

# Annual Fire Protection Program Summary for Calendar Year 2015



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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## Foreword

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This report, required by Department of Energy (DOE) Order 231.1B, *Environment, Safety and Health Reporting*, is the primary source for quantifying fire and fire-related monetary losses of properties, facilities, and equipment across the DOE Complex.

The report for calendar year (CY) 2015 was summarized from information sent to Headquarters by 27 reporting elements, representing approximately 99 percent of DOE's facility and equipment valuation (most of the significant DOE facilities have reported into this database, with the exception of the Power Marketing Administrations and Headquarters offices). Abbreviations are identified in the Glossary, as are the DOE site reporting elements and major definitions.

The fire protection data for CY2015 were extracted from the DOE Fire Protection Reporting System, with the following organizations reporting into the database:

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

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Organizations are required to report by April 30<sup>th</sup> 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

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### 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
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

## Definitions

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The following terms are from the archived DOE Manual (M) 231.1-1, *Environment, Safety, and Health Reporting Manual*. Other definitions come from 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 is 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 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) fire shall be classified as a fire loss. Exceptions are as follows: (1) burnout of electric motors and other electrical equipment through overheating from electrical causes shall be considered a fire loss only if 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.

### Notes:

- GJO, KAPL, MOAB, NBL and TJNAF may have property valuations in FIMS and/or PIDS, but do not report into the Fire Protection Database and are not included in the overall DOE fire protection calculations.



## **Executive Summary**

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In 2015, DOE sites reported no fire-related fatalities and one minor injury at the Los Alamos National Laboratory Radiochemistry Site. Specifically, a student was closing down operations when a glass flask experienced “an exothermic reaction” and shattered, resulting in lacerations of the hand and forehead. The reaction caused a small fire in the hood which the student extinguished with a hand-held fire extinguisher.

There were 137 fire protection events reported into the Fire Protection Reporting System in 2015. Of these, there were 74 fire protection monetary losses; of which 46 were directly attributable to fire or smoke and 28 were non-fire events (leaks, spills, and inadvertent releases). The total cost associated with the 74 fire protection loss events was \$1,666,595 million, which is a 67% decrease from 2014’s approximately \$5.1 million. However, \$2.4 million (47%) of the 2014 total resulted from one event – the underground vehicle fire at WIPP. Excluding the 2014 WIPP event, 2015 fire protection losses were still down 39% from 2014. Two notable components of the 2015 costs were non-fire events at INL involving broken firewater pipes that resulted in \$633,000 in losses.

The 46 fire losses in 2015 resulted in total costs of \$929,879, while the 28 non-fire losses resulted in costs of \$736,716. There were an additional 63 events in 2015 with no reported costs associated with them. These events are typically small incidents that are resolved quickly by local staff and 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.

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 21% in CY2015 to approximately \$129 billion. The overall CY2015 fire loss rate for reporting sites was approximately 0.07 cents for each \$100 in total site valuation, an 86% decrease from 2014. Again, this reflects the absence of major events like the one at WIPP as noted above.

Recurring costs for fire protection were \$210,474,820 million in CY2015, which is a 2% increase over 2014. As a ratio of cost to total valuation, in CY2015 the DOE spent approximately 16 cents per \$100 of valuation for recurring fire protection activities at the sites reporting into the Fire Protection Program database, compared with 20 cents in 2014.

## **Personnel Injuries**

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There was one fire-related personnel injury reported by DOE during CY2015. On December 21, at the Los Alamos National Laboratory Radiochemistry Site, a student with the Inorganic, Isotope, and Actinide Chemistry Group was closing down operations when a container experienced “an exothermic reaction” and shattered. The flask was in a fume hood and the student was wearing safety glasses, but still received injuries. The reaction caused a small fire in the hood which the student extinguished with a hand-held fire extinguisher. There was no actuation of the fire suppression or fire alarm systems. The student was transported to the Los Alamos Medical Center and was treated for lacerations to the hand and forehead. Hazardous Materials personnel responded and ensured the lab was in a safe configuration.

## Notable Occurrences as Reported in ORPS

There were 82 fire or fire protection-related occurrences reported into the DOE Occurrence Reporting and Processing System (ORPS) in CY2015. Of these, 6 were rated as Significance Category 2 (Moderate Impact) occurrences, and none were rated as Significance Category 1 (Major Impact), Operating Emergencies, or Recurring Events. The remaining 76 occurrences were rated as Significance Category 3 (Minor Impact) or 4 (Some Impact). Below are summaries of the six Significance Category 2 occurrences.

**Table 1**

### Summaries of Notable Fire Protection Events Reported into ORPS

Site	Description
LANL	Maintenance performed at the Weapons Engineering Tritium Facility (WETF) included parts not approved for use on the fire door and was outside the scope of the work package. This invalidated the fire door's one-hour fire rating and impacted the wet-pipe fire sprinkler system, resulting in a TSR Violation.
LANL	This occurrence resulted from the prior TSR Violation (above), when WETF declared the wet-pipe fire sprinkler system operable with no knowledge that the fire door maintenance did invalidate the one-hour fire rating. This resulted in an inadequate system operability determination, which is also a TSR Violation. This report was submitted separately because DOE Order 232.2 does not allow for the roll-up of TSR Violations into one occurrence report.
PTX	Three non-fire-rated penetration seals were discovered in a nuclear facility's credited fire barrier as part of an ongoing effort to evaluate the fire barriers and establish the Fire Barrier Technical Baseline. Pantex Fire Protection evaluated the facility conditions, and standoff distances from combustibles to the degraded seals were implemented. The Unreviewed Safety Question was determined to be positive (PUSQ).
PTX	A Potential Inadequate Safety Analysis (PISA) was declared to be positive when two pairs of doors in a facility did not support the required design attributes for the doors to be credited with a one-hour fire-rating barrier to prevent an internal fire from spreading between operating and/or staging areas.
PPPO	Workers in an airborne radioactivity area were installing a pipe-end metal cap using tack welds when the fire watch noted small flames in several areas where weld slag had come into contact with legacy debris inside the pipe end.
SRS	During a safety walk down, a potential concern was identified with the operability of the dry pipe fire sprinkler system due to removal of a gas cylinder shed's roof. Fire Protection Engineers determined that the sprinkler system could not be credited as operable without the roof in place to retain the heat from a fire in the shed. Prior to roof removal, the sprinkler system should have been considered impaired and a limiting condition of operation should have been entered.

## Fire Protection Losses

There were 137 fire protection events reported into the Fire Protection Reporting System in 2015; an increase of 47% over 2014. Of these, 74 resulted in monetary losses; of which 46 were fire loss events (directly attributable to fire or smoke) and 28 were non-fire loss events (leaks, spills, and inadvertent releases). The total cost associated with the 74 events was \$1,666,595 million, which is a 67% decrease from 2014's approximately \$5.1 million. However, \$2.4 million (47%) of the 2014 total resulted from one event – the underground vehicle fire at WIPP. Excluding that one event, fire protection losses were still down 39% from 2014. Two notable components of the 2015 costs were non-fire events at INL involving broken firewater pipes that resulted in \$633,000 in losses.

The 46 fire loss events in CY2015, (down 33% from 2014), resulted in an estimated \$929,879 in fire losses, which is an 81% decrease from 2014. Once again, this reflects the absence of the WIPP event and several other major events. The 28 non-fire losses (leaks, spills or inadvertent releases) in CY2015 represent a 13% increase over 2014, and resulted in \$736,716 in losses, a 414% increase over 2014. This increase is largely attributable to the large event at INL mentioned above.

There were an additional 63 events with no reported costs. These events are typically small incidents that are resolved quickly by local staff and 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 Fire Protection Loss Events**

Loss Category	Fire Loss Type	Number of Events*	Property Loss Amount
<b>Fire Loss Events</b>	Fire/Smoke – Brush	1 Events	\$500
	Fire/Smoke – Vehicle	4 Events	\$14,700
	Fire/Smoke – Other	17 Events	\$254,175
	Fire/Smoke – Building	24 Events	\$660,504
<b>Total Fire Loss Events:</b>		<b>46 Events</b>	<b>\$929,879</b>
<b>Non-Fire Loss Events</b>	Leaks, Spills, Releases	28 Events	\$736,716
<b>Total Fire Protection Loss Events:</b>		<b>74 Events</b>	<b>\$1,666,595</b>

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

DOE's fire loss rate for CY2015, as reported into the Fire Protection Reporting System, was approximately 0.07 cents loss per \$100 valuation.

## Major Fire Loss Events

Trending of fire loss data indicates that a small proportion of incidents constitute the majority of dollar losses reported by DOE sites. Eleven (24%) of the 46 fire loss events in CY2015 resulted in losses of \$10,000 or more per event. These 11 incidents represented \$834,238, or 90% of the total fire losses for the entire DOE Complex.

Table 3 provides descriptions of the six costliest (\$50,000 or greater) fire losses, which represent 81% of the total DOE fire losses for the year.

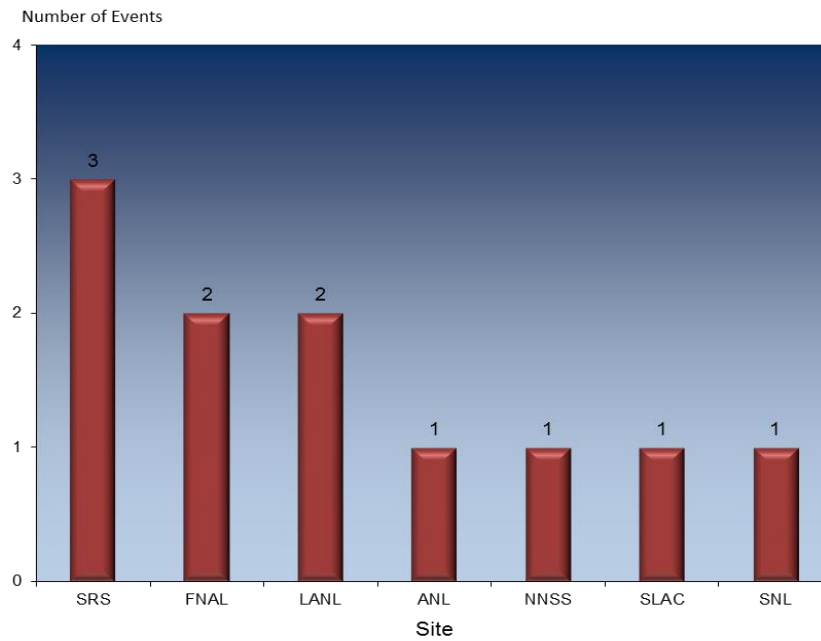
**Table 3**  
**Summaries of Fire Events with Losses of \$50,000 or Greater**

Loss Type	Location	Description	Dollar Loss
Fire/Smoke (Building)	SRS	On 2/18/2015 a fire occurred in an HVAC unit resulting from the failure of thermal cutouts, as well as the possible incorrect installation of the HVAC unit which caused the deteriorated wood frame to heat up and catch fire.	\$398,222
Fire/Smoke (Building)	SNL	On 12/11/15, at Z Machine, while charging for a daily shot activity, Z experienced a Marx capacitor bank failure. Audible pops were heard, followed by a fireball (approximately 1 second in duration) being observed on the Hi-bay cameras. The shot was aborted which dumped the remaining charge in the machine. The fireball and accompanying smoke set off the fire alarm and activated one sprinkler head directly overhead of machine. Given the need to remove the sprinkler water from the oil, the Z Machine was down for a number of days. Loss estimates include the down time to clean the oil tank of water contamination.	\$105,000
Fire/Smoke (Building)	LANL	On October 16, 2015, a mercury vapor light bulb/fixture broke, melting the acrylic cover and dropping hot fragments onto a chair, resulting in a small laboratory fire and disrupting building operations for several days.	\$75,000
Fire/Smoke (Other)	ANL	On December 20, 2015, a 911 a fire occurred in the RF1 Advanced Photon Source storage ring system. As a result, a spare transformer and new enclosure had to be installed.	\$72,600
Fire/Smoke (Other)	FNAL	An electrical malfunction occurred in a newly rebuilt pump motor. The resulting smoke from the motor traveled through a connection from the motor to the VFD controller and vented from the VFD Controller Cabinet. All recently rebuilt pump motors were found to have the same issue.	\$50,000
Fire/Smoke (Other)	SLAC	A fire occurred in the wire jacketing internal to a fan/pump motor circuit breaker.	\$50,000

**Figure 1**

**Significant Fire Loss Events by Site**

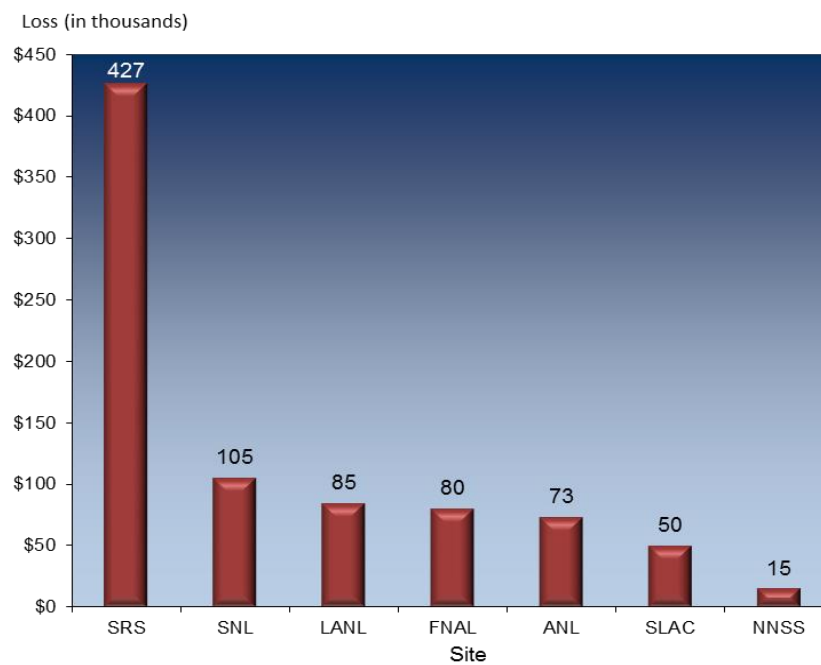
Seven DOE sites reported eleven fire loss events resulting in losses of \$10,000 or greater.



**Figure 2**

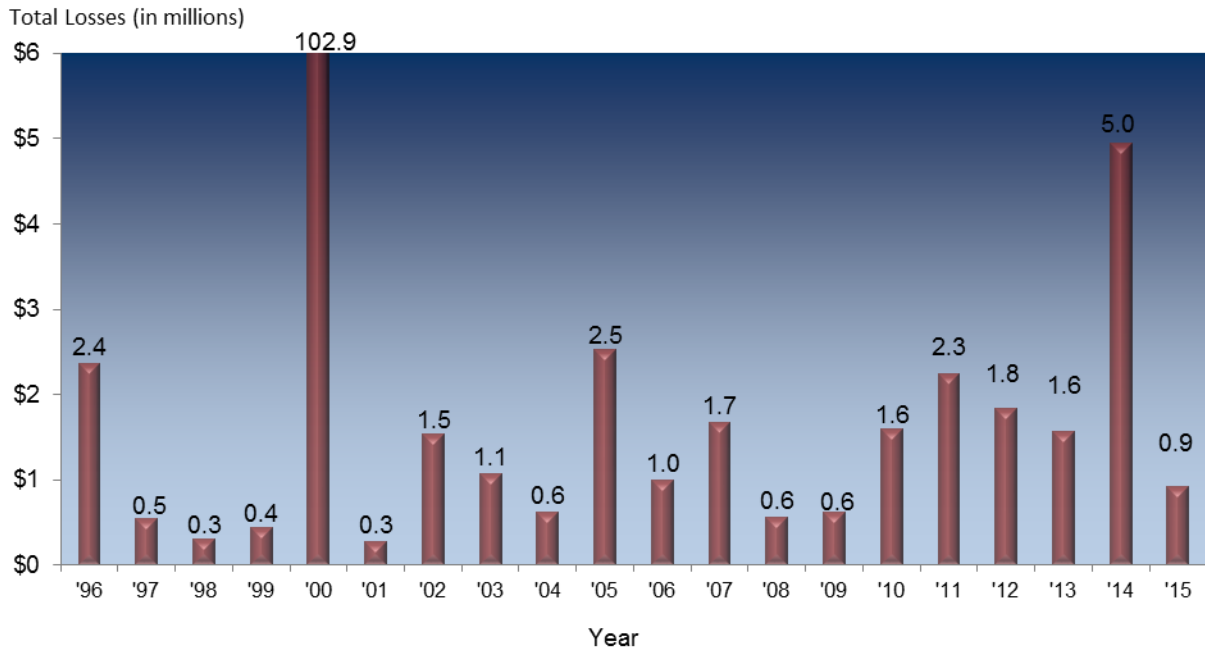
**Significant Fire Loss Amounts by Site**

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



**Figure 3**

**DOE Property and Facility Fire Loss Amounts since 1996 \***



Note: CY2000 figure includes the \$100 million LANL range fire loss and the CY2014 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. In this year's *2015 Annual Fire Protection Summary*, fire losses and non-fire losses have been 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.

Note: In this 2015 report, all charts and tables referencing historical trends have been amended, as needed, to reflect this change.

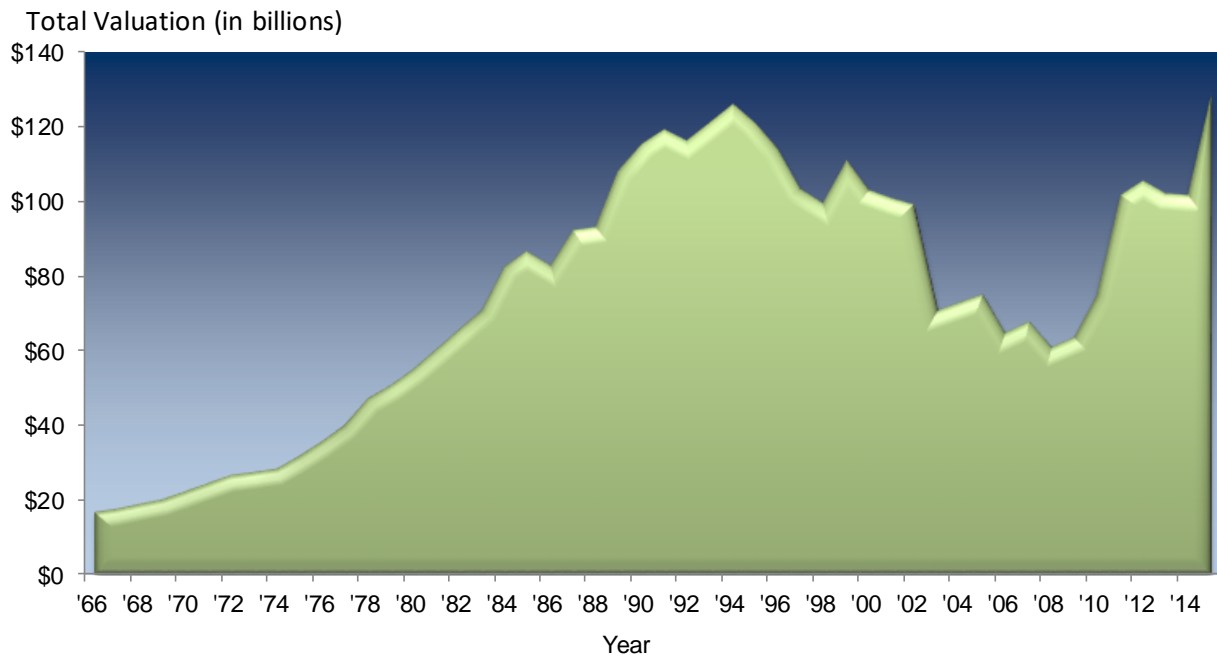
## Fire Loss Rates

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Facility and property valuation estimates serve as a common denominator for comparing annual fire loss rates, which include actual fire events and fire suppression system actuations. In CY2015, the total DOE valuation for sites reporting into the Fire Protection Database increased approximately 21% from 2014 to \$129 billion.

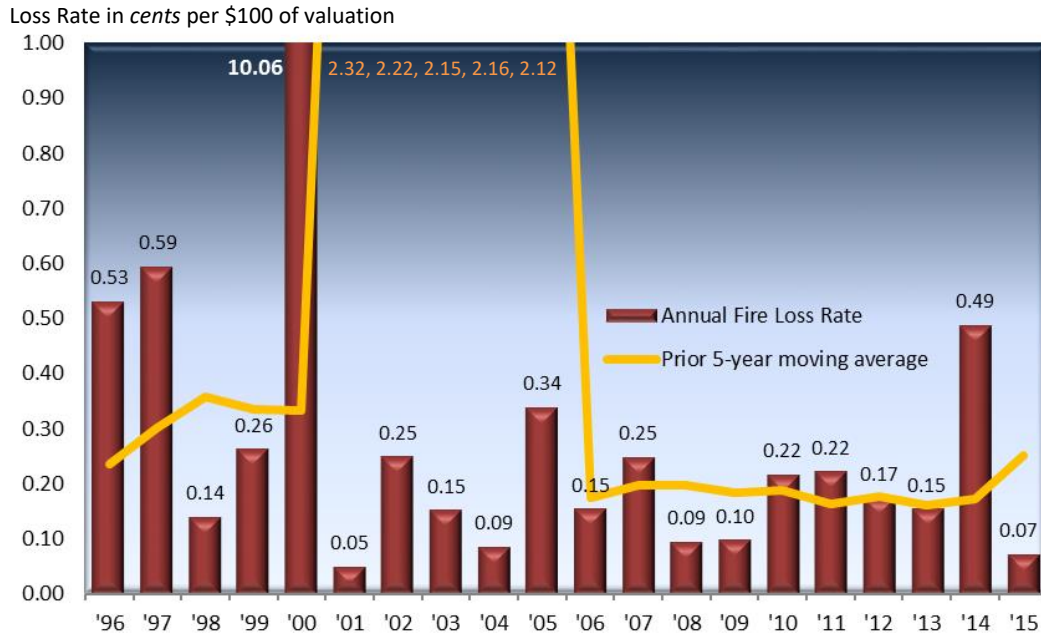
DOE's calculated 2015 fire protection loss rate for sites reported into FIMS, PIDS, and the Fire Protection Reporting System, was approximately 0.07 cents per \$100 of total valuation. This is a 86% decrease from the 2014 rate. Again, this notable decrease in the fire protection loss rate reflects the absence of a major event, such as the WIPP event in 2014.

**Figure 4**  
**DOE Total Valuation since 1966**



**Figure 5**

**DOE Fire Loss Rates for the Past 20 Years \***

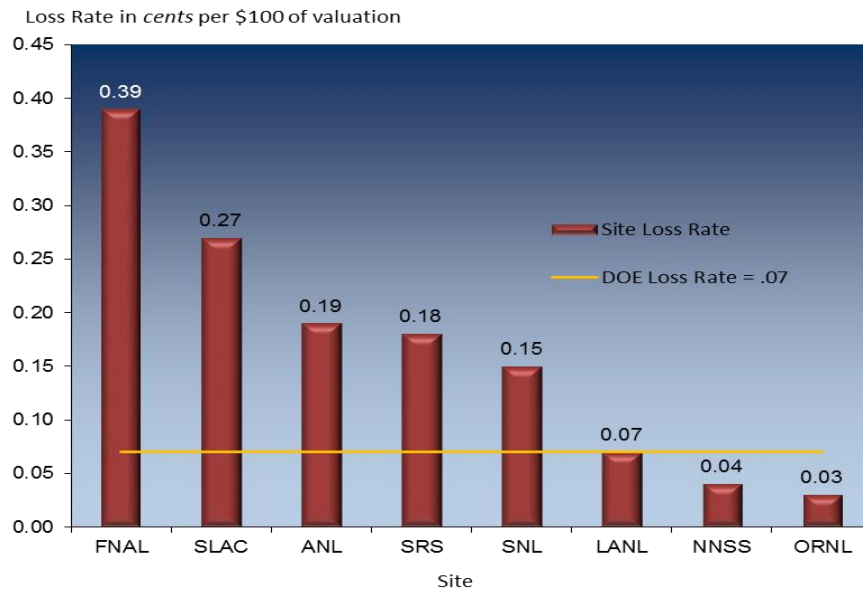


\* Please see the Note on page 6 of this report.

**Figure 6**

**Fire Loss Rates by Site**

Fire loss rates for the eight DOE sites with *total* fire losses of \$10,000 or greater.





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**Table 4**  
**DOE Fire Loss History from 1950 to the Present \***

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
1991	118,868.68	2,428,805	0.20	0.81

*Annual Fire Protection Program Summary for Calendar Year 2015*

Year	Valuation (Millions of Dollars)	Fire Loss (Dollars)	Fire Loss Rate (Cents per \$100 Valuation)	Previous 5-Year Average (Cents per \$100 Valuation)
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

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\* 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. In this year's *2015 Annual Fire Protection Summary*, the Fire Loss, Fire Loss Rate, and Previous 5-Year Average figures for 2011-2014 have been amended to reflect only actual fire losses. The 2015 figures reflect only actual fire losses.

Please see the Note on page 6 of this report.

## Recurring Fire Protection Program Costs

Yearly recurring fire protection costs for CY2015 were \$210,474,820 for those sites reporting into the Fire Protection Program database, a 2% increase over 2014. As a ratio of cost to replacement property value (recurring cost rate), DOE spent approximately 16 cents per \$100 valuation for recurring fire protection activities at those sites, compared with 20 cents in 2014. Figure 7 shows the CY2015 recurring cost distribution by activity type.

**Figure 7**

### Recurring DOE Fire Protection Program Costs by Activity

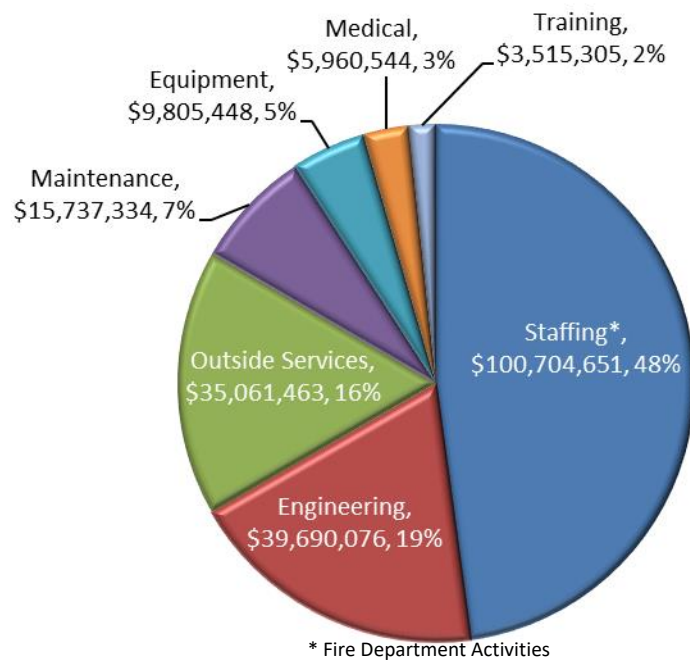
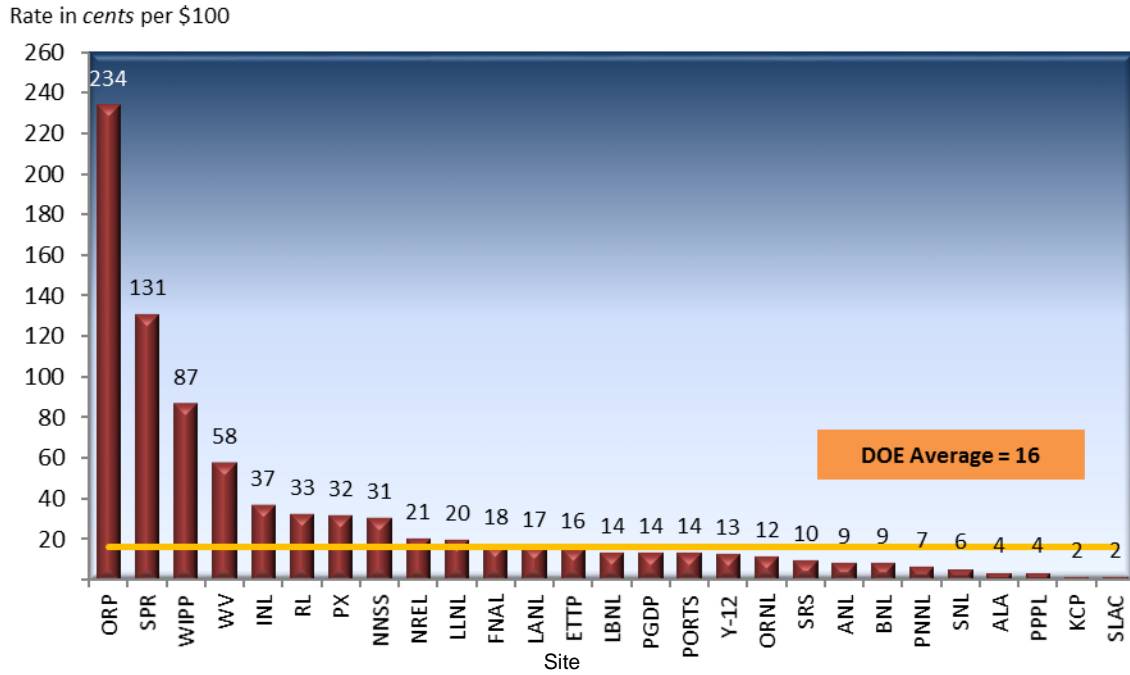


Figure 8 displays the recurring cost rates in cents per \$100 of valuation at DOE sites. It should be noted that not all recurring cost activities are consistently reported, such as outside contracts and maintenance activities.

**Figure 8**

**Recurring Fire Protection Program Cost Rates by Site**



## Water-Based Fire Suppression System Actuations

In CY2015, DOE facilities experienced inadvertent actuations of 35 wet-pipe suppression systems resulting in \$736,716 in losses. (Seven of the 35 events had no costs associated with them.) Of the 35 events, 21 were attributed to weather-related events (freezing), 5 to design/material issues, 3 to employee issues, 2 to electrical issues, and 4 were attributed to other or unspecified problems.

The four costliest events (\$10,000 or greater), representing 89% of the water-based suppression system reports, are noted below.

**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	On 1/4/2015, a firewater pipe froze and broke in MFC-791 resulting in the flooding of the basement. Repairs were estimated at \$300,000 with \$200,000 in equipment replacement.	\$500,000
Leaks, Spills, Releases	INL	On 12/31/2015, a firewater pipe froze and broke in CFA-696 resulting in replacement of fire sprinkler piping.	\$133,000
Leaks/Spills/Releases	LANL	A truck sheared-off three sprinkler heads under a canopy resulting in sprinkler water flow, fire department response, and activation of the anti-freeze system.	\$15,000
Leaks/Spills/Releases	INL	On 1/5/2015, the INL Alarm Center received a low pressure alarm and a water flow alarm from the dry-pipe fire suppression system in WMF-636. Several auxiliary drain valves and associated components had accumulated water that froze and damaged many of the valve components.	\$10,000

## 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 CY2015, DOE maintained 55 active Halon systems in operation containing approximately 28,346 pounds of Halon. The number of active Halon systems decreased by 39% from 2014, while Halon inventory amounts decreased by 43%.

There were 5 inadvertent actuations of non-water-based (carbon dioxide) suppression systems with associated dollar losses reported in CY2015 as described below.

**Table 6**

### Non-Water-Based Fire Suppression System Actuations

Loss Type	Location	Description	Dollar Loss
Leaks/Spills/Releases	ORNL	Research Modulator failed causing activation of smoke detector. Control Room Operator procedure upon receipt of smoke detector activation is to de-energize the modulator, manually activate the local application carbon dioxide extinguishing system, and notify the fire department.	5 incidents at \$5000 each for a total of \$25,000

## Fire Department Responses

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In CY2015, DOE reported 6,235 Fire Department responses, a 16% increase over 2014. The distribution of Fire Department response types is displayed below.

**Table 7**  
**Fire Department Responses**

Call Category	2015 Responses
Hazardous Materials Calls	225
Fire Calls	357
Medical Calls	1,619
Other Emergency Calls	1,701
Non-Emergency Calls	2,333

Comparing these data to the actual type of response is difficult since 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 complies 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

