Annual Fire Protection Program Summary

Calendar Year 2020

UNITED STATES DEPARTMENT OF ENERGY

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Summary Provided by:

DOE Office of ES&H Reporting and Analysis

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Office of Environment, Health, Safety and Security

Executive Summary

The Department of Energy (DOE) Order 231.1B, *Environment, Safety, and Health Reporting*, requires organizations responsible for maintaining property under the stewardship of DOE to enter reportable fire and fire protection-related incidents into the DOE Fire Protection Reporting System (FPRS). This report examines calendar year (CY) 2020, and includes information submitted by 36 DOE elements representing approximately 99 percent of DOE's facility and property valuation.

Information reported by DOE elements into the FPRS documented a total of 85 fire protection losses in 2020, resulting in monetary losses of $1,356,033. Compared to 2019 data, this represents a 24 percent decrease in the number of events and a 45 percent decrease in monetary losses. Of the 85 events, 61 resulted in monetary losses while 24 had no reported monetary losses.

There were 49 fire loss events (directly attributable to fire or smoke) in 2020, resulting in monetary losses of $1,328,871. This represents a 16 percent decrease in the number of events and a 44 percent decrease in the monetary loss amounts from 2019. There were 12 non-fire loss events due to leaks, spills, or inadvertent releases related to fire protection systems in 2020, totaling $27,162. This represents an eight percent decrease in the number of events and a 78 percent decrease in the monetary loss amounts from 2019. These notable decreases may be attributable to operational changes brought about by the Covid-19 pandemic.

In 2020, there were nine major fire losses at seven sites costing $10,000 or more, a 31 percent decrease from 2019. Of these, five resulted in losses of $50,000 or greater, compared with seven in 2019. The single largest fire loss event was a glovebox fire at the East Tennessee Technology Park (ETTP) resulting in an $886,913 loss, which alone represents 67 percent of all DOE fire losses reported in 2020.

Loss comparisons among DOE sites are performed by normalizing data against total facility and property valuation as reported in the Facility Information Management System (FIMS) and the Property Information Database System (PIDS). Total DOE valuation for sites reporting into the FPRS in 2020 was $229.6 billion, a two percent increase from 2019. The calculated DOE 2020 fire loss rate for reporting sites was 0.06 cents for each $100 in total site valuation, a 40 percent decrease from 2019.

DOE elements are required to report costs associated with recurring fire protection activities into the FRPS annually. Recurring costs for fire protection activities were $269,046,449 in 2020, a two percent increase over 2019. DOE elements are required to report costs associated with recurring fire protection activities into the FRPS annually. Figure 6 displays the recurring cost distribution by Activity Type in 2020.

As a ratio of cost to total valuation, in 2020 DOE sites spent approximately 12 cents per $100 of valuation for recurring fire protection activities, the same as in 2019. The Waste Isolation Pilot Plant (WIPP) had the highest rate at 71 cents per $100 of valuation, followed by the Hanford Site (HANF) at 42 cents and the Nevada National Security Site (NNSS) at 34 cents.

DOE reported 4,366 Fire Department responses in 2020, a 38 percent decrease from 2019.

In calendar year 2020, DOE sites reported no fire or fire protection-related injuries or fatalities into the DOE Occurrence Reporting and Processing System (ORPS). There were 79 fire or fire protection-related occurrences reported into ORPS in 2020, a four percent increase from the 76 occurrences reported in 2019. Of the 79 occurrences, eight (10 percent) were rated High Level, 34 (43 percent) were rated Low Level, and 37 (47 percent) were rated Informational Level.

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Site/Facility Acronyms and Abbreviations

AMES	Ames Laboratory
ANL	Argonne National Laboratory
BNL	Brookhaven National Laboratory
DUF6	Depleted Uranium Hexafluoride
ETTP	East Tennessee Technology Park
FNAL	Fermi National Accelerator Laboratory
GJO	Grand Junction Office
HANF	Hanford Site
INL	Idaho National Laboratory
ICP	Idaho Cleanup Project
KAPL	Knolls Atomic Power Laboratory
KCP	Kansas City Plant
LBNL	Lawrence Berkeley National Laboratory
LLNL	Lawrence Livermore National Laboratory
LANL	Los Alamos National Laboratory
MOAB	Moab Uranium Mill Tailings Remedial Action Project
MSTS	Mission Support and Test Services
NBL	New Brunswick Laboratory
NREL	National Renewable Energy Laboratory
NNSS	Nevada National Security Site
NWS	North Wind Solutions
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
ORP	Office of River Protection
OST	Office of Secure Transportation
PTX	Pantex Plant
PGDP	Paducah Gaseous Diffusion Plant
PNNL	Pacific Northwest National Laboratory
PORT	Portsmouth Gaseous Diffusion Plant
PPPL	Princeton Plasma Physics Laboratory
RL	Richland Operations Office
SLAC	SLAC National Accelerator Laboratory
SNL	Sandia National Laboratories, New Mexico
SRS	Savannah River Site
TJNAF	Thomas Jefferson National Accelerator Facility
TWPC	Transuranic Waste Processing Center
WIPP	Waste Isolation Pilot Plant
WVDP	West Valley Demonstration Project
Y-12	Y-12 National Security Complex

Definitions

Valuation Definitions

FIMS (Facility Information Management System): The DOE corporate database that maintains the inventory and property values for government owned real property and any permanently affixed structures such as buildings, trailers, fences, bridges, etc.

PIDS (Property Information Database System): The DOE corporate database that maintains the inventory and property values for government owned accountable personal property.

Property Value/Valuation: The approximate replacement value of all DOE-owned buildings/facilities and equipment. Included in the value are the cost of all DOE-owned supplies and average inventory of all source and special nuclear materials. Excluded from the value 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).

Total Valuation: The combined totals from FIMS and PIDS by site.

Loss Definitions

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 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.

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.

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.

Introduction

The *Annual Fire Protection Summary Report*, required by the Department of Energy (DOE) Order 231.1B, *Environment, Safety and Health Reporting*, is the primary source for reporting fire and fire-related costs and monetary losses associated with facilities, property, and equipment across the DOE complex, including cost- and loss-to-valuation ratios to normalize the data for comparison purposes.

This report includes data for calendar year (CY) 2020 from information submitted by 36 DOE elements representing approximately 99 percent of DOE's facility and property valuation. DOE facilities, with the exception of the Power Marketing Administrations and Headquarters offices, are required to report costs and losses associated with fire and fire protection activities into the DOE Fire Protection Reporting System (FPRS) annually by April 30 of the following year.

The data for this 2020 report were extracted from the FPRS, with the following organizations reporting:

Ames Laboratory	ORISE-ORAU
Argonne National Laboratory	ORNL/EM-Isotek
Brookhaven National Laboratory	ORNL/EM-Waster
DUF6 Paducah Site	ORNL-UT /Battelle
DUF6 Portsmouth Site	Pacific Northwest National Lab
East Tennessee Technology Park	Paducah Gaseous Diffusion Plant
Environmental Management Nevada Program	Pantex Plant
Fermi National Accelerator Laboratory	Portsmouth Gaseous Diffusion Plant
Hanford Site (Office of River Protection)	Princeton Plasma Physics Laboratory
Idaho Cleanup Project	Richland Operations Office
Idaho National Laboratory	Sandia National Laboratories
Kansas City National Security Campus	Savannah River Site
Lawrence Berkeley National Laboratory	SLAC National Accelerator Laboratory
Los Alamos National Laboratory	Strategic Petroleum Reserves
National Renewable Energy Laboratory	Thomas Jefferson National Accelerator Facility
Nevada National Security Site	Waste Isolation Pilot Plant
Office of Legacy Management	West Valley Demonstration Project
Office of Secure Transportation	Y-12 National Security Site

Because some nearby reporting elements share fire department resources, throughout this report they are grouped by site, e.g., Hanford (Office of River Protection/Richland Operations Office), Paducah (Paducah Gaseous Diffusion Plant/DUF6), Portsmouth (Portsmouth Gaseous Diffusion Plant/DUF6), Idaho (Idaho National Laboratory/Idaho Cleanup Project), NNSS (Nevada National Security Site/Environmental Management Nevada Program).

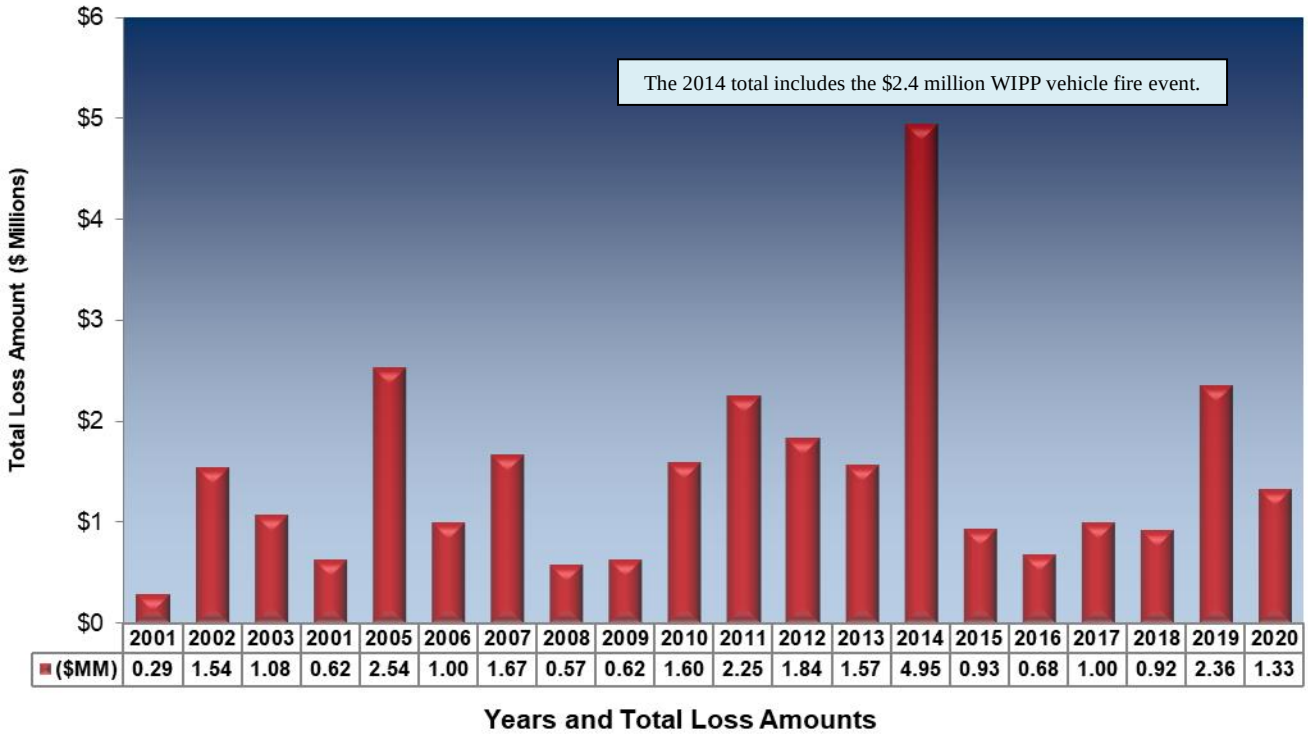
The Fire Protection Reporting System is located at: http://energy.gov/ehss/policy-guidance-reports/databases/fire-protection-database [password required]. EHSS continues to work with the DOE Fire Safety Committee to update and improve the data submission system and the content of the annual report to improve its utility to the DOE fire protection community and the Complex.

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

Fire and Fire Protection Losses

Fire Losses are events that involve fire, smoke, or both, that result in monetary losses. Figure 1 displays the 20-year trend of fire losses at DOE.

Figure 1: DOE Total Property and Facility Fire Loss 2001-2020



In 2020, DOE elements reported $1,328,871 in fire losses, a 44 percent decrease from 2019.

Note: In the Annual Fire Protection Summary reports from 2011-2014, Fire Protection Loss figures included both fire losses and non-fire losses, such as system leaks, spills, and unintentional releases. Prior to 2011 and from 2015 forward, the figures include only losses 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.

Table 1 displays the 2020 distribution, type, and monetary losses associated with Fire Loss events (all damage or loss sustained as a direct consequence of, and following the outbreak of a fire shall be classified as a fire loss, and Non-Fire Loss events (all damage sustained as a consequence of non-fire events involving fire protection systems; including leaks, spills, and inadvertent releases) reported into the FPRS.

Table 1: Summary of Reported Fire and Fire Protection Events

Loss Category	Fire Loss Type	No. of Events	Loss Amount
Fire Loss Events	Fire/Smoke Brush	9	$77,438
	Fire/Smoke Vehicle	5	$12,320
	Fire/Smoke Other	24	$1,015,778
	Fire/Smoke Building	11	$223,335
	Total Fire Loss Events	**49**	**$1,328,871**
Non-Fire Loss Events	Leaks, Spills, Releases	12	$27,162
No Reported Loss	Non-Monetary Events	24	$0.00
	Total Fire Protection Events	**85**	**$1,356,033**

In 2020 there were 85 total fire protection events reported into the FPRS, a 24 percent decrease from 2019, resulting in $1,356,033 in monetary losses, a 45 percent decrease from 2019. Of the 85 total events, 61 resulted in monetary losses, a 14 percent decrease from 2019.

Of the 61 events resulting in monetary losses, 49 were fire loss events (directly attributable to fire or smoke), a 16 percent decrease from 2019; and 12 were non-fire loss events (leaks, spills, and inadvertent releases), down eight percent from 2019. There were an additional 24 events with no reported costs.

The 49 fire loss events in 2020 resulted in $1,328,871 in fire losses, a 44 percent decrease from 2019. The 12 non-fire losses (leaks, spills, or inadvertent releases) resulted in $27,162 in losses, a 78 percent decrease from 2019.

These notable decreases in both the number of events and their associated monetary losses are likely to be attributable to operational changes brought about by the COVID-19 pandemic.

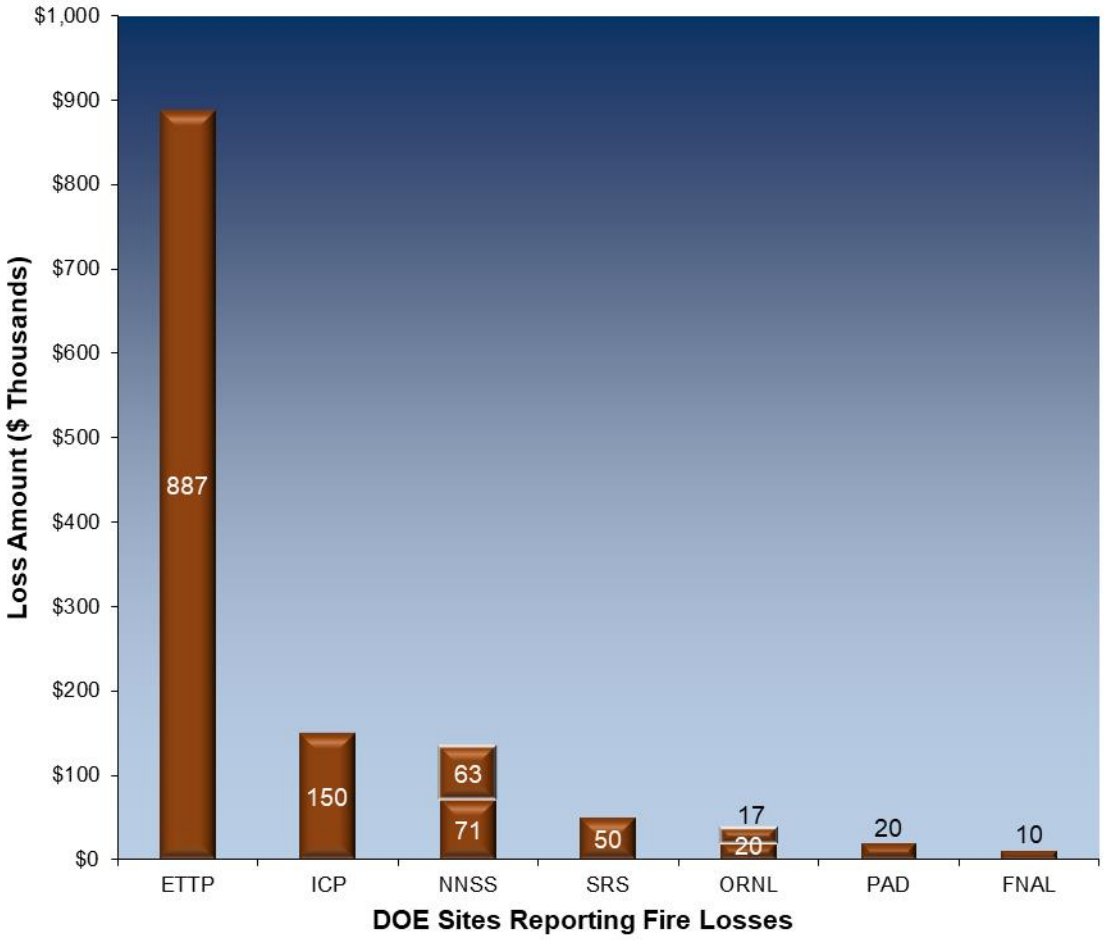
There were 24 events reported into the FPRS with no reported costs. These events were typically small incidents that were resolved quickly by local staff, or events where all associated costs were absorbed by the Fire Department.

Major Fire Loss Events ($10,000 or greater)

A small proportion of the fire events constitute the majority of the $1,328,871 total fire losses reported by DOE sites. In 2020, there were nine major fire losses at seven sites costing $10,000 or more, a 31 percent decrease from 2019. The nine major loss events (18 percent of the 49 total events) represented $1,288,071, or 97 percent of all reported fire losses in 2020. Of the nine events, five resulted in losses of $50,000 or greater, compared with seven in 2019. The single largest fire loss event was a glovebox fire at the East Tennessee Technology Park (ETTP) resulting in an $886,913 loss, which alone represents 67 percent of all DOE fire losses reported in 2020.

Figure 2 displays the distribution of the nine major ($10,000+) fire loss events at DOE sites.

Figure 2: Major Fire Losses by Site



Nine major fire loss events were reported at seven DOE sites resulting in losses of $10,000 or greater in 2020. Of the nine major loss events, there were five losses of $50,000 or greater at ETTP, Idaho Cleanup Project (ICP), Nevada National Security Site (NNSS)with two events), and Savannah River Site (SRS).

Table 2 provides summaries of the five costliest fire losses ($50,000 or greater). These five events represent $1,220,990, or 92 percent of all DOE fire protection losses for 2020.

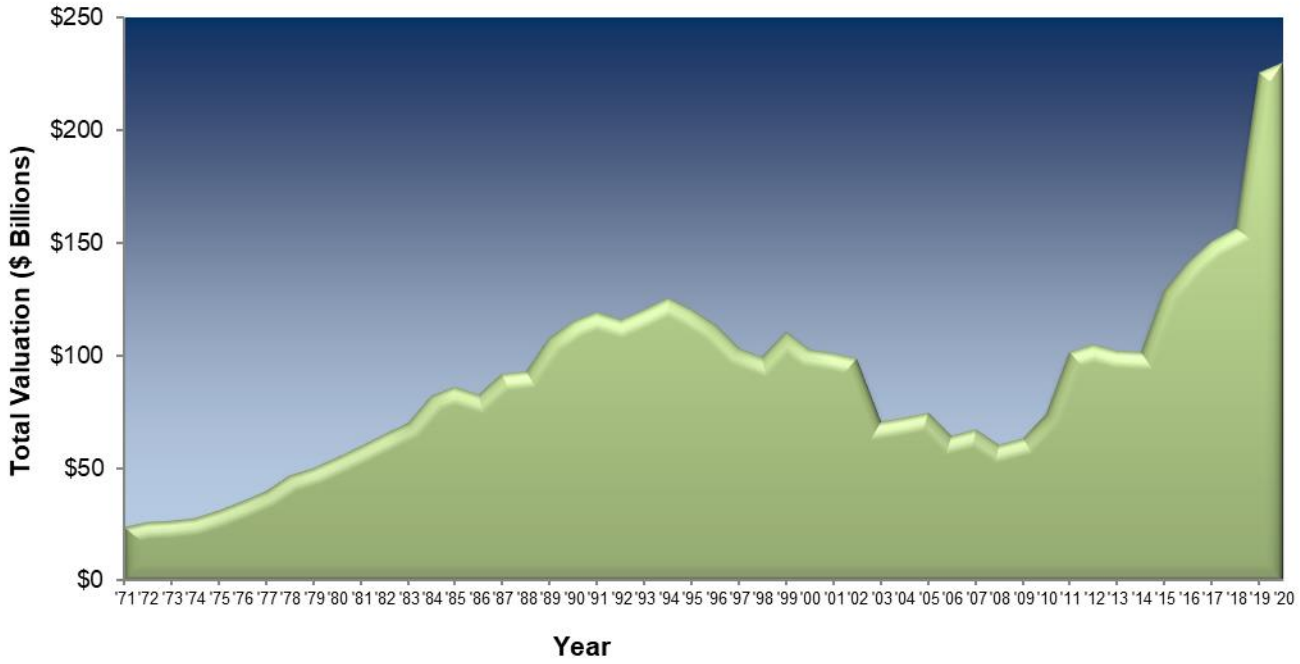
Table 2: Summary of Fire Events with Losses of $50,000 or Greater

Site	Loss Type	Cause	Description	Loss Amount
ETTP	Fire/Smoke (Other)	Unspecified	Fire in a glovebox (chamber)	$886,913
ICP	Fire/Smoke (Building)	Electrical	Wall-mounted HVAC unit malfunctioned causing a fire	$150,000
NNSS	Fire/Smoke (Brush)	Unspecified	Electrical distribution line	$71,488
NNSS	Fire/Smoke (Other)	Electrical	Electrical transformer fire	$62,589
SRS	Fire/Smoke (Building)	Other	Fire in a wood auger and conveyor belt	$50,000

Facility/Property Valuation and Calculated Fire Loss Rates

Facility/property valuation is calculated by combining data from the Facility Information Management System (FIMS) and Property Information Database System (PIDS). The combined totals serve as a common denominator for calculating and normalizing Fire Loss Rates. For historical purposes, Figure 3 displays the total DOE valuation trend over the past 50 years.

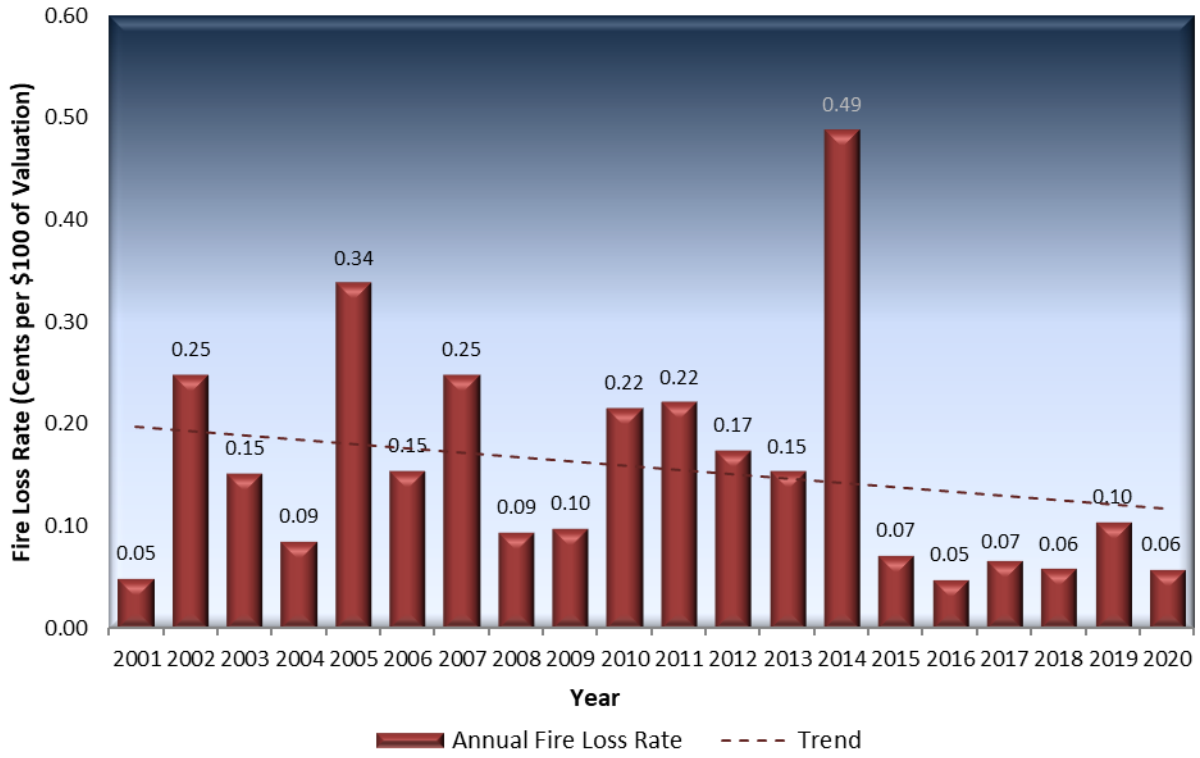
Figure 3: DOE Total Valuation from FIMS and PIDS 1971-2020



In 2020, total DOE valuation for sites reporting into the FPRS was $229.6 billion, a two percent increase from 2019.

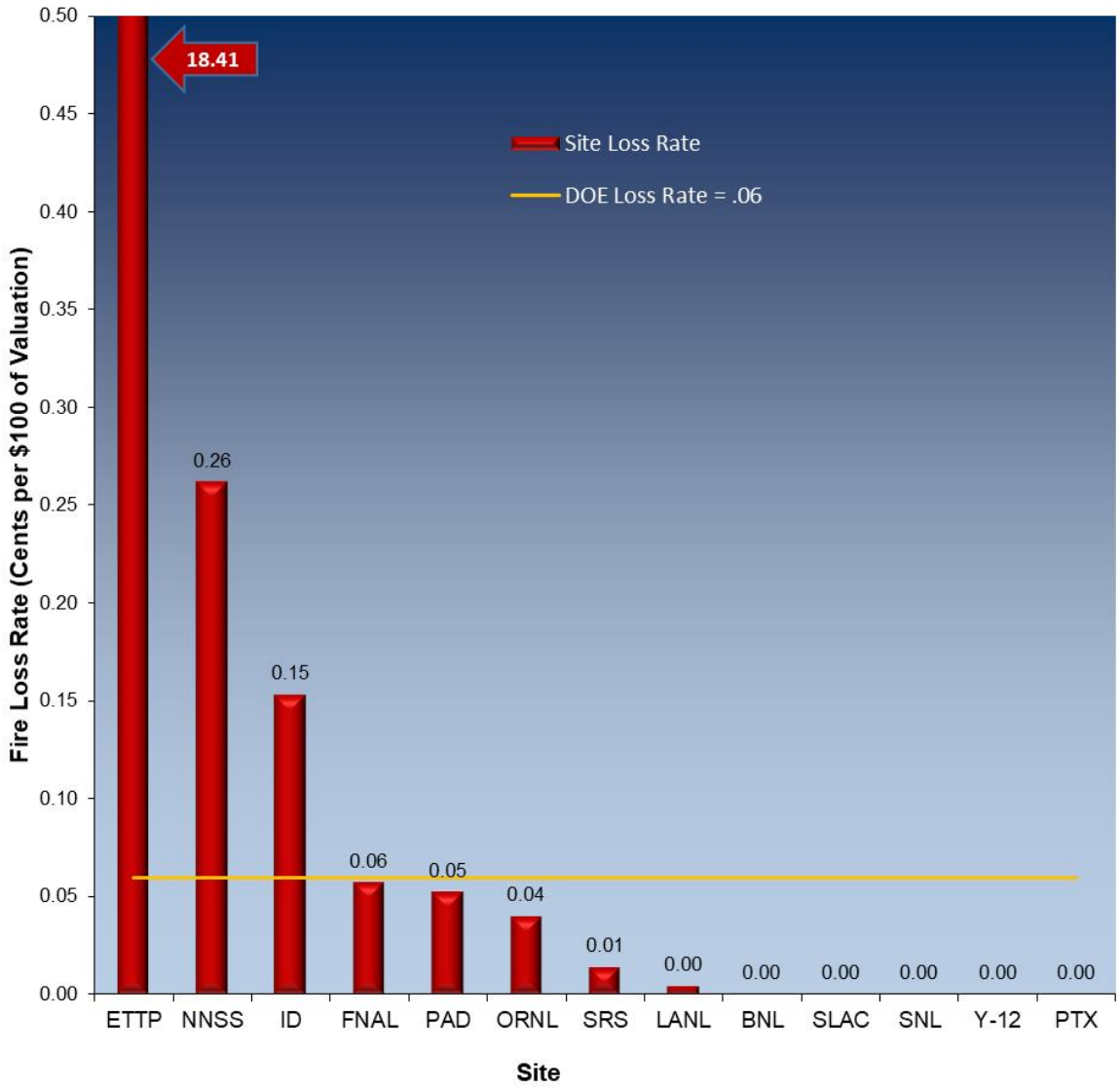
Fire Loss Rates are calculated using monetary losses and total valuation. Figure 4 displays the DOE Fire Loss Rates over the past 20 years.

Figure 4: DOE Fire Loss Rates 2001-2020



DOE's calculated 2020 *Fire Loss Rate* for sites reporting into FIMS, PIDS, and the FPRS was approximately 0.06 *cents* per $100 of total valuation, a 43 percent decrease from 2019.
Figure 5 displays the calculated Fire Loss Rates for the sites that reported monetary fire losses into the FPRS in 2020.

Figure 5: Fire Loss Rates by Site



Thirteen sites reported fire losses in 2020, a 13 percent decrease from 2019. ETTP had the highest *Fire Loss Rate* of 18.41 *cents* per $100 of valuation, followed by NNSS at 0.26 and Idaho* (ID) at 0.15 *cents*. The DOE-wide 2020 rate of 0.06 *cents* per $100 was a 40 percent decrease from 2019 and is displayed as an orange line. All other sites were equal to or below the DOE rate.

The single largest fire loss event was a fire in a glove box at ETTP resulting in a $886,913 loss, which alone represents 67 percent of all DOE fire losses reported in 2020.

* Idaho valuation data in FIMS and PIDS includes both the INL and ICP facilities; therefore, they are also combined when calculating ratios in this report.

DOE Fire Loss History

Table 3 displays DOE historical fire loss information, including valuations, monetary losses, and calculated *Fire Loss Rates* since 1950.

Table 3: DOE Fire Loss History

Year	Valuation (Millions)	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

DOE Fire Loss History (continued)

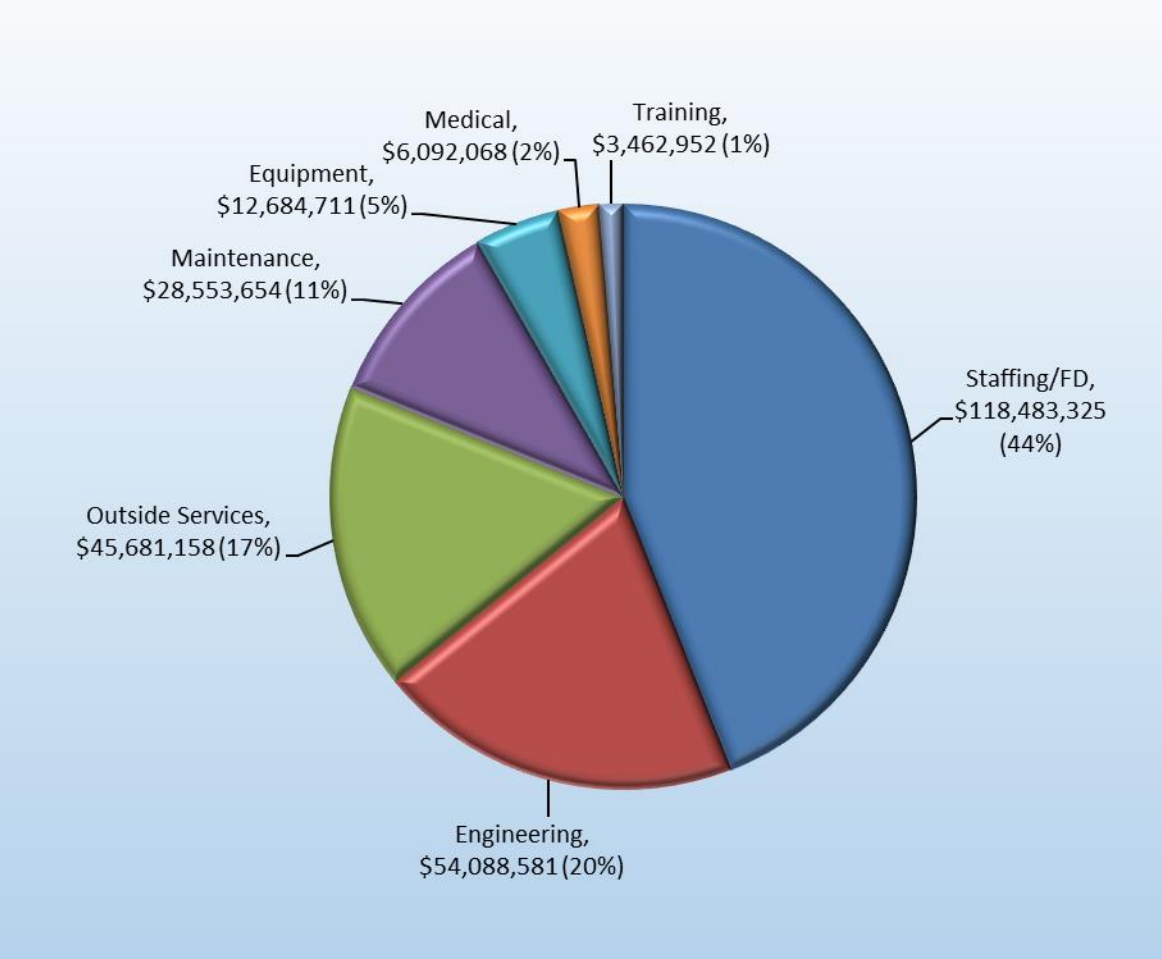
Year	Valuation (Millions)	Fire Loss (Dollars)	Fire Loss Rate (Cents per $100 Valuation)	Previous 5-Year Average (Cents per $100 Valuation)
1985	86,321.84	4,129,297	0.48	1.05
1986	82,787.52	5,295,292	0.64	0.83
1987	91,927.20	3,010,829	0.33	0.81
1988	92,998.00	8,303,120	0.89	0.74
1989	107,948.00	7,505,551	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
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	1,008,295	0.07	0.19
2018	156,161.05	917,936	0.06	0.17
2019	225,242.45	2,360,843	0.10	0.15
2020	229,570.58	1,328,871	0.06	0.07

* The *Fire Loss (Dollars)* figures from 2011-2014 (column 3 above) include both fire and non-fire losses such as system leaks, spills, and releases. The calculated *Fire Loss Rate* and the *Previous 5-Year Average* (columns 4 and 5 above) for 2011-2014 also include both fire and non-fire losses. Prior to 2011 and from 2015 forward, the figures reflect only actual fire losses.

Recurring Fire Protection Program Costs

DOE elements are required to report costs associated with recurring fire protection activities into the FRPS annually. Figure 6 displays the recurring cost distribution by Activity Type in 2020.

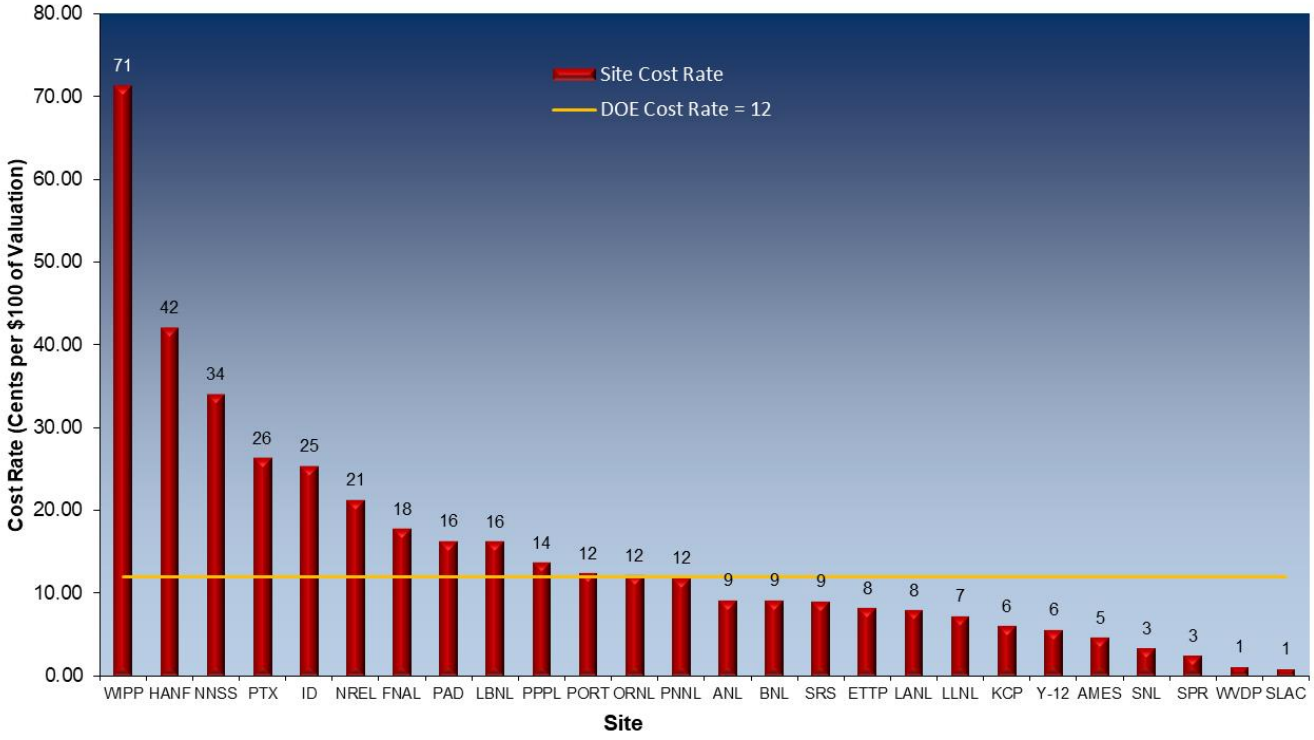
Figure 6: Fire Protection Program Costs by Activity



Total DOE recurring fire protection costs for 2020 were $269,046,449, a two percent increase over 2019. *Staffing/Fire Department Costs* represented 44 percent of all fire protection costs, compared with 45 percent the prior year. *Engineering Costs* represented 20 percent, compared with 17 percent in 2019.

A *Fire Protection Program Cost Rate* may be calculated the same way as *Fire Loss Rates*, using facility and property valuations. Figure 7 displays the *Fire Protection Program Cost Rates* for the sites.

Figure 7: Fire Protection Program Cost Rates by Site



In 2020, the DOE *Fire Protection Program Cost Rate* remained the same as in 2019 at approximately 12 *cents* per $100 (dollars) of property valuation for recurring fire protection activities, displayed as the orange line on the chart.

WIPP had the highest rate at 71 cents per $100 of valuation, followed by HANF at 42 cents and NNSS at 34 cents. DOE-wide, 10 sites had cost rates higher than the DOE rate, 13 were below the DOE average rate, and three were roughly the same as the overall DOE rate.

It should be noted that recurring cost activities are not consistently reported across the Department, such as outside contracts and maintenance activities.

Water-Based Fire Suppression System Actuations

When a water-based fire suppression system is actuated, whether by fire, equipment malfunction, or human or environmental influence, there are costs associated with the event. These costs may include damage or loss of facilities and equipment, replacement or repair costs, fire department response costs, recharging fire suppression systems, cleanup costs, etc. Table 4 displays the distribution of Water-Based Fire Suppression System Actuations by cause.

Table 4: Water-Based Fire Suppression System Actuation Causes

Cause	No. of Events
Weather	4
Electrical	3
Other/Unspecified	2
Employee	1
Design/Material	1
Total	**11**

In 2020, DOE facilities reported actuations of 15 wet-pipe suppression systems, 11 of which resulted in financial losses totaling $930,275 a 673 percent increase over 2019. As previously described, the majority of the 2020 costs were associated with one event at ETTP as described in Table 5.

Table 5 displays the two Water-Based Fire Suppression Actuation events resulting in costs of $10,000 or greater. These two events represent 98 percent of the 2020 total costs associated with Water-Based Fire Suppression Actuations.

Table 5: Costliest Water-Based Fire Suppression System Actuations

Site	Loss Type/Cause	Cause	Description	Loss Amount
ETTP	Fire Smoke (Other)	Unspecified	Fire in a glovebox	$886,913
ORNL	Fire Smoke (Other)	Design/Material	A research oven in Room 121 was partially involved in fire. The sprinkler head above the oven activated, extinguishing the fire.	$20,000

Non-Water-Based Fire Suppression System Actuations

Non-water-based fire suppression includes wet chemical (including halon), dry chemical, and clean agent extinguishing systems. Chlorofluorocarbons (including halon) are regulated under the 1991 Clean Air Act due to their detrimental impact on the ozone layer. The Environmental Protection Agency has published regulations to: 1) prohibit halon production; 2) establish container labeling requirements; 3) impose Federal procurement restrictions and halon taxes; 4) issue requirements for the approval of alternative agents; and 5) list essential areas where halon protection is considered acceptable.

DOE policy, as stated in Memorandum DOE F 132S.8, *Managed Phase Out of Halon Fixed Fire Suppression Systems*, prohibits the installation of any new halon systems. Field organizations have been requested to aggressively pursue alternative fire suppression agents to replace existing halon systems, and to effectively manage halon inventories. The Department's long-term goal is the eventual elimination of all halon systems.

In 2020, 116 active halon systems were still in use at DOE sites, the same number as in 2019. There were two actuations of Non-Water-Based Suppression Systems reported in 2020, a 75 percent decrease from 2019. The two events resulted in losses of $18,600, a 16 percent decrease from 2019.

Table 6 provides information regarding the two events.

Table 6: Non-Water-Based Fire Suppression System Actuations

Site	Loss Type	Description	Loss Amount
INL	Leaks, Spills, Releases	A failed component on a FireTrace suppression system activated inside of the Wet-Prep glovebox.	$1,600
ORNL	Fire/Smoke (Other)	A fire involving the kitchen deep-fryer flared up. A food-service worker pulled the manual discharge release for Hood System #1 (wet chemical), which covers the deep-fryer equipment.	$17,000

Fire Department Responses

Table 7 displays the distribution of 2020 fire department emergency and non-emergency responses at DOE sites by call category. In 2020, DOE reported 4,366 Fire Department Responses, a 38 percent decrease from 2019.

Table 7: Fire Department Responses

Site	Fire Calls	HazMat Calls	Other Emergency Calls	Non-Emergency Calls	Medical Calls	TOTAL SITE CALLS
AMES	2	0	0	0	0	2
ANL	6	27	103	266	65	467
BNL	12	41	23	181	32	289
ETTP	0	0	2	1	2	5
FNAL	175	1	3	0	15	194
INL	62	7	0	44	45	158
KCP	0	0	0	0	0	0
LBNL	0	2	47	9	17	75
LLNL	0	0	0	0	0	0
LANL	8	7	116	143	31	305
NREL	3	1	8	16	8	36
NNSS	7	5	0	138	52	202
OST	0	0	0	3	0	3
ORNL	9	6	23	239	96	373
PNNL	0	1	6	0	6	13
PGDP	3	3	44	10	17	77
PTX	1	43	62	220	92	418
PORT	8	2	93	6	68	177
PPPL	13	11	7	65	51	147
RL	37	0	67	369	138	611
SNL	2	6	2	34	5	49
SRS	5	6	3	43	148	205
SLAC	0	1	0	0	4	5
SPR	0	1	0	0	16	17
TJNAF	0	1	0	0	2	3
WIPP	55	5	2	0	58	120
WVDP	0	0	1	0	2	3
Y-12	3	16	258	21	114	412
TOTALS	**411**	**193**	**870**	**1808**	**1084**	**4366**

Fire Protection Occurrences Reported in ORPS

Fire and fire protection events that meet the reportability thresholds described in DOE O 232.2A, *Occurrence Reporting and Processing of Operations Information*, are required to be input into the Occurrence Reporting and Processing System (ORPS) database.

There were no ORPS-reportable fire or fire protection-related injuries or fatalities reported in 2020. There was one minor hand burn resulting from an ignited ethanol splash from a beaker reported into the Computerized Accident/Illness Reporting System (CAIRS); however, the event was below the ORPS-reportability threshold.

In 2020, there were 79 fire or fire protection-related occurrences (with 81 assigned keywords) reported in ORPS, a four percent increase from the 76 in 2019. Of the 79 reported events, 8 (10 percent) were rated *High Level*, 34 (43 percent) were *Low Level*, and 37 (47 percent) were *Informational Level*.

Table 8 displays the distribution of Fire Protection ORPS occurrences by keyword. The 79 fire protection occurrences resulted in 81 assigned keywords. The keyword counts do not equal the total because occurrences may have more than one keyword assigned.

Table 8: Distribution of Fire Protection ORPS Occurrences

Code	Keyword Description	Assigned Keywords
03A	Fire Protection Equipment Degradation	45
03C	Facility Fire	22
03D	Explosives Safety Issue	5
03G	Wildland Fire	3
03B	Fire Suppression Actuation	2
03E	National Fire Protection Association Issue	2
03F	Explosion	2
	Total	**79**

In 2020, *Fire Protection Equipment Degradation* was identified in 57 percent of all fire protection ORPS reports, followed by *Facility Fires* at 28 percent.

Table 9 displays summaries of the eight fire protection events rated as High Level ORPS occurrences.

Table 9: Summaries of High Level Fire Protection ORPS Occurrences

Site	Occurrence Description
ORNL	***Vessel Over-Pressurization Results in Damage to Laboratory Drying Oven*** On February 7, 2020, a 100-milliliter solution of ethanol and nickel nitrate was placed in a 250-milliliter hydrothermal autoclave vessel. The vessel was then placed in a laboratory drying oven and heated to a temperature of 180 Celsius. The vessel failed causing considerable damage to the oven.
ORNL	***Fire in Building 4508 Room 121*** On July 21, 2020, an elevated temperature high-cycle fatigue test was being performed on a small aluminum specimen in a convection oven. The maximum temperature rating for the oven is 426C. Once the oven reached 350C and was holding temperature, Researcher 1 left the lab. Researcher 2 was in an adjacent office heard a pop and entered the room to find that the oven was smoking. A 3rd Researcher checked Room 121 and noted fire was coming from the oven. Researcher 3 cut the power to the oven, exited the room, and activated the emergency stop for the hydraulic service supply feeding hydraulic fluid to the oven.
NNSS	***Wildland Fire on the Nevada National Security Site*** On July 27, 2020, the Operations Command Center identified fire and smoke plumes in Area 1. NNSS Fire and Rescue units responded to a wildland fire of five acres.
ICP	***Air Conditioning Unit Malfunctions and Starts Fire in a Temporary Office Building*** On July 30, 2020, an employee arriving to work noticed smoke and flame coming from an air conditioning unit on the northeast side of Chemical Processing Plant. This facility is used to support Integrated Waste Treatment Unit (IWTU) operations. The Idaho National Laboratory Fire Department arrived on scene and spent about 10-minutes fighting the fire.
NREL	***Critical Failure of Substation Equipment*** On September 8, 2020, the National Renewable Energy Laboratory (NREL) experienced a critical failure of a 115 kilovolt (kV) potential transformer (PT) located at the Flatirons Campus substation. NREL security reported a site wide power outage at the Flatirons Campus. Site Operations personnel arrived to investigate the source of the outage and noted the presence of damaged electrical equipment within the fenced substation enclosure. A review of research camera footage revealed that the PT catastrophically failed, projecting the insulator top into the air, igniting the PT mineral oil insulation, and creating additional damage to nearby electrical bus and insulators.

	Occurrence Description
LANL	***Small Capacitor Bank Fire*** On October 4, 2020, a capacitor bank at Los Alamos National Laboratory Technical Area 53 caught fire. Due to the fully charged nature of the capacitors which contained hazardous energy, LAFD and Accelerator Operations Technology - Radio Frequency Engineering (RFE) personnel determined that fighting the fire directly was not possible until the capacitors could be safely discharged. After six hours, the fire extinguished itself and personnel from LAFD and RFE entered the room to discharge the capacitor bank and eliminate any remaining hot spots.
ETTP[1]	***Fire in Contact Handled Glovebox*** On October 26, 2020, Engineering and Operations personnel were conducting a smoke test and glove port air flow velocity test at glove port 10 of the contact handled glovebox in accordance with procedure. A quantity of CoolSmoke, a commercially available gel product used to generate smoke for simulations or testing, was placed in a metal pan inside the glovebox, adjacent to glove port 10. CoolSmoke material creates simulated smoke as a result of a chemical reaction, initiated when a relatively low temperature heat source contacts the surface of the material. The material is not intended to combust when the reaction is initiated. In this event, when smoke generation was initiated using the supplied cautery tool, the CoolSmoke material immediately caught fire. The fire grew quickly in size with flames extending approximately three feet vertically from the pan and within seconds, activated a fire sprinkler head in the immediate area of glove port 10, as well as other areas of the glovebox. The fire suppression system extinguished the fire.
NNSS	***U1a Complex Substation 1-11 Fire*** On December 22, 2020, power Substation 1-11 located at the U1a Complex caught fire. Nevada National Security Site Fire and Rescue personnel, including the Incident Commander responded and extinguished the fire.

Conclusion

In 2020, the number of fire loss events reported across the DOE Complex into the Fire Protection Reporting System declined 16 percent, with monetary losses falling 44 percent. The number of non-fire losses declined eight percent, while related monetary losses fell 78 percent. Major fire losses costing $10,000 or more declined 31 percent. Total DOE valuation for sites reporting into the FPRS in 2020 rose two percent, while the calculated ratio of fire losses to total valuation fell 40 percent from 2019. The ratio of fire protection costs to total valuation remained the same as in 2019. The number of requested Fire Department responses declined 38 percent in 2020. It must be noted that these declines may be related to operational changes resulting from the Covid-19 pandemic.

Summary provided by:

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