

Annual Fire Protection Program Summary for Calendar Year 2012



UNITED STATES DEPARTMENT OF ENERGY

Summary Provided by:

Office of Environmental Protection, Sustainability Support
and Corporate Safety Analysis

Office of Health, Safety and Security

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Foreword

The Department of Energy (DOE) *Annual Fire Protection Program Summary for Calendar Year 2012* continues the series started in 1972.

Since May 1950, an Annual Fire Protection Program Summary (Annual Summary) has been submitted by DOE's fire protection community under the requirements of DOE's predecessor agencies: the Atomic Energy Commission (AEC) and the Energy Research Development Administration (ERDA). This report is currently required by section 4b (2) of DOE Order 231.1B, *Environment, Safety and Health Reporting* and is considered the primary source for quantifying monetary loss from fire across the DOE Complex.

In 1999, the Annual Summary reporting process was automated to streamline data collection and provide a more comprehensive look at reporting element activities. It is now possible to view all responses since 1991 at the Site, Operations, Lead Program Secretarial Office and Headquarters levels. In 2007, a new Fire Protection Reporting System was designed by the Office of Corporate Safety Analysis and implemented across the DOE Complex. This new process allows sites to submit their information on a real-time basis versus the submittal of an annual summary as was provided in the past. The data set being reported was reviewed in 2012–2013 as part of the Departments' Directive Reform initiative in the update of DOE Order 231.1B, *Environment, Safety and Health Reporting*. Subject Matter Experts (SME) from across the Department agreed to maintain the existing data reporting guidance.

The report for calendar year (CY) 2012 was summarized from information sent to Headquarters by 33 reporting elements (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 information contained in this publication was extracted from the Fire Protection Reporting System for CY2012. Although the requirement is for sites to submit this data to the Office of Health, Safety and Security (HSS) by April 30 of each year, this report was generated based on data reported into the Fire Protection Reporting System as of June 1, 2013, to allow ample time for a high percentage of sites to submit data.

The Fire Protection Reporting System can be found at: <http://www.hss.doe.gov/sesa/corporatesafety/fpdb.html>.

HSS plans on continuing to work with the DOE Fire Safety Committee to examine the data submission systems and content of the annual report to improve its benefit to both Headquarters and Field Elements, as needed.

Glossary

Headquarters Organizational Elements:

NNSA	National Nuclear Security Administration
SC	Science
FE	Fossil Energy
NE	Nuclear Energy
EM	Environmental Management
PMA	Power Marketing Administrations ¹
EE	Energy Efficiency & Renewable Energy
LM	Legacy Management
HSS	Health, Safety & Security

Field/Area/Site Organizational Elements:

CAO	Carlsbad Area Office
CH	Chicago Operations Office
GFO	Golden Field 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 ²
YSO	Y-12 Site Office

¹ Power Administration organizations are comprised of the Bonneville Power Administration (BPA); Southeastern Power Administration (SEPA); Southwestern Power Administration (SWPA); and the Western Area Power Administration (WAPA).

² Strategic Petroleum Reserve Office sites include: Bayou Choctaw, Big Hill, Bryan Mound, and West Hackberry.

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Site abbreviations:

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
HAN	Hanford Site ³
INL	Idaho National Laboratory
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
NETL	National Energy Technology Laboratory
NREL	National Renewable Energy Laboratory ⁴
NRF	Naval Reactors Facilities
NTS	Nevada National Security Site ⁵
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
TWPC	TRU Waste Processing Center
PX	Pantex Plant
PGDP	Paducah Gaseous Diffusion Plant ⁶
PNNL	Pacific Northwest National Laboratory
PORTS	Portsmouth Gaseous Diffusion Plant ⁶
PPPL	Princeton Plasma Physics Laboratory
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

The reference below is used throughout the report to identify various DOE elements:

DOE field organization (abr.)/Site (abr.)

Example: LASO/LANL

³ Hanford Site includes the Pacific Northwest National Laboratory and Office of River Protection facilities (Tank Farms, etc).

⁴ National Renewable Energy Laboratory includes the Wind Site.

⁵ Nevada National Security Site Includes: Amador Valley Operations, Las Vegas Operations, Nevada-Los Alamos Operations, Nevada-Special Technology Laboratory, Washington Aerial Measurements Operation, and Nevada-EG&G Wolburn NV.

⁶ On July 1, 1993, a lease agreement took effect between the DOE and the United States Enrichment Corporation (USEC) essentially transferring all ownership responsibilities to USEC.

Definitions

The following terms are defined in the text of archived DOE Manual M 231.1-1A, *Environment, Safety, and Health Reporting Manual*. Major definitions not included in this manual have been extracted from the archived DOE Order 5484.1 to clarify key concepts. Section references to these documents are given at the end of the 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 231.1-1A)

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 (\$5k to \$25k and greater than \$25k).

Estimated Loss: Monetary loss determination based on all estimated or actual costs to restore DOE facility and equipment to pre-occurrence conditions irrespective of whether this is in-fact 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. Categorization of occurrences shall be by fire loss and non-fire loss events. (APPENDIX C, DOE M 231.1-1A)

Fire Loss: All damage or loss sustained as a 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 231.1-1A)

Loss Rate: Unit of comparison in cents loss per \$100 of valuation (facilities and equipment).

Executive Summary

DOE experienced no fire-related fatalities, but three off-site firefighters from the nearby Manorville fire department were injured during a BNL range fire on April 9, 2012. Two were taken to a local hospital for smoke inhalation where they were treated and released. The third firefighter was admitted to the hospital with second-degree and first-degree burns.

There were 78 fire loss events in CY2012 (a 20% drop from the 98 events reported in CY2011) which resulted in an estimated \$1.8 million in total DOE fire losses. These total losses were approximately 22% less than last year (\$2.3 million), excluding the CY2011 Los Conchas (LANL) range fire, which caused \$62 million in damages.

Losses from the 30 non-fire related events (leaks, spills or inadvertent releases) in CY2012 cost the Department \$345,900, which is a 57% increase from last year's non-fire losses (\$220,000).

Loss comparisons among DOE sites are performed by normalizing data against total facility and property value (or valuation). Total DOE valuation increased during CY2012 approximately 5 percent (from \$101.3 Billion to \$106.1 billion). The overall CY2012 fire loss rate for reporting sites was approximately 0.18 cents for each \$100 in total site valuation.

Recurring costs for fire protection were \$179 million in CY2012 which is approximately 2% less than was spent last year (\$183 million). On a ratio of cost to total valuation, the DOE spent approximately 17 cents per \$100 in valuation for recurring fire protection activities for those sites reporting into the Fire Protection Program database (approximately the same rate as was reported in CY2011).

In CY2012, Departmental facilities experienced inadvertent actuations of 18 wet-pipe suppression systems: four were due to weather-related events (freezing), four were caused by steam/excess heat initiating actuation, three were caused by employee error and seven actuations were due to unknown causes. There were 12 inadvertent actuations of non-water based suppression systems: four were halon releases and eight were dry chemical and CO₂ releases.

DOE Property Loss Experience

Property and facility value estimates serve as a common denominator for comparing annual summary fire loss rates. In CY2012, total DOE valuation increased by approximately five percent to a total of approximately \$106.1 billion. DOE elements reported 78 fire loss events during CY2012 which accounted for a total year-end fire loss of \$1.8 million. This represents a 20% decrease in the number of fire loss events from last year (98) and a 22% reduction in fire losses (\$1.8 million) as compared to last year (\$2.3 million) excluding the CY2011 Los Conchas (LANL) range fire, which caused \$62 million in damages.

Fire Protection Program-related losses for the 30 non-fire related events rose 57% during CY2012 to \$345,900 from last year's total of \$220,000. These events included system leaks, spills and other inadvertent releases/discharges.

One significant event at ORNL involved an inadvertent sprinkler discharge in the DOE Site Office facility (Building 4500) during a planned building renovation. The water damaged 21 offices, carpeting, sheet rock and electrical equipment on the second and first floors and resulted in a \$75,000 loss.

The remaining property loss events were categorized as follows:

Fire-related:	Fire/Smoke (Building)	28 Events	\$1,528,201
	Fire/Smoke (Brush)	29 Events	262,500
	Fire/Smoke (Vehicle)	7 Events	24,000
	Fire/Smoke (Other)	14 Events	<u>25,420</u>
			\$1,840,121
Non-Fire-related¹:	Leaks, Spills, Releases	30 Events	\$345,900

DOE's fire loss rate for CY2012, as reported into the Fire Protection Reporting System, was approximately 0.18 cents loss per \$100 valuation.

The accompanying figures and tables (in order of appearance) are described as follows:

Table 1: DOE loss history from 1950 to the present

Figure 1: The Department's property valuation since 1965

Figure 2: Fire property loss since 1992

Figure 3: Fire loss rates since 1992

Figure 4: Number of fire events reported at the 8 sites posting greater than \$10,000 in total losses

Figure 5: The current year's fire loss amounts by those sites with greater than \$10,000 in total losses

Figure 6: The current year's Fire Protection Program loss rate by those sites with greater than \$10,000 in total losses

Table 2: A summary of four major fire loss events

Table 3: A summary of two water-based fire system inadvertent actuations

Table 4: Automatic non-water-based system actuations

Figure 7: Distribution of recurring Fire Protection Program costs by activity

Figure 8: The recurring Fire Protection Program cost rate in cents per \$100 of valuation by site

Organizations that are not shown in Figures 4–6 reported either insignificant or zero losses for the year.

¹ Small subset of non-fire losses (leaks, spills, releases) attributable to automatic water-based suppression systems only

Trending of fire loss data continues to indicate that a small number of incidents constitute the majority of dollar losses reported to the DOE. For example, there were 23 fire and inadvertent actuation incidents this year with loss figures exceeding \$10,000 per event. These 23 incidents accounted for nearly all of the total dollar losses for the entire complex. For example, the SNL fire at the Kauai Test Facility cost approximately \$1,200,000 and accounted for approximately 67% of the total DOE annual fire losses. Also, one range fire at Idaho plus another range fire at Nevada together cost DOE over \$215,000 in total fire losses.

A summary of four notable and costly fire and inadvertent actuation events included:

- SNL-KTF:** A fire at the Kauai Test Facility (Hawaii) started in a de-humidifier unit plugged into a 120 VAC wall outlet near an equipment alcove inside Building 648. Water sprinkler activation helped in suppression of the fire. The estimated cost to repair the damage to the facility was \$1,200,000.
- SNL-NM:** A fire damaged lighting wiring and resulted in a GFCI trip in Building 905 during a planned lithium ion battery overcharging test to destruction. The fire also caused loss of local exhaust ventilation and the local scrubber. The building was evacuated and the fire department responded to the scene. The estimated cost to repair the damage to the facility was \$125,000.
- ORNL:** An inadvertent sprinkler discharge occurred in the DOE Site Office facility (Building 4500) during a planned building renovation. The water damaged 21 offices, carpeting, sheetrock, and electrical equipment on the second and first floors resulting in a \$75,000 loss.
- INL-NE:** During welding activities on the roof of Building MFC-752, a non-listed light-duty fire blanket ignited and the flames spread to the roof insulation. The estimated cost to repair the damage to the facility was \$55,000.

Personnel Injuries

There were three personnel injuries reported by BNL during CY2012 and all three occurred during a 300-acre range fire event that required assistance from off-site fire departments. The April 9, 2012, range fire resulted in three firefighters from the off-site Manorville fire department being treated at a local hospital. Two firefighters were treated for smoke inhalation, and later released, while the third firefighter suffered second-degree and first-degree burns and was admitted to the hospital for treatment of the injuries.

Table 1
DOE Loss History from 1950 to Present

Year	Valuation (Millions of Dollars)	Fire Loss (Dollars)	Non Fire Loss (Dollars)	Loss Rates (Cents per 100 Dollar Value)		
				Fire*	Non Fire*	Total*
1950	1,800.00	486,389	10,050	2.70 -	0.06 -	2.76 -
1951	2,177.10	38,318	317,797	0.18 -	1.46 -	1.64 -
1952	3,055.10	449,107	356,600	1.47 -	1.17 -	2.64 -
1953	4,081.00	148,142	427,430	0.36 -	1.05 -	1.41 -
1954	6,095.90	185,438	190,436	0.30 -	0.31 -	0.62 -
1955	6,954.20	125,685	330,103	0.18 (1.00)	0.47 (0.81)	0.66 (1.81)
1956	7,364.10	2,206,478	940,945	3.00 (0.50)	1.28 (0.89)	4.27 (1.39)
1957	7,973.20	590,663	885,936	0.74 (1.06)	1.11 (0.86)	1.85 (1.92)
1958	8,102.50	275,560	476,265	0.34 (0.92)	0.59 (0.84)	0.93 (1.76)
1959	10,301.80	199,841	998,060	0.19 (0.91)	0.97 (0.75)	1.16 (1.67)
1960	10,708.60	636,228	764,823	0.59 (0.89)	0.71 (0.88)	1.31 (1.77)
1961	11,929.90	325,489	5,530,566	0.27 (0.97)	4.64 (0.93)	4.91 (1.91)
1962	12,108.80	3,020,023	293,341	2.49 (0.43)	0.24 (1.60)	2.74 (2.03)
1963	13,288.90	599,056	776,998	0.45 (0.78)	0.58 (1.43)	1.04 (2.21)
1964	14,582.80	480,519	870,516	0.33 (0.80)	0.60 (1.43)	0.93 (2.23)
1965	15,679.30	1,743,448	2,106,621	1.11 (0.83)	1.34 (1.35)	2.46 (2.18)
1966	16,669.00	158,220	698,753	0.09 (0.93)	0.42 (1.48)	0.51 (2.41)
1967	17,450.90	359,584	2,423,350	0.21 (0.90)	1.39 (0.64)	1.59 (1.53)
1968	18,611.90	155,986	713,097	0.08 (0.44)	0.38 (0.87)	0.47 (1.31)
1969	20,068.30	27,144,809	909,525	13.53 (0.37)	0.45 (0.83)	13.98 (1.19)
1970	22,004.30	89,456	1,611,336	0.04 (3.00)	0.73 (0.80)	0.77 (3.80)
1971	24,155.80	78,483	1,857,566	0.03 (2.79)	0.77 (0.68)	0.80 (3.47)
1972	26,383.50	222,590	698,061	0.08 (2.78)	0.26 (0.75)	0.35 (3.52)
1973	27,166.70	117,447	2,258,241	0.04 (2.75)	0.83 (0.52)	0.87 (3.27)
1974	28,255.50	249,111	930,766	0.09 (2.75)	0.33 (0.61)	0.42 (3.36)
1975	31,658.30	766,868	4,485,481	0.24 (0.06)	1.42 (0.59)	1.66 (0.64)
1976	35,512.70	251,849	2,040,727	0.07 (0.10)	0.57 (0.72)	0.65 (0.82)
1977	39,856.10	1,084,823	2,529,161	0.27 (0.11)	0.63 (0.68)	0.91 (0.79)
1978	47,027.10	12,976,036	4,501,943	2.76 (0.14)	0.96 (0.76)	3.72 (0.90)
1979	50,340.80	654,716	1,886,307	0.13 (0.69)	0.37 (0.78)	0.50 (1.47)
1980	54,654.70	1,385,686	7,160,249	0.25 (0.69)	1.31 (0.79)	1.56 (1.49)
1981	59,988.80	2,042,633	2,600,855	0.34 (0.70)	0.43 (0.77)	0.77 (1.47)
1982	65,360.40	948,691	3,252,277	0.15 (0.75)	0.50 (0.74)	0.64 (1.49)
1983	70,484.40	731,234	9,765,828	0.10 (0.73)	1.39 (0.71)	1.49 (1.44)
1984	82,166.90	1,549,807	4,917,513	0.19 (0.19)	0.60 (0.80)	0.79 (0.99)
1985	86,321.84	1,145,975	2,983,322	0.13 (0.21)	0.35 (0.85)	0.48 (1.05)
1986	82,787.52	805,030	4,490,262	0.10 (0.18)	0.54 (0.65)	0.64 (0.83)
1987	91,927.20	1,570,736	1,440,093	0.17 (0.13)	0.16 (0.67)	0.33 (0.81)
1988	92,998.00	466,120	7,837,000	0.05 (0.14)	0.84 (0.61)	0.89 (0.74)
1989	107,948.00	615,551	6,890,000	0.06 (0.13)	0.64 (0.50)	0.70 (0.63)
1990	115,076.00	8,392,746	9,078,000	0.73 (0.10)	0.79 (0.51)	1.52 (0.61)
1991	118,868.68	608,740	1,820,065	0.05 (0.22)	0.15 (0.59)	0.20 (0.81)
1992	118,267.06	1,166,858	2,486,696	0.10 (0.21)	0.21 (0.52)	0.31 (0.73)
1993	119,826.25	679,939	2,338,595	0.06 (0.20)	0.19 (0.53)	0.25 (0.73)
1994	124,350.29	1,533,717	1,869,933	0.12 (0.20)	0.15 (0.40)	0.27 (0.60)
1995	120,321.68	720,720	911,746	0.06 (0.21)	0.08 (0.30)	0.14 (0.51)
1996	113,471.00	2,372,482	3,653,350	0.21 (0.08)	0.32 (0.16)	0.53 (0.24)
1997	102,947.24	544,924	5,567,963	0.05 (0.11)	0.54 (0.19)	0.59 (0.30)
1998	99,127.79	316,475	1,062,313	0.03 (0.10)	0.11 (0.26)	0.14 (0.36)
1999	110,858.47	443,049	2,467,991	0.04 (0.10)	0.22 (0.24)	0.26 (0.34)

* Numbers shown in parentheses represent the previous 5-year running average.

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Year	Valuation (Millions of Dollars)	Fire Loss (Dollars)	Non Fire Loss (Dollars)	Loss Rates (Cents per 100 Dollar Value)		
				Fire*	Non Fire*	Total*
2000	102,514.01	102,861,283	312,839	10.03 (0.08)	0.03 (0.25)	10.06 (0.33)
2001	103,215.56	287,263	218,323	0.03 (2.07)	0.02 (0.25)	0.05 (2.32)
2002	98,779.44	1,541,174	920,673	0.16 (2.04)	0.09 (0.19)	0.25 (2.23)
2003	70,812.80	1,075,309	NC	0.15 (2.06)	NC NC	NC NC
2004	72,601.95	622,613	NC	0.09 (2.08)	NC NC	NC NC
2005	74,951.25	2,537,565	NC	0.34 (2.09)	NC NC	NC NC
2006	64,547.05	997,805	NC	0.15 (0.15)	NC NC	NC NC
2007	67,382.01	1,674,515	NC	0.25 (0.18)	NC NC	NC NC
2008	60,576.55	573,161	NC	0.10 (0.20)	NC NC	NC NC
2009	63,569.89	623,299	NC	0.10 (0.19)	NC NC	NC NC
2010	74,417.99	1,608,762	NC	0.22 (0.19)	NC NC	NC NC
2011	101,351.17	2,471,088	NC	0.24 (0.16)	NC NC	NC NC
2012	106,074.31	2,186,021	NC	0.18 (0.17)	NC NC	NC NC

* Numbers shown in parentheses represent the previous 5-year running average.

NC – The data is no longer collected

The CY2000 fire loss increase was primarily due to the Cerro Grande fire at LANL.

Figure 1
DOE Valuation

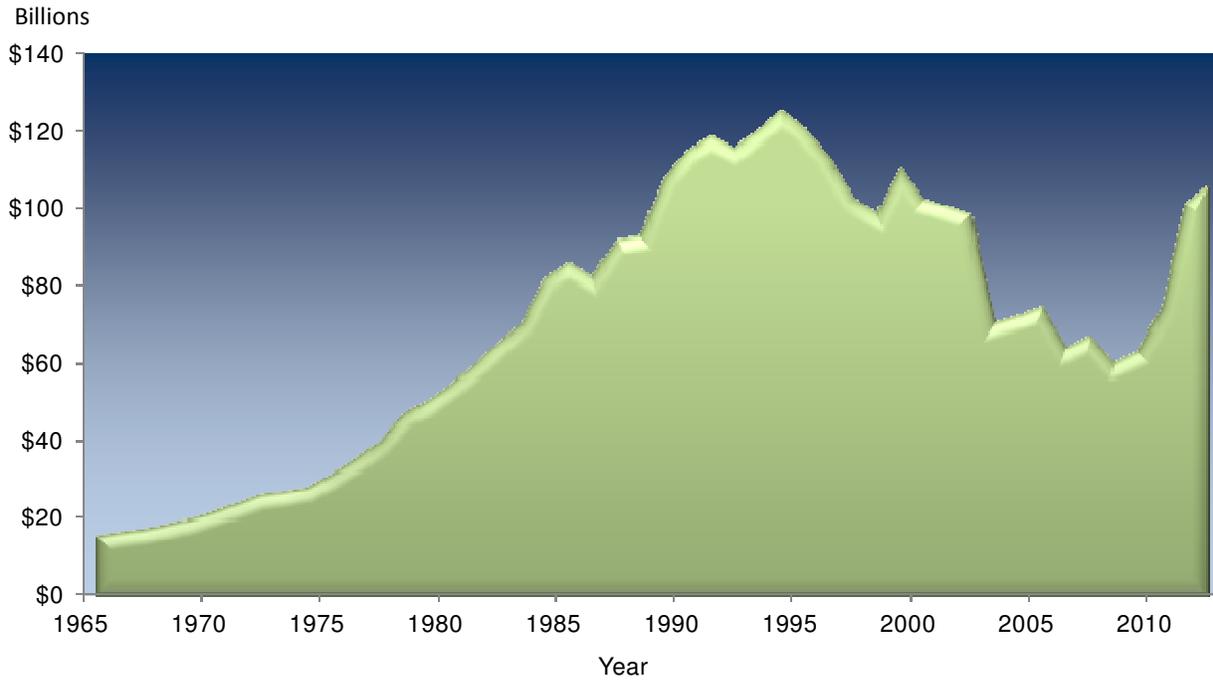
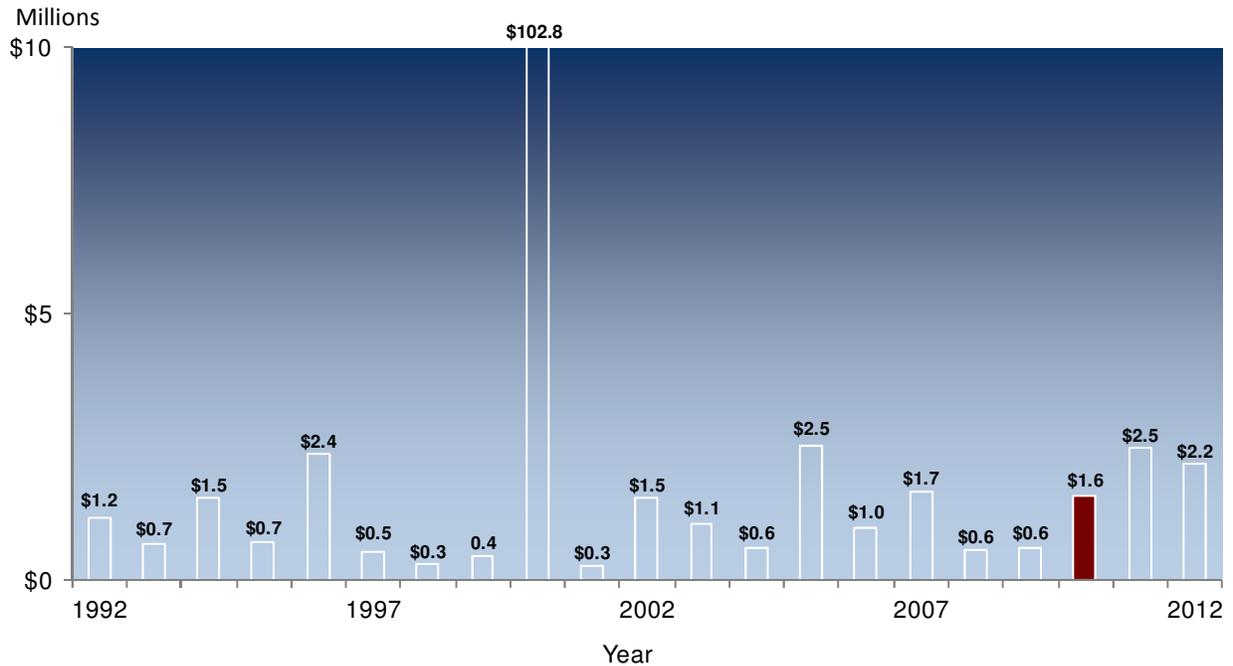


Figure 2
Property and Facility Losses Due to Fires



Note: CY2011 total DOE fire losses exclude LANL range fire; CY2000 total DOE fire losses included \$100 million LANL range fire loss.

Figure 3
DOE Fire Loss Rate
 Rate in cents per \$100 of valuation

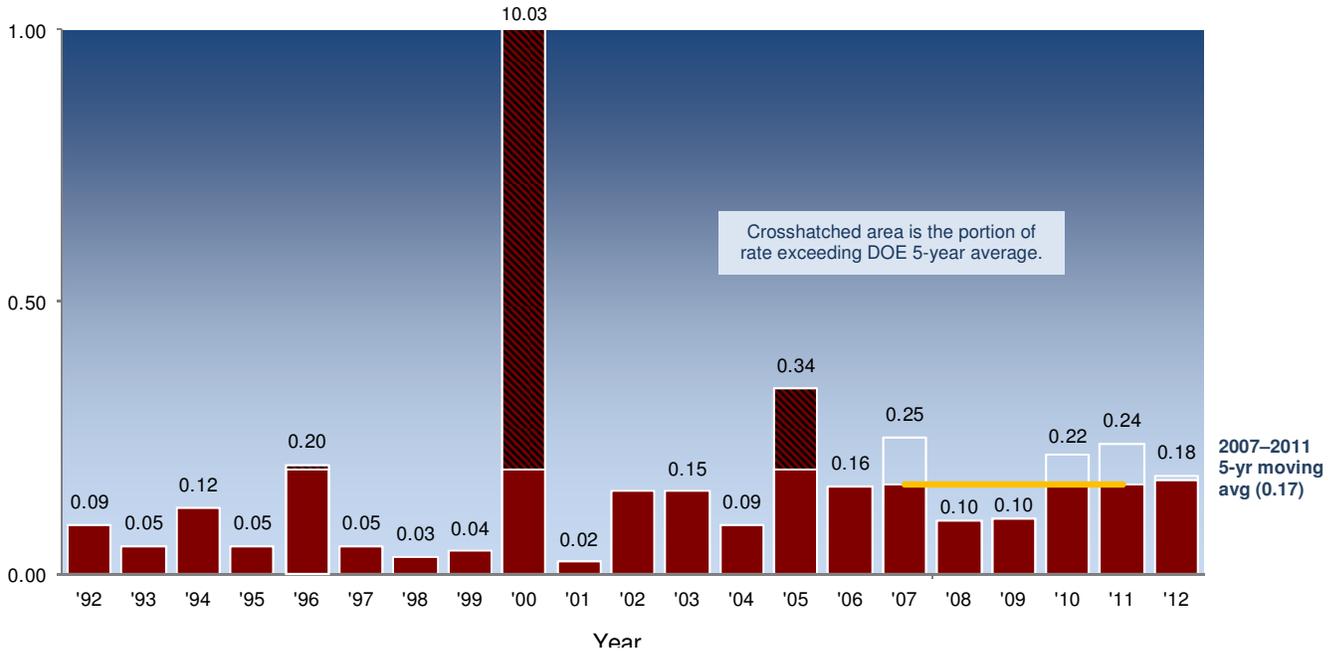


Figure 4
Fire Events

Number of fire events reported at the 8 sites (ALA, ANL, INL, LANL, NTS, SLAC, SNL, and SRS) posting greater than \$10,000 in total losses in CY2012

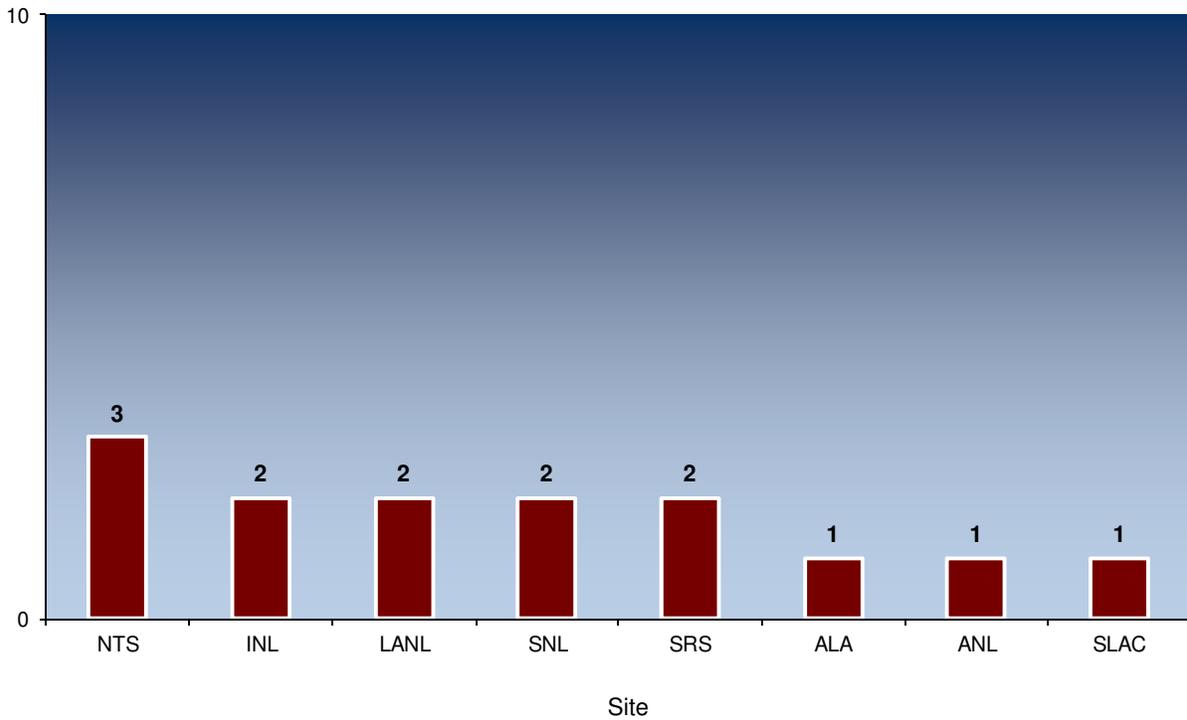


Figure 5
Fire Loss Amount

Total losses in CY2012 for those sites posting greater than a \$10,000 loss per event.

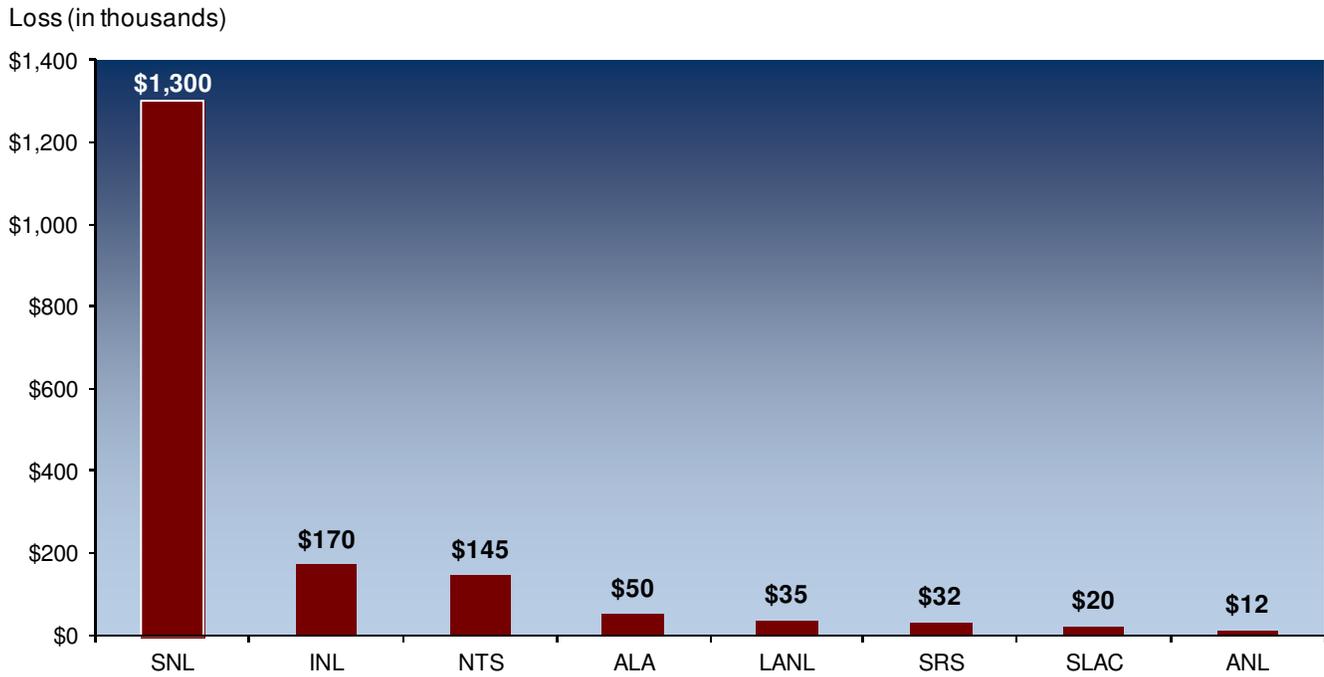
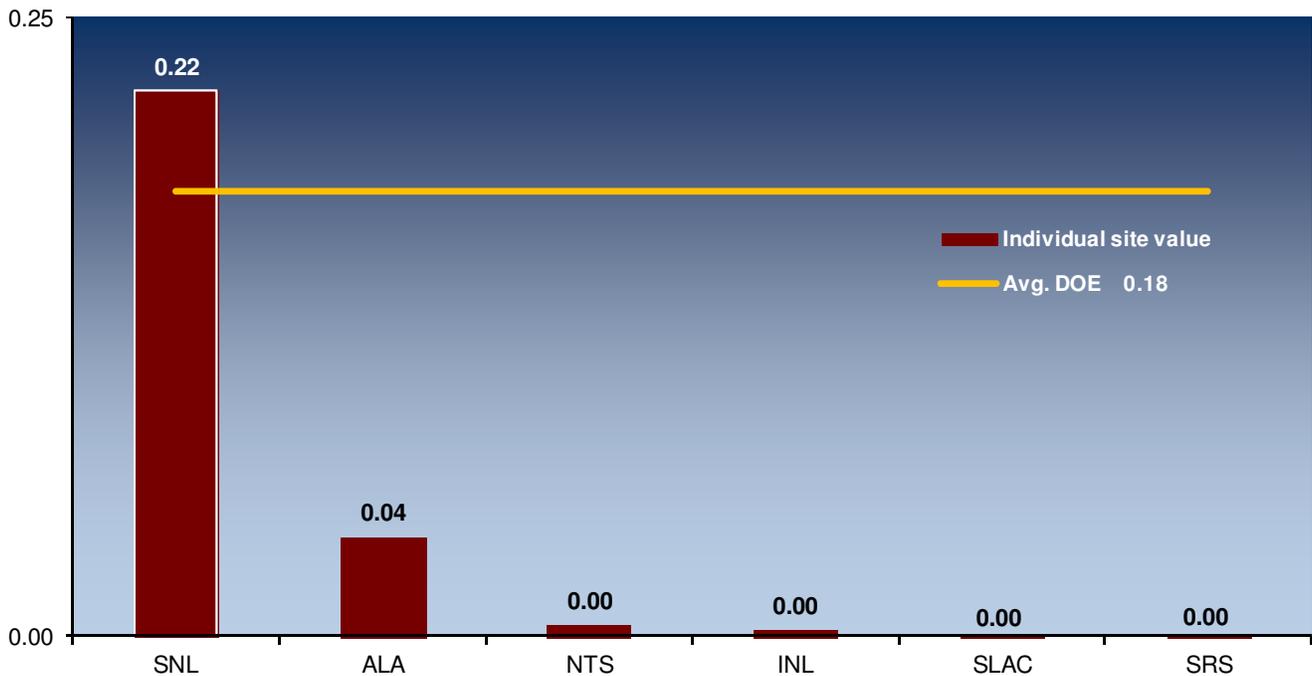


Figure 6
Fire Protection Program Loss Rate

Rate in cents per \$100 of valuation during CY2012 for those sites posting greater than a \$10,000 loss per event



Summary of Major Fire Damage Incidents

Table 2 provides a description of the four most significant of individual major (exceeding \$10,000 per event) DOE fire losses during CY2012. Eight different sites posted 14 major fire events resulting in losses greater than \$10,000 per event. The four most significant events (losses exceeding \$100,000 per event) are provided below and account for about 85% of the total DOE annual losses.

See Table 3 for significant non-fire events involving fixed automatic fire suppression systems.

Table 2
Summary of Four Major Fire Loss Events

Loss Type	Location	Description	Dollar Loss
Fire/Smoke (Building)	SNL Kauai Test Facility (HI)	A fire at the Kauai Test Facility (Hawaii) started in a dehumidifier unit plugged into a 120 VAC wall outlet in an equipment alcove inside Building 648. Water sprinkler activation helped in suppression of the fire. The estimated cost to repair the damage to the facility was \$1,200,000. There were no personnel injuries.	\$1,200,000
Fire/Smoke (Building)	SNL-NM	A fire damaged lighting wiring and resulted in a GFCI trip in Building 905 during a planned lithium ion battery overcharging test to destruction. The fire also caused loss of local exhaust ventilation and the local scrubber. The estimated cost to repair the damage to the facility was \$125,000. There were no personnel injuries.	\$125,000
Fire/Smoke (Brush)	INL-NE	A three-day range fire burned nearly 8,500 acres, including 4,400 acres of INL property. Off-site fire department assistance was rendered by the Blackfoot fire department as well as aerial resources from the BLM. The estimated fire loss was \$115,000. There were no personnel injuries.	\$115,000
Fire/Smoke (Brush)	NTS	A slow-moving range fire in Area 12 burned approximately 15 acres near the U12 G tunnel. Several utility poles were damaged and the estimated fire loss was \$100,000. There were no personnel injuries.	\$100,000

Automatic Water-Based Suppression System Performance

There were 18 inadvertent actuations of wet-pipe suppression systems: four were due to weather-related events (freezing), four were caused by steam/excess heat initiating actuation, three were caused by employee error and seven actuations were due to unknown causes.

The two most significant (exceeding \$50,000 per incident) events are noted below in Table 3.

Table 3
Summary of Two Water-Based Fire System Inadvertent Actuations

Loss Type	Location	Description	Dollar Loss
Leaks/Spills/Releases Water-Based Suppression System Actuations	ORNL	During fire sprinkler renovation on the second floor of the DOE Site Office (Building 4500), an unexpected and spontaneous activation of the fire sprinkler system occurred. The water damaged 21 offices, carpeting, sheet rock and electrical equipment on the second and first floors. Total losses were estimated at \$75,000.	\$75,000
Leaks/Spills/Releases Water-Based Suppression System Actuations	ORNL	During planned maintenance to relocate sprinkler heads on the fourth floor of Building 5300, an inadvertent release from the automatic fire sprinkler system occurred. Total losses were estimated at \$60,000.	\$60,000

Non-Water Based Fire Suppression System Performance

Concerns regarding the effect of chlorofluorocarbons, including Halon, on the ozone layer have led to their regulation under the 1991 Clean Air Act. The Environmental Protection Agency has subsequently published implementing regulations to include prohibiting new Halon production, establishing container labeling requirements, imposing Federal procurement restrictions, imposing significant Halon taxes, issuing requirements for the approval of alternative agents, and listing essential areas where Halon protection is considered acceptable.

DOE's current policy 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 CY2012, DOE maintained 162 active Halon systems in operation containing approximately 51,487 pounds of Halon. Also, stored Halon inventory was reported at approximately 32,478 pounds¹. The number of active Halon systems increased 5 % from the 154 systems active in CY2011 while active inventory amounts decreased slightly from CY2011 levels of 52,430 pounds of agent.

There were two incidents involving automatic actuations of Halon or other non-water based suppression systems that occurred in CY2012. The first event was actually a compilation of five recurring CO₂ discharges attributed to equipment failures in Building 8300 at ORNL. These five discharges resulted in a \$25,000 loss (\$5,000 per discharge).

The second event occurred at the Fermi National Accelerator Laboratory (FNAL) and involved actuation of a non-water based suppression system in the Feynman Computing Center due to faulty equipment, coupled with a near-simultaneous failure of the facility's UPS batteries, causing a Halon-1301 system in the computer center's sub-floor to discharge. Losses for the FNAL event were \$30,000.

The FNAL Halon discharge and the recurring CO₂ events at ORNL are listed in Table 4 below.

Table 4
Automatic Non-Water Based System Actuations

Loss Type	Location	Description	Dollar Loss
Leaks/Spills/Releases	FNAL Computing Ctr	Faulty equipment resulted in actuation of the Halon system in the Feynman Computing Center. There were no personnel injuries.	\$30,000
Leaks/Spills/Releases	ORNL Bldg 8300	5 events, classified as non-fire events, occurred when capacitors inside of a modulator failed resulting in a release of energy. Typical responses to the failures included de-energizing the equipment and manually activating a CO ₂ system for cooling and equipment salvage. There was no fire and no fire was observed during the fire department's response. One hundred pounds of CO ₂ agent was locally released on the modulator upon receipt of an automatic alarm indicating capacitor failure occurring remotely at the control room. This was one of several recurring events involving different modulators. The costs related to each individual event were \$5,000. There were no personnel injuries.	\$25,000

¹ SRS continues to maintain a legacy Halon repository for the DOE Complex, which includes clean Halon 1301 in bulk storage tanks and cylinders of various sizes and weights.

Recurring Fire Protection Program Costs

Yearly or recurring fire protection costs for CY2012 reached \$178,887,267 for those sites reporting into the Fire Protection Program database. On a ratio of cost to replacement property value (recurring cost rate), the DOE spent approximately 0.17 cents per \$100 valuation for recurring fire protection activities at those sites.

Figure 7 shows the CY2012 recurring cost distribution by activity. Figure 8 on page 13 lists the recurring cost rate by DOE sites. It should be noted that not all recurring cost activities were consistently reported, such as outside contracts and maintenance activities.

Figure 7
Recurring Fire Protection Program Cost Distribution

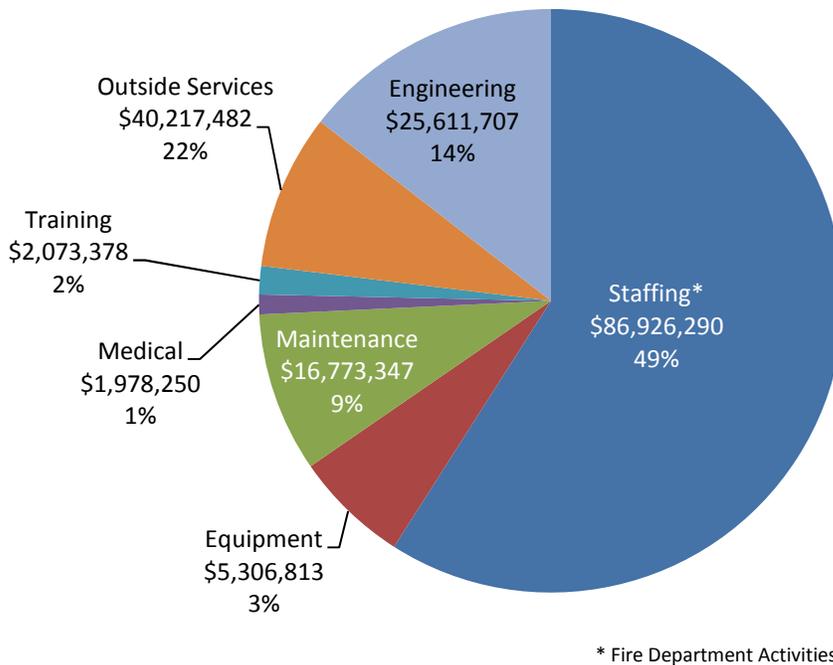
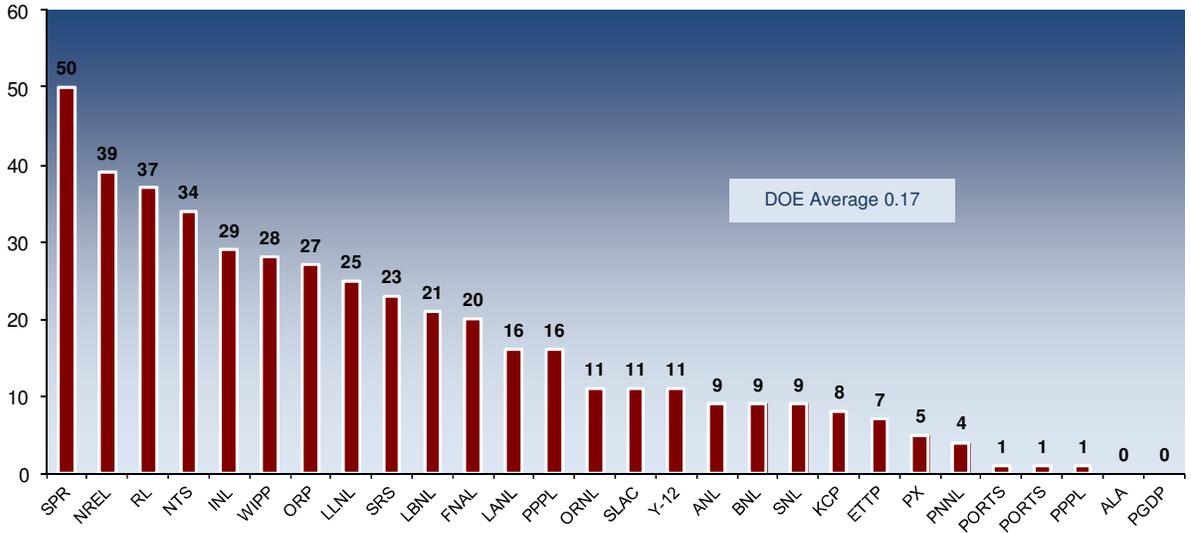


Figure 8
Recurring Fire Protection Program Cost Rate by Site
Rate in cents per \$100 of valuation



Fire Department Activities

Number of Responses:

The following is a summary of fire department responses for CY2012.

1. Fire	612
2. Hazardous Materials	234
3. Other Emergency	1,652
4. Other Non-Emergency	1,982
5. Medical	1,790
Total	6,270

Comparing this 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.