
**SUMMARY of
FIRE PROTECTION PROGRAMS
for
CALENDAR YEAR 2007**



UNITED STATES DEPARTMENT OF ENERGY
Office of Corporate Safety Analysis
Office of Nuclear Safety Policy and Assistance
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FOREWORD

A key safety objective of the U. S. Department of Energy (DOE) is to minimize the potential for and consequences of fires at DOE facilities. Since May 1950, an annual Fire Protection Program Summary (Annual Summary) has been developed by DOE and its predecessor agencies, the Atomic Energy Commission and the Energy Research Development Administration, to provide a means for measuring how well DOE is meeting this objective and where improvements can be made.

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. Guidance on how these responses can be viewed and a copy of the supporting viewing application tool can be obtained at the following internet address:

<http://hss.energy.gov/nuclearsafety/ns/fire/summary/summary.html>.

The Office of Health, Safety and Security (HSS) will work with the DOE Fire Safety Committee to examine the content of the Annual Summary (including existing reporting fields and other supporting fire protection program information) to improve its benefit to both Headquarters and Field Elements. Please contact Mark Petts at 202-586-5486 or mark.petts@hq.doe.gov to provide suggestions for improving this reporting process.

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Corporate Safety Analysis (HS-30) within the Office of Health, Safety and Security (HSS) publishes the annual *Summary of Fire Protection Programs Report* to provide an overview of the status of fire protection programs at DOE. Important indicators of the status and effectiveness of DOE fire protection programs include fire losses (deaths, injuries, and property losses), suppression system performance, fire department responses, and program maintenance cost.

In 2007, the DOE fire protection program continued to demonstrate good performance. DOE experienced no fatalities or major injuries from fire in calendar year (CY) 2007. There was, however, a significant accident during a response to a wildland fire at the Idaho National Laboratory when firefighters contacted overhead electrical transmission lines. Fortunately, the firefighters only experienced minor injuries. Ninety fire events were reported during 2007 causing an estimated \$1 million in property damage and about \$650 thousand in fire response (primary wildland fire response) cost. About 75 percent of losses are attributed to five incidents. DOE's fire loss rate in 2007 was approximately 0.25 cents for each \$100 in property value, which was 0.10 cents more than the 2006 rate. In CY 2007, two fires were successfully controlled by automatic fire suppression systems (one sprinkler and one wet chemical). However, there was an inadvertent actuation of 13 systems, primarily due to 6 weather-related events.

In CY 2007, DOE had about 9,800 fire department responses with the majority being for medical or other non-fire emergencies. About 750 of the fire department responses were fire responses. Recurring costs for fire protection was about \$168 million in CY 2007, which is approximately \$3 million more than what was spent in CY 2006. On a ratio of cost to total property value, the DOE spent approximately 24.9 cents per \$100 in property value for recurring fire protection activities.

DOE places high importance on maintaining an effective fire program to minimize the potential for and consequences of fires at DOE facilities. This Annual Summary provides useful information to evaluate the effectiveness of the DOE fire protection program and shows that DOE has an effective fire protection program for protecting its worker, the public, and the environment.

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1. INTRODUCTION

A key safety objective of the U.S. Department of Energy (DOE) is to minimize the potential for and consequences of fires at DOE facilities. Since May 1950, an annual Fire Protection Program Summary (Annual Summary) has been developed by DOE and its predecessor agencies: the Atomic Energy Commission and the Energy Research Development Administration to provide a means for measuring how well DOE is meeting this objective and where improvements can be made. 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) 2007 was summarized from information sent to Headquarters by 32 out of 50 reporting elements, representing approximately 89 percent of DOE's ownership. For comparison purposes, field offices are arranged according to the DOE Field Office reporting format, with a total of 24 categories represented. Acronyms and abbreviations used in this report are included as Appendix 1, and major definitions are provided in Appendix 2.

In 1999, the Annual Summary reporting process was automated to streamline data collection and to 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 2007. Guidance on how these responses can be viewed and a copy of the supporting viewing application tool can be obtained at: <http://hss.energy.gov/nuclearsafety/ns/fire/summary/summary.html>.

This annual summary is organized and provides data on fire losses (deaths, injuries, and property losses), suppression system performance, fire department responses, and program maintenance cost.

2. DOE PROPERTY LOSS EXPERIENCE

Property value estimates serve as a common denominator for comparing Annual Summary loss rates. In CY 2007, property values increased by approximately 4.5 percent to a total of approximately \$67.4 billion. DOE elements reported 91 fire incidents that accounted for a total year-end fire loss of \$1,674,515. These events are categorized as follows:

Fire/Smoke (Building)	37 Events
Fire/Smoke (Brush)	21 Events
Fire/Smoke (Vehicle)	10 Events
Fire/Smoke (Other)	22 Events

DOE's fire loss rate for CY 2007, as summarized from field organization reports, is approximately 0.25 cents loss per \$100 property value.

Table 1 characterizes Annual Summary loss histories since 1950. 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 loss rates since 1989
- Figure 3 - the current year's fire event tally by Field Organizations
- Figure 4 - the current year's fire loss (dollars) by Field Organizations
- Figure 5 - the current year's fire loss rate by Field Organizations

Organizations not shown in Figures 3 through 5 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, five fire incidents this year accounted for approximately 75 percent of the total dollar loss amount.

The largest fire loss for the year occurred at Idaho National Laboratory (INL) during a wildland fire encompassing approximately 9,000 acres South and East of the East Butte. Firefighting costs are estimated at \$500,000, with added property losses estimated at \$25,485.

Fire Protection Summary for Calendar Year 2007

Table 1. DOE Fire Loss History from 1950 to Present

Year	Property Value(PV) * (Dollars)	Fire Loss (Dollars)	Rate** (Cents/100 Dollar PV)
50	1,800,000,000	486,389	2.70 -
51	2,177,100,000	38,318	0.18 -
52	3,055,100,000	449,107	1.47 -
53	4,081,000,000	148,142	0.36 -
54	6,095,900,000	185,438	0.30 -
55	6,954,200,000	125,685	0.18 (1.00)
56	7,364,100,000	2,206,478	3.00 (0.50)
57	7,973,200,000	590,663	0.74 (1.06)
58	8,102,500,000	275,560	0.34 (0.92)
59	10,301,800,000	199,841	0.19 (0.91)
60	10,708,600,000	636,228	0.59 (0.89)
61	11,929,900,000	325,489	0.27 (0.97)
62	12,108,800,000	3,020,023	2.49 (0.43)
63	13,288,900,000	599,056	0.45 (0.78)
64	14,582,800,000	480,519	0.33 (0.80)
65	15,679,300,000	1,743,448	1.11 (0.83)
66	16,669,000,000	158,220	0.09 (0.93)
67	17,450,900,000	359,584	0.21 (0.90)
68	18,611,900,000	155,986	0.08 (0.44)
69	20,068,300,000	27,144,809	13.53 (0.37)
70	22,004,300,000	89,456	0.04 (3.00)
71	24,155,800,000	78,483	0.03 (2.79)
72	26,383,500,000	222,590	0.08 (2.78)
73	27,166,700,000	117,447	0.04 (2.75)
74	28,255,500,000	249,111	0.09 (2.75)
75	31,658,300,000	766,868	0.24 (0.06)
76	35,512,700,000	251,849	0.07 (0.10)
77	39,856,100,000	1,084,823	0.27 (0.11)
78	47,027,100,000	12,976,036	2.76 (0.14)
79	50,340,800,000	654,716	0.13 (0.69)
80	54,654,700,000	1,385,686	0.25 (0.69)
81	59,988,800,000	2,042,633	0.34 (0.70)
82	65,360,400,000	948,691	0.15 (0.75)
83	70,484,400,000	731,234	0.10 (0.73)
84	82,166,900,000	1,549,807	0.19 (0.19)
85	86,321,840,000	1,145,975	0.13 (0.21)
86	82,787,520,000	805,030	0.10 (0.18)
87	91,927,200,000	1,570,736	0.17 (0.13)
88	92,998,000,000	466,120	0.05 (0.14)
89	107,948,000,000	615,551	0.06 (0.13)
90	115,076,000,000	8,392,746	0.73 (0.10)
91	118,868,680,000	608,740	0.05 (0.22)
92	118,267,060,000	1,166,858	0.10 (0.21)
93	119,826,250,000	679,939	0.06 (0.20)
94	124,350,290,000	1,533,717	0.12 (0.20)
95	120,321,680,000	720,720	0.06 (0.21)
96	113,471,000,000	2,372,482	0.21 (0.08)
97	102,947,240,000	544,924	0.05 (0.11)
98	99,127,790,000	316,475	0.03 (0.10)
99	110,858,470,000	443,049	0.04 (0.10)
00	102,514,010,000	102,861,283	10.03 (0.08)
01	103,215,560,000	287,263	0.03 (2.07)
02	98,779,440,000	1,541,174	0.16 (2.04)
03	70,812,800,000	1,075,309	0.15 (2.06)
04	72,601,950,000	622,613	0.09 (2.08)
05	74,951,250,000	2,537,565	0.34 (2.09)
06	64,547,050,000	997,805	0.15 (0.15)
07	67,382,010,000	1,674,515	0.25 (0.18)

*Table shows actual dollar amounts for the reporting year (i.e., not normalized for inflation).

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

Figure 1. DOE Property Valuation

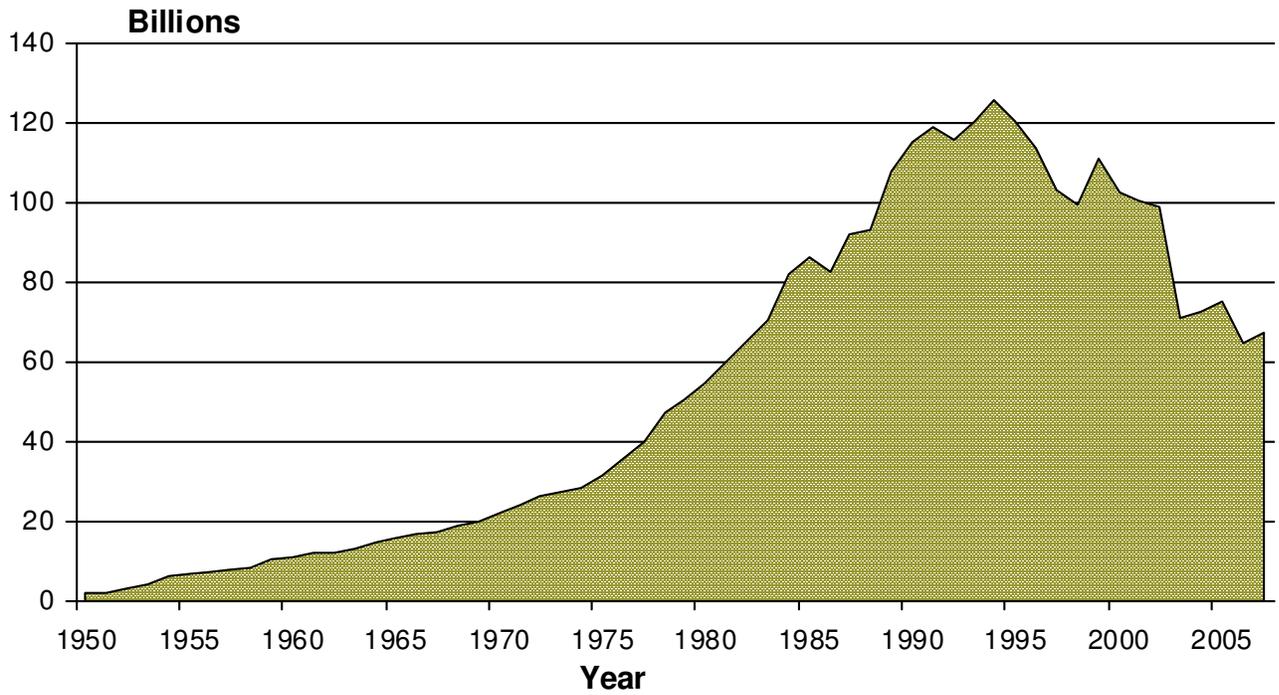


Figure 2. DOE Fire Loss Rate

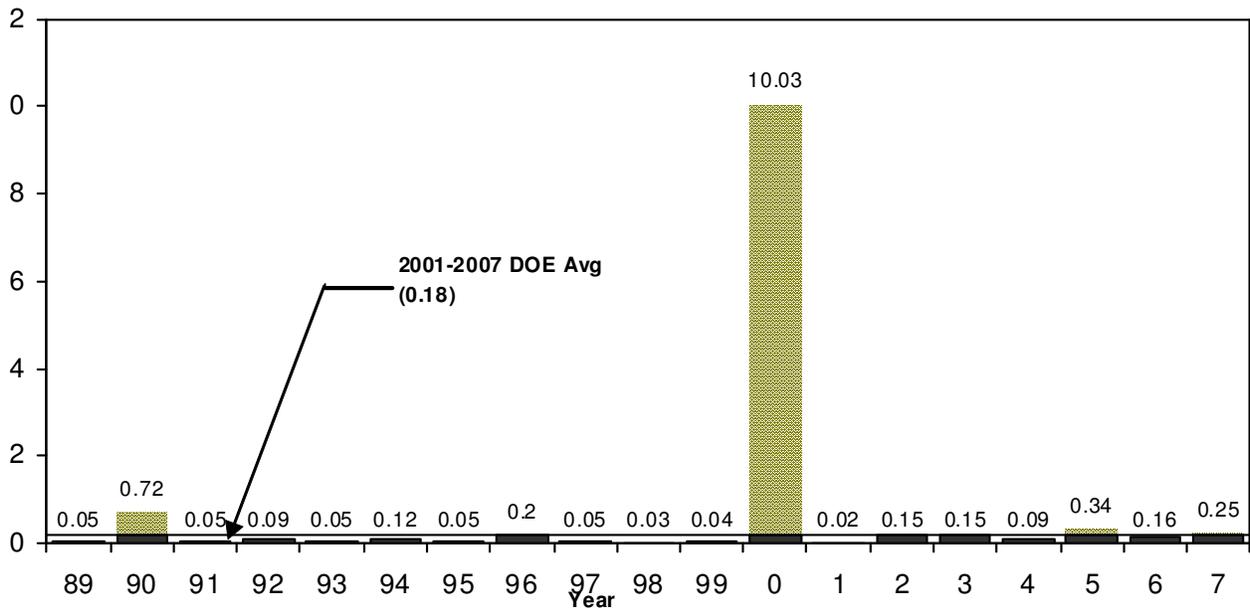


Figure 3. Fire Events by Field Organization

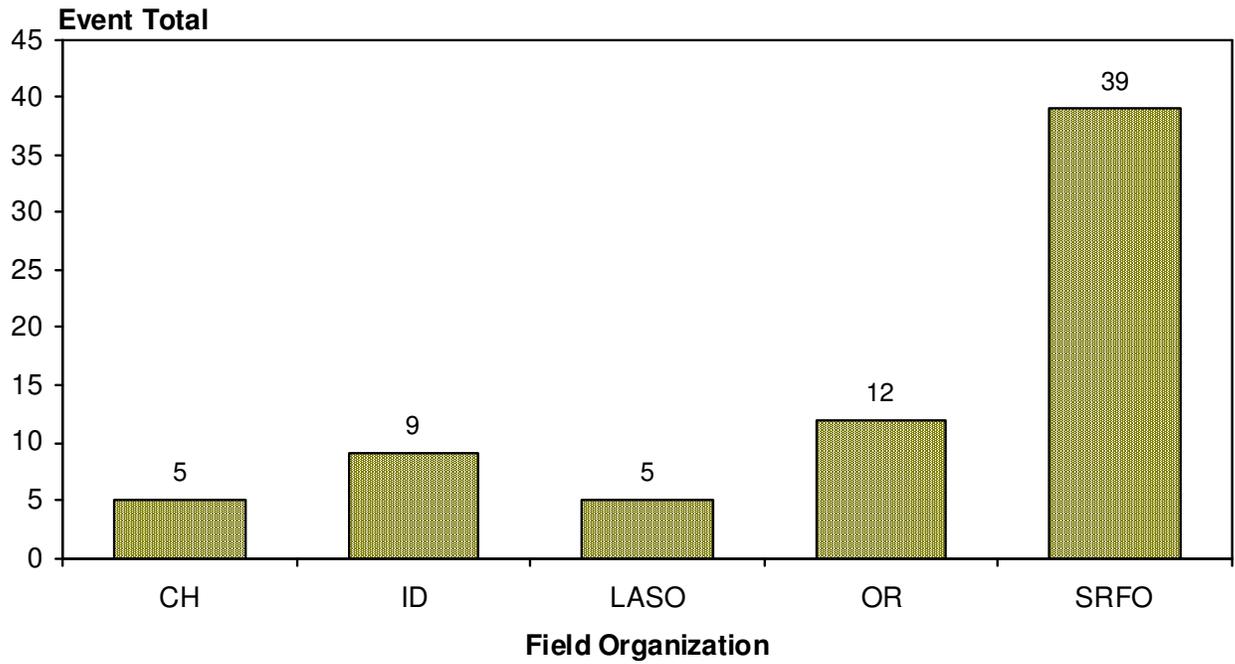


Figure 4. Fire Loss Amount by Field Organization

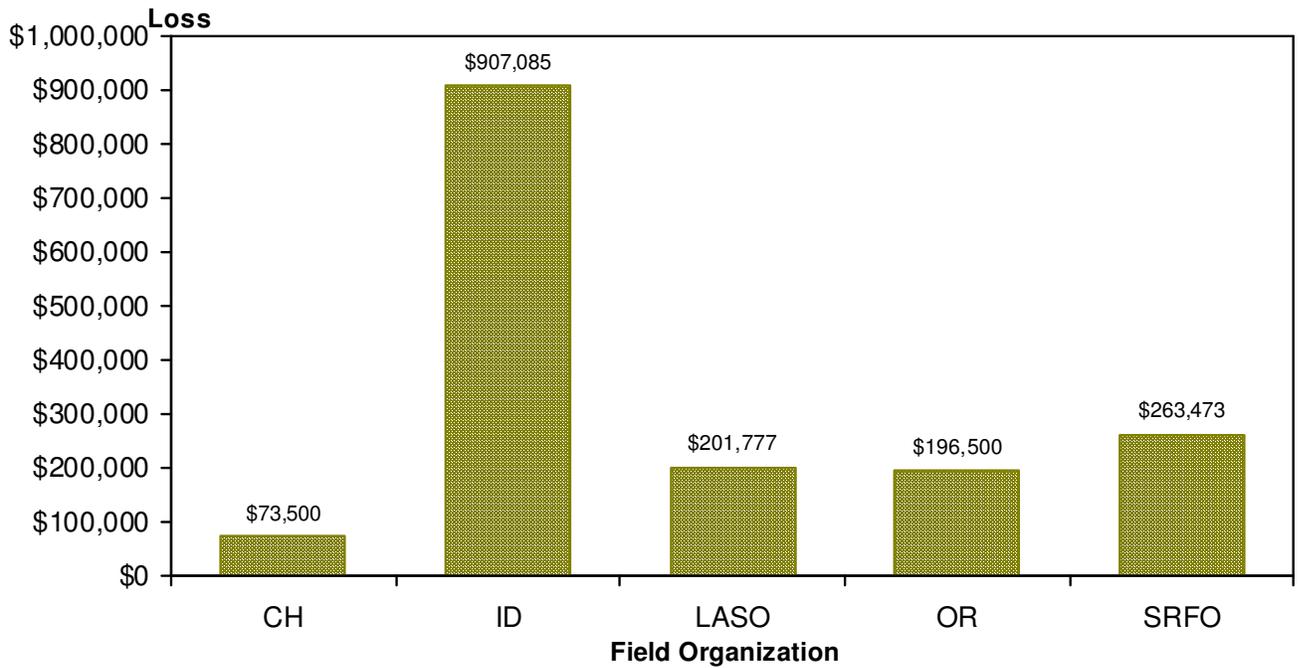
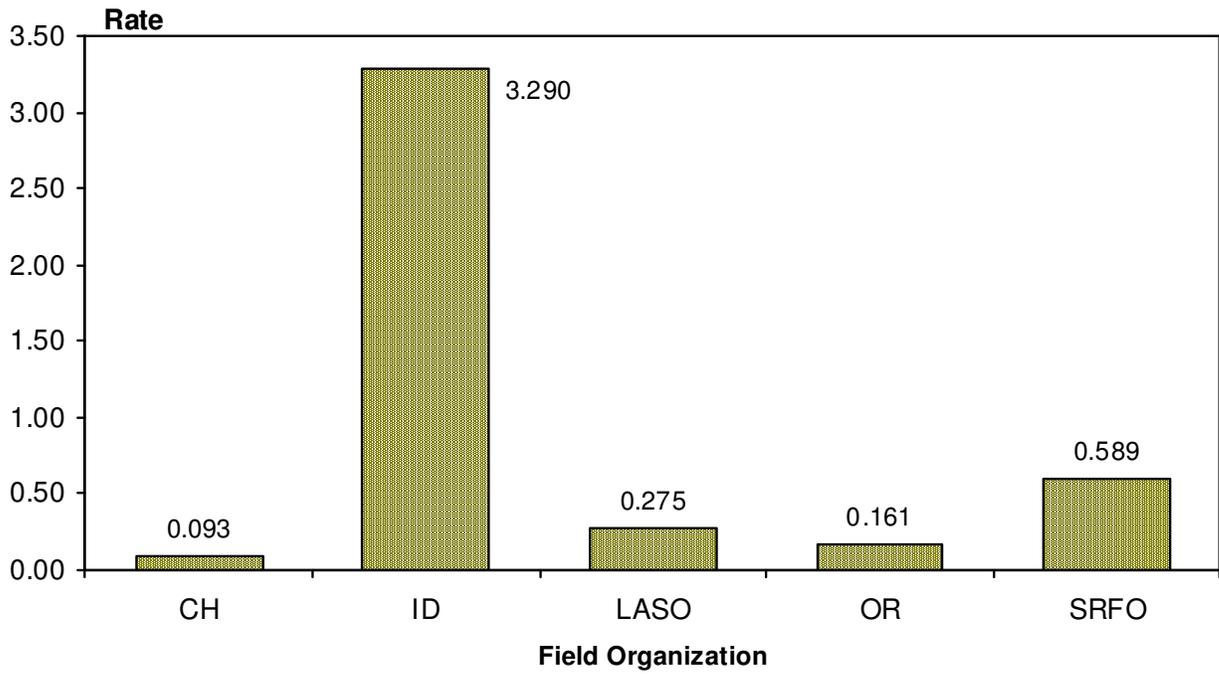


Figure 5. Fire Loss Rate by Field Organization



3. SUMMARY OF FIRE DAMAGE INCIDENTS

The following table provides a description of major DOE fire losses (dollar loss greater than \$5,000) over the year. This information was extracted essentially verbatim from data entered into the annual reporting summary application. See Tables 3 and 5 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)	ID/INL	At 1745 hours, the Idaho National Laboratory Fire Department responded to a wildland fire south and east of the East Butte. The fire, initiated by lightning, was burning in grass, sage brush and pinion junipers with very active flames and rate of spread. The fire eventually involved 9,434 acres (8,715 acres on INL land), spanning an area around East Butte to highway 20/26. A Unified Command was established between the INL Battalion Chief and the Bureau of Land Management Incident Commander. The fire required indirect suppression tactics including construction of dozer containment lines and backfiring operations along Highway 20. Off-site support included BLM ground and air units (four heavy air tanker drops), two Federal hot shot crews, the Shelley Fire Department and the Blackfoot Fire Department. The fire was contained at 2100 hours on 7/19, controlled at 1600 hours on 7/21 and declared out at 2000 hours on 7/22. Fire exposure damage occurred to telecommunications equipment located on East Butte. INL property damage was limited to minor damage to cabling at the INL East Butte Facility (\$16,485) and various signs (estimated at \$9,000). Emergency Response Organization and Memorandum of Understanding (BLM, Airborne suppression, etc.) costs are estimated at \$500,000. The East Butte access road will require more frequent grading, due to accumulating rocks from the hillside. Rocky Mountain Power transmission lines within the burn area experienced significant damage requiring multiple pole replacements.	\$525,485
Fire/Smoke (Building)	SRO/SRS	At 1536 hours, Savannah River Site Fire Department personnel were dispatched to a fire alarm received from 221-H, 7th level, Section #2, Elevator Control Room. All units responded and found smoke showing through the window of the door. The lock was cut from the caged area that housed the controls, and panels were removed to find the source. Apparently, some type of short or failure of contactors or relays caused extensive damage inside the cabinet. Power was de-energized before FD entry. The fire self-extinguished. The FD assisted facility personnel to check the elevator shaft and car for possible trapped passengers although 100 percent accountability had been established. The elevator was clear. Further investigation revealed that the power and control circuits were severely damaged and have to be replaced. There were no injuries.	\$250,000
Fire/Smoke (Building)	LASO/LANL	At LANL TA-54-288, a fire originating within HVAC unit of transportable office trailer (wood construction) resulted in total loss of	\$190,277

Table 2. Summary of Fire Damage Incidents

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		the structure. Automatic heat detector activation initiated FD response and suppression operations. FIMS/MOADS RPV = \$130,277. Contents estimated value was \$10,000. Demolition and removal costs estimated to be \$50,000.	
Fire/Smoke (Brush)	ID/INL	At 1231 hours, the INL Fire Department was dispatched to a report of fire south of the Buttes. While in route, the INL FD confirmed a developing smoke plume south of the Middle Butte. All INL wildland firefighting units were dispatched to respond and BLM support was requested. BLM air resources responded and initiated and directed aerial operations, including initial retardant drops along the west and south sides of the fire. Following retardant drops, the INL FD anchored at the northwest boundary of the fire and initiated direct suppression tactics. Upon arrival of BLM ground resources, a unified command was established. Upon evaluation, it was established that the majority of the fire involved BLM property and incident command was transferred from INL to BLM. INL continued to support BLM with suppression on the south division of the fire and structural protection for private ranch structures threatened by the fire. Suppression efforts were suspended during the passing of a strong thunder cell. The same storm provided wetting rains which significantly reduced the spread of the fire. INL and BLM dozers and firefighters completed construction of an initial containment line during the course of the first burn period. All INL resources were pulled from the scene during the first evening. BLM completed follow up containment and mop up in the following days. INL response resources included the FD water tender, all four wildland units, and two dozers. BLM provided multiple engines, dozers, air attack, seven SEAT drops, and two heavy air tanker drops. The fire was declared contained at 1800 on 8/18, controlled at 1400 on 8/20 (by BLM). The fire involved an estimated 2,676 acres (1,054 INL). There was no damage to INL property. Emergency Response Organization and Memorandum of Understanding (BLM, Airborne suppression, etc.) costs are estimated at \$150,000. Lightning was established as the probable ignition factor.	\$150,000
Fire/Smoke (Building)	ID/INL	The fire initiated in building TRA 668, Rm. 98, chemical hood #688 7. A fire occurred in a laboratory fume hood as a result of ignition of red phosphorous powder during material handling evolutions. The thermal effects including smoke damage of the fire were confined to the hood, contents within the hood, and hood exhaust system. Three OSHA recordable cases resulted from the fire (one was the chemist performing the evolution, the other two were employees exposed to the smoke from the fire). The large majority of costs incurred as a result of the fire are associated with the investigation and salvage/cleanup phase (recovery).	\$145,000
Fire/Smoke (Building)	OR/ETTP	On 2/24, a fire originated near the HVAC unit of the north trailer of the 7078 E trailer at ORNL. This fire spread into the combustible concealed space above the ceiling of the west end of the trailer. It was spotted by a passerby and extinguished by the ORNL Fire	\$100,000

Table 2. Summary of Fire Damage Incidents

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		Department. The trailer is protected by an active sprinkler system which did not operate during this fire. Repair or replacement of the trailer will cost around \$100,000.	
Fire/Smoke (Brush)	ID/INL	At approximately 1740 hours, the INL Fire Department responded to a report of smoke on US Highway 20/26 milepost 263. BLM Atomic City was also dispatched. Upon arrival, the INL FD encountered a working fire with moderate flame spread on the north side of the road, initially estimated at 3 acres. Strong winds from the north/northeast had pushed the fire to the highway, with a backing flame front on the north side of the fire. The INL Battalion Chief assumed incident command with the initial support of INL Wildland Units #1 and #2. INL WLU #3 and #4, the INL tender, a BLM chase vehicle, and BLM heavy wildland unit responded later in the event. Though not requested by the INL BC, a wildland unit from Arco also responded. The fire was suppressed using direct tactics. There were no dozer containment lines constructed. The fire was declared contained at 2029 and controlled at 2117 on 7/14. The fire was declared out at 2142 hours on 7/15. The fire was of human origin with the probable ignition factor established as a downed power line from the Rocky Mountain Power 66.9 kV service to Arco, ID. Final fire size was estimated at 3 acres. During the response, INL WLU #1 accidentally contacted the sagging overhead power line, resulting in the electrical shock injury of two INL firefighters and damage to WLU #1 (tires, wheels, radios, light bar). Damage to the vehicle was estimated at \$5,000. One power pole required repair by Rocky Mountain Power personnel. The balance of the fire loss figure is attributed to the investigation of the wildland fire/electrical shock incident.	\$55,000
Fire/Smoke (Building)	OR/ORNL	On June 13, the ORNL Fire Department responded to a VESDA Alert Supervisor Alarm condition in Building 8300 at the Spallation Neutron Source Site. While responding, the condition escalated to a VESDA Fire Alarm condition. The assignment was upgraded. Upon arrival, facility personnel reported to the Command Post and advised Command they had lost a modulator in the west end of Building 8300. The entry team made first entry and found a moderate amount of smoke coming from one modulator and around a blue transformer directly behind the modulator, but no fire was showing. Also a small amount of liquid had leaked from the modulator. Further investigation and dismantling of the equipment revealed a small fire inside the modulator that was extinguished with three portable fire extinguishers. Once the fire was extinguished, the facility was ventilated and turned back over to facility management for recovery.	\$50,000
Fire/Smoke (Building)	CH/SLAC	Electrical cable fire in PEP II region 4 estimated at approximately \$50,000.	\$50,000
Fire/Smoke (Vehicle)	ID/INL	Workers discovered that a rechargeable battery had failed during unattended charging and overheated, severely damaging one of the Unmanned Aerial Vehicles. The heat did extensive damage to the fixed wing UAV fuselage and melted a light fixture diffuser. Also black	\$23,000

Table 2. Summary of Fire Damage Incidents

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		soot was deposited throughout the trailer as a result of the melted plastics from the event. The trailer was located adjacent to the UAV runway. No personnel witnessed the event, and no personnel were injured.	
Fire/Smoke (Building)	CH/ANL	The fire originated from the failure of a heater control system for an experiment that resulted in overheating of oil used in the experiment and the melting of its plastic container. A fire extinguisher was used by a fire department officer to extinguish the fire. The officer suffered breathing problems because he was not using an air pack and inhaled smoke and products of combustion. Fire damage was limited to the experiment cabinet with no fire damage to the room or surroundings.	\$22,000
Fire/Smoke (Building)	KSO/KCP	While grinding circuit boards consisting of plastic and metal components the exhaust system became clogged and a small dust deflagration occurred with an ensuing fire located with in the grinder and duct work. Fire was extinguished using ABC fire extinguisher and water. Kansas City, MO Fire Department responded to provide assistance and back up support.	\$14,700
Fire/Smoke (Building)	OR/ORNL	On November 30, fire alarm master box #152 received from Building 2525. All units responded. Command established on the north side. Upon arrival, an employee working in West section of the facility informed the Incident Commander that there was smoke coming from a room near the south center portion of the building and that all other employees (six) working in the facility had evacuated and were in Building 2518. Water was flowing from the sprinkler system drain. The entry team advanced a hose line to the area that smoke was visible. Room 124A was checked and found water on the floor but no visible smoke and/or fire. Entry team continued a search to Room 124B and found that a sprinkler head was flowing water and the fire was contained to Room 124B. A small fire was visible on the floor under the desk top. The attack line was advanced into the room and the fire was completely extinguished. Once the fire was out the thermal imaging camera was used to check for hot spots. Elevated temperatures were found on the south wall of the adjoining office. The entry team returned to Room 124B and removed sheetrock below and above the desk to confirm there was no fire extension. Ventilation fans were set up to remove smoke from within the building. Overhaul of the room was initiated and debris was placed in a large trash container and moved outside, south side.	\$10,000
Fire/Smoke (Building)	OR/ORNL	On February 24, the ORNL Fire Department responded to a report of smoke coming from a Building 7078 office trailer. Upon arrival smoke was seen from the west end of the trailer. Emergency crews donned full turn out gear. A water supply was established using two 3-inch supply lines from a hydrant to Engine 1. Emergency crews entered the facility with a charged line and with a backup team in place. Pump operator used water from pre-piped deck gun on Engine 1 to protect nearby exposures. Fire was found in the attic above the finished	\$10,000

Table 2. Summary of Fire Damage Incidents

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		ceiling. The sprinkler system did not activate. Sprinkler piping and sprinkler heads were installed below the finished ceiling and not in the concealed space where the fire was located. Fire Attack crew entered the men's restroom on the west end of the trailer, forced entry into the attic space and extinguished the fire. Fire controlled at approximately 1430 hrs. Power was secured to the facility using Shift E-Squad personnel and Electrical Utility Operations. IC initiated mutual aid support which was provided by Y-12. Off-duty FD personnel initiated to cover balance of plant. Overhaul was conducted, salvage tarps were used to cover furniture in the conference room area, and the thermal imager was used to check the area for hot spots. No hot spots were found. Water was used to saturate the insulation in the attic over the conference room. Command was terminated 1640 hrs. A Fire Watch was established at the facility until 2400 hrs with two hour checks to continue at the discretion of the officer in charge. Facility Management on the scene with Bechtel Jacobs Company, LLC Fire Protection representative. Facility turned over to Facility Management for fire origin and cause investigation.	
Fire/Smoke (Building)	FETC/LANL	An employee at LANL TA-3-261 Otowi placed a plastic mug in a microwave to re-heat it that ignited a fire. The employee called 911, and another employee activated fire alarm, thus evacuating the facility. FD responded and extinguished the fire with a portable fire extinguisher, and vented smoke from the area by breaking an exterior window. Fire/smoke damage to microwave, carpet, several office cubicles, replace window, and clean-up of smoke and dry chemical residue was required. Loss of work time for clean-up was not calculated.	\$10,000
Fire/Smoke (Building)	OR/ORNL	On August 24, the ORNL Fire Department responded to a VESDA smoke detector and manual pull station activation in Building 8300 at the Spallation Neutron Source site. Upon arrival, facility personnel reported that there had been a small fire in a modulator and that they had extinguished the fire with a 10-pound multi-purpose fire extinguisher and then pulled the manual pull station. Upon arrival, facility personnel reported to the Command Post and advised Command they had lost a modulator in the west end of Building 8300. The entry team made first entry and found a moderate amount of smoke coming from one modulator and around a blue transformer directly behind the modulator, but no fire was showing, only moderate smoke. Also a small amount of liquid had leaked from the modulator. Further investigation and dismantling of the equipment revealed a small fire inside the modulator that was extinguished with three portable fire extinguishers. Once the fire was extinguished, the facility was ventilated and turned back over to facility management for recovery.	\$7,500
Fire/Smoke (Building)	PSO/PAN	On 12/4, at approximately 0930 hours, the Aramark cafeteria crew observed smoke coming from the grill located on the east side of the 12-70 cafeteria. After seeing smoke but no flame, one of the workers	\$7,500

Table 2. Summary of Fire Damage Incidents

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		pulled the wet chemical fire suppression system manual release. Upon arrival of the Pantex Fire Department, FD personnel smelled smoke, but did not see any fire. After further investigation a small grease fire was observed inside and underneath the grill. This small grease fire was extinguished by the PFXD with a Class K fire extinguisher located on the wall adjacent to the grill.	
Fire/Smoke (Building)	OR/ORNL	On November 10, the ORNL Fire Department responded to a supervisor fire alarm condition from Building 8300 at the Spallation Neutron Source site. While responding, the VESDA smoke detection system elevated from an Alert Supervisor condition to an Action Fire Alarm condition. The assignment was upgraded to an emergency response. Upon arrival Fire Department personnel found moderate smoke in the general area of an electrical modulator with fire contained inside the modulator. Fire Department personnel made entry into the facility after consulting with facility personnel, located the affected modulator, de-energized the modulator, and activated the manually activated local application fixed Carbon Dioxide fire extinguishing system.	\$7,500
Fire/Smoke (Building)	OR/ORNL	On December 14, the ORNL Fire Department responded to a VESDA Alert Supervisor Alarm from Building 8300 at the Spallation Neutron Source site. While responding, the condition escalated to a VESDA Fire Alarm condition. The Fire Department assignment was upgraded to emergency. Upon arrival facility personnel indicated that there was an event in one of the modulators and that there was no fire. The modulator was de-energized and the manually activated local application carbon dioxide system was discharged as a precaution. Fire Department personnel investigated the modulator, declared the scene safe, and returned responsibility of the facility and equipment to the facility manager.	\$7,500

4. WATER-BASED AUTOMATIC SUPPRESSION SYSTEM PERFORMANCE

A total of 12 incidents were reported where water-based suppression systems operated in CY 2007. System actuations are broken down as follows: (1) Dry-pipe; (7) Wet-pipe; and (2) Deluge and (2) Preaction. Of these, two actuations were directly caused by fire. Causes for the remaining system actuations are as follows: design/material related (3), weather related (6) and unspecified (1).

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

Table 3: Water-Based System Actuations

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Fire/Smoke (Building)	OR/ORNL	Fire alarm master box #152 received from Building 2525. All units responded. Command established on the north side. Upon arrival, an employee working in West section of the facility informed the Officer in Charge that there was smoke coming from a room near the south center portion of the building and that all other employees (six) working in the facility had evacuated and were in Building 2518. Water was flowing from the sprinkler system drain. The entry team advanced a hose line to the area that smoke was visible. Room 124A was checked and found water on the floor but no visible smoke and/or fire. Entry team continued search to Room 124B and found that a sprinkler head was flowing water and the fire was contained to Room 124B). A small fire was visible on the floor under the desk top. The attack line was advanced into the room and the fire was completely extinguished. Once the fire was out the thermal imaging camera was used to check for hot spots. Elevated temperatures were found on the south wall of the adjoining office. The entry team returned to Room 124B and removed sheetrock below and above the desk to confirm there was no fire extension. Ventilation fans were set up to remove smoke from within the building. Overhaul of the room was initiated and debris was placed in a large trash container and moved outside, south side.	\$10,000
Fire/Smoke (Other)	LASO/LANL	LANL TA-15-494 AROE improperly configured HVAC fresh air intake allowed cold into server room. Freeze damage to a sprinkler head allowed slow leak, misting and freezing of released water, and water damage to server equipment. Flow rate insufficient to actuate flow switch. Server equipment dried to extent possible. One server rack required replacement for return to service.	\$7,500
Leaks, Spills, Releases	SSO/SNL-AL	On 12/28, at approximately 1600 hours a pilot head for the deluge fire protection sprinkler system in building 9967 at SNL-NM failed causing an activation of the deluge system. The cause of the failure was due to a power failure creating freezing conditions in the facility. No damage was reported. Approximately 20 man hours were required to complete repairs and return the system to service.	\$820
Leaks, Spills, Releases	SSO/SNL-AL	On 12/29, at approximately 1340 hours, a frozen fire protection sprinkler failed in the west penthouse of building 893. Building 893 is in the abatement stage of decontamination and decommissioning	\$620

Table 3: Water-Based System Actuations

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		and is equipped with temporary heat except for the penthouse and a couple of the attached portions of the building. The penthouse has a floor drain that managed all of the water. No damage was reported. Approximately 15 man hours were required to complete the repairs and return the system to service.	
Leaks, Spills, Releases	SSO/SNL-AL	On 12/29, at approximately 1220 hours, an inspectors test valve failed in the chemical dispense room of 858N causing an activation of the Fire Cycle automatic sprinkler system. The cause of the failure was due to an improperly sealed door creating freezing conditions in the facility. No damage was reported. Approximately 7.5 man hours were required to complete the repairs and return the system to service.	\$320
Leaks, Spills, Releases	SNR/KS	Frozen sprinkler on a Dry Pipe Sprinkler system.	\$0
Leaks, Spills, Releases	PSO/PAN	Broken sprinkler.	\$0
Leaks, Spills, Releases	PSO/PAN	Broken sprinkler.	\$0
Leaks, Spills, Releases	KSO/KCP	Due to pipe corrosion, a hole developed in the water pipe of the pre-action dry-pipe system, allowing a loss of air pressure and system activation.	\$0
Leaks, Spills, Releases	KSO/KCP	Outside dry pipe system froze, rupturing a 2" drain line.	\$0
Leaks, Spills, Releases	YSO/Y-12	Deluge system actuated due to an air leak in the detection system.	\$0
Leaks, Spills, Releases	YSO/Y-12	Frozen sprinkler system due to loss of building heat.	\$0

There are a total of 249 incidents in DOE records where water-based extinguishing systems operated in a fire. The satisfactory rate of performance is 98.8 percent, or 246 times out of 249 incidents. In CY 2007, the DOE experienced a situation where sprinklers were installed, but did not operate in a fire. This event occurred when a fire in a trailer having an installed sprinkler system entered the combustible concealed space. Two other failures during a fire were attributed to a closed cold weather valve controlling a single sprinkler in a wood dust collector (1958); and a deluge system failure due to a hung-up trip weight in a 1963 transformer explosion.

From the above history, DOE has experienced 120 fires that were either controlled or extinguished by the wet-pipe type of automatic suppression system. Table 4 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 four or fewer sprinklers activating; 92 percent were controlled with three or fewer 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 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 apply this performance metric to other design aspects, such as sprinkler system water containment, since no specific design criteria exists 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 Events	Cumulative Percentage of Events
1	85	85	71	72
2	19	104	16	88
3	6	110	5	92
4	4	114	3	95
5	2	116	2	97
6	1	117	1	98
7	2	119	2	99
8	0	119	0	99
9+	1	120	1	100

5. 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 U.S. 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 2007, the DOE retained 249 Halon 1301 systems in operation containing approximately 79,463 pounds of agent. Stored Halon 1301 inventory was reported at approximately 47,203 pounds. Operational and stored inventory amounts for the Halon 1211 were reported at 21,063 and 48,941 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 six incidents were reported at DOE where Halon 1301 or other non-water based suppression systems operated in CY 2007. Of these, three release events were directly caused by a fire (two manual, one automatic) and no sites reported any system failures during a fire. Additionally, approximately 390 pounds of Halon 1301 were released to the environment. Non-water-based system activations of interest are listed in Table 5:

Table 5: Non-Water-Based System Actuations

LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
Leaks, Spills, Releases	SSO/SNL-AL	A CO2 system Bldg. 858N discharged on the Verteq benches WB17 and WB18 that was caused by a faulty fire suppression unit controller.	\$12,069
Fire/Smoke (Building)	OR/ORNL	On November 10, the ORNL Fire Department responded to a supervisor fire alarm condition from Building 8300 at the Spallation Neutron Source site. While responding, the VESDA smoke detection system elevated from an Alert Supervisor condition to an Action Fire Alarm condition. The assignment was upgraded to an emergency response. Upon arrival Fire Department personnel found moderate smoke in the general area of an electrical modulator with fire contained inside the modulator. Fire Department personnel made entry into the facility after consulting with facility personnel, located the affected modulator, de-energized the modulator, and activated	\$7,500

Table 5: Non-Water-Based System Actuations

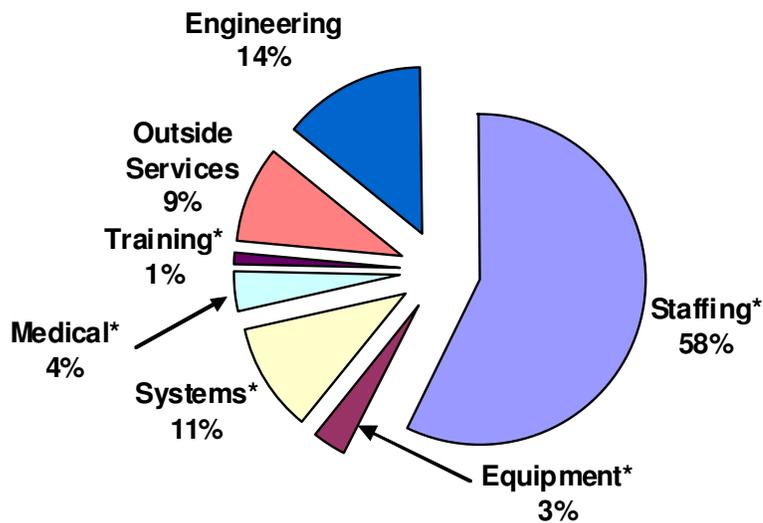
LOSS TYPE	LOCATION	DESCRIPTION	DOLLAR LOSS
		the manually activated local application fixed Carbon Dioxide fire extinguishing system.	
Fire/Smoke (Building)	OR/ORNL	On December 14, the ORNL Fire Department responded to a VESDA Alert Supervisor Alarm from Building 8300 at the Spallation Neutron Source site. While responding, the condition escalated to a VESDA Fire Alarm condition. The Fire Department assignment was upgraded to emergency. Upon arrival facility personnel indicated that there was an event in one of the modulators and that there was no fire. The modulator was de-energized and the manually activated local application carbon dioxide system was discharged as a precaution. Fire Department personnel investigated the modulator, declared the scene safe, and returned responsibility of the facility and equipment to the facility manager.	\$7,500
Fire/Smoke (Building)	PSO/PAN	On 12/4, at approximately 0930, the Aramark cafeteria crew observed smoke coming from the grill located on the east side of the 12-70 cafeteria. After seeing smoke but no flame, one of the workers pulled the wet chemical fire suppression system manual release. Upon arrival of the PXXFD, fire department personnel smelled smoke, but did not see any fire. After further investigation a small grease fire was observed inside and underneath the grill. This small grease fire was extinguished by the PXXFD with a Class K fire extinguisher that was located on the wall adjacent to the grill.	\$7,500
Leaks, Spills, Releases	SSO/SNL-AL	At approximately 0605 hours on 7/12, a fire alarm system was activated and released the Halon fire suppression agent (390 pounds of Halon #1301) in Room 117 of Building 981. The building was evacuated. Investigation into the incident identified that a roof top air conditioning unit (RTU) motor overheated. The motor overload protection failed in the closed position which allowed the motor to continue running and overheat. The function of the overloads is to open the motor circuit shutting down the motor in an over load condition. The heat created by the motor caused the insulating varnish on the motor windings to smoke. The smoke entered the room through the duct, activated the smoke detection system, and released the Halon fire suppression agent. The Halon system is being replaced by a water-based suppression system.	\$6,650
Leaks, Spills, Releases	PSO/PAN	Dry Chemical Release due to power outage.	\$0

6. RECURRING FIRE PROTECTION PROGRAM COSTS

Yearly or recurring fire protection costs for CY 2007 reached \$167,641,740 for the DOE Complex. On a ratio of cost to replacement property value (recurring cost rate), the DOE spent approximately 24.9 cents per \$100 property value for recurring fire protection activities.

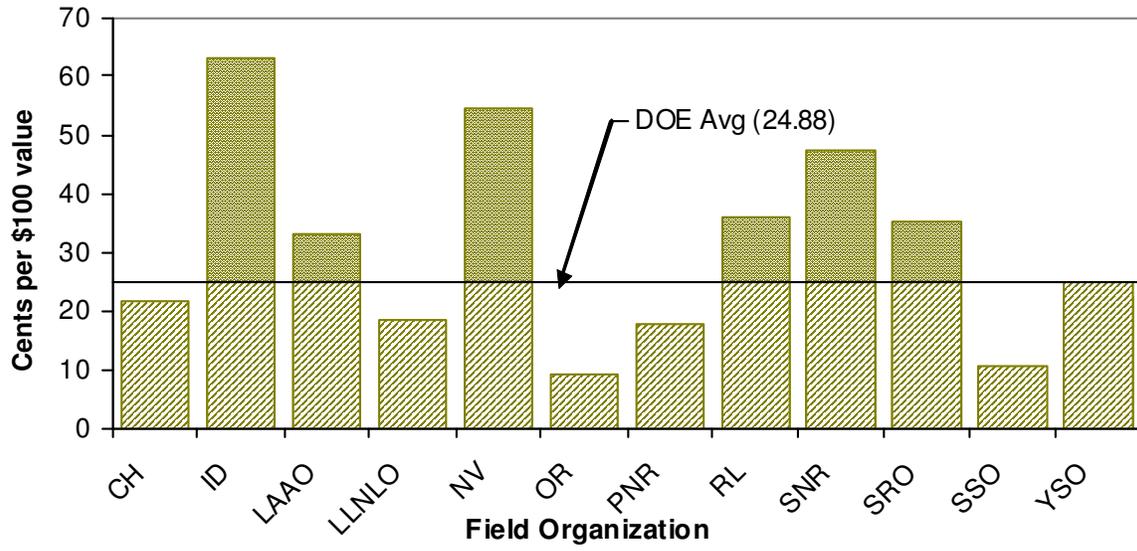
Figure 6 shows the CY 2007 recurring cost distribution by activity. Figure 7 lists the recurring cost rate by DOE field organizations. It should be noted that not all recurring cost activities were consistently reported, such as outside contracts and maintenance activities. Additionally, sites that did not report recurring costs this calendar year (e.g., Brookhaven National Laboratory, Waste Isolation Pilot Plant) had their costs carried forward from the past reporting period to maintain the validity of the statistic.

Figure 6. Recurring Fire Protection Cost Distribution



* Fire Department Activities

Figure 7. Cost Rate by Operations Office



7. FIRE DEPARTMENT ACTIVITIES

Number of Responses

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

Fire	737
Hazardous Materials	403
Other Emergency	4,097
Other Non-Emergency	2,791
Medical	1,816
Total	9,844

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.

Major Equipment Purchases

Table 6 provides a list of major fire protection equipment purchases at some of DOE's major sites during CY 2007.

Table 6: Major Equipment Purchases

LOCATION	DESCRIPTION	DOLLAR COST
RL/HAN	Replacement of 65-ft Aerial	742,000
PSO/PAN	Wildland vehicles	410,921
NV/NTS	(2) Type 1 Ambulances	150,000
NV/NTS	(2) type V1 Wild-land Engines	150,000
SNR/KAPL	ESS Turnout Gear	43,000
SNR/KAPL	Haz-Mat Trailer	7,000
PNR/BAPL	PPE, Nozzels, Attack Line Hose	5,251
RL/HAN	Rescue 93	649
RL/HAN	Replacement of 65-ft Aerial	742,000
PSO/PAN	Wildland vehicles	410,921
NV/NTS	(2) Type 1 Ambulances	150,000

Fire Protection Summary for Calendar Year 2007

Notable Response Descriptions

Table 7 provides data on notable onsite fire responses, such as mutual aid responses, that are not already included in this Report:

Table 7: Notable Responses

LOCATION	DATE	DESCRIPTION
YSO/Y-12	5/1/07	Cooling Tower 9409-24E was under refurbishment with deluge sprinkler locked out for modifications. Cooling towers wooden structure burned with 4- to 6-foot flames.
CH/PPPL	12/31/07	During CY 2007, 124 mutual aid responses were accomplished.
ID/INL	7/7/07	A single juniper was ignited by lightning.
ID/INL	7/20/07	A 13-acre human cause fire was extinguished by INL and BLM wildland firefighters.
ID/INL	8/1/07	A small wildland fire occurred due to a blown tire.
ID/INL	8/13/07	A small 4-acre fire occurred near highway 20, possibly due to human causes.
ID/INL	8/16/07	A small 1.5-acre wildland fire occurred north of highway 20/26.
ID/INL	8/17/07	A 1.25-acre wildland fire occurred in Kyle canyon area.
ID/INL	8/20/07	A 50-acre fire occurred near Jefferson Avenue, suspect human caused.
ID/INL	5/31/07	A 5-acre wildland fire occurred along highway 20/26.
ID/INL	7/3/07	A vehicle catalytic converter started a small wildland fire (300 sq.ft.).
ID/INL	7/7/07	A 4-acre, lightning started, wildland fire occurred near East Butte.
PSO/PAN	3/2/07	Small grass fire at the burning grounds - fire started from normal burning and was easily contained to the center of the burning grounds.
PSO/PAN	12/4/07	Small grease fire in cafeteria, extinguished with a portable class K extinguisher.
CH/LBL	3/12/07	Private vehicle had fire in the engine compartment in the cafeteria parking lot.
CH/LBL	8/27/07	Overheated private vehicle fire occurred near main entrance to Lab at Blackberry Gate.
RL/HAN	7/13/07	The Hanford Fire Department responded to a grass fire south of the 100F Area. The fire was determined to be caused by a lightning strike. The fire was approximately 1 acre in size and did not threaten any facility or radiological/hazardous material areas. The fire was contained and there were no personnel injuries. EM-RL-PHMC-FSS-2007-0006
RL/HAN	7/19/07	The Hanford Fire Department responded to and extinguished a grass fire, approximately 25 acres in size, on the Hanford Site near the 100K Area. The fire was initially believed to have been caused by a lightning strike; however, further investigation identified failed jumper mounting bolts on an adjacent 230kV transmission tower as a possible ignition source. Upon determination that the transmission tower may have contributed to the incident, the 230kV transmission line was de-energized and removed from service. The line was energized following successful completion of tower repairs. In addition, further inspections of the transmission towers and hardware in the immediate vicinity were made with no other deficiencies noted. EM-RL--PHMC-FSS-2007-0007
RL/HAN	8/13/07	The Hanford Fire Department, along with personnel and equipment from other fire departments per mutual aid agreements, responded to a report of a wildland fire on State Route 240 between mile posts 17 and 18. The fire was burning on US Fish and Wildlife property on Fitzner Arid Lands Reserve of the Hanford Reach National Monument. The fire burned an area of approximately 8,000 acres prior to being extinguished. There were no injuries reported, though two HFD brush trucks suffered damage. The cause of fire is under investigation. EM-RL--PHMC-FSS-2007-0009
RL/HAN	8/16/07	At approximately 1630 hours on 8/16/07, the DOE activated the Hanford Emergency Operations Center due to a large and fast moving fire that crossed State Route 240 and moved onto the Hanford Site. The Wautoma Fire originated about 12 miles west of the

Fire Protection Summary for Calendar Year 2007

Hanford Site. The combined environmental conditions of ambient fuel, high temperature, low humidity, and strong gusting winds overcame efforts at containment before the fire reached Hanford. DOE partnered with the U.S. Fish and Wildlife Service to fight the fire. The fire burned 9,559 acres on the Hanford Site, 46,844 acres on the ALE Reserve, and 8,221 acres offsite - a total of 64,624 acres. No facilities were affected. Sampling from multiple sites reveals no release of radioactive contamination. EM-RL--PHMC-FSS-2007-0010

YSO/Y-12	5/1/07	Cooling Tower 9409-24E was under refurbishment with deluge sprinkler locked out for modifications. Cooling towers wooden structure burned with four to six feet flames.
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8. SUMMARY

This annual fire protection program summary provides useful information to evaluate the effectiveness of DOE fire protection program. The following are highlights from this report.

In 2007, DOE experienced no fatalities or major injuries from fire in CY 2007. There was however, a significant accident during a response to a wildland fire at the Idaho National Laboratory when firefighters contacted overhead electrical transmission lines. Fortunately the firefighters only experienced minor injuries. Ninety-one fire events were reported during 2007 causing an estimated \$1 million in property damage and about \$650 thousand in fire response (primary wildland fire response) cost. About 75 percent of losses are attributed to five incidents. DOE's fire loss rate in 2007 was approximately 0.25 cents for each \$100 in property value which is 0.10 cents more than the 2006 rate. In CY 2007, three fires were successfully controlled by automatic fire suppression systems (two sprinklers and one wet chemical). However, there was an inadvertent actuation of 13 systems, primarily due to 6 weather-related events.

In CY 2007, DOE had about 9,800 fire department responses with the majority being for medical or other non-fire emergencies. About 750 of the fire department responses were fire responses. Recurring costs for fire protection was about \$168 million in CY 2007 which is approximately \$3 million more than what was spent in CY 2006. On a ratio of cost to total property value, the DOE spent approximately 24.9 cents per \$100 in property value for recurring fire protection activities.

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 Mark Petts at 202-586-5486 or mark.petts@hq.doe.gov if you have any suggestions for improving this reporting process.

APPENDIX 1 – ACRONYMS

ANL	Argonne National Laboratory	PAN	Pantex Site
BAPL	Bettis Atomic Power Laboratory	PPPL	Princeton Plasma Physics Laboratory
BC	Battalion Chief	PSO	Pantex Site Office
BLM	Bureau of Land Management	PXFD	Pantex Fire Department
BNL	Brookhaven National Laboratory		
CH	Chicago Operations Office	SNL-AL	Sandia National Laboratories, Albuquerque
CY	Calendar Year	SNR	Schenectady Naval Reactors Office
DOE	U.S. Department of Energy	SRO	Savannah River Field Office
		SRS	Savannah River Site
		SSO	Sandia Site Office
ETTP	East Tennessee Technology Park	UAV	Unmanned Aerial Vehicle
FD	Fire Department	VESDA	Very Early Smoke Detection Apparatus
FETC	Federal Energy Technology Center	WIPP	Waste Isolation Pilot Plant
HAN	Hanford Site ¹	WLU	Wildland Unit
HQ	DOE Headquarters	Y-12	Y-12 Plant
HSS	Office of Health, Safety and Security	YMP	Yucca Mountain Project
HVAC	Heating, Ventilation and Air Conditioning	YSO	Y-12 Site Office
IC	Incident Commander		
ID	Idaho Operations Office		
INL	Idaho National Laboratory		
KAPL	Knolls Atomic Power Laboratory		
KCP	Kansas City Plant		
KS	Kansas City Site Operations		
KSO	Kesserling Site		
LANL	Los Alamos National Laboratory		
LASO	Los Alamos Site Office		
LBL	Lawrence Berkeley National Laboratory		
NV	Nevada Site Office		
NTS	Nevada Test Site ²		
OR	Oak Ridge Operations Office		
ORNL	Oak Ridge National Laboratories		
OSHA	Occupational Safety & Health Administration		

¹ Hanford Site includes the Pacific Northwest National Laboratory.

² 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.

APPENDIX 2 - 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.

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)

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)

Loss Rate: Unit of comparison in cents loss per \$100 of property value.

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)