

# Annual Fire Protection Program Summary

## Calendar Year 2022



UNITED STATES DEPARTMENT OF ENERGY

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*Summary Provided by:*

DOE Office of ES&H Reporting and Analysis

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## Executive Summary

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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) 2022, and includes information submitted by 32 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 110 fire protection-related (fire and non-fire) events in 2022, resulting in monetary losses of \$837,007. Compared to 2021 data, this represents a 16 percent increase in the number of events, but a 47 percent decrease in monetary losses. Of the 110 events, 56 resulted in monetary losses while 54 had no reported monetary losses.

There were 38 fire loss events (directly attributable to fire or smoke) in 2022, resulting in monetary losses of \$711,619. This represents a 12 percent decrease in the number of events, and a 47 percent decrease in the monetary loss amounts from 2021. There were 18 non-fire loss events (leaks, spills, or inadvertent releases or actuations) related to fire protection systems in 2022, totaling \$125,388. This represents a 14 percent decrease in the number of events, and a 45 percent decrease in monetary losses from 2021.

In 2022, there were 11 major fire losses at 6 sites costing \$10,000 or more, a 10 percent increase from the 10 reported in 2021. Of these, three resulted in losses of \$50,000 or greater, compared with six in 2021, a 50 percent decrease in the number of such events. The single largest fire loss event was a fire in a dust suppression water cannon at Portsmouth that resulted in a \$350,000 loss, which alone represents 49 percent of all DOE fire losses reported in 2022.

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 2022 was \$267.0 billion, an 11 percent increase from 2021. The highest calculated Fire Loss Rate was at the Portsmouth Gaseous Diffusion Plant, at 0.66 cents per \$100 of valuation. The DOE-wide 2022 Fire Loss Rate was 0.03 cents per \$100 in total site valuation, a 50 percent decrease from 2021. This represents the lowest DOE Fire Loss Rate since the inception of this report in 1950.

DOE elements are required to report costs associated with recurring fire protection activities into the FRPS annually. In 2022, recurring costs for fire protection activities were \$308,874,584, a 17 percent increase from 2021. As a ratio of cost to total valuation, DOE sites spent approximately 12 cents per \$100 of valuation for recurring fire protection activities in 2022, a 5 percent increase from 2021. The Waste Isolation Pilot Plant (WIPP) had the highest rate at 75 cents per \$100 of valuation.

There were 6,565 Fire Department responses in 2022, a 3 percent increase from 2021.

In calendar year 2022, DOE sites reported no fire or fire protection-related injuries or fatalities into the DOE Occurrence Reporting and Processing System (ORPS). There was one minor burn injury reported into the Fire Protection Reporting System (FPRS) by the Nevada National Security Site. There were 174 fire or fire protection-related occurrences reported into ORPS in 2022, an 18 percent increase over 2021. The vast majority of these continue to be attributable to fire protection equipment degradation events at Pantex Plant resulting from ongoing issues associated with the Det-Tronics system. Of the 174 occurrences, 7 (4 percent) were rated High Level, 120 (69 percent) were rated Low Level, and 47 (27 percent) were rated Informational Level.

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## Site/Facility Acronyms and Abbreviations

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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
ICP	Idaho Cleanup Project
ID	Idaho (INL and ICP)
INL	Idaho National Laboratory
KAPL	Knolls Atomic Power Laboratory
KCNCS	Kansas City National Security Campus
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
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

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### 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, DOE-wide and 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) 2022 from information submitted by 32 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 2022 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), and LANL (Los Alamos National Laboratory/EMLA).

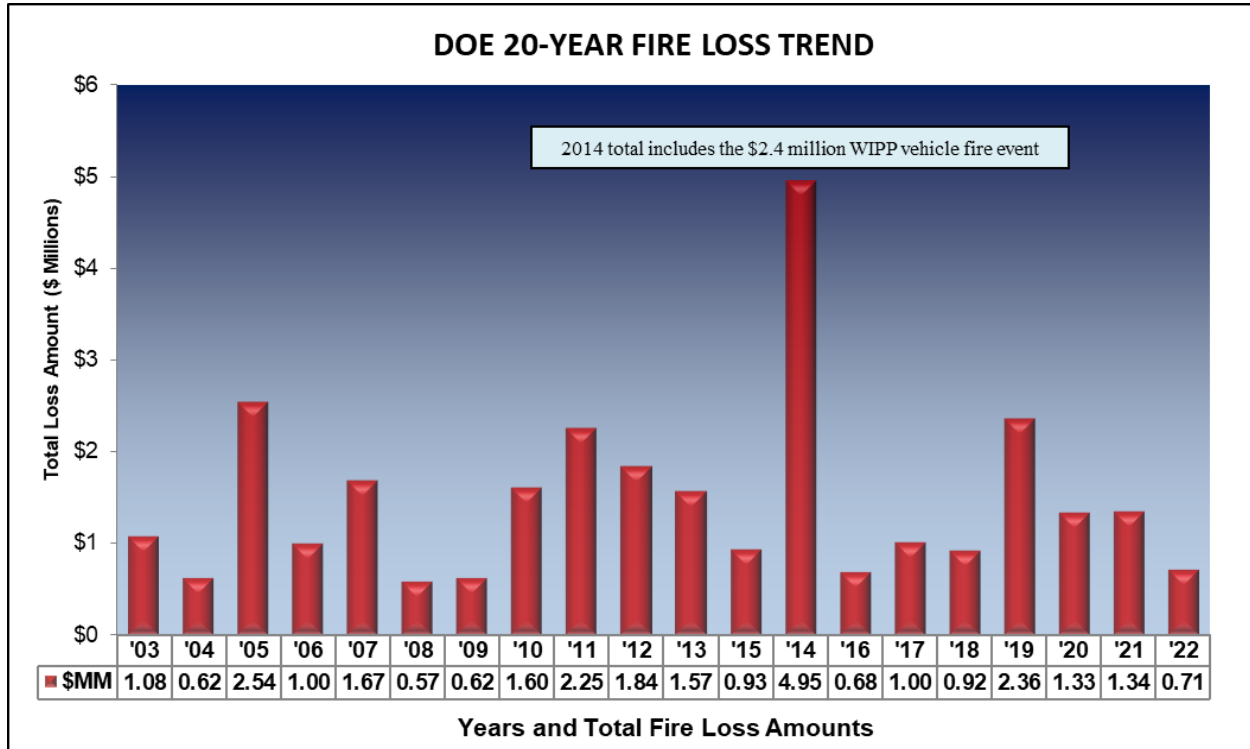
The Fire Protection Reporting System is located at: <http://energy.gov/ehss/policy-guidance-reports/databases/fire-protection-database> [password required]. EHSS continues to collaborate with the DOE Fire Safety Committee to update and improve the data submission system and the content of the annual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

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 Losses 2003-2022*

In 2022, DOE elements reported 38 fire loss events totaling \$711,619 in fire losses. When compared with 2021, this represents a 12 percent decrease in the number of events and a 47 percent decrease in loss amounts.

*DOE Annual Fire Protection Program Summary for Calendar Year 2022*

Table 1 displays the 2022 loss category, loss type, and monetary losses associated with Fire Loss events (all damage or loss sustained as a direct consequence of a fire) 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*

FIRE AND FIRE PROTECTION EVENT SUMMARY			
Loss Category	Fire Loss Type	No. Events.	Loss Amount
Fire Loss Events	Fire/Smoke (Brush)	1	\$ 50
	Fire/Smoke (Building)	16	\$ 307,270
	Fire/Smoke (Other)	16	\$ 385,250
	Fire/Smoke (Vehicle)	5	\$ 19,049
	<b>Total Fire Loss Events</b>	<b>38</b>	<b>\$ 711,619</b>
Non-Fire Loss Events	Leaks/Spills/Releases	18	\$ 125,388
	<b>Total Monetary Losses</b>	<b>56</b>	<b>\$ 837,007</b>
No Reported Loss	Non-Monetary Events	54	\$ -
	<b>Total Fire Protection Events</b>	<b>110</b>	<b>\$ 837,007</b>

In 2022 there were 110 total fire protection-related events reported into the FPRS, a 16 percent increase from 2021, resulting in \$837,007 in monetary losses, a 47 percent decrease from 2021. Of the 110 total events, 56 resulted in monetary losses, a 13 percent decrease from 2021. There were 54 events with no reported costs, a 74 percent increase from 2021. These events are typically small incidents or false alarms that are resolved quickly by local staff, or events where all costs are absorbed by the Fire Department.

Of the 56 events resulting in monetary losses in 2022, 38 were fire loss events (directly attributable to fire or smoke), a 12 percent decrease from 2021; and 18 were non-fire loss events (leaks, spills, and inadvertent releases), a 14 percent decrease from 2021.

The 38 fire loss events in 2022 resulted in \$711,619 in fire losses, a 47 percent decrease from 2021. The 18 non-fire losses (leaks, spills, or inadvertent releases) resulted in \$125,388 in losses, a 45 percent decrease from 2021.

Table 2 displays the causes of the 38 fire loss events reported into the FPRS in 2022.

*Table 2: Fire Loss Causes*

FIRE LOSS CAUSES		
Cause	No. of Events	Cost
Other	16	\$378,500
Procedure Related	1	\$184,920
Employee Related	4	\$100,150
Design Related	6	\$27,400
Electrical	11	\$20,649
<b>Total</b>	<b>38</b>	<b>\$711,619</b>

In 2022, the majority of fire losses were attributed to “Other” causes (including equipment and vehicle fires and miscellaneous small fire events), followed by “Electrical” causes, although the latter category resulted in relatively low monetary losses.

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

A small proportion of the fire events constitute the majority of the total fire losses reported by DOE sites. Figure 2 displays the distribution of major (\$10,000+) fire loss events at DOE sites.

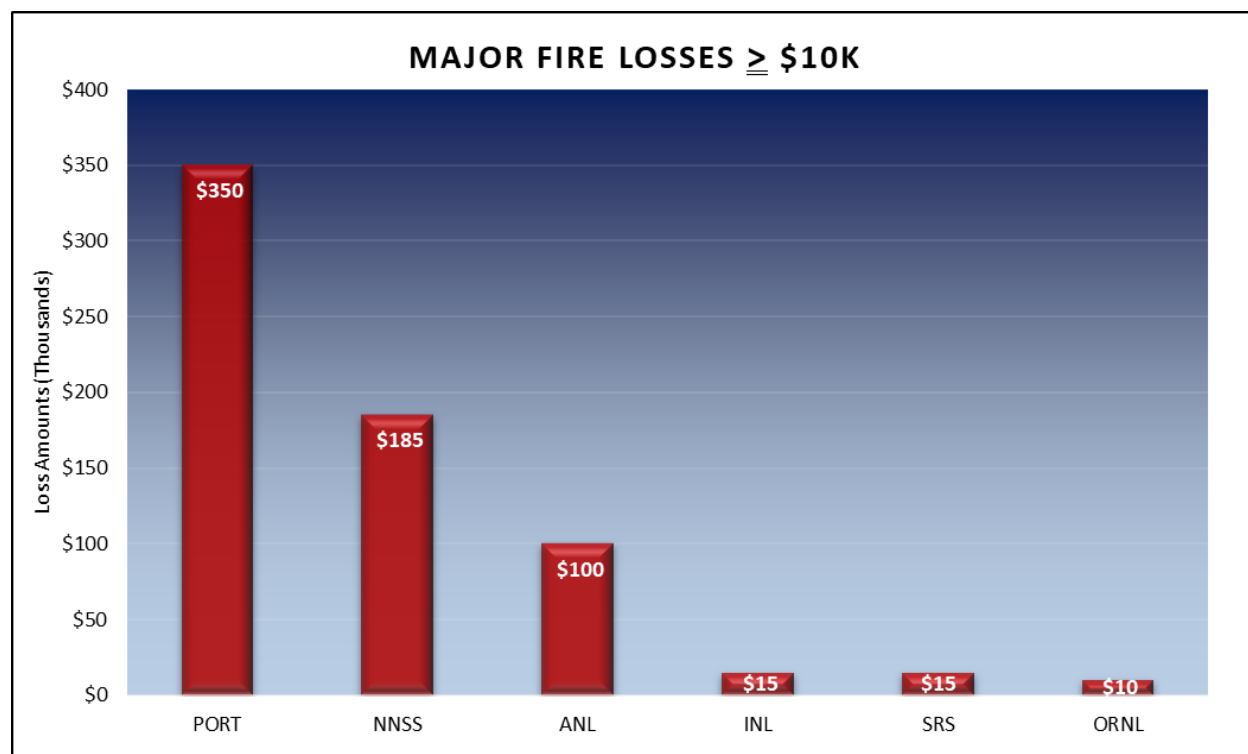


Figure 2: Major Fire Losses by Site

In 2022, there were six major fire losses at six sites costing \$10,000 or more, a 40 percent decrease from 2021. The six major loss events (16 percent of the 38 total events) represented \$675,020 or 95 percent of all reported fire losses in 2022. Of the six events, three resulted in losses of \$50,000 or greater, a 50 percent decrease from 2021. The single largest event was a fire that destroyed a self-contained dust suppression water cannon at Portsmouth resulting in a \$350,000 loss, which alone represents 49 percent of all DOE fire losses reported in 2022.

Additionally, there were five non-fire losses over \$10,000 involving leaks, spills, and releases in 2022. All five were at Y-12, the largest of which was a \$38,945 loss resulting from frozen pipes and valves.

*DOE Annual Fire Protection Program Summary for Calendar Year 2022*

Table 3 provides information and site descriptions for the three costliest fire losses (\$50,000 or greater). These three events represent \$634,920, or 89 percent of all DOE fire protection losses for 2022.

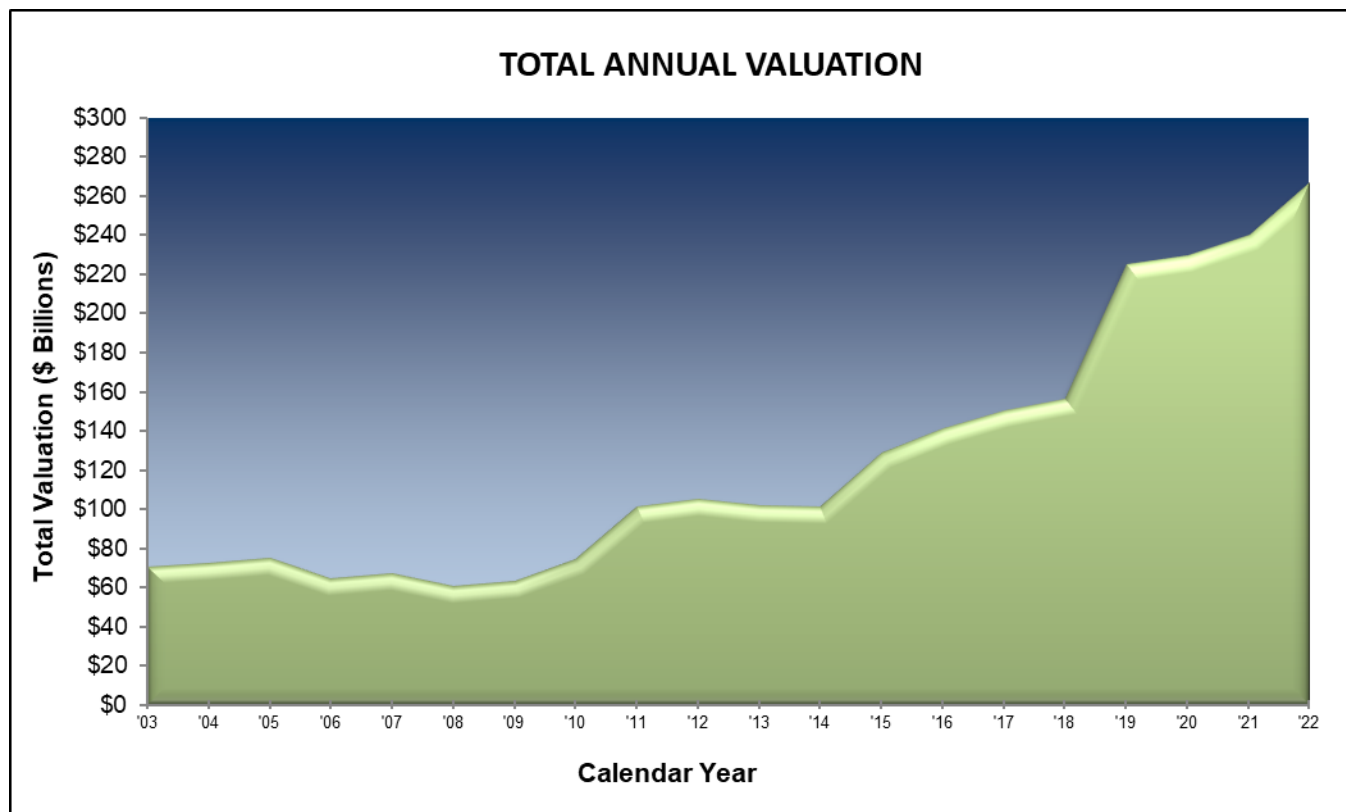
*Table 3: Summary of Fire Events with Losses of \$50,000 or Greater*

SUMMARY OF FIRE LOSS EVENTS > \$50,000				
Site	Loss Amount	Loss Type	Cause	Description
PORT	\$350,000	Fire/Smoke (Other)	Other	Dust Destroyer (self-contained dust suppression water cannon) was in operation and a nearby worker noticed it was on fire. The fire was extinguished but resulted in total loss of the machine. Ignition source was traced back to the engine area.
NNSS	\$184,920	Fire/Smoke (Building)	Procedure Related	On November 21, 2022, a vehicle fire broke out while it was on the lift in the Motor Pool Maintenance facility. The fire suppression system was activated which contained the fire to the area of origin. One worker was sent to Occupational Medicine for evaluation and released pending follow-up before returning to work. The pick-up truck was a total loss, and the facility obtained minimal damage.
ANL	\$100,000	Fire/Smoke (Building)	Employee Related	Argonne FD responded to a smoke investigation. Crews located a small smoldering fire on the exterior of a building entrance. Smoke was being pulled from the exterior and filled the void space between the foundation and drywall with smoke. The cause of the fire could not be determined due to damage caused by suppression efforts but is likely to have been caused by hot work being done in the area igniting combustible leaf litter.

NOTE: Major losses associated with leaks, spills, releases, and actuations are detailed in the Water-Based Fire Suppression System Actuations and Non-Water-Based Fire Suppression System Actuations sections of this report.

## 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 and Fire Protection Program Cost Rates (discussed later in this report). For historical context, Figure 3 displays the total DOE valuation trend over the past 20 years.



*Figure 3: DOE Total Valuation from FIMS and PIDS 2003-2022*

In 2022, total DOE valuation for sites reporting into the FPRS was \$267.0 billion, an 11 percent increase from 2021.

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

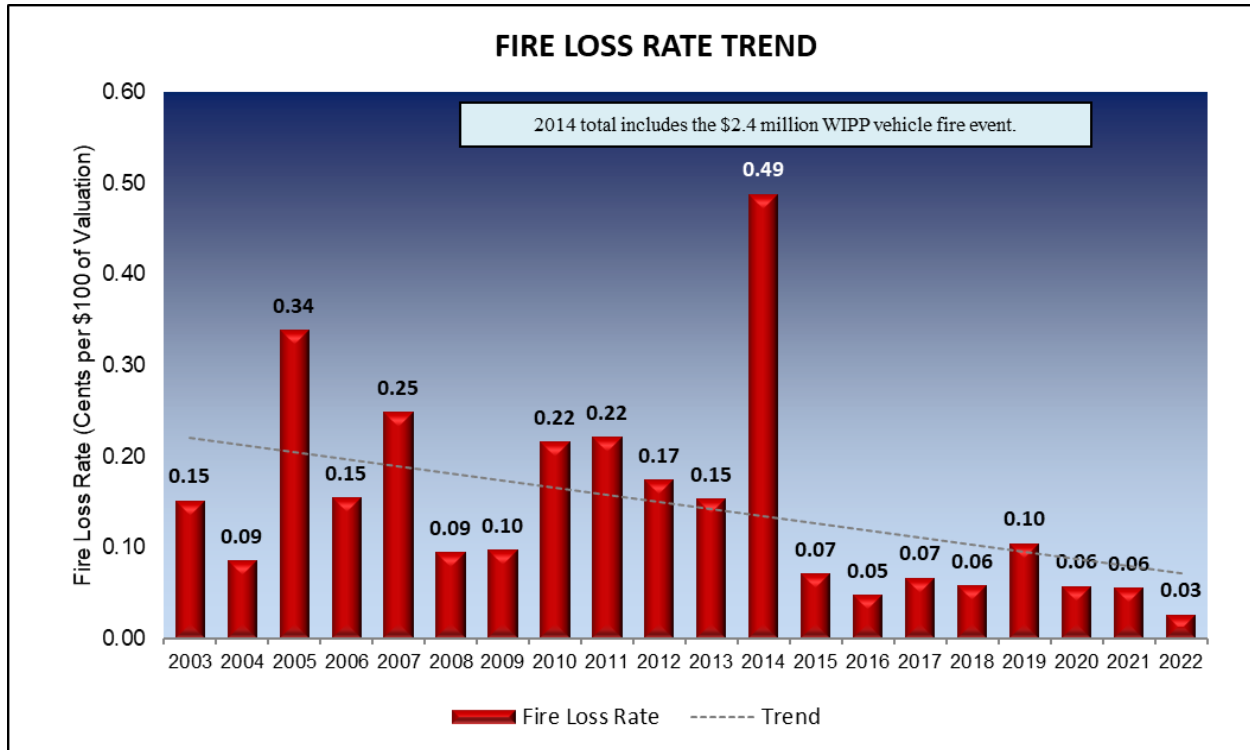


Figure 4: DOE Fire Loss Rates 2003-2022

DOE's calculated 2022 Fire Loss Rate for sites reporting into FIMS, PIDS, and the FPRS was approximately 0.03 cents per \$100 of total valuation, a 50 percent decrease from 2021. This represents the lowest DOE Fire Loss Rate since the inception of this report in 1950.

Figure 5 displays the Fire Loss Rates for sites that reported monetary fire losses into the FPRS in 2022.

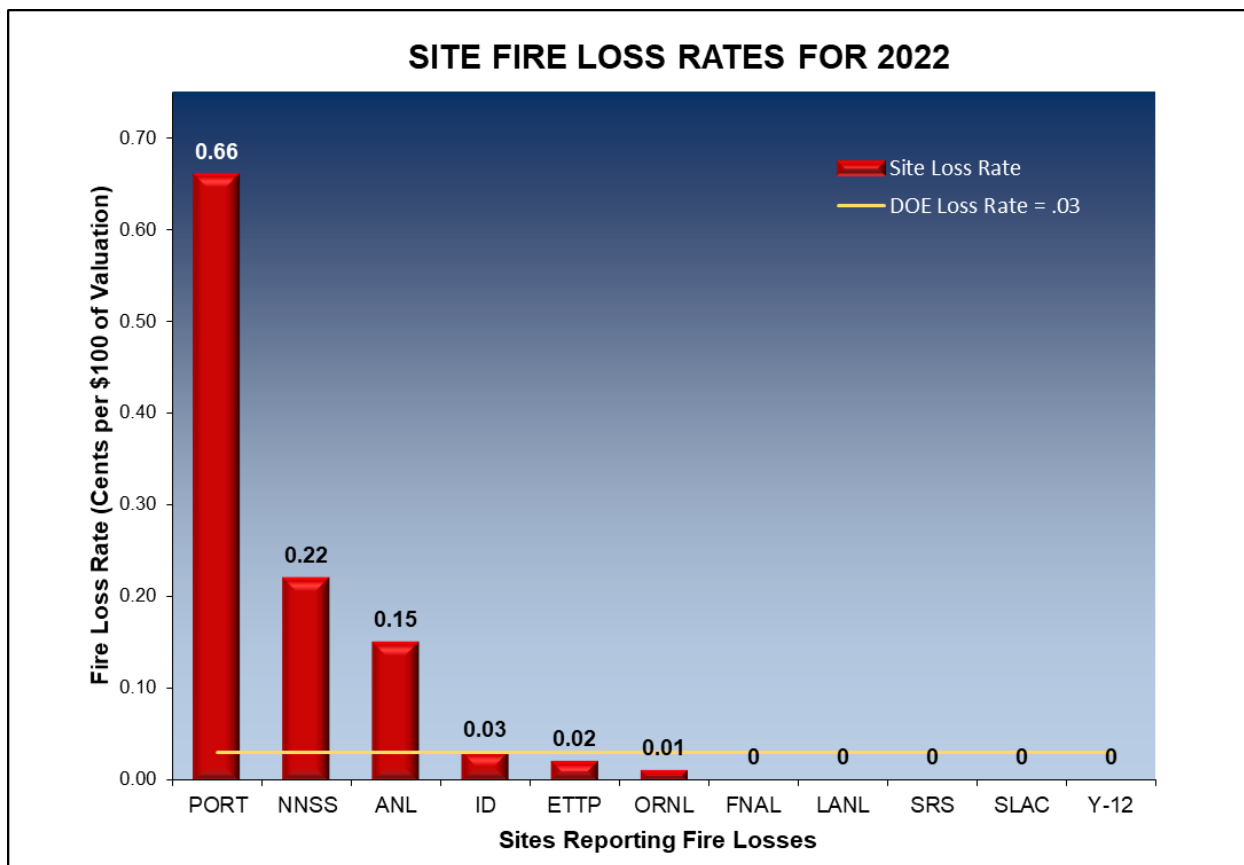


Figure 5: Fire Loss Rates by Site

Eleven sites reported fire losses in 2022, a 10 percent decrease from 2021. The DOE-wide 2022 Fire Loss Rate of 0.03 cents per \$100 is displayed as an orange line in the figure. PORT had the highest Fire Loss Rate of 0.66 cents per \$100 of valuation, followed by NNSS at 0.22, and ANL at 0.15. All other sites were below the DOE-wide rate, with some rounding down to zero.

## DOE Fire Loss History

Table 4 displays DOE historical fire loss information, including valuations, monetary losses, and calculated Fire Loss Rates since 1950.

*Table 4: 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
2021	239,970.22	1,336,492	0.06	0.07
2022	267,078.63	711,619	0.03	0.07

\* Fire Loss Amounts from 2011-2014 (column 3) include both fire and non-fire losses such as system leaks, spills, and releases.

## 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 DOE recurring cost distribution by activity type in 2022.

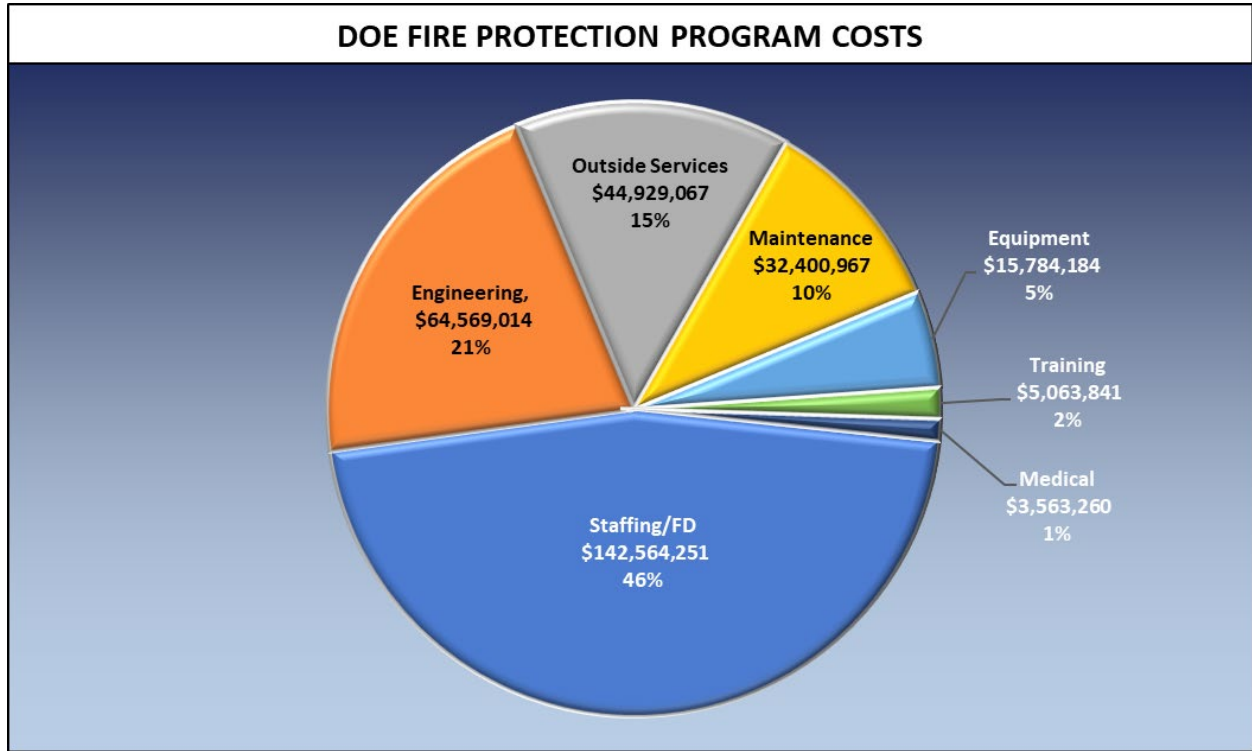


Figure 6: Fire Protection Program Costs by Activity in 2022

DOE total recurring fire protection costs for 2022 were \$ \$308,874,584, a 17 percent increase from 2021. Staffing/Fire Department Costs represented 46 percent of all fire protection costs, the same as in 2021.

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 in 2022.

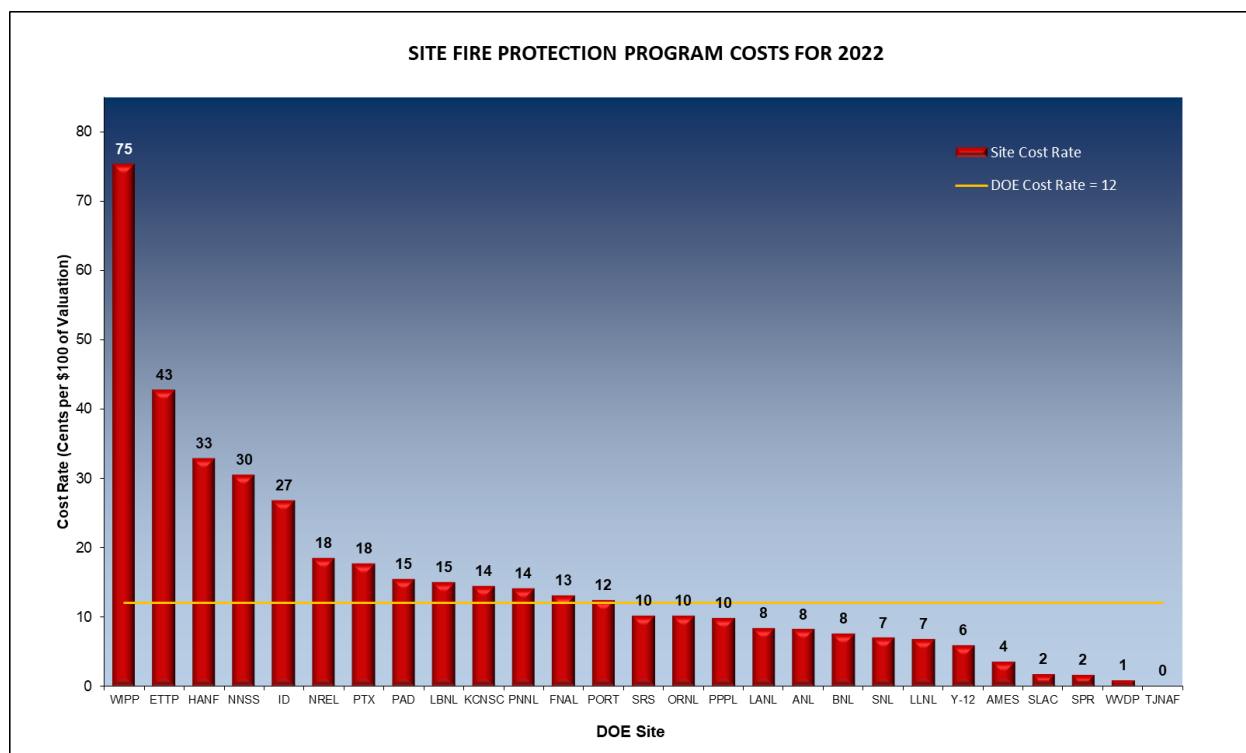


Figure 7: Fire Protection Program Cost Rates by Site

In 2022, the DOE Fire Protection Program Cost Rate was approximately 12 cents per \$100 (dollars) of property valuation for recurring fire protection activities, displayed as the orange line on the chart; a 10 percent increase from 2021.

The Waste Isolation Pilot Plant (WIPP) had the highest rate at 75 cents per \$100 of valuation, an 18 percent decrease from 2021. This was followed by the East Tennessee Technology Park (ETTP) at 43 cents. DOE-wide, 12 sites had cost rates higher than the DOE rate, while 13 sites were at or below the DOE rate.

It should be noted that recurring cost activities are not reported consistently across the DOE Enterprise. Some sites maintain their own fire departments, while other sites contract with local municipal or volunteer fire departments for fire protection activities. This can result in differing cost levels and/or distributions for “Staffing/FD,” “Outside Services,” “Engineering” 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 5 displays the distribution of DOE Water-Based Fire Suppression System Actuations by cause in 2022.

*Table 5: Water-Based Fire Suppression System Actuation Causes*

WATER-BASED SYSTEM ACTUATION CAUSES		
Cause	No. of Events	Cost
Weather Related	7	\$76,706
Unspecified	6	\$34,234
Other	4	\$5,000
<b>TOTAL</b>	<b>17</b>	<b>\$115,940</b>

In 2022, DOE facilities reported actuations of 32 wet-pipe suppression systems, 17 (53 percent) of which resulted in financial losses totaling \$115,940, a 34 percent decrease from 2021.

Table 6 displays the Water-Based Fire Suppression Actuation events resulting in costs of \$10,000 or greater. These five events, all at Y-12, cost \$92,107 and represent 79 percent of the total costs associated with DOE Water-Based Fire Suppression Actuations in 2022.

*Table 6: Costliest Water-Based Fire Suppression System Actuations*

COSTLIEST WATER-BASED SUPPRESSION SYSTEM ACTUATIONS (>\$10K)				
Site	Loss Amount	Loss Type	Cause	Description
Y-12	\$38,945	Leaks, Spills, Releases	Weather related	Building lost heat and froze small diameter sprinkler piping and AF1-002 isolation valves, causing them to break.
Y-12	\$16,153	Leaks, Spills, Releases	Weather related	Building lost heat and froze small diameter sprinkler piping causing it to break.
Y-12	\$13,644	Leaks, Spills, Releases	Unspecified	System valved-out due to leak in sprinkler piping.
Y-12	\$13,272	Leaks, Spills, Releases	Unspecified	Leaking sprinkler piping.
Y-12	\$10,093	Leaks, Spills, Releases	Weather related	Sprinkler activated due to extremely cold incoming air causing Freezestat to shut the ventilation fan off and trip the steam heat to default in the open position.

## Non-Water-Based Fire Suppression System Actuations

Non-water-based fire suppression system actuations include 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) identify 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 2022, 122 active halon systems were reported in use at DOE sites, a 36 percent increase from 2021. Eighty-three of the 122 active halon systems (68 percent) were at the Savannah River Site, 19 systems (16 percent) were at the Fermi National Laboratory, and 12 systems (10 percent) were at the Thomas Jefferson National Accelerator Facility.

There was one loss event associated with Non-Water-Based Suppression Systems at NNSS resulting in losses of \$9,448, an 82 percent decrease from 2021. Table 7 provides information regarding the event.

*Table 7: Non-Water-Based Fire Suppression System Actuation*

NON-WATER-BASED SYSTEM ACTUATIONS			
Site	Loss Amount	Cause	Description
NNSS	\$9,448	Employee Related	On June 21, 2022, an Infrastructure Analysts backed into the fire suppression manual activation button, releasing FM-200 fire suppressing agent into the building. There was no spare FM-200 bottle available, so a fire watch had to be established until a replacement could be obtained.

## Fire Department Responses

Table 8 displays the distribution of 2022 fire department emergency and non-emergency responses at DOE sites by call category.

*Table 8: Fire Department Responses*

FIRE DEPARTMENT RESPONSES						
Site	Fire Calls	HazMat Calls	Other Emergency Calls	Non-Emergency Calls	Medical Calls	TOTAL CALLS
AMES	0	0	0	0	0	0
ANL	16	43	16	454	112	641
BNL	23	39	28	134	106	330
ETTP	5	0	0	1	9	15
FNAL	163	16	0	0	18	197
HANF	24	0	115	397	219	755
INL	81	7	1	20	168	277
KCNSC	0	0	0	1	13	14
LBNL	2	1	24	0	7	34
LLNL	10	21	606	22	50	709
LANL	11	11	54	215	76	367
NREL	0	0	3	21	7	31
NNSS	9	5	9	63	53	139
OST	0	0	1	3	1	5
ORNL	7	7	55	298	89	456
PNNL	0	0	0	10	2	12
PGDP	4	4	98	38	34	178
PTX	3	25	97	186	102	413
PORT	8	6	166	3	138	321
PPPL	72	18	44	77	198	409
SNL	2	9	12	41	13	77
SRS	17	5	167	40	292	521
SLAC	1	0	2	5	9	17
SPR	1	4	0	0	52	57
TJNAF	0	0	0	2	4	6
WIPP	13	1	0	0	42	56
WVDP	3	0	0	1	2	6
Y-12	6	26	250	15	225	522
<b>TOTAL</b>	<b>481</b>	<b>248</b>	<b>1748</b>	<b>2047</b>	<b>2041</b>	<b>6565</b>

There were 6,565 Fire Department responses in 2022, a 3 percent increase from 2021.

## 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 2022. There were 174 fire or fire protection-related occurrences reported in ORPS in 2022, an 18 percent increase from 2021. Of the 174 occurrences, 7 (4 percent) were rated High Level, 120 (69 percent) were rated Low Level, and 47 (27 percent) were rated Informational Level.

Table 9 displays the distribution of Fire Protection ORPS keywords. Note: The 174 fire protection occurrences resulted in 179 assigned keywords because five occurrences were assigned two keywords.

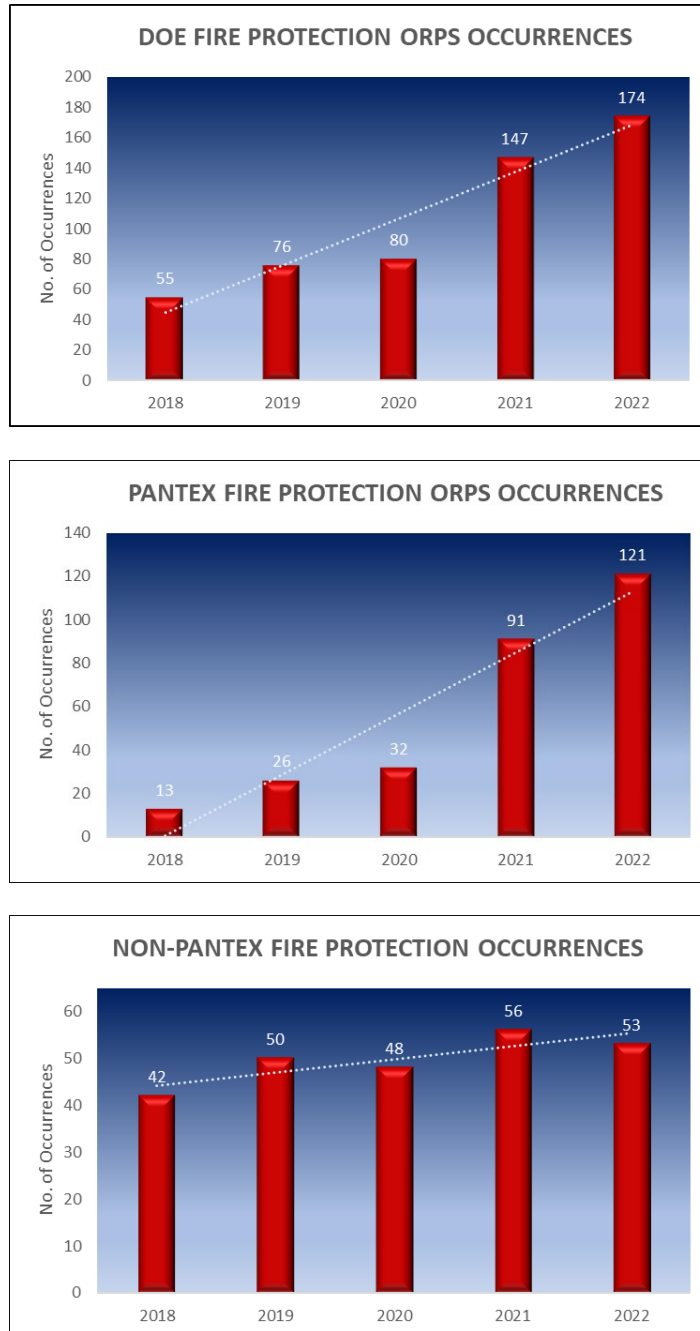
*Table 9: Distribution of Fire Protection ORPS Keywords*

FIRE PROTECTION ORPS OCCURRENCES		
Code	Keyword Name	Occurrences
03A	Fire Protection Equip Degradation	139
03B	Fire Suppression Actuation	4
03C	Facility Fire	27
03D	Explosives Safety Issue	4
03E	National Fire Protection Association Issue	1
03F	Explosion	1
03G	Wildland Fire	3
TOTAL		174

In 2022, *Fire Protection Equipment Degradation* was identified in 80 percent of all fire protection ORPS reports, followed by *Facility Fires* at 16 percent.

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Over the past 5 years, Pantex Plant occurrences reported into ORPS have increased from 24 percent to 70 percent of all DOE fire protection occurrences. The vast majority of these continue to be attributable to fire protection equipment degradation events at Pantex Plant resulting from ongoing issues associated with the Det-Tronics system. Figure 8 displays the 5-year trend of DOE fire protection ORPS occurrences, with and without Pantex Plant.



*Figure 8: Fire Protection Occurrence Trend from ORPS*

While DOE fire protection ORPS occurrences continue to trend upward, the trendline is much flatter when Pantex Plant occurrences are removed.



Table 10 displays summaries of the seven fire protection ORPS occurrences rated as High Level in 2022.

*Table 10: Summaries of High Level Fire Protection ORPS Occurrences*

HIGH-LEVEL FIRE PROTECTION ORPS OCCURRENCES	
Site	Occurrence Description
IDEM	On January 19, 2022, operators were preparing to move a telehandler for hydraulic system maintenance. The driver started to raise the boom to allow other support operators to remove the boom jack and observed smoke and flames coming from the engine compartment. A second operator discharged a fire extinguisher into the engine compartment. The fire did not appear to be extinguished. The second operator assisted the driver in exiting the telehandler and manually activated the telehandlers onboard fire suppression system. When the FD arrived the fire and smoke were no longer observed, and the telehandler was cooling off. (EM-ID--IEC-RWMC-2022-0001)
LBNL	On May 20, 2022, a researcher was conducting a set of protocols to test electrolysis cell performance of a newly designed porous transport layer. The first four tests proceeded without incident. After the fifth test, a second researcher discovered that a fire had ignited on the electrical connections of the electrolyzer. The fire was reported to be small, approximately six inches in size. A third researcher laboratory called 911 and used a fire extinguisher to extinguish the fire. (SC--BSO-LBL-ETA-2022-0001)
NETL	On March 23, 2022, the NETL in Pittsburgh experienced a fire in the Research & Development Plateau. The fire resulted in the automatic fire suppression system activating and water subsequently infiltrating into the building. The fire was extinguished through activation of the sprinkler system. The cause of the fire is still under review, and no injuries were reported. (FE--NETL-GOPE-NETLPIT-2022-0004)
NNSS	On November 21, 2022, a vehicle fire broke out while it was on the lift in the Motor Pool Maintenance facility. The fire suppression system was activated which contained the fire to the area of origin. NNSS Fire and Rescue responded, extinguished the fire, and established a fire watch. One involved worker was sent to Occupational Medicine for evaluation. They were released pending further follow-up before returning to work. The pick-up truck was a total loss, and the facility obtained minimal damage. (NA--NVSO-MSTS-NNSS-2022-0012)
PTX	On August 20, 2022, a TSR violation occurred when an NNSA representative entered a facility and found the facility crane was not parked in accordance with the Operator Aid posted in the facility. The facility crane was then moved to the proper position per the parking requirements. It was subsequently determined that the facility crane being improperly parked caused a degradation to the Facility Fire System. (NA--NPO-CNS-PANTEX-2022-0121)

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SNL	<p>On May 17, 2022, workers discovered a wildland fire in the Lurance Canyon. The FD was dispatched, observed smoke and fire, established an Incident Command, and initiated wildland firefighting operations. Additional firefighting resources were requested from the U.S. Forest Service. The Emergency Director declared an Operational Emergency Not Requiring Classification. By the end of the first operational period, the fire was 50 percent contained. On May 18, the EOC went into a second operational period. The fire burned approximately 10 acres and Incident Command reported the fire was 99 percent contained. Mop-up operations continued by firefighters to mitigate hot spots, but there was no longer a threat of spreading. No injuries or damage to infrastructure were reported as a result of this fire. (NA--SS-SNL-NMSITE-2022-0003)</p>
Y-12	<p>On March 8, 2022, the Operations Center received emergency notification system alarms indicating loss of power to three buildings. A smoke and electrical burn smell in the fan room at Building 9212 was reported to the OC. The FD identified smoke coming from the area around three transformers. The smoke was visible inside the building and appeared to be coming from the switchgear. The FD applied water to extinguish and cool the burning transformer. (NA--NPO-CNS-Y12NSC-2022-0009)</p>

## **Key Observations for Calendar Year 2022**

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- The DOE-wide 2022 Fire Loss Rate was 0.03 cents per \$100 in total site valuation, a 50 percent decrease from 2021. This represents the lowest DOE Fire Loss Rate since the inception of this report in 1950.
- DOE elements reported 110 fire protection-related (fire and non-fire) events resulting in monetary losses of \$837,007. Compared with 2021 data, this represents a 16 percent increase in the number of events, but a 47 percent decrease in monetary losses.
- There were 38 fire loss events (directly attributable to fire or smoke) in 2022, resulting in monetary losses of \$711,619. This represents a 12 percent decrease in the number of events, and a 47 percent decrease in the monetary loss amounts from 2021.
- There were 11 major fire losses at six sites costing \$10,000 or more, a 10 percent increase from the 10 reported in 2021. Of these, three resulted in losses of \$50,000 or greater, compared with 6 in 2021, a 50 percent decrease in the number of such events.
- There were 174 fire or fire protection-related occurrences reported into ORPS, an 18 percent increase over 2021. The vast majority of these continue to be attributable to fire protection equipment degradation events at Pantex Plant resulting from ongoing issues associated with the Det-Tronics system.

*Summary provided by:*

Office of ES&H Reporting and Analysis

