

SUMMARY OF FIRE PROTECTION PROGRAMS FOR CALENDAR YEAR 2005



UNITED STATES DEPARTMENT OF ENERGY
OFFICE OF NUCLEAR AND FACILITY SAFETY
POLICY (EH-2.1)

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FOREWORD

This edition of the Annual Fire Protection Program Summary for the Department of Energy (DOE) 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 5a.(8) of DOE Order 231.1, "Environment, Safety and Health Reporting" and is considered the primary source for quantifying monetary loss from fire across the DOE Complex.

The report for calendar year (CY) 2005 was summarized from information sent to Headquarters by 27 out of 49 reporting elements, representing approximately 84 percent of DOE's ownership. For comparison purposes, field offices are arranged according to the DOE Field Office reporting format, with a total of 23 categories represented. Abbreviations are identified in the Glossary, as are the DOE site reporting elements and major definitions.

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. Additionally, a built-in reference to other DOE reporting activities (ORPS) is provided, allowing reporting elements and DOE managers the opportunity to easily review all fire protection events and activities under their responsibility. For example, the information contained in this publication was extracted from the Annual Summary application taken at the Headquarters level for CY 2005. A copy of the latest version of this application can be obtained at the following internet address: <http://www.eh.doe.gov/fire/summary/summary.html>.

GLOSSARY

Field/Area/Site Organization abbreviations:

PSO	Amarillo Area Office
CH	Chicago Operations Office
HQ	DOE Headquarters
GFO	Golden Field Office
ID	Idaho Operations
KSO	Kansas City Site Office
LM	Legacy Management
NETL	National Energy Technology Laboratory
NPR	Naval Petroleum Reserves
NV	Nevada Site Office
NSC	NNSA Service Center
OR	Oak Ridge Operations Office
ORP	Office of River Protection
PNR	Pittsburgh Naval Reactors Office
PA	Power Marketing Administrations ¹
RD	Repository Development
RL	Richland Operations Office
RF	Rocky Flats Operations
SSO	Sandia Site Office
SRO	Savannah River Operations
SPR	Strategic Petroleum Reserves ²
YSO	Y-12 Site Office

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
EML	Environmental Measurements Laboratory
FNAL	Fermi National Accelerator Laboratory
FEMP	Fernald Environmental Management Project

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

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

GJO	Grand Junction
HAN	Hanford Site ³
INL	Idaho National Engineering & Environmental Laboratory
ITRI	Inhalation Toxicology Research Institute
KAPL	Knolls Atomic Power Laboratory
KCP	Kansas City Plant
KSO	Kesserling Site
LBL	Lawrence Berkeley National Laboratory
LLNL	Lawrence Livermore National Laboratories
LANL	Los Alamos National Laboratories
MEMP	Miamisburg Environmental Management Project
MGN	Morgantown Federal Energy Technology Center
NREL	National Renewable Energy Laboratory ⁴
NRF	Naval Reactor Facilities
NTS	Nevada Test Site ⁵
NBL	New Brunswick Laboratory
ORISE	Oak Ridge-Institute of Science & Education
ORNL	Oak Ridge National Laboratories
PAN	Pantex Site
PGDP	Paducah Gaseous Diffusion Plant ⁶
PNL	Pacific Northwest Laboratory
PGH	Pittsburgh Federal Energy Technology Center
POR	Portsmouth Gaseous Diffusion Plant ⁶
PPPL	Princeton Plasma Physics Laboratory
SLAC	Stanford Linear Accelerator Center
SNLA	Sandia National Laboratories, Albuquerque
SNLL	Sandia National Laboratories, Livermore
SRS	Savannah River Site
TJNL	Thomas Jefferson National Accelerator Facility
WIPP	Waste Isolation Pilot Plant
WVDP	West Valley Demonstration Project
Y-12	Y-12 Plant
YM	Yucca Mountain Project

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

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

Example: AL/LANL

³ Hanford Site includes the Pacific Northwest National Laboratory

⁴ National Renewable Energy Laboratory includes the Wind Site

⁵ Nevada Test 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 DOE Manual M 231.1-1, "Environment, Safety, and Health Reporting Manual." Major definitions not included in this manual have been extracted from the rescinded order DOE 5484.1 to clarify key concepts. Section references to these documents are given at the end of the definition.

1. **Property Value:** The approximate replacement value of all DOE-owned buildings 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)
2. **Estimated Loss:** Monetary loss determination based on all estimated or actual costs to restore DOE property and equipment to preoccurrence 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 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 is 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)
3. **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)
5. **Loss Rate:** Unit of comparison in cents loss per \$100 of property value.

EXECUTIVE SUMMARY

DOE experienced no fatalities or major injuries from fire in CY 2005. There were however, 78 fire events reported during the period causing an estimated \$2,537,565 in fire fighting costs and property damage. These losses are approximately \$1,914,952 more than fire losses sustained in CY 2004, with about 90 percent of losses attributed to 5 incidents. Loss comparisons between the DOE and private industry are performed by normalizing data against total property value. DOE property valuation increased by about 3.3 percent (from 72.6 to 75.0 Billion dollars) resulting in an overall CY 2005 fire loss rate of approximately 0.34 cents for each \$100 in property value.

Recurring costs for fire protection exceeded 151 million dollars in CY 2005. On a ratio of cost to total property value, the DOE spent approximately 20.26 cents per \$100 in property value for recurring fire protection activities.

In CY 2005, three fires were controlled by automatic fire suppression systems (2 sprinkler and 1 Co2). The success of these systems was, however, offset by the inadvertent actuation of 12 systems primarily due to employee or weather related causes (4 events each).

DOE PROPERTY LOSS EXPERIENCE

Property value estimates serve as a common denominator for comparing Annual Summary loss rates. In CY 2005 property values increased by approximately 3.3 percent to a new total of approximately 75.0 Billion dollars. DOE elements reported 78 fire incidents¹ that accounted for a total year-end fire loss of \$2,537,565. These events are categorized as follows:

Fire/Smoke (Building)	41 Events
Fire/Smoke (Brush)	19 Events
Fire/Smoke (Vehicle)	7 Events
Fire/Smoke (Other)	11 Events

DOE's fire loss rate for CY 2005, as summarized from field organization reports, is approximately 0.34 cents loss per \$100 property value.

Table 1 characterizes Annual Summary loss histories since 1950 and includes both fire and non-fire loss rate categories up to 2003 when the non-fire reporting total was abandoned by EH. Numbers shown in parentheses represent a 5-year running average, where applicable. The accompanying figures are described as follows:

Figure 1 - graphical representation of the Department's property valuation since 1950

¹ By comparison, the Occurrence Reporting and Processing System (ORPS) logged 51 fire events in CY 2005. Also, page 13 of this report indicates that Fire Departments cataloged a total of 767 Fire events over the year, with a majority of events (689) determined by the sites to be insignificant for Headquarters reporting purposes.

Fire Protection Summary
For Calendar Year 2005

Figure 2 - fire and non-fire property loss since 1983

Figure 3 - fire loss rates since 1989

Figure 4 - the current year's fire event tally by Field Organizations

Figure 5 - the current year's fire loss (dollars) by Field Organizations

Figure 6 - the current year's fire loss rate by Field Organizations

Organizations not shown on Figures 4 through 6 reported either insignificant or zero losses for the year.

Trending of fire loss data indicates that a small number of incidents constitute the majority of dollar losses reported to the DOE. For example, 5 fire incidents this year accounted for approximately 90 percent of the total dollar loss amount.

The largest fire loss for the year noted as follows:

1. NV/NTS – Wildland Fire of 5,459 acres caused by lightning Total material and labor costs to suppress the incident was reported to be approximately 1.5 million Dollars.

Table 1
DOE Loss History From 1950 To Present

Year	Property Value (Millions of Dollars)	Fire Loss (Dollars)	Non-fire Loss (Dollars)	Loss Rates (cents per 100 Dollar Value)		
				Fire*	Non-Fire*	Total*
50	1,800.00	486,389	10,050	2.70 -	0.06 -	2.76 -
51	2,177.10	38,318	317,797	0.18 -	1.46 -	1.64 -
52	3,055.10	449,107	356,600	1.47 -	1.17 -	2.64 -
53	4,081.00	148,142	427,430	0.36 -	1.05 -	1.41 -
54	6,095.90	185,438	190,436	0.30 -	0.31 -	0.62 -
55	6,954.20	125,685	330,103	0.18 (1.00)	0.47 (0.81)	0.66 (1.81)
56	7,364.10	2,206,478	940,945	3.00 (0.50)	1.28 (0.89)	4.27 (1.39)
57	7,973.20	590,663	885,936	0.74 (1.06)	1.11 (0.86)	1.85 (1.92)
58	8,102.50	275,560	476,265	0.34 (0.92)	0.59 (0.84)	0.93 (1.76)
59	10,301.80	199,841	998,060	0.19 (0.91)	0.97 (0.75)	1.16 (1.67)
60	10,708.60	636,228	764,823	0.59 (0.89)	0.71 (0.88)	1.31 (1.77)
61	11,929.90	325,489	5,530,566	0.27 (0.97)	4.64 (0.93)	4.91 (1.91)
62	12,108.80	3,020,023	293,341	2.49 (0.43)	0.24 (1.60)	2.74 (2.03)
63	13,288.90	599,056	776,998	0.45 (0.78)	0.58 (1.43)	1.04 (2.21)
64	14,582.80	480,519	870,516	0.33 (0.80)	0.60 (1.43)	0.93 (2.23)
65	15,679.30	1,743,448	2,106,621	1.11 (0.83)	1.34 (1.35)	2.46 (2.18)
66	16,669.00	158,220	698,753	0.09 (0.93)	0.42 (1.48)	0.51 (2.41)
67	17,450.90	359,584	2,423,350	0.21 (0.90)	1.39 (0.64)	1.59 (1.53)
68	18,611.90	155,986	713,097	0.08 (0.44)	0.38 (0.87)	0.47 (1.31)
69	20,068.30	27,144,809	909,525	13.53 (0.37)	0.45 (0.83)	13.98 (1.19)
70	22,004.30	89,456	1,611,336	0.04 (3.00)	0.73 (0.80)	0.77 (3.80)
71	24,155.80	78,483	1,857,566	0.03 (2.79)	0.77 (0.68)	0.80 (3.47)
72	26,383.50	222,590	698,061	0.08 (2.78)	0.26 (0.75)	0.35 (3.52)
73	27,166.70	117,447	2,258,241	0.04 (2.75)	0.83 (0.52)	0.87 (3.27)
74	28,255.50	249,111	930,766	0.09 (2.75)	0.33 (0.61)	0.42 (3.36)
75	31,658.30	766,868	4,485,481	0.24 (0.06)	1.42 (0.59)	1.66 (0.64)
76	35,512.70	251,849	2,040,727	0.07 (0.10)	0.57 (0.72)	0.65 (0.82)

Fire Protection Summary
For Calendar Year 2005

Year	Property Value (Millions of Dollars)	Fire Loss (Dollars)	Non-fire Loss (Dollars)	Loss Rates (cents per 100 Dollar Value)		
				Fire*	Non-Fire*	Total*
77	39,856.10	1,084,823	2,529,161	0.27 (0.11)	0.63 (0.68)	0.91 (0.79)
78	47,027.10	12,976,036	4,501,943	2.76 (0.14)	0.96 (0.76)	3.72 (0.90)
79	50,340.80	654,716	1,886,307	0.13 (0.69)	0.37 (0.78)	0.50 (1.47)
80	54,654.70	1,385,686	7,160,249	0.25 (0.69)	1.31 (0.79)	1.56 (1.49)
81	59,988.80	2,042,633	2,600,855	0.34 (0.70)	0.43 (0.77)	0.77 (1.47)
82	65,360.40	948,691	3,252,277	0.15 (0.75)	0.50 (0.74)	0.64 (1.49)
83	70,484.40	731,234	9,765,828	0.10 (0.73)	1.39 (0.71)	1.49 (1.44)
84	82,166.90	1,549,807	4,917,513	0.19 (0.19)	0.60 (0.80)	0.79 (0.99)
85	86,321.84	1,145,975	2,983,322	0.13 (0.21)	0.35 (0.85)	0.48 (1.05)
86	82,787.52	805,030	4,490,262	0.10 (0.18)	0.54 (0.65)	0.64 (0.83)
87	91,927.20	1,570,736	1,440,093	0.17 (0.13)	0.16 (0.67)	0.33 (0.81)
88	92,998.00	466,120	7,837,000	0.05 (0.14)	0.84 (0.61)	0.89 (0.74)
89	107,948.00	615,551	6,890,000	0.06 (0.13)	0.64 (0.50)	0.70 (0.63)
90	115,076.00	8,392,746	9,078,000	0.73 (0.10)	0.79 (0.51)	1.52 (0.61)
91	118,868.68	608,740	1,820,065	0.05 (0.22)	0.15 (0.59)	0.20 (0.81)
92	118,267.06	1,166,858	2,486,696	0.10 (0.21)	0.21 (0.52)	0.31 (0.73)
93	119,826.25	679,939	2,338,595	0.06 (0.20)	0.19 (0.53)	0.25 (0.73)
94	124,350.29	1,533,717	1,869,933	0.12 (0.20)	0.15 (0.40)	0.27 (0.60)
95	120,321.68	720,720	911,746	0.06 (0.21)	0.08 (0.30)	0.14 (0.51)
96	113,471.00	2,372,482	3,653,350	0.21 (0.08)	0.32 (0.16)	0.53 (0.24)
97	102,947.24	544,924	5,567,963	0.05 (0.11)	0.54 (0.19)	0.59 (0.30)
98	99,127.79	316,475	1,062,313	0.03 (0.10)	0.11 (0.26)	0.14 (0.36)
99	110,858.47	443,049	2,467,991	0.04 (0.10)	0.22 (0.24)	0.26 (0.34)
00	102,514.01	102,861,283	312,839	10.03 (0.08)	0.03 (0.25)	10.06 (0.33)
01	103,215.56	287,263	218323	0.03 (2.07)	0.02 (0.25)	0.05 (2.32)
02	98,779.44	1,541,174.00	920,673	0.16 (2.04)	0.09 (0.19)	0.25 (2.23)
03	70,812.80	1,075,309.00	No longer collected	0.15 (2.06)	NC NC	NC NC
04	72,601.95	622,613	No longer collected	0.09 (2.08)	NC NC	NC NC
05	74,951.25	2,537,565	No longer collected	0.34 (2.09)	NC NC	NC NC

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

Figure 1
DOE Property Valuation

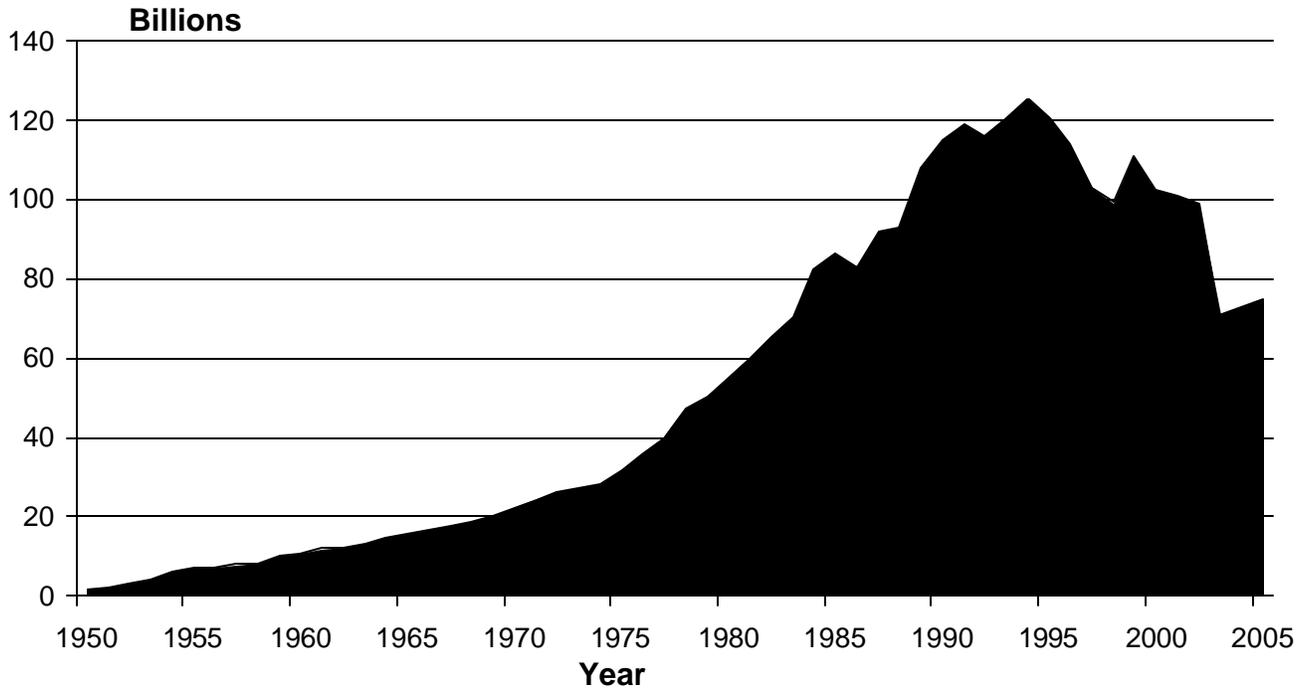


Figure 2
Property Loss

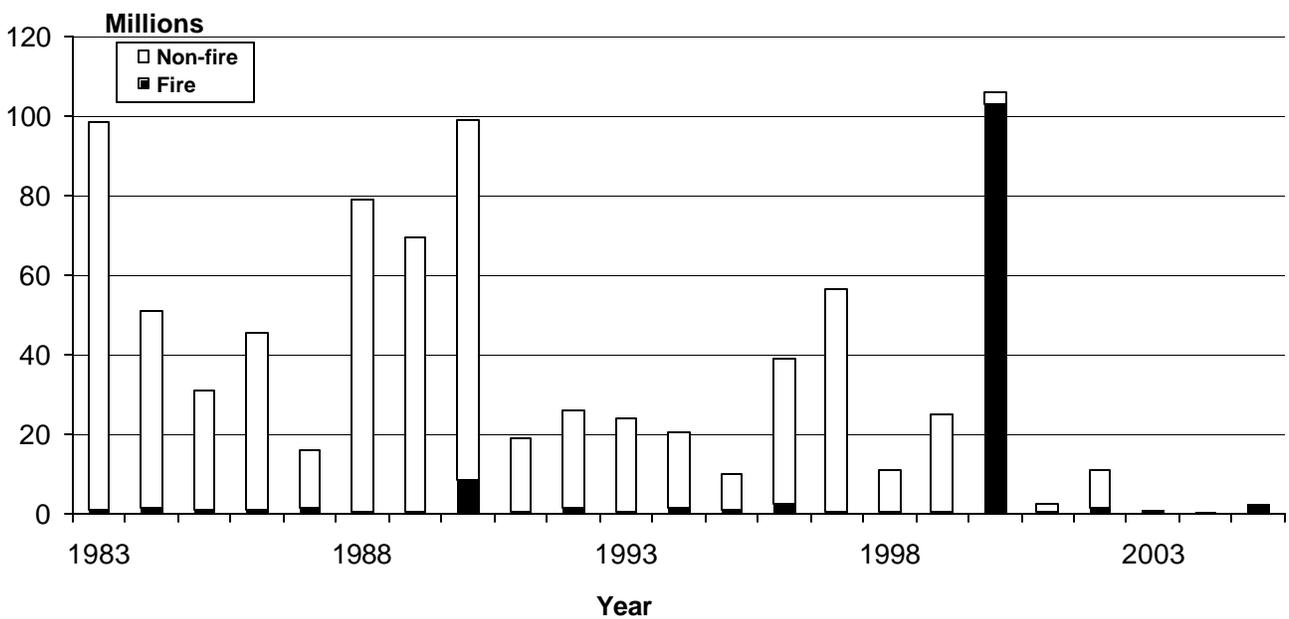


Figure 3
DOE Fire Loss Rate

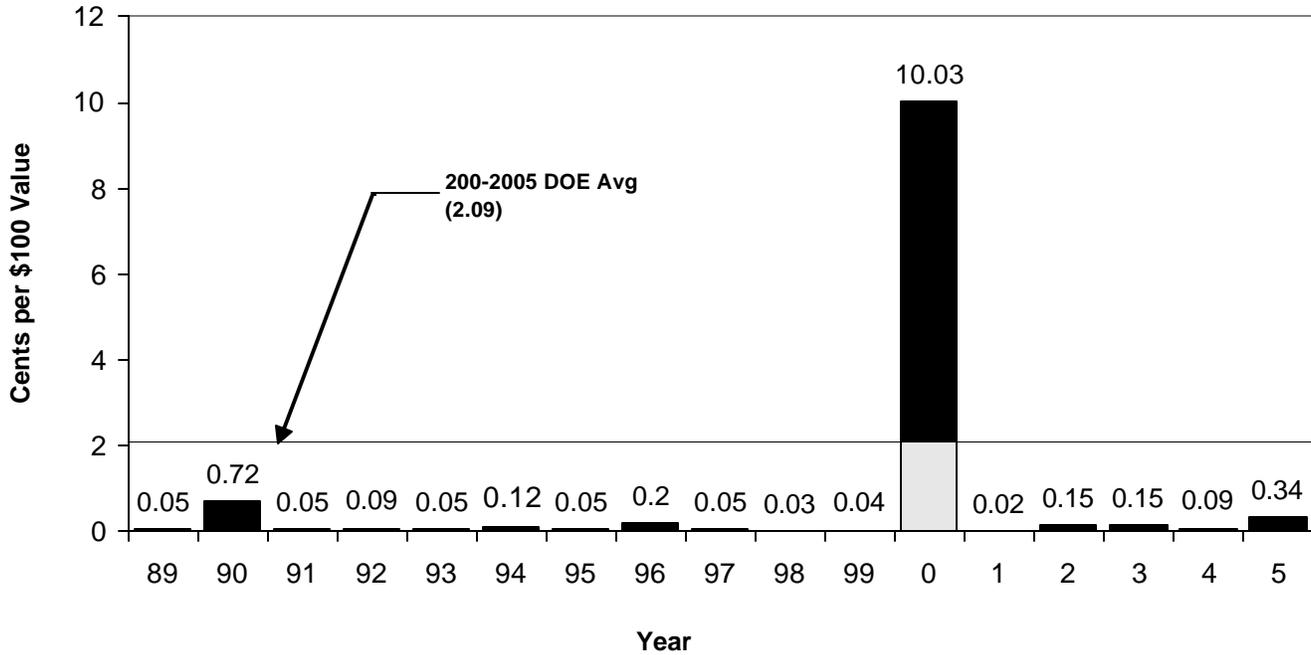


Figure 4
Fire Events by Field Organization

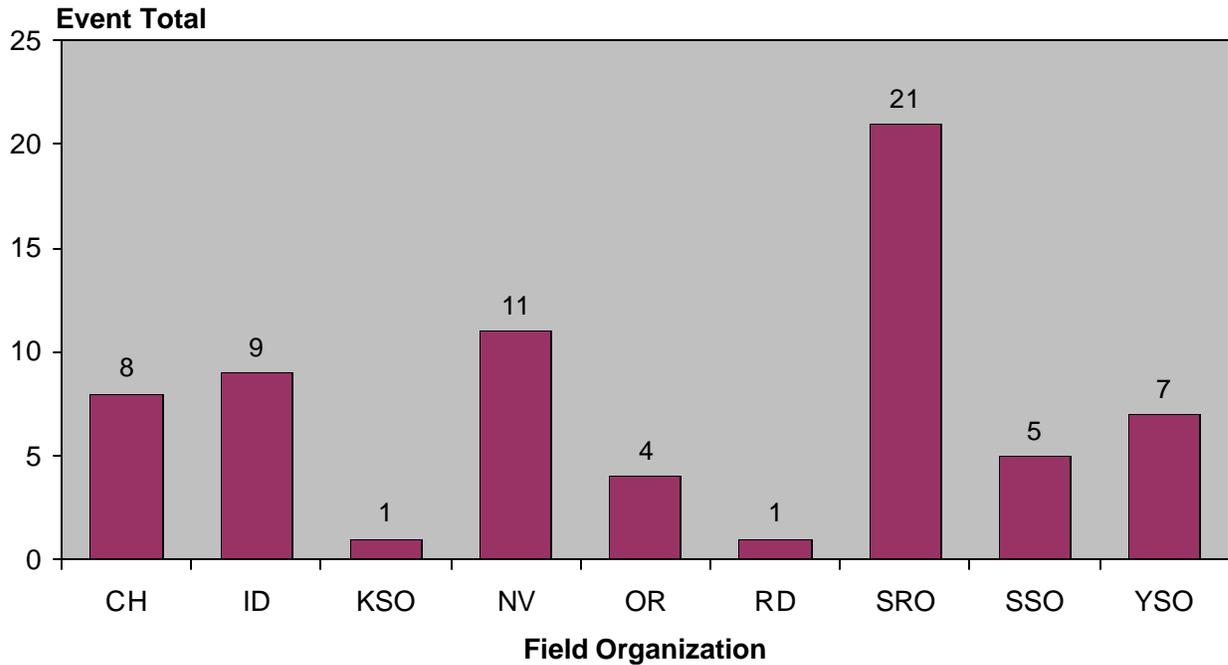


Figure 5
Fire Loss Amount by Field Organization

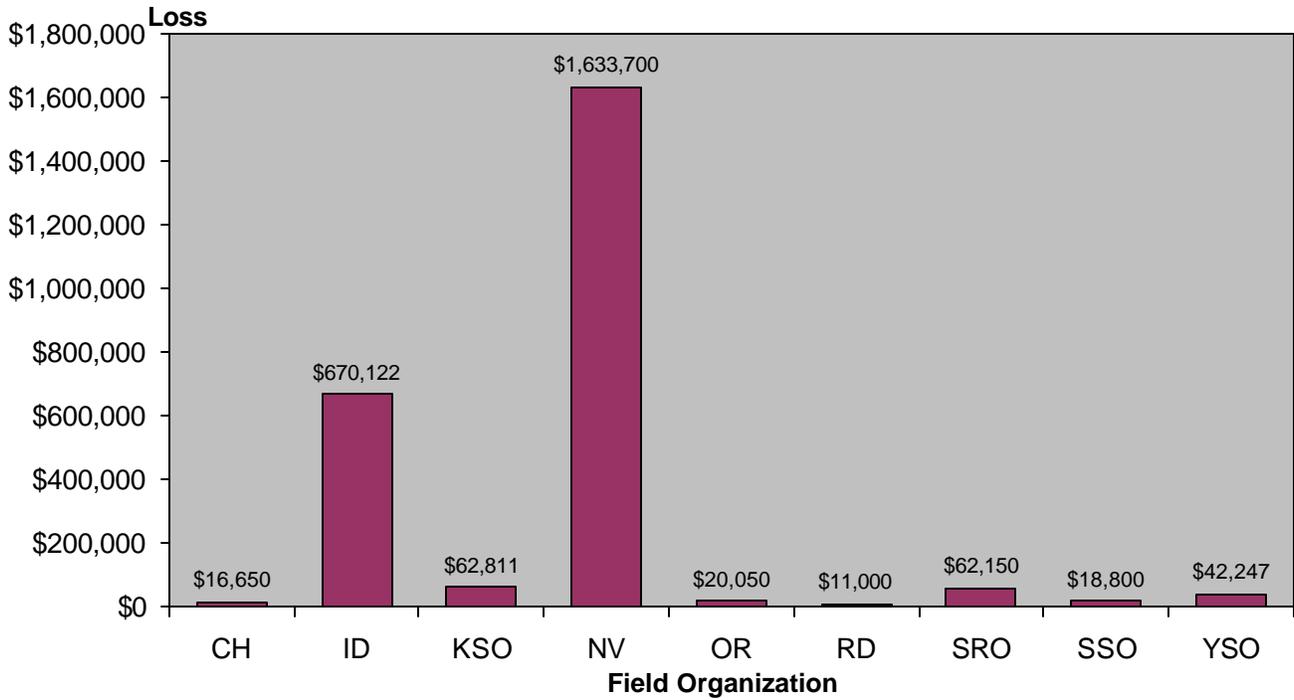
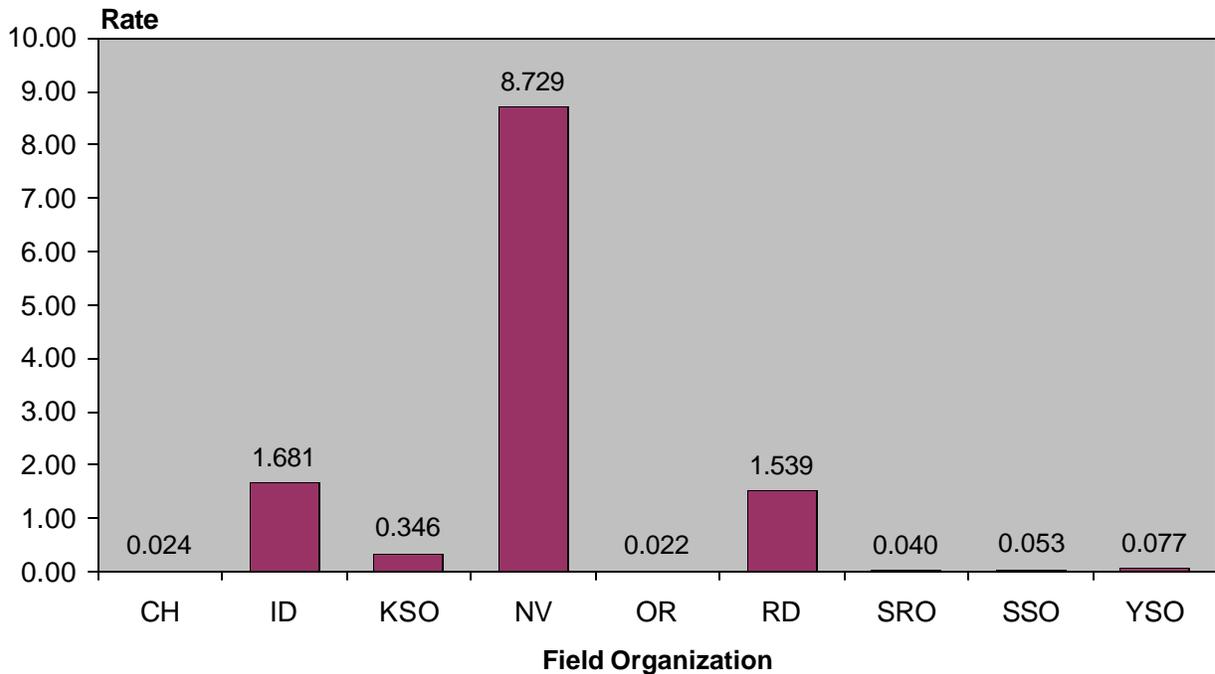


Figure 6
Fire Loss Rate by Field Organization



SUMMARY OF FIRE DAMAGE INCIDENTS

The following table provides a description of major DOE fire losses over the year. See Tables 3 and 6 for fire events involving fixed automatic fire suppression systems:

Table 2: Summary of Fire Damage Incidents			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Fire/Smoke (Brush)	NV/NTS	Wildland Fire of 5,459 acres caused by lightning	\$1,503,300.00
Fire/Smoke (Building)	ID/INL	V-tank remediation project was air sparging V-tank 9 directly to remove sludge. The granulated activated Charcoal (GAC) within the filter housing overheated due to abnormal VOCs being released within V-tank 9. The GAC material self-ignited, melted the housing of one filter and flowed onto the ground. Workers taking instrument readings noticed the fire, left the building, notified their supervisor which in turn notified the INL FD.	\$373,522.00
Fire/Smoke (Building)	ID/INL	Waste drums were being excavated from waste pit 4 and vented at the -13 foot elevation. After retrieving and venting the second drum, a fire was experienced. The operator utilized the soil near the excavation to control the fire.	\$250,000.00
Fire/Smoke (Brush)	NV/NTS	Wildland fire of approximately 2050 acres that was caused by lightning.	\$87,600.00
	KSO/KCP	On November 2, 2005 at approximately 0950 hours the KCP Fire Protection Department responded to a fire in a production area at FW45 of the Kansas City Plant (KCP). The fire activated one sprinkler head at approximately 0944 hours. KCP fire protection personnel used a standpipe fire hose to put out the fire which had started in the plastic tank portion of a Pre-Cleaner machine. The fire was confirmed extinguished by 1004 hours. The Kansas City Missouri Fire Department (KCFD) was called and responded to be available if backup help was needed. Metropolitan Ambulance Service Trust (MAST) was called and responded in case they were needed. All associates working in the area were safely evacuated. No injuries occurred. KCFD personnel provided assistance in ventilating the area. Cause of the fire was determined to be operation the tank heater with no liquid in the tank due to the failure of safety interlocks to operate.	\$62,811.00
Fire/Smoke (Vehicle)	SRO/SRS	At 14:54, SRSFD personnel were dispatched to the 484-D, Ash Basin to a report of a vehicle fire. Upon arrival, fire fighters used 500 gallons of water with one hose line to extinguisher the fire in the 1992 Ford water truck. The truck had been refilling with water at the secondary basin behind the 484-D power house. The driver started to get back in the cab and noticed smoke coming from under the dash. He quickly got away from the truck and notified supervision. When the FD arrived, moderate smoke and flames were observed coming from inside the cab/dash area and from under the hood. The apparent cause was an electrical short under the dash that quickly involved the wiring, plastic, and insulation in the surrounding area. There were no injuries.	\$50,000.00
Fire/Smoke (Building)	ID/INEEL	Ignition of hydrogen gas generated by exothermic reaction of zinc powder and sulfuric acid in a five gallon bucket. The laborer extinguished the fire with an ABC fire extinguisher then notified his supervisor. The fire department was notified, responded, and verified the fire was out.	\$43,000.00

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Table 2: Summary of Fire Damage Incidents			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Fire/Smoke (Brush)	NV/NTS	Wildland fire of approximately 1000 acres that was caused by lightning.	\$42,800.00
Fire/Smoke (Building)	YSO/Y-12	Fire involved a process material, which unexpectedly ignited during maintenance activities. Fire was extinguished by the Fire Department. The majority of the costs were associated with the clean-up efforts. Physical costs were negligible.	\$41,200.00
Fire/Smoke (Building)	SSO/SNL-AL	SNL Event No: 12688 Bldg. 6640 Department 05133 was conducting a Marx generator characterization test in the south bay of building 6640. The Marx generator was contained in an aluminum oil tank with an open top. The Marx was being discharged into a ~50 ohm water/salt load. A Marx self break curve had been established and the experiment was proceeding through incremental steps in charge voltage to thoughtfully verify proper operation of the Marx up to the maximum 100 kV charge level. At ~1:30 pm the first shot at 100kV charge was attempted. The Marx pre-fired at ~96 kV and erected fully. The expected peak output voltage of ~600 kV was achieved. At approximately 4 us into the discharge decay (~430 kV), it appears that an oil arc occurred from the trigger screw on the last Marx generator spark gap to the surface and then across the surface to ground on the tank. The result was oil vaporization and a fire ball which rose to the roof of the test bay and then flash charred some of the roof insulating material. The duration of the fire was approximately 5 seconds according to the personnel present. The personnel in the area secured the test site by draining the oil out of the MARX generator into 55 gallon barrels. The overhead door in the airlock was opened to ventilate the room to get the smoke out of the room. Cause: The fire was due to a faulty component in the MARX generator that caused an oil arc to occur from the trigger screw on the last Marx generator spark gap to the surface and then across the surface to ground on the tank.	\$14,000.00
Fire/Smoke (Building)	RD/YM	Fire occurred on a welding machine. It was extinguished by workers using fire extinguishers and the Nevada Test Site (NTS) Fire & Rescue was not called. Damage was confined to the welder itself, which was approximately 30 years old. It was declared a total loss. Although no loss value was declared in the ORPS report (No. HQ-BSYM-YMSGD-2005-0006), the present day replacement cost for a machine with comparable features is estimated to be between \$ 8,000 and \$11,000.	\$11,000.00
Fire/Smoke (Building)	OR/ORNL	ORNL Fire Department responded to an automatic alarm that had activated at Building 3150. Upon arrival no smoke or fire was visible, fire alarm horns were sounding and the building was being evacuated. Building occupants reported smoke in the building. Upon entry Fire Department personnel discovered smoke and then fire in a Room 115 laboratory oven. The fire was extinguished using a portable fire extinguisher. The building was secured, ventilated, the oven was removed from the structure, and the event was turned over to the facility for recovery.	\$10,500.00
Fire/Smoke (Building)	CH/ANL	Building 46 exterior fire caused by a misplaced cigarette	\$8,000.00
Fire/Smoke (Building)	CH/LBL	Plastic lens on 250 watt light fixture caught fire, extinguished by fire department. LBNL property damage limited to light fixture, wiring & fire	\$7,000.00

Table 2: Summary of Fire Damage Incidents			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		extinguisher recharge.	
Fire/Smoke (Building)	SRO/SRS	At 10:30, the Battalion Chief received a telephone call from the 235-F Shift Manager about some damage that was done to an automatic transfer switch during the night. Shift F-6 responded earlier on an alarm during a lightning storm. The facility and FD personnel had walked down the facility and found nothing. This morning the facility discovered the automatic transfer switch (ATS) without illuminated power lights. The FD investigated the exterior cover only because no E&I personnel were available to open the unit. It showed soot on the right side of the panel upon further investigation. There were no injuries and the dollar loss is estimated at \$6000.00.	\$6,000.00
Fire/Smoke (Vehicle)	OR/ORNL	The ORNL Fire Department responded to a fire that had self-extinguished at the request of the Laboratory Shift Superintendent's Office as reported via the business telephone. Upon arrival Fire Department personnel noted soot and heat damage on the windshield and significant fire and heat damage under the hood in the engine compartment. The vehicle was last driven at the close of business on a Friday with no notable problems. The fire damage was discovered on Monday morning. The fire originated at the positive post on the battery inside the engine compartment. Four or five separate wires tied into this post. There was not a continuity of combustibles for fire to spread beyond the area of origin.	\$5,500.00

WATER-BASED AUTOMATIC SUPPRESSION SYSTEM PERFORMANCE

A total of 10 incidents were reported where water-based suppression systems operated in CY 2005. All 10 actuations were from wet-pipe systems. Of these, two events were directly caused by a fire. Causes for the remaining system actuations are as follows: employee related (2), design/material related (3), weather related (3), other (1), and unspecified (0).

Water-based system activations of interest are listed in Table 3.

Table 3: Water Based System Actuations			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Leaks, Spills, Releases	SSO/SNL-AL	SNL-AL Event No.: 954004 The IC, SNL Security and Maintenance responded to a report of a water flowing out into a nearby storm drain. The cause of water leak was due to a frozen sprinkler water line that broke. The valve was shut off and water leak was stopped. Appropriate personnel were notified and Facilities logged the water line for repairs. Cause: The cause of the flood was a broken 90 degree elbow on the automatic sprinkler piping due to frozen and expanded water. The cause of major flood damage was the lack of adequate and timely response by both Security (HCC) and the KAFB Fire Department (FS). Loss Estimates: \$103,000 (Business	\$103,000.00

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Table 3: Water Based System Actuations			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		Interruption - \$95,000; Property Loss - \$8,100	
Fire/Smoke (Building)	KSO/KCP	On November 2, 2005 at approximately 0950 hours the KCP Fire Protection Department responded to a fire in a production area at FW45 of the Kansas City Plant (KCP). The fire activated one sprinkler head at approximately 0944 hours. KCP fire protection personnel used a standpipe fire hose to put out the fire which had started in the plastic tank portion of a Pre-Cleaner machine. The fire was confirmed extinguished by 1004 hours. The Kansas City Missouri Fire Department (KCFD) was called and responded to be available if backup help was needed. Metropolitan Ambulance Service Trust (MAST) was called and responded in case they were needed. All associates working in the area were safely evacuated. No injuries occurred. KCFD personnel provided assistance in ventilating the area. Cause of the fire was determined to be operation the tank heater with no liquid in the tank due to the failure of safety interlocks to operate.	\$62,811.00
Leaks, Spills, Releases	ID/INL	1 inch CPVC sprinkler coupling failed above the main east entrance. Coupling had been installed on 7/28/05 for security area boundary purposes.	\$16,000.00
Leaks, Spills, Releases	ID/INL	Firewater pip leak due to corrosion.	\$7,100.00
Leaks, Spills, Releases	ID/INL	Firewater pipe freeze/break in the ambulance canopy.	\$4,420.00
Fire/Smoke (Building)	CH/LBL	On June 28, 2005, one sprinkler activated in the fume hood of Latimer Hall, a UC Berkeley campus building. The fume hood fire was caused by a faulty hot plate that overheated an oil bath. While damage to LBNL property was limited to the hot plate, beaker and stand, there was water damage to the UC campus building.	\$1,000.00
Leaks, Spills, Releases	SSO/SNL-AL	SNL Event No.: 648005 The IC, SNL Fire Protection and SNL Custodial personnel responded. While operating an electric man lift, personnel inadvertently broke off a section of the fire alarm sprinkler line, releasing water and activating the fire alarm. Custodial personnel cleaned up the area. Cause: Human error. Man lift accidentally broke off section of sprinkler piping	\$991.00
Leaks, Spills, Releases	YSO/Y-12	Building 9709: Sprinkler head discharged on a wet pipe system. Cause of sprinkler failure is attributed to age. The sprinkler was placed into service 60 years ago.	\$0.00
Leaks, Spills, Releases	YSO/Y-12	Building 9111: Construction workers cut a 1" hole in an 8" fire line, by mistake	\$0.00
Leaks, Spills, Releases	YSO/Y-12	Building 9212: A wet pipe sprinkler system experienced a split pipe and a broken fitting, due to freezing.	\$0.00
Leaks,	YSO/Y-12	Building 9202: A one inch sprinkler pipe on a wet pipe system	\$0.00

Table 3: Water Based System Actuations			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Spills, Releases		failed due to freezing	

There are a total of 247 incidents in DOE records where water based extinguishing systems operated in a fire. The satisfactory rate of performance is 99.2 percent, or 245 times out of 247 incidents. The two failures during a fire were attributed to; a closed cold weather valve in 1958 controlling a single sprinkler in a wood dust collector and, a deluge system failure due to a hung-up trip weight in a 1963 transformer explosion.

From the above history, DOE has experienced 118 fires that were either controlled or extinguished by the wet-pipe type of automatic suppression system. Table 4 below provides a summary on the number of sprinklers actuated to control or extinguish a fire against the number of occurrences where this event was reported. For example: 95 percent of these fires were controlled or extinguished with 4 or less sprinklers activating, 92 percent were controlled with 3 or less sprinklers activating, and so on.

The significance of this table is to highlight actual performance on systems that have been installed according to standard design practices (in this case the National Fire Protection Association (NFPA) Standard 13, Installation of Sprinkler Systems). By comparing the actual performance to design requirements, the designer or reviewer can get a sense of the conservativeness of the design area requirement in the National consensus standard. This table could also be used to apply this performance metric to other design aspects, such as sprinkler system water containment, since no specific design criteria exist on the subject.

Table 4
**DOE Wet-Pipe Automatic Suppression Performance
1955 to 2003**

Number of Sprinklers Activated per Fire Event	Number of Events	Cumulative Total of Events	Percentage of Event	Cumulative Percentage of Events
1	83	83	72	72
2	19	102	16	86
3	6	108	5	92
4	4	112	3	95
5	2	114	2	97
6	1	115	1	97
7	2	117	2	99
8	0	117	0	99
9+	1	118	1	100

NON WATER-BASED FIRE SUPPRESSION SYSTEM PERFORMANCE

Concerns regarding the effect of chlorinated fluorocarbons (CFCs) and Halon on the ozone layer have led to their regulation under the 1991 Clean Air Act. The Environmental Protection Agency has subsequently published rules on this regulation 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 CY 2005, the DOE retained 340 Halon 1301 systems in operation containing approximately 108,240 pounds of agent. Stored Halon 1301 inventory was reported at approximately 60,579 pounds². Operational and stored inventory amounts for the Halon 1211 were reported at 73,278 and 19,878 pounds, respectively.

Sites considering any Halon transfers outside the DOE are reminded that all excessed Halon should be transferred to the Department of Defense. Please contact you local Defense Logistics Agency for specific information relating to such transfers.

A total of 13 incidents were reported at DOE where Halon 1301 or other non-water based suppression systems operated in CY 2003. Of these, one event was directly caused by a fire and no sites reported any system failures during a fire. Additionally, approximately 574³ pounds of Halon 1301 were released to the environment. Non-water-based system activations of interest are listed in Table 6 below.

Table 6: Non Water Based System Actuations			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Leaks, Spills, Releases	SSO/SNL-AL	SNL Event No.: 371005 The IC, Rescue Recon, SNL Security, SNL Safety, KAFB FD and Fire Alarm Maintenance personnel responded to a Halon activation in room 104. KAFB FD conducted a walk through and declared the building fire safe. Cause: User's equipment component failure set off smoke detector that initiated release of Halon.	\$12,160.00
Leaks, Spills, Releases	ID/INL	Dry chemical system in Drum Packaging Station #1 was discharged to summon help for a medical emergency.	\$3,000.00
Leaks, Spills, Releases	ID/INL	Halon release of approximately 20 pounds. Likely cause established as weather induced fault on control circuitry.	\$2,000.00
Fire/Smoke (Building)	NV/NTS	(1) Carbon Dioxide fire suppression system was manually discharged inside a glove box from a spontaneous ignition event. The fire was successfully extinguished by this action.	\$0.00

² Amount excludes banked inventory at the SRS – 51,906 pounds Halon 1301, 0 pounds Halon 1211. SRO reports that the Halon bank is no longer accepting Halon inventory from the sites.

³ The above figure does not consider system leakage in a stable condition.

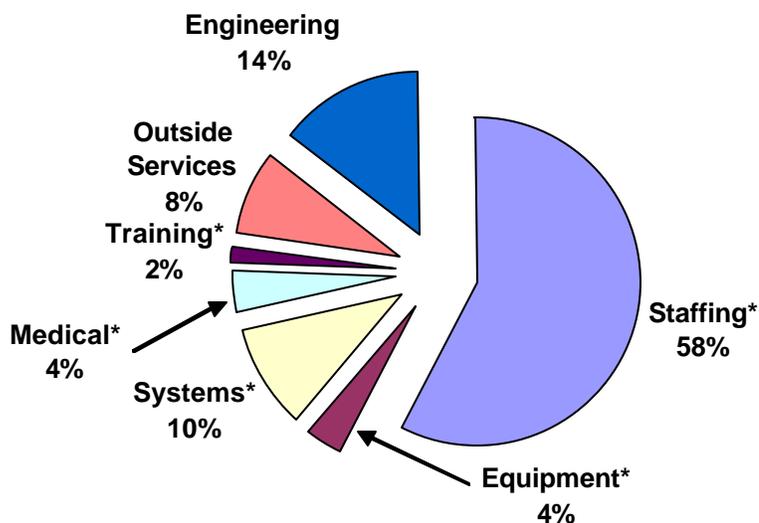
Table 6: Non Water Based System Actuations			
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Leaks, Spills, Releases	KSO/KCP	At approximately 1330 hours on May 11, 2005, the Kansas City Plant (KCP) Patrol Headquarters Fire Suppression System (HALON 1301) was activated. D. M. Ward (subcontractor) saw cut a fire protection suppression system detector conduit while performing demolition work. Contractor work was being performed while the security console was staffed and in service. Approximately 240 pounds of HALON 1301 was discharged to the security console room. Four KCP associates and four subcontractors were working in the security console room at the time of the HALON 1301 discharge. No personal injuries occurred.	\$0.00

RECURRING FIRE PROTECTION PROGRAM COSTS

Yearly or recurring fire protection costs for CY 2005 reached \$151,867,797. for the DOE Complex. On a ratio of cost to replacement property value (recurring cost rate), the DOE spent approximately 20.2 cents per \$100 property value for recurring fire protection activities.

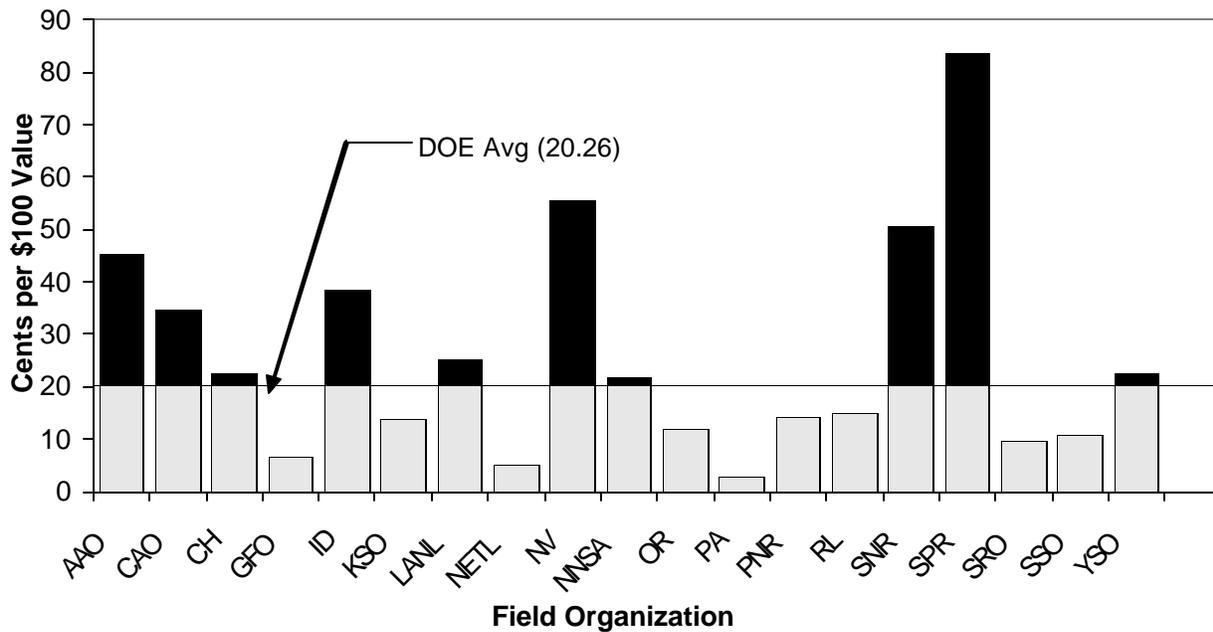
Figure 11 shows the CY 2005 recurring cost distribution by activity. Figure 12 lists the recurring cost rate by DOE field organizations. It should be noted that not all recurring cost activities were consistently reported, such as outside contracts and maintenance activities. Additionally, sites that did not report recurring costs this calendar year (primarily LANL) had their costs carried forward from the past reporting period to maintain the validity of the statistic.

Figure 11
Recurring Fire Protection Cost Distribution



* Fire Department Activities

Figure 12
Cost Rate by Operations Office



Note that in CY-04, RF had a Cost Rate of \$ 4.70 per 100 dollars replacement value.

FIRE DEPARTMENT ACTIVITIES

a. Number of Responses: The following is a summary of fire department responses for CY 2005.

1. Fire	767
2. Hazardous Materials	515
3. Other Emergency	3,067
4. Other Non-Emergency	8,090

5. Medical	2,065
Total	14,504

Comparing this data to the actual type of response is difficult since sites do not report incident responses in a consistent fashion. The Office of Environment, Safety and Health is examining the use of a standard reporting format which complies with the National Fire Protection Association's Guide 901, "Uniform Coding for Fire Protection" that could be linked to other DOE incident reporting programs for an accurate and cost effective approach to data collection in DOE. Other options, such as folding DOE's fire data collection into State or National programs such as the National Fire Incident Reporting System, are also being considered.

b. Major Equipment Purchases:

Table 7: Major Equipment Purchases		
LOCATION	DESCRIPTION	AMOUNT
RL/HAN	(3) wildland brush trucks	\$1,386,600.00
OR/ORNL	Fire Department Pumping Apparatus	\$350,000.00
SNR/KS	SCBA (Scott)	\$287,600.00
RL/HAN	(1) tactical communications unit	\$159,700.00
RL/HAN	air compressor	\$102,300.00
ID/INL	Phillips MRS Monitor Defibrillators	\$87,945.00
SRO/SRS	Heart monitor/EKG/AED	\$68,000.00
PNR/BAPL	(3) Automatic External Defibrillators and other eqpt.	\$49,742.00
RL/HAN	(2) emergency generators	\$47,400.00
ID/INL	Special Ops Trailer and Tools	\$21,447.00
KSO/KCP	Electric Response Vehicle	\$12,000.00
KSO/KCP	SCBA Air Cylinders	\$10,200.00
SNR/KAPL	Scott Air Cart	\$7,942.00
SNR/KAPL	Maxi-Force Air Bag Replacement Kit	\$5,257.00
SNR/KAPL	Hydrant test kit	\$1,269.00
CH/BNL	SCBA replacement	\$109.00

c. Notable Response Descriptions, such as mutual aid responses, that are not already included in this Report:

Table 8: Notable Responses		
LOCATION	DATE	DESCRIPTION
OR/ORNL	08/05/2006	The ORNL Fire Department operated on the scene of a small fire involving Sodium Hydride for four hours on August 5, 2006. The incident was reported via 911 and a fire alarm box was simultaneously pulled initiating building evacuation and automatic notification. The incident

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Table 8: Notable Responses		
LOCATION	DATE	DESCRIPTION
		was located in a chemical laboratory in the center of the ORNL Campus. The fire was extinguished using a portable fire extinguisher by the laboratory occupant. Incident Command was established, the facility was secured, Fire Department personnel verified extinguishment, and ORNL Hazardous Materials cleanup team was requested to clean up the sodium hydride. Fire Department personnel were on standby during the cleanup and recovery effort. Incident Command remained active until the scene was declared safe and the facility was returned to Facility Management responsibility.
KSO/KCP	8/17/2005	Contractor golf cart battery cables overheated causing a small fire and minor damage to golf cart. Damage estimated at \$200 to contractor owned cart.
KSO/KCP	05/11/05	Electrical short in back up alarm for a KCP owned fork trucked caused minor smoke from dash area. Ignition was turned off and truck shop called to repair fork truck. No reportable loss incurred.
KSO/KCP	07/26/05	Report of car fire in southeast parking lot. Minor fire found in wire under front bumper extinguished. Minor damage to employee owned car.
KSO/KCP	12/16/05	Smoking rubbish fire in cigarette receptacle. No damage incurred.
KSO/KCP	09/20/05	An industrial oven/furnace was operated above the auto ignition temperature of the material inside, resulting in a fire inside the oven. No product or property loss. Fire contained to the oven.
YSO/Y-12	2005	Fire Protection Operations (FPO) responded to a radiological spill. FPO emergency lights were needed for spill clean-up.
YSO/Y-12	2005	Ambulance and crew responded as mutual aid (next-out) emergency response.
PNR/BAPL	07/28/2005	On 07/28/2005, the Bettis Volunteer Fire Department (BVFD) responded to an off-site mutual-aid call for assistance from the West Mufflin and McKeesport fire departments who had responded to a business district commercial structure fire in Glassport. The BVFD fire fighters conducted interior fire attack, roof ventilation, and exposure protection for the buildings that were adjacent to the involved structure.
SNR/KS		Mutual Aid, Rock City Falls Fire Department large brush fire; brush truck (2 times)
SNR/KS		Mutual Aid, Community Ambulance Corp Support Helicopter Landing (3 times)

CONCLUSIONS

DOE experienced no fatalities or major injuries from fire in CY 2005. The Annual Summary reporting process has recently been automated to streamline data collection and provide a more thorough review of DOE Reporting Element activities. It is now possible to view all Annual Summary Reporting Element responses since 1991 at the Site, Operations, Lead Program Secretarial Office and Headquarters levels, as well as reference other DOE reporting activities such as ORPS. A copy of the latest version of this application can be obtained at the following internet address:

<http://www.eh.doe.gov/fire/summary/summary.html>.