SUMMARY OF FIRE PROTECTION PROGRAMS FOR CALENDAR YEAR 2006

UNITED STATES DEPARTMENT OF ENERGY
OFFICE OF NUCLEAR SAFETY & ENVIRONMENT
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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) 2006 was summarized from information sent to Headquarters by 27 out of 42 reporting elements, representing approximately 88 percent of DOE's ownership. For comparison purposes, field offices are arranged according to the DOE Field Office reporting format, with a total of 22 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. For example, the information contained in this publication was extracted from the Annual Summary application taken at the Headquarters level for CY 2006. A copy of the latest version of this application can be obtained at the following internet address: http://www.hss.energy.gov/nuclearsafety/nsea/fire//summary/summary.html.

The Office of Health, Safety and Security (HSS) plans on working with the DOE Fire Safety Committee to examine the content of the annual report (including existing reporting fields contained within this Summary and other supporting fire protection program information that may be utilized) to improve its benefit to both Headquarters and Field Elements. Please contact Jim Bisker jim.bisker@hq.doe.gov if you have any suggestions for improving this reporting process.

GLOSSARY

Headquarters Organizational Elements:

NNSA	National Nuclear Security Administration
SC	Office of Science
FE	Fossil Energy
NE	Nuclear Energy
EM	Environmental Management
PMA	Power Marketing Administrations[1]
EE	Energy Efficiency & Renewable Energy
RW	Radioactive Waste
LM	Legacy Management
HSS	Health Safety & Security

Field/Area/Site Organizational Elements:

CAO	Carlsbad Area Office
CH	Chicago Operations Office
HQ	DOE Headquarters
GFO	Golden Field Office
ID	Idaho Operations
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
OR	Oak Ridge Operations Office
ORP	Office of River Protection
PSO	Pantex Site Office
PFO	Pittsburgh Field Office
RLFO	Richland Field Office
SSO	Sandia Site Office
SRFO	Savannah River Field Office
SPRO	Strategic Petroleum Reserve Office[2]
YSO	Y-12 Site Office

Site abbreviations:

ALA	Ames Laboratory

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 Sites include: Bayou Chochtaw, Big Hill, Bryan Mound and West Hackberry.

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	Kesserling Site
KAFB	Kirtland AFB
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]
ORISE	Oak Ridge Institute of Science & Education
ORNL	Oak Ridge National Laboratories
TWPC	Tru Waste Processing Center
PAN	Pantex Site
PGDP	Paducah Gaseous Diffusion Plant[6]
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:

[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.

DOE field organization (abr.)/Site(abr.)
Example: LASO/LANL

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 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)

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 2006. There were however, 84 fire events reported during the period causing an estimated $997,805 in fire fighting costs and property damage. These losses are approximately $1,540,260 less than fire losses sustained in CY 2005, with about 81 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 decreased by about 13.9 percent (from 75.0 to 64.5 Billion dollars) resulting in an overall CY 2006 fire loss rate of approximately 0.15 cents for each $100 in property value (0.19 less then the CY-05 rate).

Recurring costs for fire protection exceeded 164 million dollars in CY 2006 which is approximately 13 million more then what was spent in CY-2005. On a ratio of cost to total property value, the DOE spent approximately 25.4 cents per $100 in property value for recurring fire protection activities.

In CY 2006, two fires were controlled by automatic fire suppression systems (1 sprinkler and 1 Halon). The success of these systems was, however, offset by the inadvertent actuation of 18 systems primarily due to seven weather-related events.

DOE PROPERTY LOSS EXPERIENCE

Property value estimates serve as a common denominator for comparing Annual Summary loss rates. In CY 2006, property values decreased by approximately 13.9 percent to a total of approximately 64.5 billion dollars. DOE elements reported 84 fire incidents[1] that accounted for a total year-end fire loss of $997,805. These events are categorized as follows:

Fire/Smoke (Building)	37 Events
Fire/Smoke (Brush)	25 Events
Fire/Smoke (Vehicle)	4 Events
Fire/Smoke (Other)	18 Events

DOE's fire loss rate for CY 2006, as summarized from field organization reports, is approximately 0.15 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 discontinued. 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
Figure 2 - fire and non-fire property loss since 1983
Figure 3 - fire loss rates since 1989

[1] By comparison, the Occurrence Reporting and Processing System (ORPS) logged 51 fire events in CY 2006. Also, page 14 of this report indicates that Fire Departments logged a total of 880 Fire events over the year, with a majority of events (796) determined by the sites to be insignificant for Headquarters reporting purposes.

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 81 percent of the total dollar loss amount.

The largest fire loss for the year noted as follows:

1. NSO/NTS – Wildland Fire of approximately 8,500 acres in Areas 14, 25, and 29 at the Nevada Test Site that resulted in containment costs of approximately $321,500.00.

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)
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)

Year	Property Value (Millions of Dollars)	Fire Loss (Dollars)	Non-fire Loss (Dollars)	Loss Rates (cents per 100 Dollar Value) Fire*	Non-Fire*	Total*
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	920,673	0.16 (2.04)	0.09 (0.19)	0.25 (2.23)
03	70,812.80	1,075,309	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
06	64,547.05	997,805	No longer collected	0.15 (0.15)	NC NC	NC NC

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

Figure 1

DOE Property Valuation

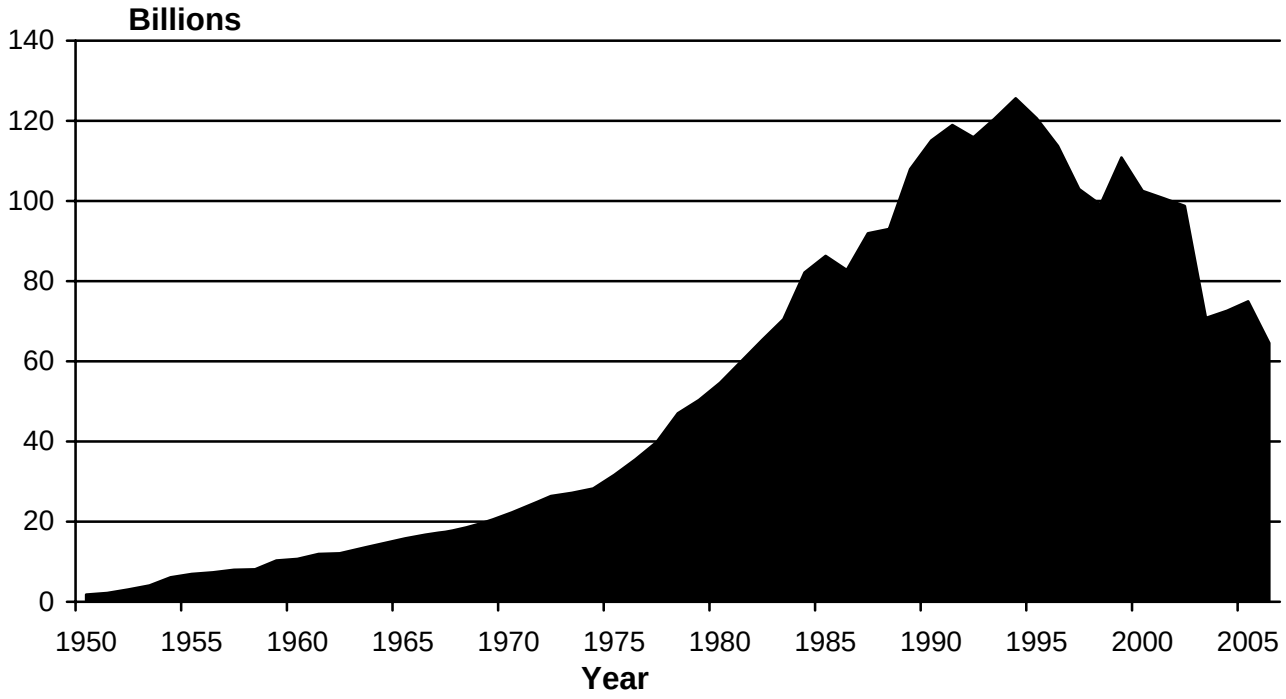


Figure 2

Property Loss

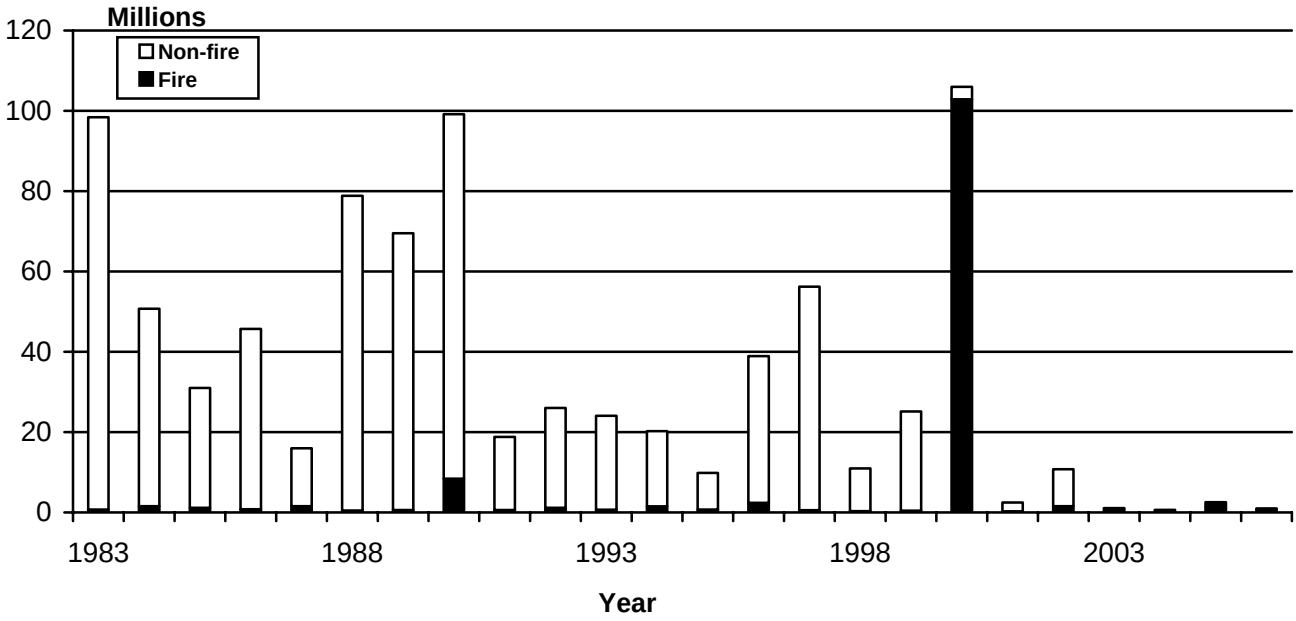


Figure 3

DOE Fire Loss Rate

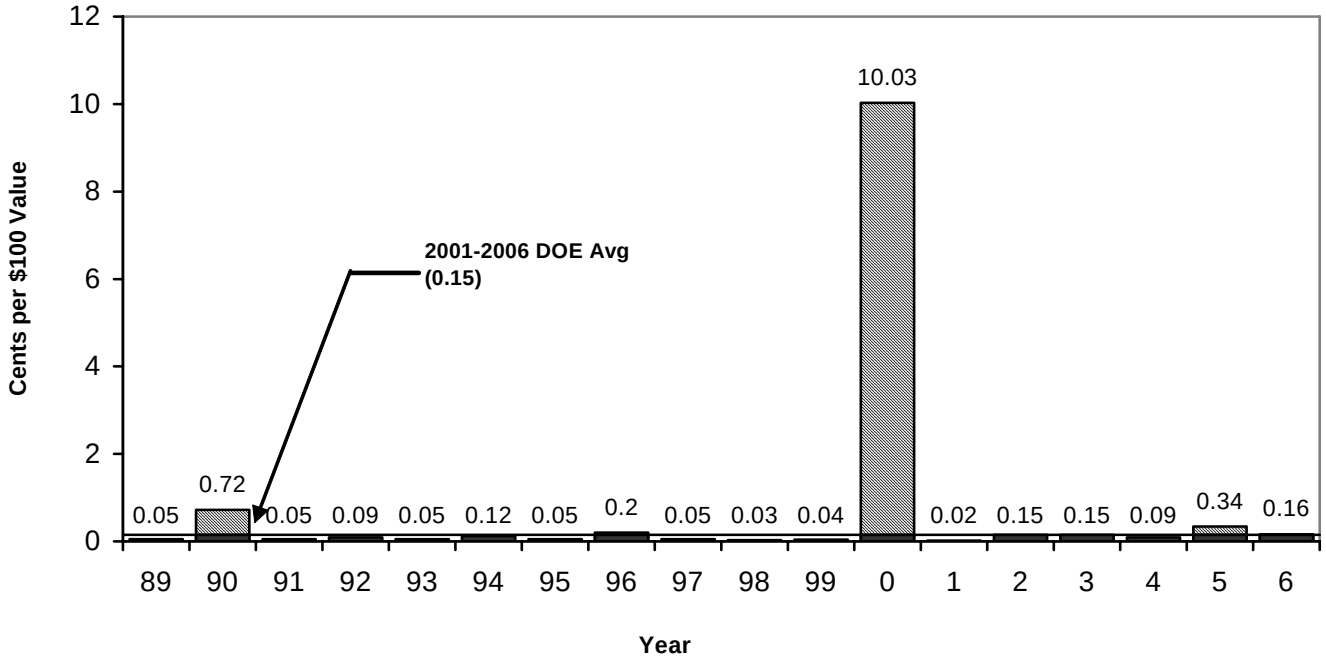


Figure 4

Fire Events by Field Organization

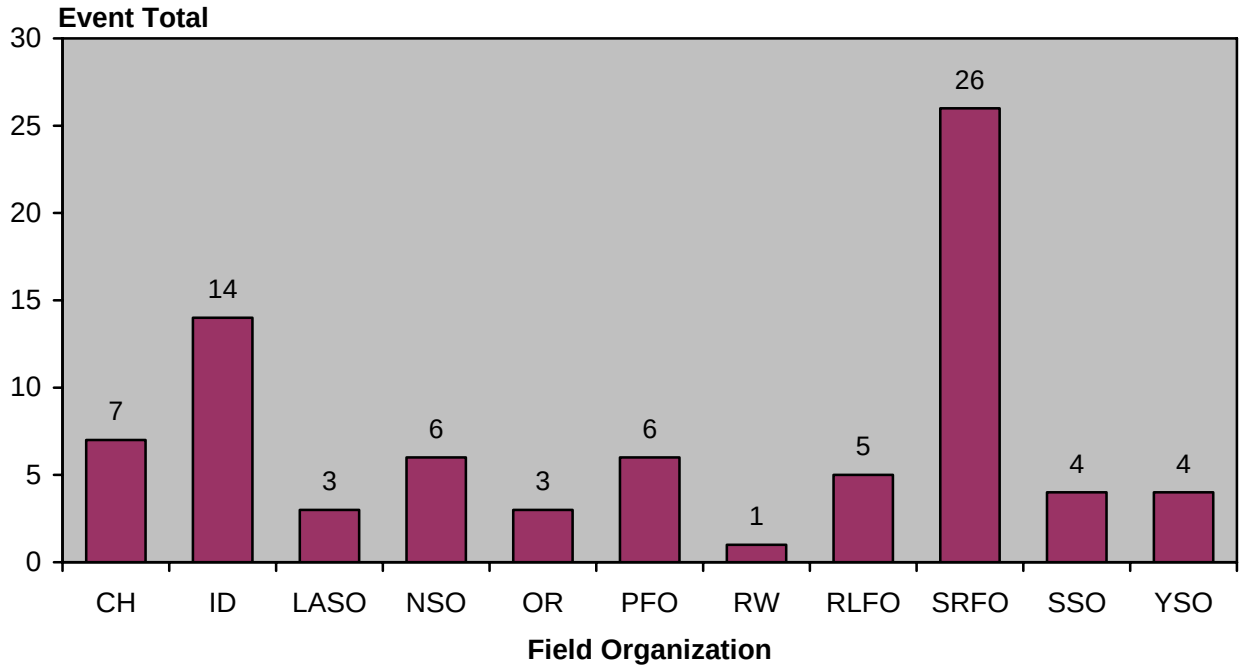


Figure 5

Fire Loss Amount by Field Organization

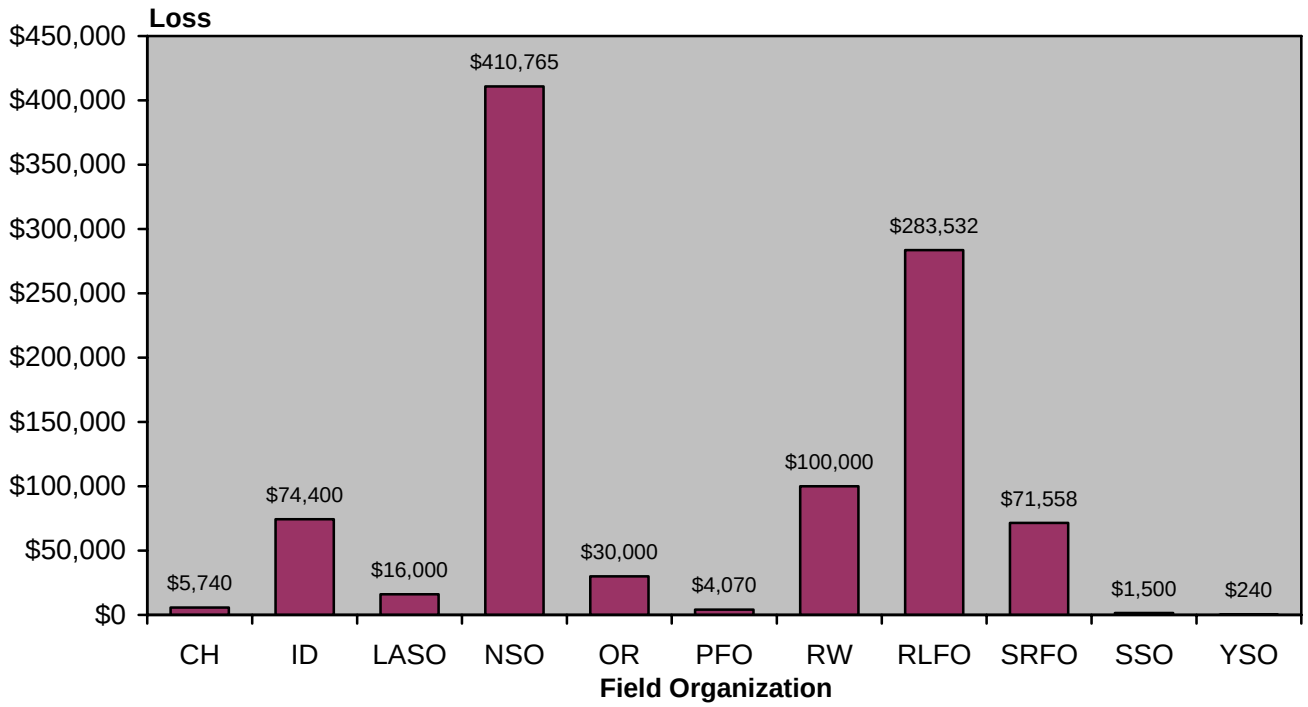
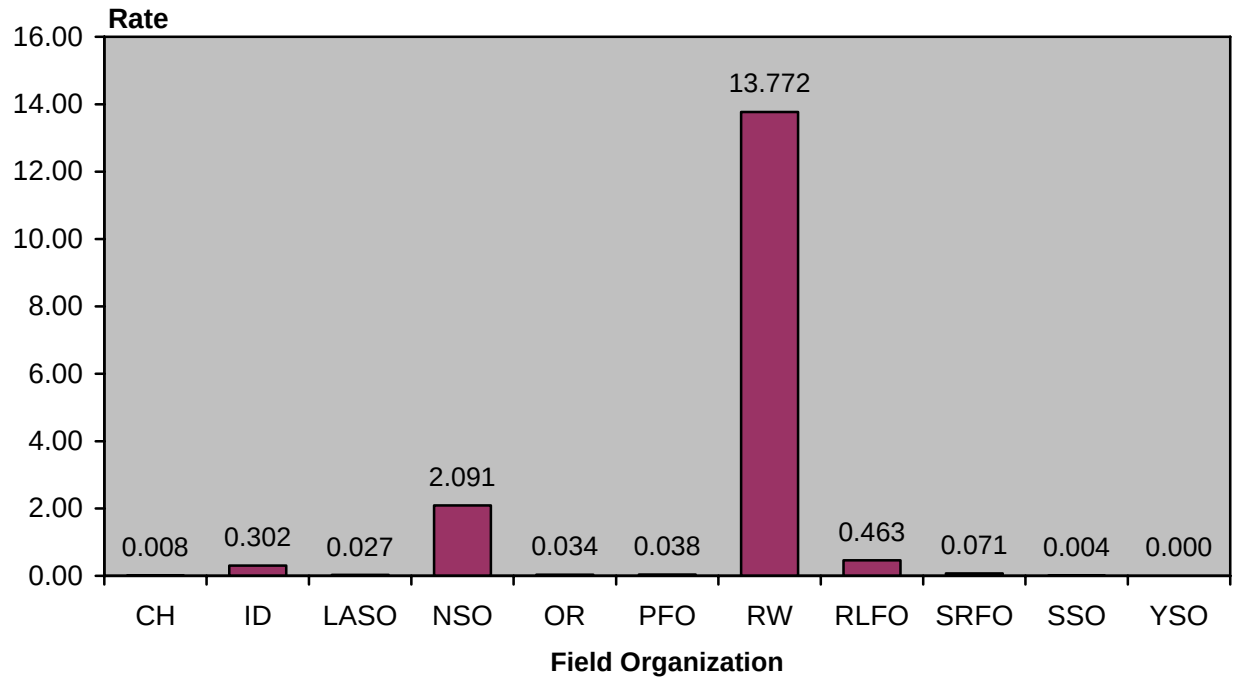


Figure 6

Fire Loss Rate by Field Organization



SUMMARY OF FIRE DAMAGE INCIDENTS

The following table provides a description of major (dollar loss greater then $5,000) 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)	NSO/NTS	This 8,500 acre fire occurred in Areas 14, 25, and 29 at the Nevada Test Site. There were no losses to NTS Systems, Structures or Components (SSCs). This fire lasted four days and required the assistance of Bureau of Land Management (BLM) U.S. Forest Service (USFS), U.S. Air Force (USAF), and Nevada Division Forestry (NDF) personnel to extinguish. NA--NVSO-NST-NTS-2006-0001, Mid Valley Fire on NTS 7/4/07 Total labor, subsistence, housing, aircraft fuel, equipment - $180,581 Total off-site firefighting support - $141,150	$321,731.00
Fire/Smoke (Building)	RLFO/HAN	The Hanford Fire Department (HFD) responded to a trailer fire (MO-304) in a laydown yard near Gate 810 in the 600 Area. This is near the northeast corner of the 200 East Area. The trailer was unoccupied at the time and there are no employee injuries or operational or environmental impacts as a result of the fire. The fire was controlled by 1637 hours. The fire originated from a failed power strip / suppressor. The building had zero value; fire replacement cost for the contents was $283,532.	$283,532.00
Fire/Smoke (Building)	RW/YM	On Sunday afternoon, January 29, 2006, a structure fire originated inside the Operator's Trailer (OT) 25-7023 located at the Exploratory Studies Facility (ESF) North Portal Pad of the YMP. The fire extended beyond the OT to nearby exposures that included: a government owned 1999 Ford F-150 pickup truck, a rented portable toilet, an electrical distribution station, several transportainers utilized for storage/office space, and a covered tire storage area. The fire continued to burn unreported until personnel arriving for work on Monday morning January 30, 2006 discovered it. The fire resulted in a loss of approximately $100,000 (Structures $20,500; Vehicle $10,260; Equipment $61,500; Rented Portable Toilet $1,240 ;Repair of Transportainers $ 3,500;Cleanup$ 3,000) Remedial actions taken to prevent Based on the fire investigation conducted immediately following this event, it was determined that the point of origin was inside the electric motor/blower assembly of the heating unit attached to Trailer 25-7023. The heating unit was manufactured in 1986. This was probably the result of a bearing failure on the electric motor drive shaft. Molten metal material was transported through the duct system, igniting the ductwork and depositing burning material inside Trailer 25-7023. No fixed fire suppression system was installed in any of the structures involved. A cross-reference to DOE reports: BSC Incident Report: SO-IRB-2006-03 that includes The Bechtel Nevada Fire Investigation Report: Exploratory Studies Facility Pad at Yucca Mountain Project A800 PR 06 0018 as Attachment 2 Occurrence Reporting and Processing System (ORPS): RW-YMPO-BSYM-YMSGD-2006-0003	$100,000.00
Fire/Smoke (Building)	SRFO/SRS	At 10:43, SRSFD personnel were dispatched to a call-in notification of a fire in the 706-8C trailer. Smoke and fire were showing through the roof. Upon arrival, fire fighters used charged hose lines to extinguish the fire which originated from the heater coils on HVAC Unit #002. The fire did extensive damage to the attic area and caused some damage to the roof. The majority of the trailer contents was salvaged and has been removed.	$55,697.00

Table 2: **Summary of Fire Damage Incidents**			
LOSS TYPE	**LOCATION**	**DESCRIPTION**	**DOLLAR LOSS**
Fire/Smoke (Building)	NSO/NTS	This 50 Acre fire occurred in Area 27 at the NTS near Skull Mountain and was extinguished by NST F&R personnel. There were no losses to NTS SSCs.	$45,731.00
Fire/Smoke (Building)	ID/INL	The drive belt for exhaust fan 750-203A caught fire, through friction, when the drive pulley seized and the blower pulley kept turning. This caused the belt to keep spinning around the stationary pulley, thus causing sufficient friction to ignite the belt. When Fire Department personnel arrived, no flaming combustion was noted (only smoldering combustion). The fire was extinguished using two water fire extinguishers.	$44,000.00
Fire/Smoke (Brush)	NSO/NTS	This 30 acre fire occurred in Area 25 near Cat Canyon and was extinguished by NTS F&R personnel. There were no losses to NTS SSCs.	$25,188.00
Fire/Smoke (Other)	OR/ETTP	An electrical fire originated in the HVAC unit of the west trailer of the newly installed K-1310-LW trailer "quad." This fire spread into the combustible wood structure above the ceiling of the north end of the unit. It was spotted by a passerby and promptly reported to the ETTP Fire Department, who responded and extinguished the fire. There were no injuries resulting from this fire but there was moderate damage to the one trailer unit, and some smoke damage to the other units in the "quad." The damaged unit was removed reducing the five trailer quad to a four trailer quad. Mold has prevented the surviving trailers from being used.	$25,000.00
Fire/Smoke (Building)	ID/INL	A grabber screw, heated by friction from the shredding process was kicked up and landed in a small amount of wood/fiberglass dust that had collected on one of the channels on the shredder enclosure door. The material smoldered for approximately 8 hours and was constantly monitored by Fire Department and Operations personnel. No fire suppression equipment was used as the fire self-extinguished.	$20,000.00
Fire/Smoke (Vehicle)	LASO/LANL	Fire in engine compartment of pickup truck was extinguished and vehicle towed to repair facility.	$16,000.00
Fire/Smoke (Brush)	NSO/NTS	This 9 acre fire occurred in Area 18 at the NTS near Buckboard Mesa Road and was extinguished by NTS F&R personnel. There were no losses to NTS SSCs.	$9,615.00
Fire/Smoke (Other)	SRFO/SRS	At 08:19, Fire Department personnel were dispatched to a call-in notification of a fire at 221-H, south dock. Facility personnel heard a loud bang from the T-2 transformer and saw flames and smoke coming from the wires. The transformer was still smoking when the FD arrived. Site Utilities Department personnel were requested at the scene to open the breaker on the pole and de-energize the power. There were no further actions taken on the part of the SRSFD. There were no injuries and the estimated dollar loss is $5,500.00.	$5,500.00
Fire/Smoke (Building)	CH/LBL	Improper charging protocol resulted in damage to UPS system's batteries, causing overheating & smoke detector to operate. A few battery cases were charred. There was no open flame when the Building Manager took batteries offline & problem was resolved. Entire set of batteries has been replaced with standby units provided by installer who is finalizing full replacement under warranty. Minor impact to operations, no out of pocket expenses for materials or equipment for LBNL. No injuries were reported.	$5,000.00
Fire/Smoke (Vehicle)	SRFO/SRS	At 23:10, SRSFD personnel were dispatched to a call-in notification by a WSI LE unit of a 115 KV substation fire at 504-3G, which is off of Hwy. 125 @ Gate A13. Upon arrival, SCE&G personnel were already on-scene and had extinguished the fire with a 2.5 lb. fire extinguisher. There were no	$5,000.00

Table 2: **Summary of Fire Damage Incidents**			
LOSS TYPE	**LOCATION**	**DESCRIPTION**	**DOLLAR LOSS**
		further actions on the part of the SRSFD except to stand-by until SCE&G personnel were clear of lines. There were no injuries.	
Fire/Smoke (Brush)	NSO/NTS	This 8.5 acre fire occurred in Area 12 at the Nevada Test Site, and was extinguished by NST fire and Rescue personnel. Two electrical utility poles were destroyed by the fire. There was no damage to utility lines or insulators.	$5,000.00
Fire/Smoke (Other)	OR/ORNL	The ORNL Fire Department responded to a fire in a microwave tunnel dryer that is used for drying wood chips. Upon arrival the machinery had been de-energized and the fire was extinguished by building occupants using a portable fire extinguisher. Damage was limited to the conveyor belt assembly on the machinery. There was no fire extension or smoke damage beyond the conveyor belt.	$5,000.00
Fire/Smoke (Building)	ID/INL	A spark from metal sizing operations ignited a piece of cardboard in the south box line. The operator extinguished the flames using the manual CO2 system.	$5,000.00

WATER-BASED AUTOMATIC SUPPRESSION SYSTEM PERFORMANCE

A total of 16 incidents were reported where water-based suppression systems operated in CY 2006. System actuations are broken down as follows: (8) Dry-pipe; (7) Wet-pipe; and, (1) Deluge. Of these, one actuation was directly caused by fire. Causes for the remaining system actuations are as follows: employee related (1), design/material related (3), weather related (7), procedure related (2), other (1), and unspecified (2).

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	SS0/SNL-AL: SNL Event No: 20159, Bldg. 702 NW High Bay Storage Retriever. SNL Emergency Responders responded to a report of a fire alarm with water flow activation. It was determined that the cause of the alarm was from a severed sprinkler head. The sprinkler head was capped and the area was made safe. Cause: Sprinkler design/installation LTA. Independent review of design/documentation LTA. Material storage LTA. During operation of the carousel, an overhead sprinkler was broken. The investigation found that there was inadequate clearance between the sprinkler and the placement of the stored commodities within the carousel and there was no barrier or guard around the sprinkler to protect it from physical damage. Contributing causes include no approved design of the fire suppression system and inadequate controls of commodity storage configuration. An ES&H Lessons Learned from the event was issued	$160,000.00
Leaks, Spills,	LASO /LANL	Vehicle sheared off dry pendant sprinkler heads under overhang, activating sprinkler system and discharge of anti-	$5,000.00

Table 3: **Water Based System Actuations**			
LOSS TYPE	**LOCATION**	**DESCRIPTION**	**DOLLAR LOSS**
Releases		freeze solution. ORPS NA--LA-LANL-ADOADMIN-2006-0010	
Leaks, Spills, Releases	KCSO/KCP	Sprinkler head was damaged due to steam pipe movement while steam was being returned to service from a scheduled shutdown. Water damaged a nearby FACP.	$5,000.00
Leaks, Spills, Releases	SSO/SNL-AL	SS0/SNL-CA: During a period of high prevailing temperature (114F was the reported high on 7/21/06) at approximately 6:00 PM on 7/21/06, the 6-inch fire sprinkler riser in 963-1 failed and allowed full flow into the building. The failure point was at a coupling located above the double-check backflow prevention assembly (BFP) and below the fire alarm flow switch. Although the water caused several trouble conditions from the tamper switch and flow switch relays located nearby when they got wet, no water flow alarm was ever generated. Therefore dispatch of the Fire Department was delayed until the Security personnel investigated the scene and called the Fire Marshal who requested a LLNL Fire Department response. LLNL Fire Department entered the building and was able to isolate the flow at the riser using one of the isolation valves on the BFP assembly. The coupling that failed is designed to be assembled using a plain end pipe (i.e. not threaded, grooved, flanged or welded) and is designed to be torqued to 250 ft-lbs and has teeth (grippers) that grip the pipe to provide thrust restraint. Storage in the immediate vicinity of the riser was wetted to the top tier of storage. The insulation in the vicinity of the riser was destroyed and the electrical components of the fire alarm system in the vicinity of the riser were damaged beyond repair	$2,266.00
Leaks, Spills, Releases	SSO/SNL-AL	SS0/SNL-AL: SNL Event No: 16804, Water Leak at T-53. Sandia and Kirtland Emergency Personnel responded to a water leak in the fire suppression system. It was determined that a pipe joint had separated on the main sprinkler line. The water flow was stopped and SNL Custodial personnel cleaned up the excess water. The riser room required replacement of sheetrock and insulation from the water damage. Cause: A pipe joint had separated on the main sprinkler line	$2,000.00
Leaks, Spills, Releases	LASO /LANL	Inadvertent deluge system activation during scheduled PM releases 300 gal of water. ORPS NA--LA-LANL-HEMACHPRES-2006-0002	$1,000.00
Fire/Smoke (Building)	PSO/PAN	Fire in Heater. Sprinkler activated and extinguished fire.	$0.00

There are a total of 248 incidents in DOE records where water based extinguishing systems operated in a fire. The satisfactory rate of performance is 99.2 percent, or 246 times out of 248 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 119 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	84	84	71	71
2	19	103	16	87
3	6	109	5	92
4	4	113	3	95
5	2	115	2	97
6	1	116	1	97
7	2	118	2	99
8	0	118	0	99
9+	1	119	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 2006, the DOE retained 267 Halon 1301 systems in operation containing approximately 86,312 pounds of agent. Stored Halon 1301 inventory was reported at approximately 72,787 pounds[2]. Operational and stored inventory amounts for the Halon 1211 were reported at 41,354 and 39,860 pounds, respectively.

Sites considering Halon transfers outside the DOE should contact the local Defense Logistics Agency for specific information relating to such transfers.

A total of 4 incidents were reported at DOE where Halon 1301 or other non-water based suppression systems operated in CY 2006. Of these, one event was directly caused by a fire and no sites reported any system failures during a fire. Additionally, approximately 264[3] 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	SS0/SNL-AL: SNL Event No: 44006, Bldg. 808 Clean Room FM-200 Release. The IC, KAFB FD, SNL Security Rescue Recon and SNL Fire Alarm Maintenance personnel responded. Upon arrival, construction personnel informed responders that while conducting work, the fire alarm system was activated which released a fire suppression product. Rescue Recon conducted air monitoring which determined low oxygen levels. The room was ventilated and when air quality returned to normal conditions personnel were allowed to return to work. Cause: The key for the fire suppression manual pull station remained in the pull station while a light switch was being installed immediately above the pull station. The combination of the pounding involved in the construction activity and with the key in the pull station, the pull station opened, immediately releasing the FM-200 suppression agent.	$17,295.00
Leaks, Spills, Releases	LASO/LANL	FM-200 extinguishing system inadevertant activation/discharge when personnel bumped manual release station	$5,000.00
Leaks, Spills, Releases	SSO/SNL-AL	SSO/SNL-CA: A small (78 lb) halon system in the B8 trailer west of 910 discharged. This is an optional system and is not required by any codes or DOE orders but exists because B8 trailer is mobile and occasionally must be dispatched to remote locations. The cause of the actuation is apparently system age (detector heads)and repairs are in progress as of the press date for this report. I,T & M for the system is performed per requirements, but the heads are old and will be replaced with updated versions prior to full reactivation. Halon 1301 from a small on site reserve was used to refill the tank.	$0.00
Fire/Smoke (Other)	CH/FNAL	System FP325DIGE 186 lbs of Halon (non-fire release) most likely from other work in the area.	$0.00

[2] Amount excludes banked inventory at the SRS – 51,747 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.

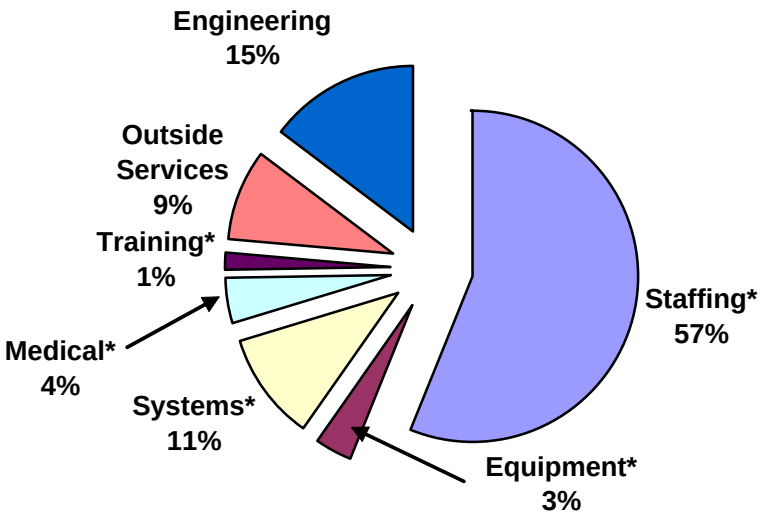
RECURRING FIRE PROTECTION PROGRAM COSTS

Yearly or recurring fire protection costs for CY 2006 reached $164,048,165 for the DOE Complex. On a ratio of cost to replacement property value (recurring cost rate), the DOE spent approximately 25.42 cents per $100 property value for recurring fire protection activities.

Figure 11 shows the CY 2006 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 (BNL, SPR, WIPP) had their costs carried forward from the past reporting period to maintain the validity of the statistic.

Figure 11

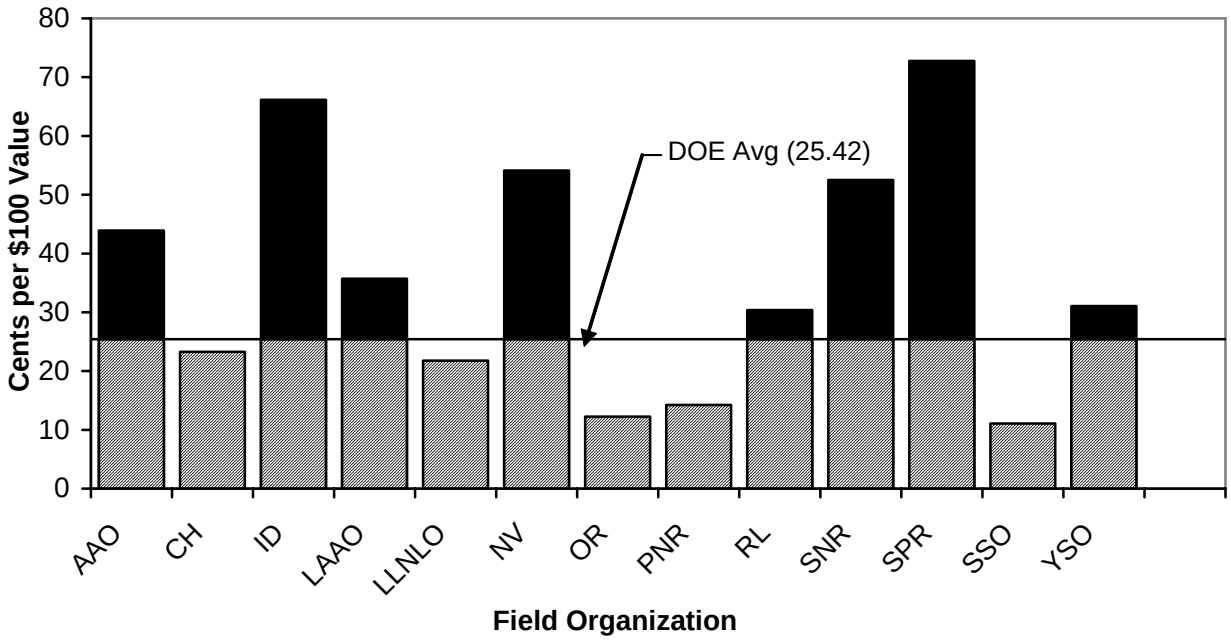
Recurring Fire Protection Cost Distribution



* Fire Department Activities

Figure 12

Cost Rate by Operations Office



FIRE DEPARTMENT ACTIVITIES

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

1.	Fire	880
2.	Hazardous Materials	458
3.	Other Emergency	3,348
4.	Other Non-Emergency	2,283
5.	Medical	1,906
	Total	8,875

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 Health, Safety and Security 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**
PSO/PAN	4 new wildland fire vehicles	$450,000.00
NV/NTS	Hazmat Rescue Vehicle	$350,000.00
OR/ORNL	Ambulance	$92,000.00
SRO/SRS	Mobile Breathing Air Compressor	$75,000.00
KSO/KCP	In-Plant Fire Response Vehicle	$50,000.00
NV/NTS	(2) Slip-in Fire Pumps/Tanks	$31,000.00
NV/NTS	Wildland Fire response trailer	$9,500.00
NV/NTS	Misc. technical rescue eqpt.	$9,200.00
NV/NTS	Multiple victim trailer	$7,500.00
SNR/KAPL	vision stick	$7,000.00
SNR/KAPL	MSA Sirius Meters	$4,000.00

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

Table 8: **Notable Responses**		
LOCATION	**DATE**	**DESCRIPTION**
PSO/PAN	4/22/06	Grass Fire SE corner of the Plant.
PSO/PAN	7/5/06	Vehicle accident on perimeter road West of 16-1.
PSO/PAN	7/13/06	Dump Truck Fire
PSO/PAN	11/2/06	Smoldering Railroad Tie
OR/ORNL	05/06/06	The ORNL Fire Department responded to a reported fire at the Molten Salt Reactor Experiment facility. Upon arrival, facility personnel reported that a fluorine leak in the south truck bay was the source of the fire. Facility evacuation was confirmed and accountability was completed shortly after arrival. One patient was treated for possible injuries, but refused transportation to a medical facility. The cylinder of fluorine was described by facility personnel as being a full 5 pound cylinder at 300psi. The Hazardous Material response team was requested. After entry plans were developed and briefings were complete, an entry team made access to the facility for reconnaissance. No fluorine was detected during the entry process. Leaking tank was shut off and critical systems were put into a safe condition. Based on the entry teams findings a reentry plan was developed by facility management and the EOC. The scene was declared safe and responsibility was turned over to facility personnel. The event was terminated seven hours after initial report.
SNR/KAPL		Mutual Aid Schenectady County HAZMAT (2 times)
SNR/KAPL		Mutual Aid Niskayuna Fire Department Car Accident
SNR/KAPL		Building P7 Electrical Transformer Failure

CONCLUSIONS

DOE experienced no fatalities or major injuries from fire in CY 2006. The Annual Summary reporting process has recently been automated to streamline data collection and provide a more through 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.hss.energy.gov/nuclearsafety/nsea/fire//summary/summary.html