

SUMMARY OF FIRE PROTECTION PROGRAMS FOR CALENDAR YEAR 1996



UNITED STATES DEPARTMENT OF ENERGY

OFFICE OF WORKER HEALTH AND SAFETY

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TABLE OF CONTENTS

FOREWORD ii

GLOSSARY iii

DEFINITIONS v

EXECUTIVE SUMMARY..... 1

DOE FIRE LOSS STATISTICS2

SIGNIFICANT FIRE LOSS DATA8

WATER-BASED AUTOMATIC SUPPRESSION SYSTEM PERFORMANCE9

RECURRING FIRE PROTECTION PROGRAM COSTS13

FIRE DEPARTMENT RESPONSES.....14

CONCLUSION.....15

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 summary has been submitted from each field organization under the requirements of DOE's predecessor agencies: the Atomic Energy Commission (AEC) and the Energy Research Development Administration (ERDA). The Summary is currently required in section 5a.(8) of DOE Order 231.1, "Environment, Safety and Health Reporting" which recently replaced DOE 5484.1, "Environmental Protection, Safety and Health Protection Information Reporting Requirements".

Beginning in 1981, all individual accident reports required by DOE Order 5484.1 have been compiled within the Computerized Accident Incident Reporting System (CAIRS). Each quarter, CAIRS issues the Occupational Injury and Property Damage Summary which statistically reports on DOE loss topics such as: fatalities, injuries, illnesses, fire, and nonfire losses. The Annual Fire Protection Program Summary (Annual Summary) is compiled from field organization annual reports and includes a more comprehensive look at the DOE fire protection program. Fire loss statistics are provided, as are reports on a broad range of fire protection activities including: automatic suppression system performance, fire department responses, and the recurring cost of fire protection at DOE. Fire loss statistics from the Annual Summary are also validated with the CAIRS fire loss reports, and trended against the CAIRS nonfire loss data. Discrepancies with either fire loss statistic are investigated and corrected as necessary.

The report for calendar year (CY) 1996 was summarized from information sent to Headquarters by 22 out of 27 field organizations representing approximately 95 percent of DOE's holdings. For comparison purposes, field offices are arranged according to the CAIRS reporting format, with a total of 20 categories represented. Abbreviations are identified in the Glossary, as are the DOE site and management and operations (M&O) contractors and major definitions.

GLOSSARY

Field organization abbreviations:

AL	Albuquerque Operations
CH	Chicago Operations
ETC	Energy Technology Centers ¹
HQ	Headquarters (DOE)
ID	Idaho Operations
NPR	Naval Petroleum Reserves ²
NV	Nevada Operations
OK	Oakland Operations (San Francisco)
OFO	Ohio Field Office
OR	Oak Ridge Operations
PA	Power Administrations ³
PNR	Pittsburgh Naval Reactors Office
RF	Rocky Flats Operations
RL	Richland Operations
SNR	Schenectady Naval Reactors Office
SPR	Strategic Petroleum Reserves
SR	Savannah River Operations
SSC	Superconducting Super Collider Project
YM	Yucca Mountain Site Characterization Project Office

Site or M&O contractor abbreviations:

BAPL	Bettis Atomic Power Laboratory
ANL-W	Argonne National Laboratory, West

¹ Energy Technology Center organizations are comprised of: the Bartlesville Project Office (BPO); the Pittsburgh Energy Technology Center (PETC); and the Morgantown Energy Technology Center (METC).

² Naval Petroleum Reserve organizations are comprised of: the Naval Petroleum Reserves in California (NPR-1), and the Naval Petroleum & Oil Shale Reserves in CO, UT, and WY (NPR-2,3).

³ Power Administration organizations are comprised of: the Alaska Power Administration (APA); the Bonneville Power Administration (BPA); Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA); and the Western Area Power Administration (WAPA).

BM	Bryan Mound Crude Oil Storage Site
BNL	Brookhaven National Laboratory
ETEC	Energy Technology Engineering Center
FA	Fermi National Accelerator Laboratory
FEN	Fernald Site
HAN	Hanford Site
INEL	Idaho National Engineering Laboratory
ITRI	Inhalation Toxicology Research Institute
K-25	Oak Ridge's K-25 Site
KAPL	Knolls Atomic Power Laboratory
KCP	Kansas City Plant
KSO	Kesserling Site
LANL	Los Alamos National Laboratories
LLNL	Lawrence Livermore National Laboratories
MB	Mound Site
NRF	Naval Reactor Facilities
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratories
PAN	Pantex Site
PGDP	Paducah Gaseous Diffusion Plant ⁴
PI	Pinellas Site
PNL	Pacific Northwest Laboratory
POR	Portsmouth Gaseous Diffusion Plant ⁴
PPPL	Princeton Plasma Physics Laboratory
ROSS	Ross Aviation, Inc.
SLAC	Stanford Linear Accelerator Center
SNLA	Sandia National Laboratories, Albuquerque
SNLL	Sandia National Laboratories, Livermore
SRS	Savannah River Site
WH	West Hackenberry
WI	Weeks Island Site
WS	Windsor Site
Y-12	Oak Ridge's Y-12 Plant

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

DOE field organization (abr.)/site or M&O contractor (abr.)
Example: AL/LANL

⁴ On July 1, 1993, a lease agreement took effect between the DOE and the United States Enrichment Corporation (USEC) essentially transferring all ownership responsibilities to USEC.

DEFINITIONS

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

1. **Property Value:** The approximate replacement value of all DOE-owned buildings and equipment. Include the cost of all DOE-owned supplies and average inventory of all source and special nuclear materials. Exclude 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 done in fact. Estimate includes: (1) any necessary nuclear decontamination; (2) restoration in areas that received water or smoke damage, (3) any reductions for salvage value, and (4) any lost revenue experienced as a result of the accident. Estimate excludes: (1) down time; and (2) any outside agency payments. Losses sustained on private property is not reportable, even if DOE is liable for damage and loss consequences resulting from the occurrence. Categorization of occurrences shall be by fire loss and nonfire 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)
4. **Nonfire Loss:** All damage or loss sustained as a consequence of the following events: (1) explosions; (2) natural cause events (such as earthquakes and hurricanes); (3) electrical malfunctions; (4) transportation (cargo) losses; (5) mechanical malfunctions; (6) radiation releases or other nuclear accidents; and (7) miscellaneous accidents (such as thermal, chemical or corrosion-related accidents). (CHAPTER 4.2.c, DOE 5484.1)
5. **Loss Rate:** Unit of comparison in cents loss per \$100 of property value.

EXECUTIVE SUMMARY

DOE experienced no fatalities or major injuries caused by fire in CY 1996. There were however, 80 fire incidents during this period amounting to \$2,370,351 in property damage. These losses are approximately 1.6 million higher than CY 1995, with 85 percent of the cost attributed to 5 incidents. Comparing fire loss to past DOE and private industry experience is performed by normalizing data against total property value. Doe's assets decreased by 6 percent in CY 96 to 113.7 Billion dollars resulting in a fire loss rate of approximately 0.21 cents for each \$100 property value. The above rate is ZZ higher than

If the DOE were to match its fire loss rate to that of the private sector, it would have to incur losses of over 3.4 million dollars to meet comparable industry losses for CY-1996.

DOE's success in reducing risk or incidence from fire to the public and its workers is attributed to the implementation and maintenance of a comprehensive fire protection program, which compares favorably with the best of class in the private sector. This program includes the adoption of a "defense in depth" fire safety philosophy; conformance with industry standards and DOE-specific fire safety criteria for design, construction, and operation of its facilities; fully capable site emergency response personnel; and qualified fire safety professionals.

Recurring costs for these fire protection activities reached 102 million dollars for the year, down 7.5 million over the previous year's figure. Approximately 66 percent of recurring costs are attributed to fire department staffing and system inspection activities, with the remaining amount spent on engineering fees and maintenance activities.

*During the year, one fire was controlled by an automatic wet pipe sprinkler system, continuing the DOE track record on sprinkler effectiveness at a 99 percent rate.

The effectiveness of these fixed suppression systems were, however, offset by the inadvertent actuation of 116 systems primarily due to frozen sprinkler systems. Also, concerns remain regarding inadvertent Halon discharges (18 of the above 116 events), which caused the release of approximately 2,684 pounds of Halon to the environment in CY 1995, though this number represents an 8 percent reduction in last year's figure. The DOE is committed to minimizing this ozone depleting substance through implementation of its recently developed managed halon phaseout guidelines.

Future activities of the DOE fire protection community center on reducing the incidence of fire risk at its sites, optimizing costs associated with fire protection, and providing support for mission advances within the Department.

DOE FIRE LOSS STATISTICS

DOE experienced no fire related fatalities in CY 1995, continuing a trend since the inception of the AEC in 1948. Three fire related injuries were identified at DOE due to maintenance, experimental or firefighting activities. These injuries were considered minor and unrelated, and represented no common root cause. All were analyzed and appropriate remedial action taken to avoid recurrence.

Property value estimates were taken from the CAIRS database to serve as a common denominator for comparing Annual Summary loss rates to the CAIRS Summary. CAIRS data shows that DOE property values dropped approximately 4.3 percent in CY 1995.

In all, 87 fire incidents were consistently reported by field organizations accounting for a total year-end fire loss of \$743,374. Field organizations did not consistently report the number of nonfire events, but did identify loss amounts totaling \$1,256,560.

DOE's fire loss rate for CY 1995, as summarized from field organization reports, is approximately 0.06 cents loss per \$100 value; a decrease of about 55 percent over last year's 0.11 cent figure. This statistic is 3.5 times lower than the 1987-1993 DOE average of 0.21, continuing the downward trend in fire loss rates over the previous year. In comparison, the loss rate average for the highly protected risk (HPR) insurance industry was about 0.30 cents per \$100 value⁵. This success is attributed to a conservative, yet flexible fire safety program, as well as the efforts of DOE's safety professionals in identifying and mitigating fire hazards before they result in a loss.

Table 1 characterizes Annual Summary loss histories since 1950 and includes both fire and nonfire loss rate categories. Numbers shown in parentheses represent a 5-year running average, where applicable. The accompanying figures provide a graphical representation of the Department's property valuation since 1950 (Figure 1); fire and nonfire loss data since 1950 (Figure 2); fire loss rates over a 13 year period (Figure 3); nonfire loss rates over the same time period (Figure 4); the current year's fire loss rate for Field organizations (Figure 5); and, the current year's nonfire loss rate for these sites. Sites that are not shown on these graphs 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 losses reported to the DOE. For example, the five largest fire incidents accounted for approximately 78 percent of the total loss category.

The largest fire and nonfire losses for the year are noted below:

⁵ Factory Mutual Research Corporation (FMRC) reports that the loss rate average is based on fire losses involving both sprinkler and nonsprinklered facilities within the HPR class of protection.

1. OK/ETEC - A small sodium leak caused a seven week delay at the Pump Test Facility. Property losses were estimated at \$3,500; business interruption losses were estimated at \$260,400. CAIRS and ORPS report numbers were not identified.
2. OFO/FEN - Tank over-pressured and collapsed while being filled with water. Loss estimated at \$393,000.

The CY 1995 CAIRS Summary reports that 13 fire incidents caused losses totaling \$163,064; approximately \$580,000 less than field reports. Of this difference, \$213,000 can be traced to two brush fire incidents, \$263,500 to a single incident involving business interruption costs, and the remaining discrepancy linked to 11 other incidents which were not incorporated into the CAIRS database. The CAIRS Summary also reports 60 nonfire incidents producing losses of \$869,206, approximately \$387,000 less than field reports. Of this difference, \$239,000 can be traced to a number of incidents at OK where a CAIRS report was not submitted.

This report has historically identified discrepancies between field reports and the CAIRS data. In many incidences, these discrepancies were traced to either delayed reporting, cost estimating differences, improper loss characterization, or a misinterpretation on the need to file a report at all. Since CAIRS loss statistics are often extracted for use in other documents such as reports to Congress, performance indicator studies, and media releases, a less than accurate reflection is the result. CAIRS administrators are addressing these issues by increased field training programs and by streamlining the CAIRS reporting process using state of the art electronic technology. A part of this technology includes developing a "seamless" approach using a library of definitions that allows reporting data to be related to a number of different reports.

Fire Protection Summary
For Calendar Year 1996

Table 1
DOE Loss History From 1950 To Present

Year	Property Value (Millions of Dollars)	Fire Loss (Dollars)	Nonfire Loss (Dollars)	LOSS RATES (cents per 100 Dollar Value)		
				Fire*	Non-Fire*	Total*
50	1800.00	486389	10050	2.70	0.06	2.76
51	2177.10	38318	317797	0.18	1.46	1.64
52	3055.10	449107	356600	1.47	1.17	2.64
53	4081.00	148142	427430	0.36	1.05	1.41
54	6095.90	185438	190436	0.30	0.31	0.61
55	6954.20	125685	330103	0.18 (1.00)	0.47 (0.81)	0.65 (1.81)
56	7364.10	2206478	940945	3.00 (0.50)	1.28 (0.89)	4.28 (1.39)
57	7973.20	590663	885936	0.74 (1.06)	1.11 (0.86)	1.85 (1.92)
58	8102.50	275560	476265	0.34 (0.92)	0.59 (0.84)	0.93 (1.76)
59	10301.80	199841	998060	0.19 (0.91)	0.97 (0.75)	1.16 (1.66)
60	10708.60	636228	764823	0.59 (0.89)	0.71 (0.88)	1.30 (1.77)
61	11929.90	325489	5530566	0.27 (0.97)	4.64 (0.93)	4.91 (1.90)
62	12108.80	3020023	293341	2.49 (0.43)	0.24 (1.60)	2.73 (2.03)
63	13288.90	599056	776998	0.45 (0.78)	0.58 (1.43)	1.03 (2.21)
64	14582.80	480519	870516	0.33 (0.80)	0.60 (1.43)	0.93 (2.23)
65	15679.30	1743448	2106621	1.11 (0.83)	1.34 (1.35)	2.45 (2.18)
66	16669.00	158220	698753	0.09 (0.93)	0.42 (1.48)	0.51 (2.41)
67	17450.90	359584	2423350	0.21 (0.89)	1.39 (0.64)	1.60 (1.53)
68	18611.90	155986	713097	0.08 (0.44)	0.38 (0.87)	0.46 (1.31)
69	20068.30	27144809	909525	13.53 (0.36)	0.45 (0.83)	13.98 (1.19)
70	22004.30	89456	1611336	0.04 (3.00)	0.73 (0.80)	0.77 (3.80)
71	24155.80	78483	1857566	0.03 (2.79)	0.77 (0.67)	0.80 (3.46)
72	26383.50	222590	698061	0.08 (2.78)	0.26 (0.74)	0.34 (3.52)
73	27166.70	117447	2258241	0.04 (2.75)	0.83 (0.52)	0.87 (3.27)
74	28255.50	249111	930766	0.09 (2.74)	0.33 (0.61)	0.42 (3.35)
75	31658.30	766868	4485481	0.24 (0.06)	1.42 (0.58)	1.66 (0.64)
76	35512.70	251849	2040727	0.07 (0.10)	0.57 (0.72)	0.64 (0.82)
77	39856.10	1084823	2529161	0.27 (0.10)	0.63 (0.68)	0.90 (0.78)
78	47027.10	12976036	4501943	2.76 (0.14)	0.96 (0.76)	3.72 (0.90)
79	50340.80	654716	1886307	0.13 (0.69)	0.37 (0.78)	0.50 (1.47)
80	54654.70	1385686	7160249	0.25 (0.69)	1.31 (0.79)	1.56 (1.48)
81	59988.80	2042633	2600855	0.34 (0.70)	0.43 (0.77)	0.77 (1.47)
82	65360.40	948691	3252277	0.15 (0.75)	0.50 (0.74)	0.65 (1.49)
83	70484.40	731234	9765828	0.10 (0.73)	1.39 (0.71)	1.49 (1.44)
84	82166.90	1549807	4917513	0.19 (0.19)	0.60 (0.80)	0.79 (0.99)
85	86321.84	1145975	2983322	0.13 (0.21)	0.35 (0.85)	0.48 (1.06)
86	82787.52	805030	4490262	0.10 (0.18)	0.54 (0.65)	0.64 (0.83)
87	91927.20	1570736	1440093	0.17 (0.13)	0.16 (0.68)	0.33 (0.81)
88	92998.00	466120	7837000	0.05 (0.14)	0.84 (0.61)	0.89 (0.75)
89	107948.00	615551	6890000	0.06 (0.13)	0.64 (0.50)	0.70 (0.63)
90	115076.00	8392746	9078000	0.73 (0.10)	0.79 (0.51)	1.52 (0.61)
91	119236.00	623940	2019000	0.05 (0.22)	0.17 (0.59)	0.22 (0.81)
92	119294.00	1260950	3647805	0.11 (0.21)	0.31 (0.52)	0.42 (0.73)
93	120733.88	781269	3193534	0.06 (0.20)	0.26 (0.55)	0.32 (0.75)
94	125733.88	1417138	2287372	0.11 (0.20)	0.18 (0.43)	0.29 (0.63)
95	120579.98	743374	1256560	0.06 (0.21)	0.10 (0.34)	0.16 (0.55)

Fire Protection Summary
For Calendar Year 1996

Year	Property Value	Fire Loss	Nonfire Loss	LOSS RATES (cents per 100 Dollar Value)		
96	113728.50	2370351	1486506	0.21 (0.08)	0.13 (0.20)	0.34 (0.28)

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

Figure 1

DOE Property Valuation

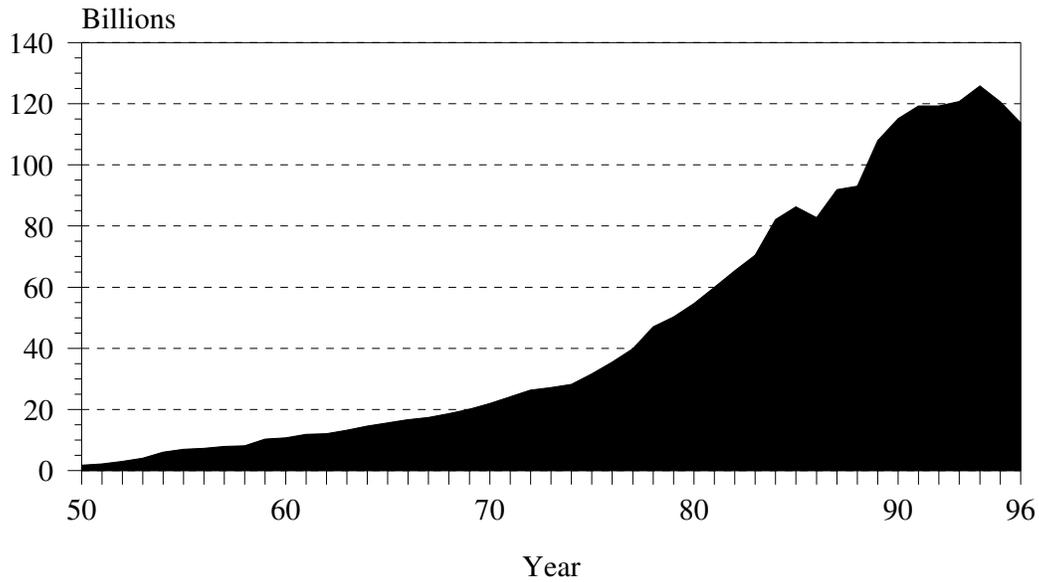


Figure 2

Property Loss

Fire Protection Summary
For Calendar Year 1996

