue alternative fire suppression agents to replace existing systems and to effectively manage expanding Halon inventories. The long-term goal is the gradual replacement of all Halon systems.

In 2017, the number of reported active Halon systems at DOE sites decreased 7% from 2016 to 127 systems, while inventory amounts decreased 6% to approximately 44,059 pounds of Halon.

There were 7 actuations of a non-water-based suppression system reported in 2017 resulting in $28,764 in costs, as summarized in Table 6.

Table 6

Non-Water-Based Fire Suppression System Actuations

Loss Type	Location	Description	Dollar Loss
Fire/Smoke (Other)	ORNL	Modulator failure resulted in manual actuation of CO2 System. Not fire related. Note: Discharge is precautionary.	$25,000 (5 at $5,000 each)
Fire/Smoke (Building)	SNL	The FM200 system activated for due to vibrations from a nearby blast tube test.	$ 3,064
Fire/Smoke (Other)	FNAL	Fire originated and was contained in ceiling mounted electric heater, extinguished by FD using CO2 fire extinguisher.	$ 4,700

Fire Department Responses

In 2017, DOE reported 5,860 Fire Department responses, which is a 4% decrease from the 6,082 in 2016. The distribution of Fire Department response types is displayed in Table 7.

Table 7

Fire Department Responses

Call Category	2016 Responses
Fire Calls	483
HazMat Calls	222
Other Emergency Calls	1,466
Non-Emergency Calls	2,138
Medical Calls	1,551
TOTAL Fire Department Responses	**5,860**

Comparing this data to actual responses is difficult because sites do not report incident responses in a consistent fashion. The Fire Protection Committee continues to examine the use of a standard reporting format which would comply with the National Fire Protection Association's Guide 901, *Uniform Coding for Fire Protection*, which could be linked to other DOE incident reporting programs.

Summary provided by:

Office of ES&H Reporting and Analysis