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THE 1969 ROCKY FLATS FIRE – WE SHOULD NOT FORGET

BRUCE CAMPBELL, FSFPE | **November 2022**

Outline

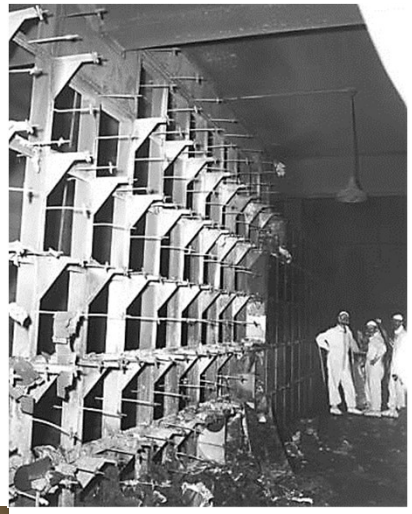
- Purpose
- 1957 Rocky Flats Fire
- Welding Fatality at K-25
- Gaseous Diffusion Plant Fire
- Paducah Chemical Fire
- Rocky Flats – Background
- 1969 Rocky Flats fire
- Conclusions
- Acknowledgements

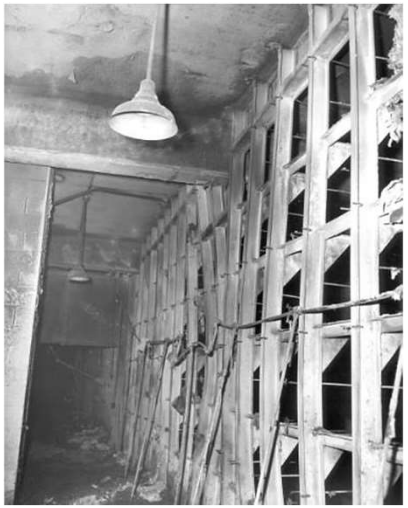
Purpose

- Provide brief examples of past DOE fires
- Provide an overview of the 1969 fire at the former Rocky Flats Plant.
- To ensure we don’t forget the lessons learned from these events

1957 Rocky Flats Fire

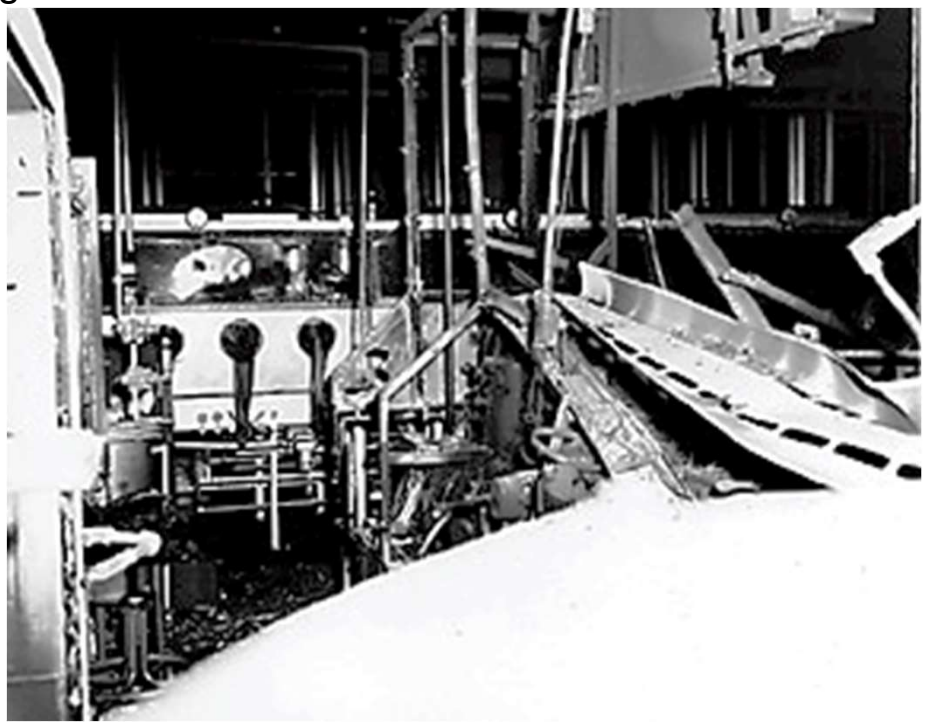
- Very serious plenum fire initiating in a glovebox on the floor below
- Gloveboxes are enclosures that are provided with robust exhaust ventilation that permit personnel to work and handle hazardous materials safely. Gloves are used to permit access to the material(s)
- Gloveboxes at the time were constructed of polymethyl methacrylate (Plexiglas)
- Ignited by spontaneous combustion of Pu metal
  - Spread to Plexiglas, gloves, filters, etc.
- Extinguished via hose lines





1957 Rocky Flats Fire

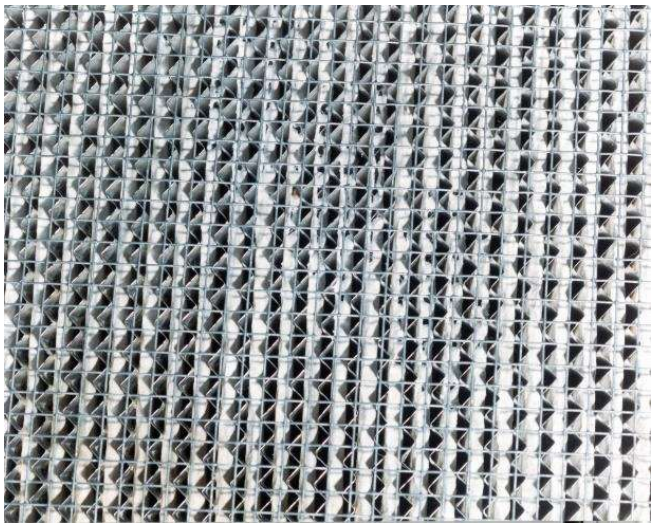
- Filters; “Flammable chemical warfare system (CWS) filters”
- Pu was likely released in the range of 4 to 25 grams
  - Could have been much worse
  - Most Pu did not reach the stack
    - Insufficient stack velocity for the Pu to be lofted
    - The building was static due to damage to the ventilation system



1957 Rocky Flats Fire

Fire suppression measures – post 1957 fire.

+ Use of glass-fiber filters in lieu of cellulose-asbestos filters.
+ Multiple stage filter plenums, minimum of 2-stages of High Efficient Particulate Air (HEPA) filtration.
+ Sprinklers were not widely considered at that point (due to nuclear criticality concerns), but sprinklers were considered for future construction on limited basis.



Welding Fatality at K-25

- March 11, 1997 – Oakridge, TN.
- Oakridge National Laboratory K-25 site.
- Work was being performed in high contamination zone – no dedicated fire watch was on duty.
- Welder unknowingly ignited his anti-contamination clothing – fully consumed in flames in < 3mins resulting in fatality.
- Anti-contamination outfit 100% cotton. Flame retardant version available, but not made mandatory.
- As a result of this incident, hot work programs were improved across the DOE complex.

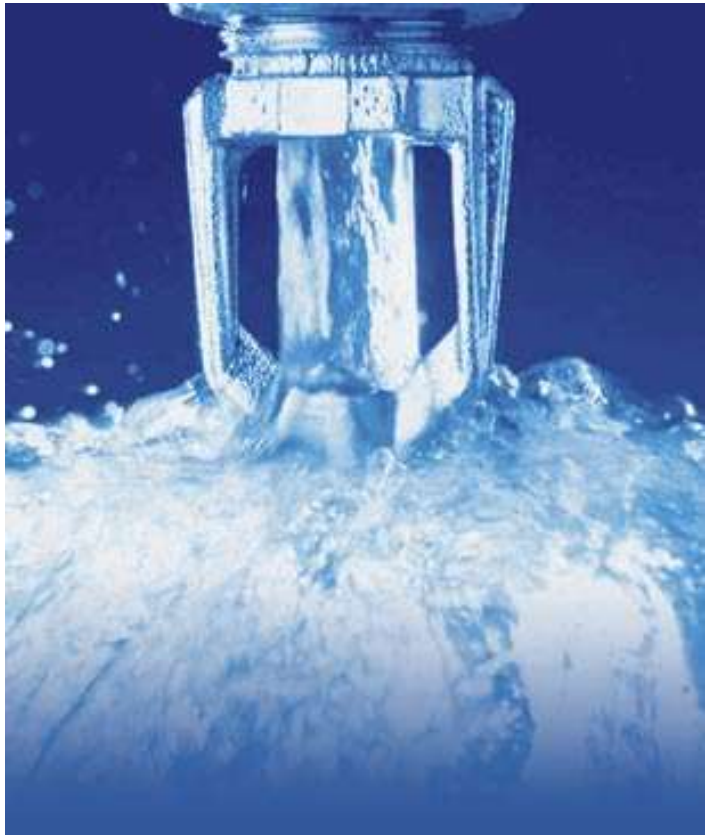
Gaseous Diffusion Plant Fire

- November 11, 1956 – Paducah, KY.
- Fire started from a compressor gas seal leak in one of the smaller buildings in the Paducah Gaseous Diffusion Plant.
- Building was unsprinklered.
- The fire ignited the underside of the roof, leading to the complete destruction of the 70,000 ft^2 roof.
- Despite limited damage to equipment, total cost was $2.1 million*.
- This incident led to increased sprinklerizations of AEC plants.

*$16.9 million in 2010

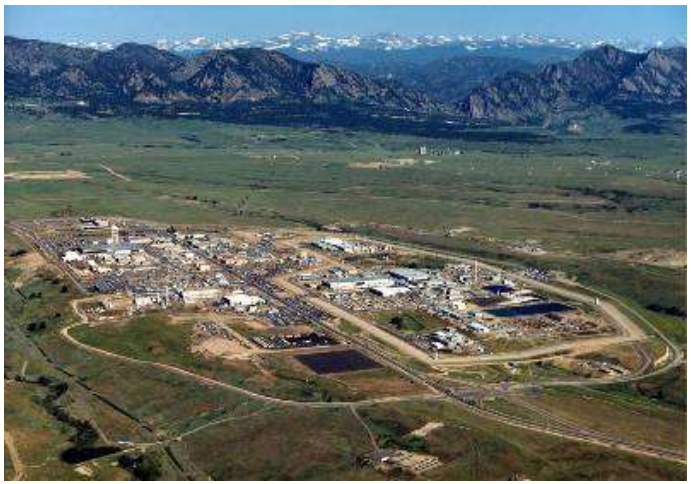
Paducah Chemical Fire

- December 13, 1962 – Paducah, KY.
- An explosion followed by a chemical fire occurred at the same Paducah Gaseous Diffusion Plant, but in a much larger building.
- While the sprinkler system effectively extinguished the fire, the steam that formed caused most of the 2,341 sprinkler heads to activate.
- Losses were reported at $2.9 million*. Had the sprinkler system not been in place, estimated damages ~$160 million**.
- The system supported a maximum flow rate of 40,000 gpm over 23 systems, consuming 2,800,000 gallons of water.



Rocky Flats – Background

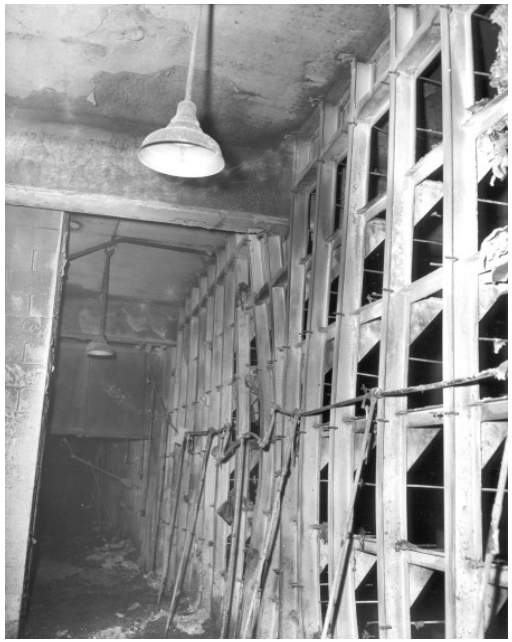
- Rocky Flats was a former nuclear weapons production facility.
- Previously manufactured various nuclear weapon components, including nuclear triggers; one of the key facilities within the DOE.
- Opened in 1953.
- 6,500 acres of which 375 acres was the main industrial secured zone.



All Courtesy RFETS/DOE

Background

- All facilities were demolished in late 2005, starting in mid 1990s.
- Largest D&D project in the nation, several billion dollars.
- Site of two significant nuclear fires, one in 1957 and the other in 1969.



All Courtesy RFETS/DOE

Closure Project

The Rocky Flats Closure Project was an enormous undertaking. To complete the mission:

- More than 21 tons of weapons-useable nuclear materials were removed.
- Decontaminated and demolished 800 structures, comprising more than 3 million square feet.
- Drained 30,000 liters of plutonium solutions.
- Size reduced and removed more than 1,450 contaminated production glove boxes and 700 tanks.
- Stabilized and packaged 100 tons of high-content plutonium residue.
- Performed environmental cleanup actions at 130 sites.
- Dispositioned millions of classified items and excess property.
- Safely shipped more than 600,000 cubic meters of radioactive waste – enough to fill a string of railcars 90 miles long.

Water Tower Demolition

Rocky Flats pre 2002

Rocky Flats February 2005

Courtesy RFETS/DOE

Rocky Flats September 2005

Courtesy RFETS/DOE

Background: Pre-fire

From 1955 to March 1971

+ 602 reported fires
+ 374 in Plutonium areas
+ 228 in other areas

“Although these figures look high, many of these were small fires from metal chips or turnings…”

Background: Pre-Fire

- Building 776/777 built originally for new weapon systems production based on new technology.
- Building was being sprinklered at the time of the fire, but not in service, except for the second floor.

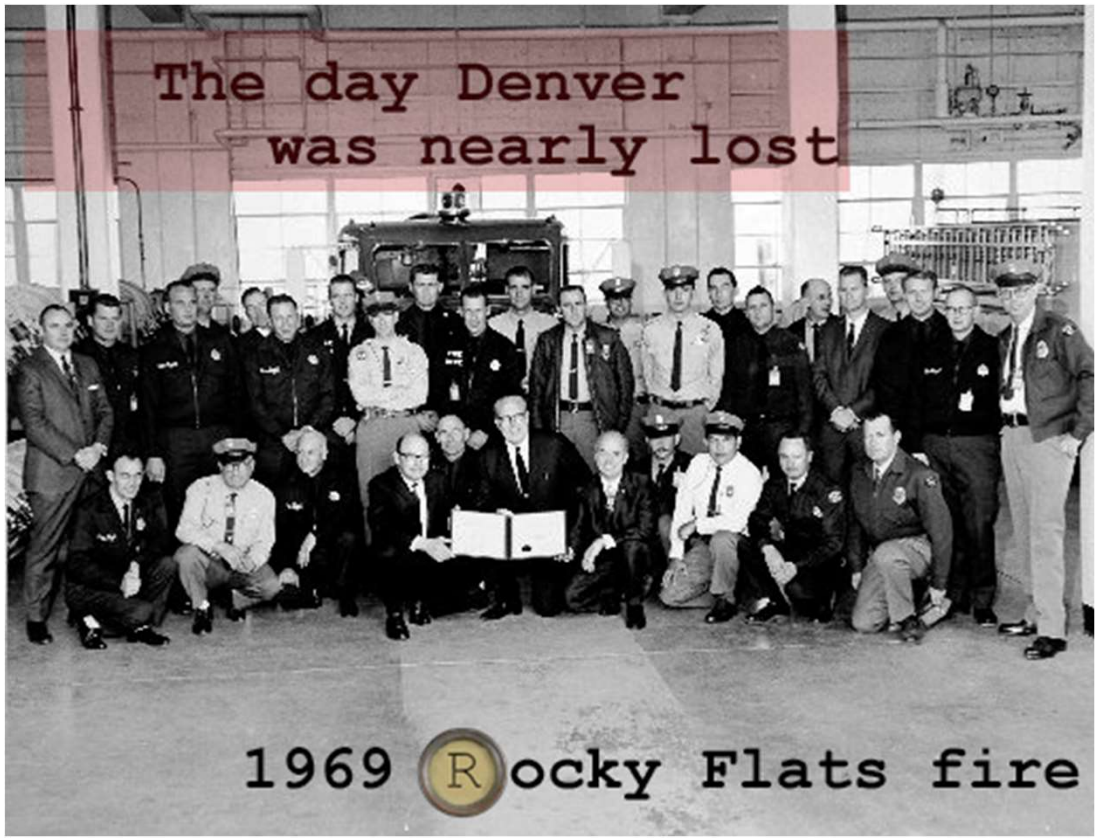
Courtesy United States Department of Energy

Fire Department (at the time of the fire)

- 750 gpm pumper
- 500 gpm pumper
- 1,000-gallon tanker with 200 gpm pump
- Rescue truck
- Fully equipped ambulance

FD Staffing

- Two-platoon system
- Each platoon
  - Captain (salaried)
  - Lieutenant (salaried)
  - Six firefighters (hourly)
- One firefighter on a five-day schedule



Water Supply

- 1.7M raw water pond
- 250,000 gallon clear well
- 300,000-gallon elevated tank
- 500,000-gallon grade level tank
- No fire pumps
- System “floated” off of the 300K elevated tank, 500K tank supply to the 300K tank

1969 Fire – Overview

- May 11, 1969, 2:27 PM (Mothers' Day)
- The fire started as a fully involved glovebox (north foundry line) in Building 776
- Initial alarm from a heat detector
- Firefighters instructed to be extremely careful in the use of water prior to that fire

6:41 – *they can't stop it…*
7:43 – *box numbers don't mean a thing, the whole thing is rolling and we're trying to stop it now…*

1969 Fire – Overview

- Heavy smoke conditions
  - Plexiglas® biggest smoke factor.
  - Benelex® also involved 1% was combusted (painted with 1 coat of fire-resistant coating).
- At least 60 gloves involved in the initial line.
- 10 minutes before the fire, Stationary Operating Engineers and Security had made a walk-thru of the area.

1969 Fire – Overview

- First attempts to extinguish the fire were via multiple 50-pound CO2 wheeled extinguishers (not successful).
- Water utilized within 7 minutes via 1½ inch lines.
  - Decision by the fire captain who was in the building.
- Area not sprinklered (was in the process of being sprinklered due to the 1957 fire).
- 41,000 gallons per hour were used to fight the fire.

1969 Fire – Overview

- A total of 33 firefighters and security guards fought the fire.
- No outside firefighting units were called or assisted.
  - Some self-contained breathing apparatus was borrowed.
- No action was initiated to contact local authorities (they were informed later) or to establish roadblocks outside the plant perimeter.

Criticality

Criticality

- **An accident**, where an amount of fissile material accidentally comes together into a supercritical amount.
- Fissile materials are those that can undergo the fission reaction.
- Fission reaction is a material that can sustain a chain reaction with neutrons of thermal energy.
- The result is a sudden release of energy and deadly radiation.
- Accompanied by a blue flash.

Criticality

Why was there no criticality?

+ Water in sheep dips, reported to be cans in the bottom of the sheep dips.
  - A dip or passageway to permit personnel to go under the glovebox.
+ Short bursts of water in the Volrath® cans.
+ Fog streams directed at the top of the glovebox.
+ Small blue flames were seen, later found to be magnesium carriers.
+ Pu “crusting”; discussed later.
+ Conservative in spacing.
+ Water level in the building maintained to 2 inches.
+ Bottom line: LUCKY.

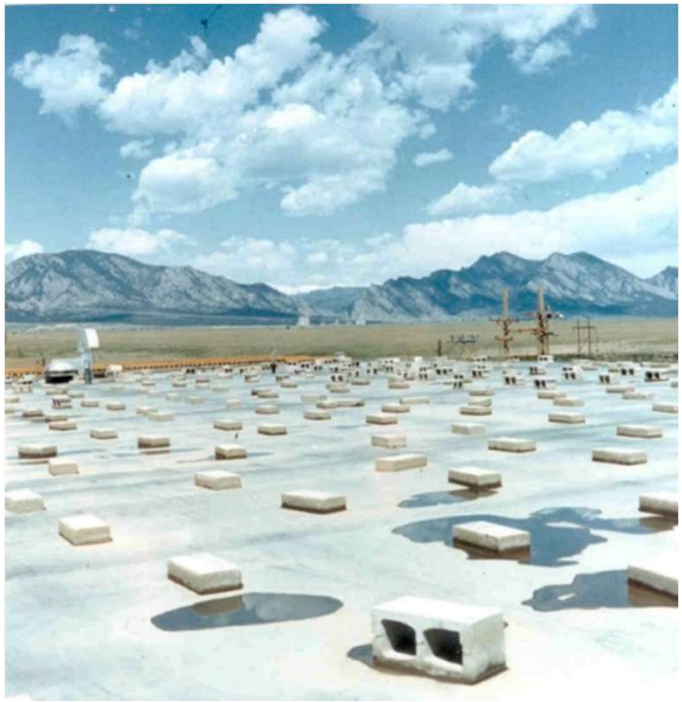
1969 Fire – Overview

Challenges to fighting the fire, other than the obvious.

+ Problems occurred from the contamination of Self-Contained Breathing Apparatus (SCBA) and how to prevent it from entering the low-pressure side of the system.
+ Control of contamination to get people in and out of the fire area.
  - Area's exterior of the building ended-up being contaminated.
+ The one firefighter uptake was due to issues with changing of his SCBA.
  - Inhaled contaminated material into his lungs.

1969 Fire – Overview

- The fire spread from Building 776 to 777 within 25 minutes (via the conveyor line system).
- About 2 hours into the fire the sprinklers on the second floor were operating.
- It took nearly 6 hours to put the fire under control.
- It was estimated that 100 x 10^6 Btu (11,183,592 joules) of heat was liberated during the fire.
  - E.g., a magnitude 4.0 earthquake releases a similar amount energy.



Heat Load

APPENDIX G-3

Estimated Heat Load
Plexiglas, Benelex and Plutonium

Plexiglas Windows
4000# burned x 11,000 Btu/# = 44×10^6 Btu

Benelex Shield (includes Plexiglas Shielding)
4500# burned x 8500 Btu/# = 38×10^6 Btu

Miscellaneous Combustibles
Estimated = 10×10^6 Btu

Plutonium
850 Kg. x 5200 Btu/Kg. = 4.5×10^6 Btu

Total 969.5×10^6 Btu
or approximately 1×10^8 Btu

1969 Fire – Overview

- A $3.5M neutron shielding effort occurred in 1968 that added approximately 1,170,000 pounds of Benelex (Trademark by Masonite Corporation) and Plexiglas.
  - Required due to unacceptable exposure of the employees.
  - It was effective at reducing the exposures.
- Plutonium briquettes were stored in the gloveboxes and provided with “flowerpot” heat detectors.
  - Briquettes were pressed Pu chips; a briquette is 3-inches in diameter and 1-inch thick; 1500 grams.

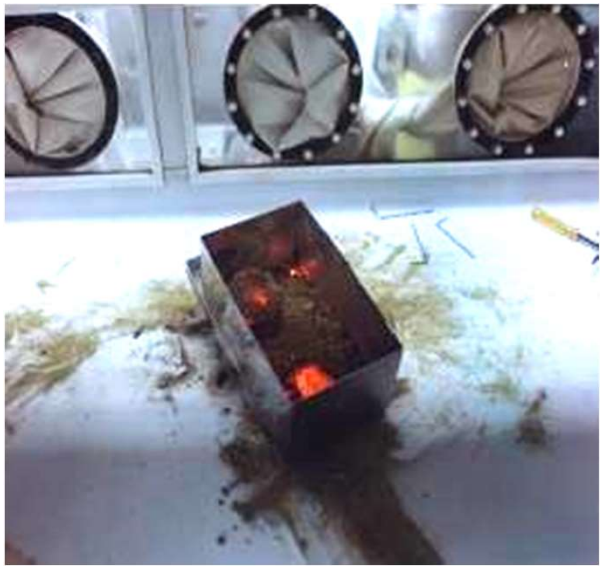
Water and Plutonium

Roland Felt reported that

- The Rocky Flats fire was the first known fire where large quantities of water was used on burning plutonium
- It had been hypothesized that a hydrogen explosion could occur if water was used on burning Pu, none occurred during the fire
- The burned Pu was confined in the fire areas in well-defined piles

“Burning Plutonium”

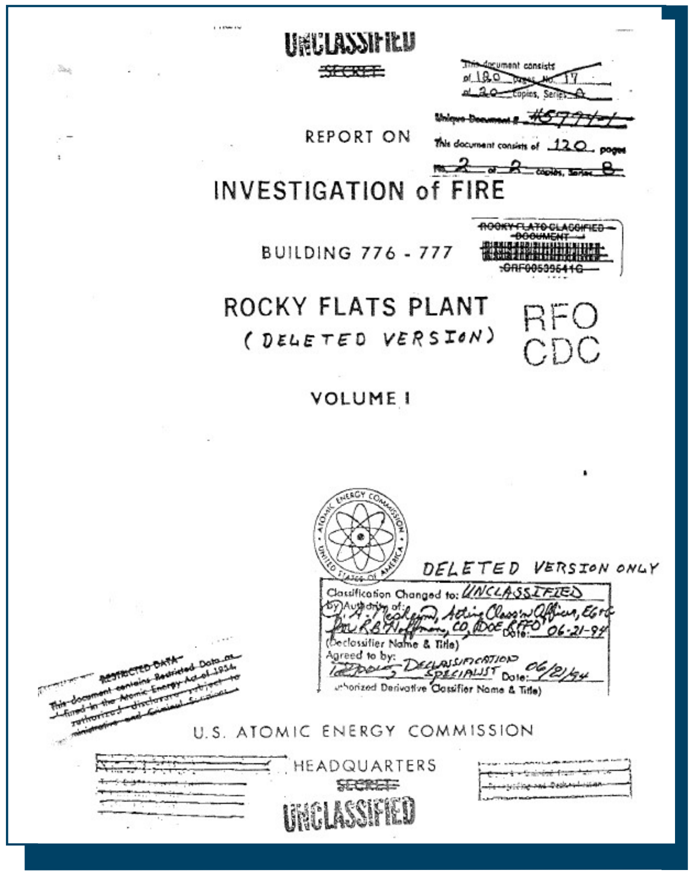
- Is misleading
- Pu metal simply reacts with oxygen to produce heat and plutonium dioxide (the oxidation process)
- Pu oxide is a nonvolatile substance
- The greater the surface area to mass ratio, the greater the chances of oxidation
- Non-alloyed Pu is also more prone to oxidation



Water versus Plutonium

- After the fire it was noted that the Pu Oxide was crusty instead of powdery
- The utilization of water had the effect of forming a moist oxide coating over the burning metal which baked to a rigid crust
- This crust prevented the loose oxide from being dispersed
- This also contributed to the lack of a criticality
- Showed that if done properly, water can be used to extinguish fires involving or near plutonium

Cause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REPORT ON

INVESTIGATION of FIRE

BUILDING 776 - 777

~~ROCKY FLATS CLASSIFIED DOCUMENT~~

ROCKY FLATS PLANT
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RFO
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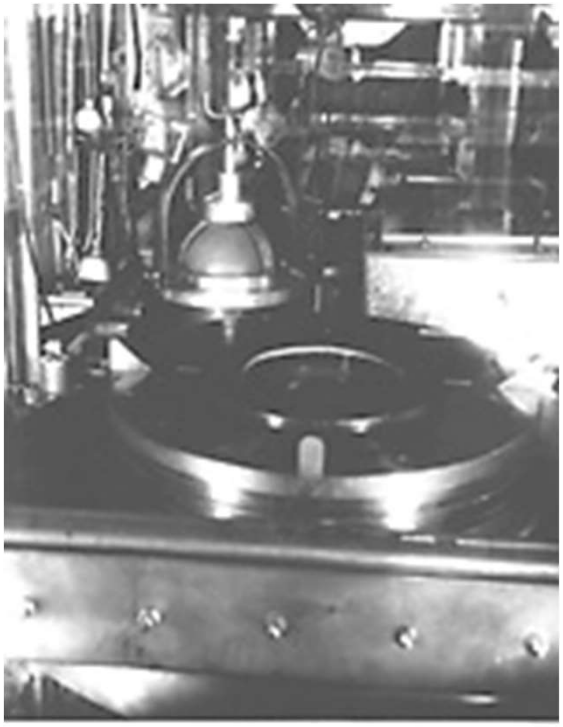
Cause

- No evidence of arson
- Started in the North Foundry line
- Self ignition of a briquette ignited shielding material
- Had been burning for a long time prior to discovery
- Initiated inside the glovebox
- “With the installation of the Benelex-Plexiglas storage container in 1968, the heat detection system was nullified”

Cause

The type of briquette that self ignited had not occurred previously at Rocky Flats, however the storage configuration was different (shielding might have provided insulation), thus a self-ignited fire was plausible

+ Other forms had self-ignited
+ Differences between alloyed and non-alloyed Pu



Cause

- About one-half of the heat released during the fire was from the Plexiglas glovebox windows
- Less than 5% was from the Pu
- The remainder was from the shielding material, gloves and normal combustibles

Cause

- “The fact that the building structure, including the roof was not breached by the fire, that most of the ventilation system continued to operate, and only a part of the final stage of one set of filters was damaged appear to have been the controlling factor in limiting the amount of Pu release”
- “Although the area subjected to fire damage was relatively small, the damage to equipment and the building due to contamination was very extensive”
- The conveyor system contributed to the extent of the loss
- Some large structural elements were warped

Injuries

- No serious physical injuries to personnel fighting the fire
- One firefighter received a significant lung burden of Pu
  - He is still alive and well
  - Was transferred out of the fire department
  - Several went to Los Alamos for treatment, analysis and monitoring (chelating agent treatment may have occurred)

Benelex

- Manufactured by Masonite®
- Burning characteristics of Benelex more closely approach those of the dense hardwoods
- 8240 Btu's per pound
- Ignition temperature of 795° F
- Prolonged exposure at 4 hours at 475° F also causes ignition
- A single coat of fire resistive coating was applied, but not well maintained

Plexiglas

- 9,900 Btu's per pound to 11,600 Btu's per pound
- Ignition temperature of 775 degrees F
- Some "fire retardant" methacrylate was used

Benelex versus Plexiglas

From a 1967 Report

- “Benelex will sustain combustion after ignition whereas Plexiglas SE-3 will not. The rate of burning Benelex is approximately one-third of Plexiglas G. Benelex rates between Plexiglas G and Plexiglas SE-3 in its burning characteristics”
- SE-3 Plexiglas is fire retardant

Factory Mutual Tests of June 1969

TABLE 1

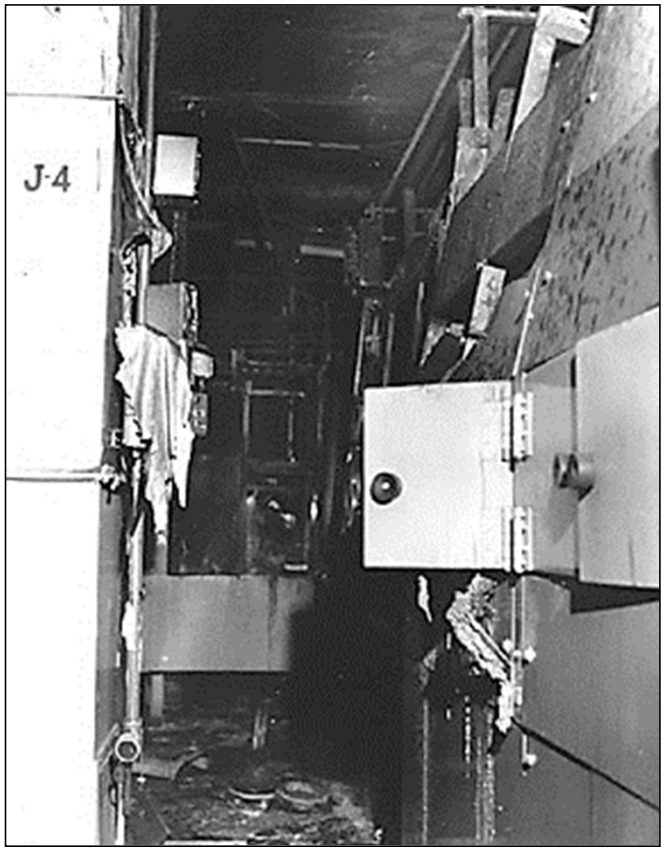
Material	Auto-ignition Temp.	Density lbs/ft^3	Heat of Combustion Btu's/lb	Ease of Ignition	Spont. Heating Tendency
Acrylite	915°	73	11,200	2	No
Benelex	800°	89.4	8,200	3	Yes[1/]
Homolite 101-B	785°	89	9,500	4	No
Plexiglas G	870°	75.7	11,600	1	No
Plexiglas SE-3	775°	75	9,900	5	No

Plutonium

- Pyrophoric
- Pu burns “in a somewhat docile, if persistent manner”
  - Oxidizes at 6000C to 8250C
  - It gives off no flames or gasses
- Converts to Pu02
  - Only converts to a full oxide if agitated, other wise it converts to a sub-oxide that is still pyrophoric
- 5.2 Btu/gram, at a burning rate of 700 grams/hour

Damages

- Initial estimate; $50M in 1969 dollars, ($378M in 2021 dollars*)
- Final was “only” about $26M ($197M in 2021 dollars)
- However, in real terms the damages could have easily hit $1B or more
  - Clean-up alone would approach or exceed $300M considering the level of effort and based on today’s stricter requirements (PPE, exposure limits, work control, work planning, fitness for duty, etc.)



Damages

- First floor of Building 776/777 grossly contaminated
- Second floor of Building 776/777 highly contaminated
- Everything was stripped from 776

Courtesy of the United Stated Department of Energy

Plutonium Involvement

- An estimated 1 kg of oxidized Pu was on the floor of the glovebox of origin (Glovebox 134-39).
- Significant number of other briquettes oxidized within their containers in multiple gloveboxes
- Total Pu in Building 776/777 was 3,400 kg.

Courtesy of the United Stated Department of Energy

Plutonium Involvement

- 1,400 kg was in the area of origin.
- Most damaged Pu was oxidized, some was chemically damaged due to the loss of inerting.
- No evidence of Pu-Water explosions (due to H^2).

Courtesy of the United Stated Department of Energy

Plexiglas

- The Plexiglas windows in the primary burn area were almost completely consumed.
- All gloves also consumed.
- In some of the primary burn area, the Benelex and Plexiglas shielding was heavily charred.

Courtesy of the United Stated Department of Energy

Fire Damage – Preliminary

SUMMARY
FIRE DAMAGE, BUILDINGS 776 & 777
(Costs in thousands of dollars)

Feature	Concentrated Damage Area	Partial Damage Area	Fringe Area	Other	Total
Capital Funds					
Equipment	$ 2,800	$ 800	$ —	$ —	3,600
Gloveboxes, Conveyors, and Shielding	4,400	2,000	—	—	6,400
Services (incl. power, alarms, air water, CCL_4, oil, coolant, etc.)	2,500	—	—	—	2,500
Support and Analytical Equipment	200	—	300	—	500
Walls, Ceiling and Floors	100	60	40	—	200
Structural Repairs	1,500	1,000	500	—	3,000
Building 707 Addition	—	—	—	2,500	2,500
Compartmentalization	—	—	—	3,000	3,000
Sprinkler System	—	—	—	600	600
Subtotal	$ 11,500	$ 3,860	$ 840	$ 6,100	$ 22,300

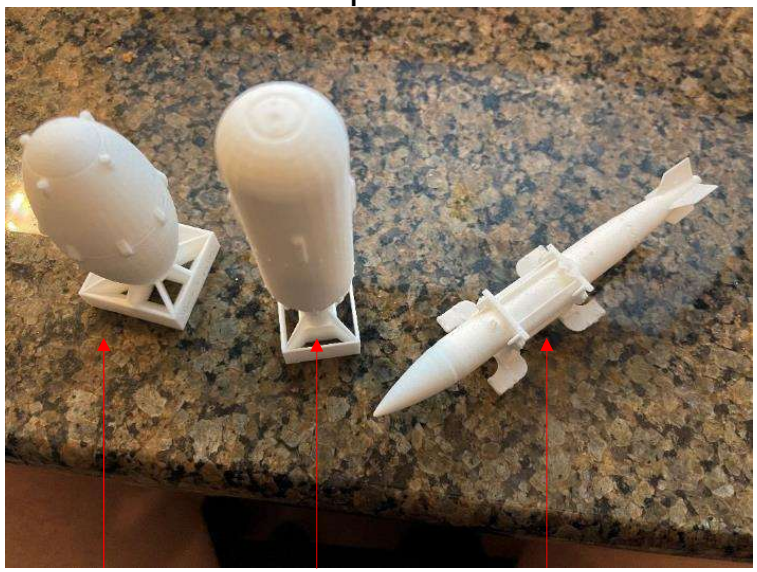
Fire Damage – Preliminary

SUMMARY
FIRE DAMAGE, BUILDINGS 776 & 777
(Costs in thousands of dollars)

Feature	Concentrated Damage Area	Partial Damage Area	Fringe Area	Other	Total
Subtotal (brought forward)					$ 22,300
Engineering, Design and Inspection (25%)					5,600
Subtotal					$ 27,900
Contingency (40%)					11,100
TOTAL CAPITAL FUNDS					$ 39,000
Operating Funds					
Decontamination and Cleanup (600 man years)					$ 8,400
Cleanup Supplies					1,000
TOTAL OPERATING FUNDS					$ 9,400
GRAND TOTAL CAPITAL AND OPERATING FUNDS					$ 48,400

Business Interruption

“The capability to produce and assemble plutonium pits for War Reserve weapons was lost for a period of several months and production of special devices for the weapons laboratories was interrupted.”



Mark 4, Fat Boy Mark 1, Little Boy B-61

Environmental Impacts

- According to Wikipedia [1], about 1,400 kilograms (3,100 lb) of plutonium was in the storage area where the fire occurred, and about 3,400 kilograms (7,500 lb) total plutonium was in Building 776/777 [2] All gloves also consumed
- The 1969 fire released 13–62 mCi (140 - 900 milligrams or 0.00031 - 0.00198 pounds) of plutonium,[3] [4] about 1/1000 as much as was released in the 1957 fire.
- The 1969 fire led local health officials to perform independent tests of the area surrounding Rocky Flats to determine the extent of the contamination. This resulted in the first releases of information to the public that populated areas southeast of Rocky Flats had been contaminated [5] [6]

[1] Wikipedia, *Radioactive contamination from the Rocky Flats Plant,* https://en.wikipedia.org/wiki/Radioactive_contamination_from_the_Rocky_Flats_Plant, last accessed 2/8/2022.

[2] *Past DOE Fires/1969 Rocky Flats Fire,* Bruce Campbell, Hughes Associates, Inc.,

[3] *Technical Summary Report for the Historical Public Exposure Studies for Rocky Flats Phase II,* John E. Till, et.al, Radiological Assessments Corporation, September 1999

[4] *$50,000 Damage at Atomic Plant,* Youngstown Vindicator, September 13, 1957

[5] *Democracy and Public Health at Rocky Flats: The Examples of Edward Martell and Carl J. Johnson,* in Quigley, Dianne; Lowman, Amy; Wing, Steve (eds.). *Ethics of Research on Health Impacts of Nuclear Weapons Activities in the United States*. Collaborative Initiative for Research Ethics and Environmental Health (CIREEH) at Syracuse University. pp. 55–97.

[6] *Rocky Flats Virtual Museum,* University of Colorado at Boulder, April 9, 2020.

Fire Clean-up Summary

Area	230,000 square feet
Volume of Waste	300,000 cubic feet
Gloveboxes	2,600 linear feet
Man-hours	1,000,000
Cost	$9.4M

Recovery Efforts

- Lighting and power had to be provided
- Compressed breathing air was furnished for supplied air work by a new peripheral system (a bid deal)
- Within 24-hours decontamination efforts began in the lightly contaminated areas utilizing 200 personnel
  - Half-mask respirators were used
- Within days AEC investigators were in the building

Recovery Efforts

- Large quantities of plutonium were removed from the gloveboxes and conveyor systems
  - It has been reported that more Pu was recovered than was reported in the inventory at the time of the fire; this was likely due in part to Pu trapped in the ventilation system

Recovery Efforts

- About 200,000 (2,000 hours/year, 5 hours/8-hour day), 150 workers exposure hours were expended in the clean-up
- Approximately 4,000 instances of supplied air use

Recovery Efforts

- Approximately 1,200 wound cases
- One known case of significant internal deposition of Pu resulting from fire fighting or recovery efforts
  - Lung deposition which occurred to a fireman wearing self-contained equipment during fire fighting operations

Contamination Spread

- Contamination was found by Alpha direct survey to exist outside of the building in a “rather limited area”
  - Roof of the building and out to a maximum of 100 to 200 feet, largely from unfiltered second floor utility exhausts and from track-out by fire fighters
- Locker rooms, laundry and maintenance shops were lightly contaminated to about 20,000 DPM per 100 CM2

Conclusions from the Fire

- Building 776/777, a vital nuclear weapons production facility, did not even meet the minimum AEC fire safety standards (note sprinklers were not required at the time)
- Plexiglas windows most significant contributor
- Benelex also a contributor (only 1% burned)
- Long interconnected conveyor system, without fire barriers

Conclusions from the fire

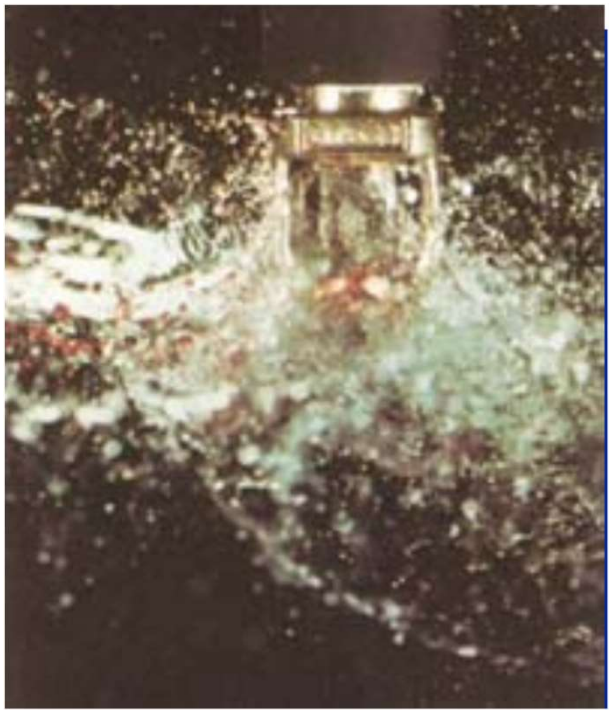
- Recycling of turnings, chips and skull material
- Storage of Pu briquettes without container lids
- If there had not been the Benelex-Plexiglas storage container, the fire would not have ignited the windows
- The Benelex-Plexiglas container also impaired the storage container heat detector

Conclusions from the fire

- The Benelex and Plexiglas shielding also made fire fighting and clean-up efforts difficult
- No gloveboxes or equipment could be saved
- No loss time injuries
- Ventilation system operated throughout the fire

Other Changes/Improvements

- Facility wide automatic sprinkler protection
- Non-combustible containers with tight fitting lids for the storage of all forms of Pu
- Eliminate unnecessary storage of combustibles within gloveboxes
- Glovebox overheat detection system was upgraded and fixed detectors which monitor air temperatures were added
- Quicker processing of pyrophoric forms of Pu having a large surface to mass ratio such as turnings, slag, to PuO2



Other Changes/Improvements

- Production areas eliminated Plexiglas and Benelex shielding over a long period
- The use of plastics as glovebox structural components were eliminated
- The use of gloveboxes and conveyor lines for long-term storage of Pu was eliminated, storage; storage vaults were nitrogen inerted
- Fire stops were provided for gloveboxes and conveyor lines. Dampers were automatic

Other Changes/Improvements

- Ventilation systems for Pu processing lines were changed to supply & exhaust air from GB's and conveyor lines
  - At the time of the fire, air was drawn into the GBs from the room and exhausted through the conveyor system. Using the conveyor system contributed to the fire spread
- Areas with pyrophoric Pu were N2 inerted
  - It was found that O2 of less than 5% inhibits the ignition of Pu (plus all other combustibles)

Other Changes/Improvements

- All room air exhaust plenums were equipped with a cooling chamber and two stages of HEPA filters
  - Cooling is achieved by automatic water sprays which provide an amount of water calculated to reduce 1000º F inlet air to approximately 200º F, system activated by 190º F heat detectors
- All glovebox air exhaust plenums and inert plenums were provided with 4 stages of HEPA in lieu of 2 stages

Other Changes/Improvements

- Manually operated deluge systems were provided for the first stage of HEPA filters
- All exhaust filter plenums were designed to prevent direct impingement on the face of the HEPA filters
  - Accomplished via baffles or directional air changes
- Heat detectors were provided upstream of filters

Other Changes/Improvements

- Fire-rated walls and doors were provided to limit fire spread
  - Including upgrading of exterior walls and roofs
- Rooms were subdivided to limit the spread of fire
- Two 2500 gpm fire pumps and Two 500,000-gallon suction tanks
- New fire alarm system
- Emergency generators
  - Lighting
  - Ventilation

Lessons Learned

- Sprinklers, sprinklers, sprinklers…
- Combustible loading
- Fixed suppression systems
- Fixed detection systems
- Fire separations
- An adequately-staffed on-site professional fire department is critical
- These new requirements are captured in the Department of Energy Standards and Orders, as well as NFPA 801, *Standard for Fire Protection of Facilities Handling Radioactive Materials.* The Nuclear Regulatory Commission, Department of Defense, and the American Glovebox Society have similar criteria.

Lessons Learned

"While Rocky Flats does have fire protection experts and they provide advice to line management when called upon, there is no one centralized safety organization with appropriate responsibility to assure that overall safety evaluations are performed."

Excerpt from the U. S. Atomic Energy Commission "Investigation of Fire, Rocky Flats, Building 776-777, May 11, 1969", Volume V, August 1969.

Conclusions

- The firefighters who fought the fire were heroes without question and they clearly prevented a much more serious and catastrophic fire
- Combustible loading was the primary contributor
- The lack of automatic sprinklers, sufficient detection and fire barriers were also a major contributors
- Because of this fire, the nuclear industry including the weapons and commercial nuclear power, have implemented robust fire protection programs. These programs have resulted in a superior fire record that is orders of magnitude lower than normal industry, as it must be considering the risks.

HEALTH and SAFETY

information

United States Atomic Energy Commission

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AEC HONORS DOW FIREFIGHTERS*

Firemen and security guards were honored on February 13, 1970, for their heroism while fighting the May 11, 1969, fire at Rocky Flats. A recognition ceremony was held with the men's families in attendance. The guests witnessed the presentation of the AEC Citation Award to the Fire Department and to the Guard Force, and also watched as individual awards were presented to their husbands and fathers. Following the presentation, the families were escorted to see the Fire Department facilities.

*Reprinted, by permission, from the DOW CORRAL, Vol. 18, No. 4, February 20, 1970

Honored members of the Fire Department and Plant Protection force pose inside the fire station. With them are Joe Bristol (standing, left), Superintendent of both groups during the May 11, 1969 fire, and (left to right, holding the citation) Ted Eckert, Fire Chief, Commissioner Larson, AEC, and Lloyd Joshel, General Manager of The Dow Chemical Company, Rocky Flats Division.

Acknowledgements

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