



# Regulatory Requirements of DOE's Facility Safety and Fire Protection Program over the past 30 years

**Presentation for the 2008 Fire Safety Workshop**

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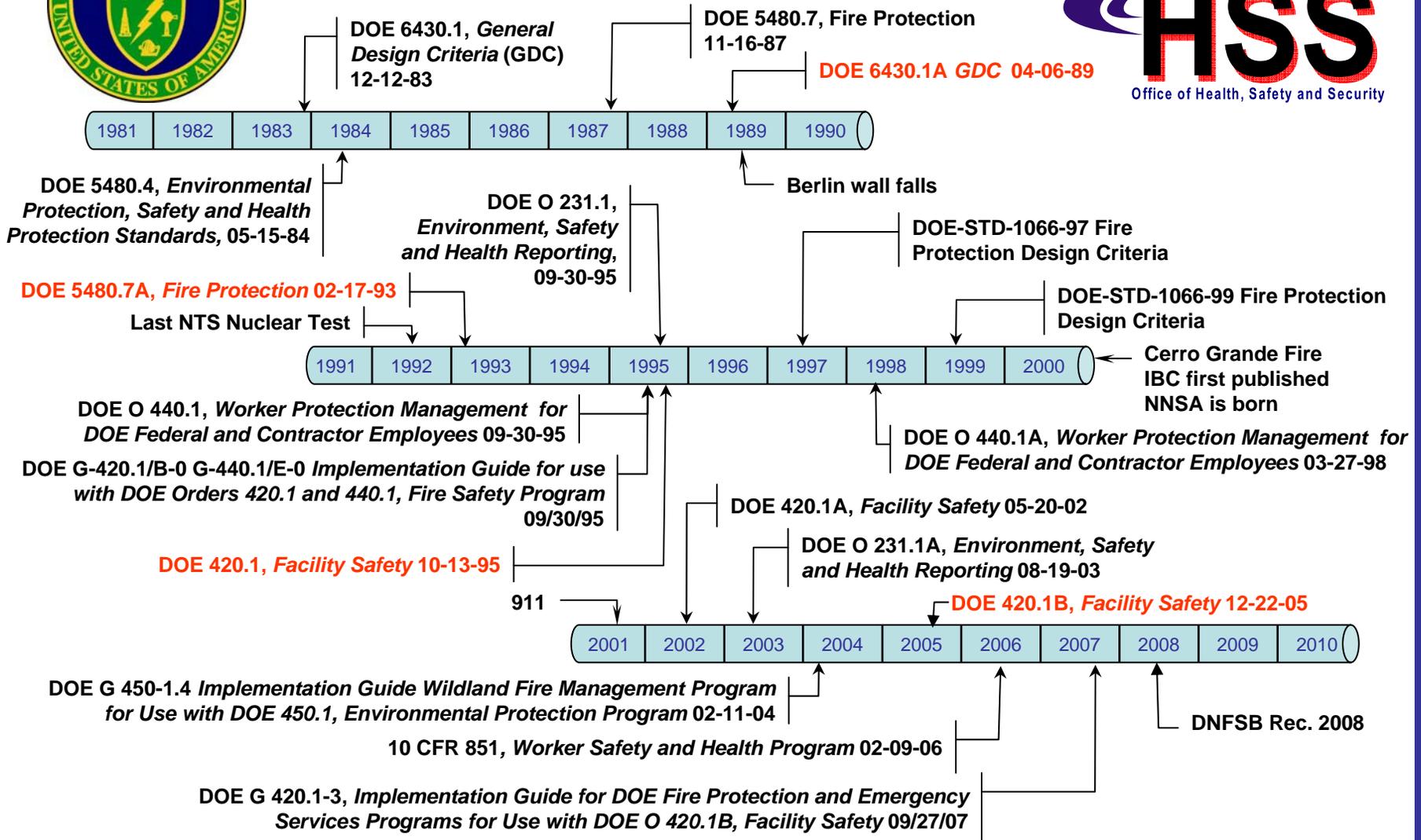
# Purpose



- Describe DOE Building and Fire Protection regulatory requirements since 1980
- Identify areas of opportunity for future regulatory requirement clarity
  - DOE 420.1B: New construction requirement
  - DOE-STD-1066: Fire Protection Design Criteria



# Facility/Fire Safety Requirements Since 1980

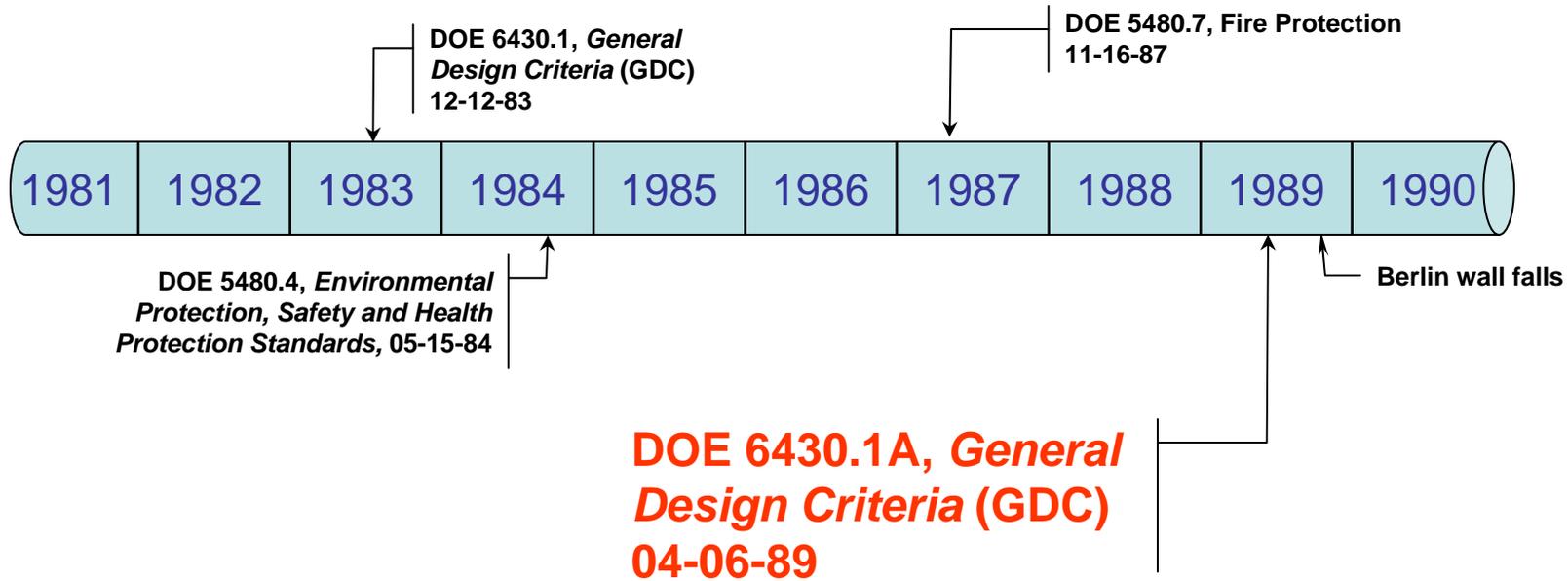


Note 1: DOE/EP-108, *Standard for Fire Protection of AEC Electronic Computer Data Processing Systems* and DOE/EV-0043, *Standard on Fire Protection for Portable Structures* 8-79 are referenced in 5480.7A. The DOE/EP-108 Standard was absorbed into DOE Std 1066; and, DOE/EV-0043 renumbered as DOE -STD-1088 in 1995.

Note 2: DOE420.1, *Facility Safety* issued 3 page changes with the latest being 11/22/00



# Requirements From 1980-1990





# DOE 6430.1A, General Design Criteria (GDC) April 1989



- **PURPOSE.** To provide general design criteria (GDC) for use in the acquisition of the Department's facilities (DOE's building code)
- Policy statements
  - Must apply professional A/E principles and practices
  - Must satisfy all applicable Executive Orders, Federal laws, and regulations.

**While the Department is not required to comply with state and local building codes, laws, and ordinance, the planning, design, and construction processes should accommodate them to the extent consistent with the accomplishment of the Department's mission.**

- Must be designed and constructed to be reasonable and adequate for their intended purpose and consistent with health, safety, security, and environmental protection requirements.



# DOE 6430.1A

## Division 1 – General Requirements



- The predominant model building code in the region shall govern on issues not reversed in these criteria. **State, municipal, county, and other local building and zoning codes and ordinances should be reviewed for possible conflicts with these criteria.**
- While it is not mandatory that DOE projects comply with such local codes and regulations, the design professional is encouraged to cooperate with local officials and DOE personnel to accommodate the intent of local codes and regulations as much as possible.



# DOE 6430.1A

## Division 1 – Regulatory Requirements



- Among the list of documents referenced as mandatory per the GDC are the following:
  - **DOE 5480.7, Fire Protection**
  - DOE 5480.4, Environmental Protection, Safety and Health Protection Standards
  - BOCA, Basic National Mechanical Code
  - **Uniform Building Code**
  
- Most (57) NFPA Installation Standards are referenced in the GDC including: NFPA 13, 24, 72(Series) &101
  
- Deviations must be approved from either the DOE organization responsible for facility projects or the OPI under any of 7 specified conditions listed in the GDC.



# DOE 6430.1A

## Division 1 – Section 0110-6 Fire Protection



- Construction type per UBC
- Special Fire protection design analysis required for each facility vital to DOE mission (e.g., developed to meet or exceed the “improved risk” level, general design analysis per 5480.7).
- Facilities divided into fire loss areas less than \$75 million. Separated by fire walls not less than 4-hours fire resistance.
- Adjacent occupancy separation walls 2-hours fire resistance or better.
- Hazardous area considerations such as suppression, alarms, interlocks and other precautions as needed.



# DOE 6430.1A

## Fire Protection Provisions (Other Divisions)



- Automatic suppression required for all facilities where the MPFL exceeds 1 million (Note: no minimum area specified)
- Includes criterion on where suppression is not required
- Additional criteria for when the MPFL exceeds \$25 million
- Recognition that emergency responders/adequate water supplies may be the principal basic method of redundant fire protection.
- Light hazard occupancy requirements of NFPA 13 prohibited.
- Fire alarms per NFPA 72 series
- Special (Nonreactor Nuclear Facility) requirements detailed.



# Requirements From 1990-2000

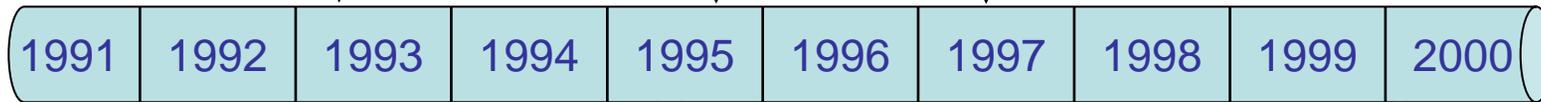


**DOE 5480.7A,  
Fire Protection  
02-17-93**

DOE O 231.1,  
*Environment, Safety  
and Health Reporting,*  
09-30-95

DOE-STD-1066-97 Fire  
Protection Design Criteria

DOE-STD-1066-99 Fire  
Protection Design Criteria



Last NTS Nuclear Test

DOE O 440.1, *Worker Protection Management for  
DOE Federal and Contractor Employees* 09-30-95

DOE G-420.1/B-0 G-440.1/E-0 *Implementation Guide  
for use with DOE Orders 420.1 and 440.1, Fire Safety  
Program* 09/30/95

DOE 420.1, *Facility Safety* 10-13-95

Cerro Grande Fire  
IBC first published  
NNSA is born

DOE O 440.1A, *Worker Protection  
Management for DOE Federal and  
Contractor Employees* 03-27-98



# DOE 5480.7A

## The Fire Protection Order



- Purpose: To establish requirements for a comprehensive fire protection and related perils protection program
  
- Objectives:
  - Minimize the potential for the occurrence of a fire.
  - Ensure that fire does not cause a release of hazardous material that will threaten the public health and safety or the environment.
  - Establish requirements that will provide an acceptable degree of life safety to DOE and contractor personnel
  - Ensure that process control and safety systems are not damaged by fire or related perils.
  - Ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and its effects.
  - Ensure that property damage from fire and related perils does not exceed an acceptable level.



# Regulatory Requirements of DOE 5480.7A



- **Mandatory Criteria**
  - 29 CFR's 1910 & 1926 (OSHA Requirements)
  - NFPA Codes and Standards
  - DOE 5480.4, Environmental Protection, Safety and Health Protection Standards
  - **DOE 6430.1A GDC**
  - DOE/EP-108, Standard for Fire Protection of AEC Electronic Computer Data Processing Systems
  - DOE/EV-0043, Standard on Fire Protection for Portable Structures 08/79
  
- **Code of Record**
  - Fire protection codes and standards in effect when facility design commenced
  - Upon modification and as determined by the AHJ (Exception: If there is a significant hazard that endangers building occupants or the public)



# Regulatory Requirements of DOE 5480.7A (continued)



## ■ Referenced Criteria

- National Fire Protection Association Handbooks
- Factory Mutual Loss Prevention Data sheets/Approval Guide
- Society of Fire Protection Engineers (SFPE) Handbook.
- DOE Explosives Safety Manual, DOE/EV/06194.
- **Local and State fire protection criteria.**
- DOE Fire Protection Resource Manual.
- American Petroleum Institute Guidelines.
- NFPA guides, manuals and recommended practices.
- UL Product Directories
- “General Fire Fighting Guidance for Nuclear Weapons,”
- DOE 5482.IB, ES&H Appraisal Program,
- DOE 5484.1, Information Reporting Requirements
- DOE 5500.IB, Emergency Management System



# DOE 5480.7A Observations



- Definition section includes terms such as “exemption” and “equivalency”. Safety Class is also defined (see GDC Division 13). Note that a “Fire Area” is defined in 5480.7A as a location bounded by 2-hour rated construction.
- Primary fire protection program requirement that the facility be characterized by a fire protection program that is considered “best in class”
- To meet the primary requirement above all Fire Protection Programs shall meet or exceed the minimum requirements established by the NFPA as directed by the PSO. Basic requirements include:
  - A reliable water supply of acceptable capacity for fire suppression
  - Noncombustible construction
  - Automatic fire extinguishing systems
  - A fully staffed, trained, and equipped emergency response force
  - A means to summon the emergency response force in the event of a fire
  - A means to notify and evacuate building occupants in the event of a fire.
  - Additional protection measures may be deemed necessary as determined by the AHJ (for special situations).



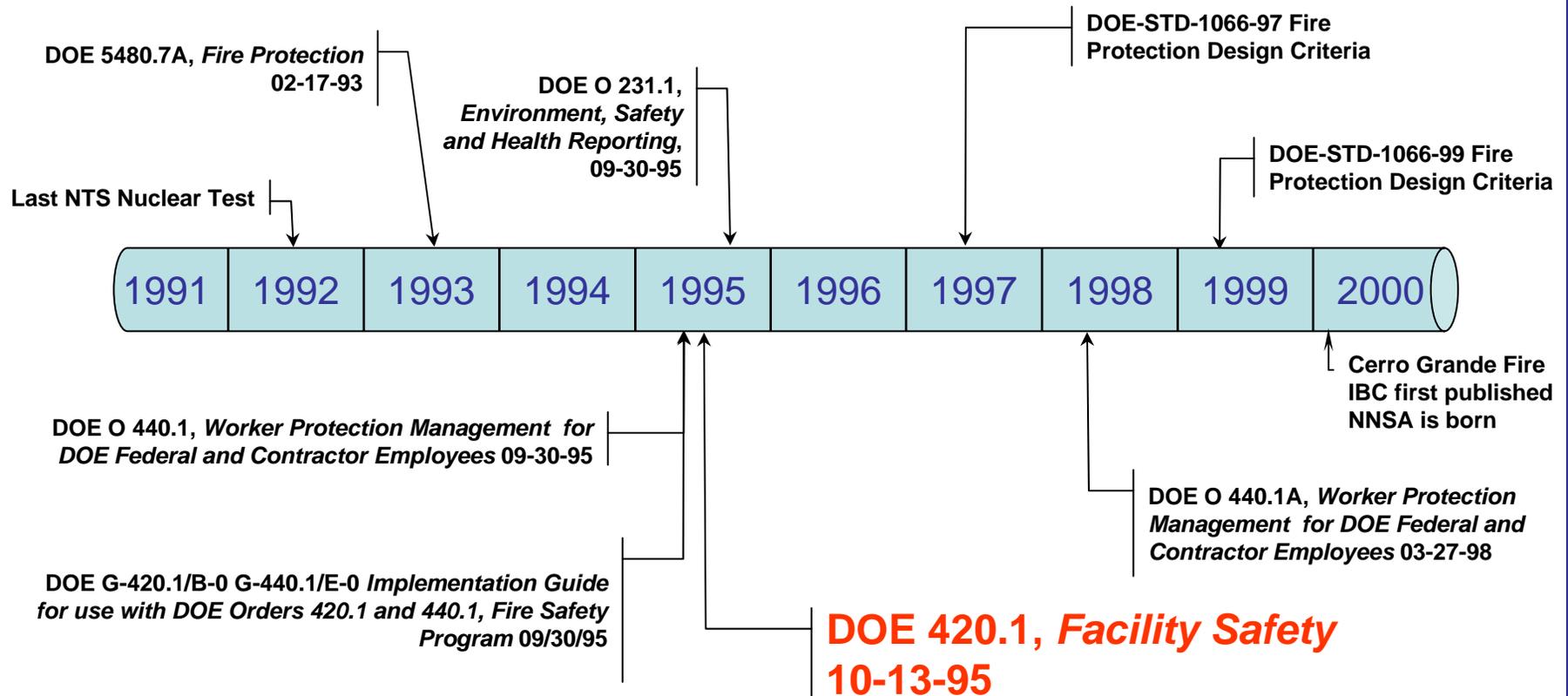
# DOE 5480.7A Observations (continued)



- Minimum assessment frequencies specified and scoped for both programs and facilities.
- Introduction and scope of an FHA.
- Protection of safety class equipment from fire.
- Life Safety according to NFPA 101.
- Automatic fire suppression system requirement for all **new structures over 5,000 sf** or in all structures where the MPFL exceeds \$1 million dollars.



# Requirements From 1990-2000



Note that DOE-STD-1066, Fire Protection Design Criteria was developed to replace certain mandatory fire protection requirements in both DOE 5480.7A, and the GDC with the GDC being canceled ~2002.

Note also that during this period the International Code Council was formed (1997) and the first edition of the International Building Code published (2000).



# DOE 420.1

## The Facility Safety Order



- Established facility safety requirements (safety design, criticality safety, fire protection and natural phenomena hazards mitigation).
  - Canceled subject-specific Orders including: DOE 5480.7A, *Fire Protection*
  - Note that the 420.1 Order also canceled out the Nuclear and Explosives Safety requirements in the GDC but all other GDC requirements were still required
- Fire Protection Requirements contained in Section 4.2
- Introduced both “Implementation Plans” as guidance and “Contractor Requirements Documents”
- Section 4, Requirements states in part

**..All new construction shall, as a minimum, conform to the Model Building Codes applicable for the state or region, supplemented with additional safety requirements associated with the hazards in the facility in a graded manner**

Requirement contradicts with the GDC which still applies



# Regulatory Requirements of DOE O 420.1



- Order does not call out specified references like 5480.7A did but does include an appendix section in the G-420.1/B0 Implementation Guide which references the UBC as well as the local building code (if enforced on site).
- Section 4.2.3 includes similar HPR language, but states that HPR application includes meeting the applicable building code and NFPA Codes and Standards, or exceeding them
- Section 4.2.3 also has the code of record clause and says that when significant modifications to a facility occur, the current edition of the code or standard shall apply to the modification.
- References DOE 440.1 for worker protection requirements
- Also generally references compliance to DOE directives, and other applicable Federal, state and local fire protection requirements in section 4.2.1.1



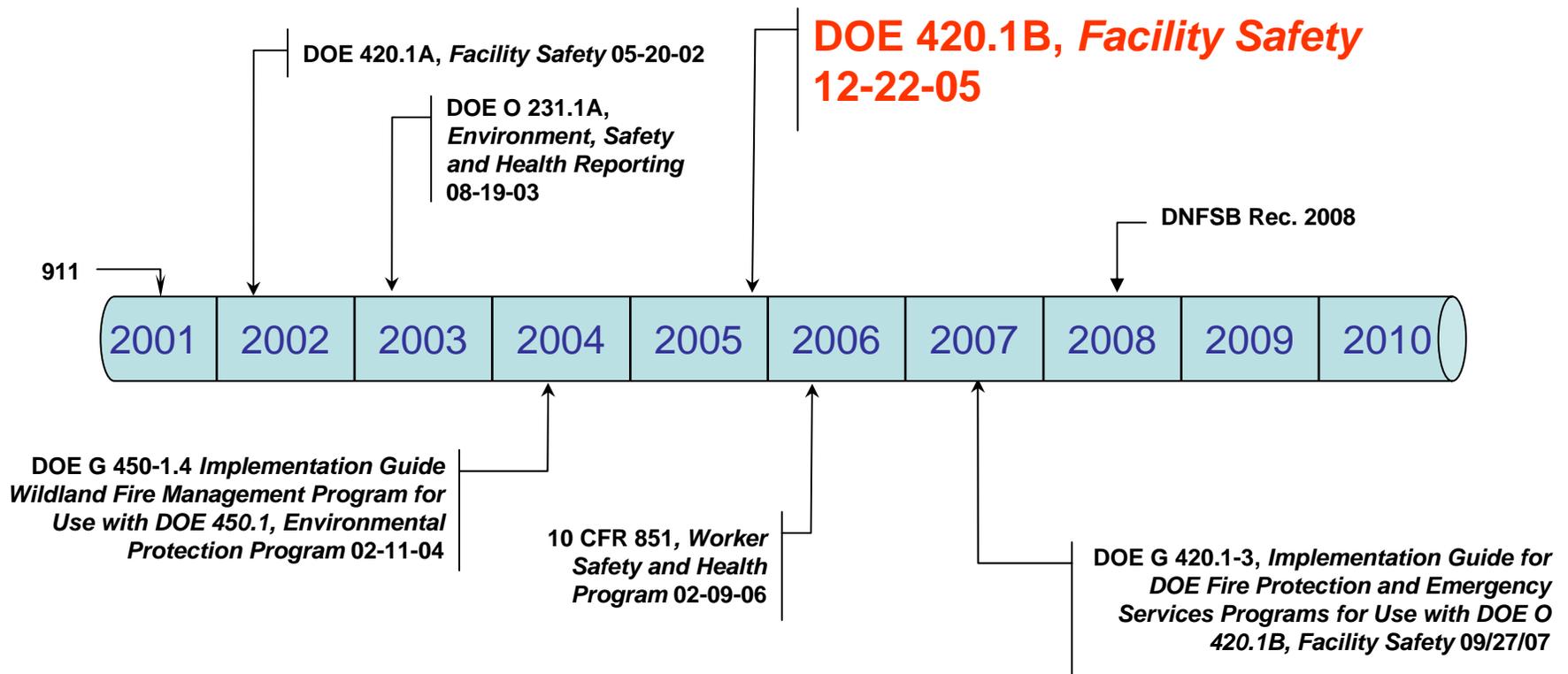
# DOE O 420.1 Observations



- Facility and program assessment frequency/scope items revised and moved to the Implementing Guide (IG).
- Adds an FHA “Fire Area” concept in the IG. Note that a Fire Area is defined in 5480.7A as a location bounded by 2-hour rated walls.
- Introduces the **Baseline Needs Assessment (BNA)** requirement in the Order and details the BNA’s scope in the IG.
- Automatic suppression system requirement for all significant structures, areas subject to loss of safety class systems, significant life safety hazards, unacceptable program interruption, or fire loss potential in excess of defined limits.
- **IG includes defined limits as all structures over 5000 sf or in all structures where the MPFL exceeds \$1 million dollars.**



# Requirements 2000+





# DOE 420.1B

## The Facility Safety Order



- Added System Engineer programs
- Section 4 states All new construction, as a minimum, must comply with national consensus industry standards and the model building codes applicable for the state or region, supplemented in a graded manner with additional safety requirements for the associated hazards in the facility that are not addressed by the codes.
- The edition reformats Fire Protection into Chapter II and expands the Regulatory Requirements section by calling out the standards referenced in the Order's text.



# DOE O 420.1B



## Regulatory fire protection references include:

- Applicable NFPA codes and standards
- DOE-STD-1066-99
- DOE O 440.1A, Worker Protection Management for DOE Federal and Contractor Employees, 3-27-98. Note that 10 CFR 851, Worker Safety and Health Rule was not published yet
- DOE M 440.1-1A, DOE Explosives Safety Manual, 1-9-06
- DOE G 440.1-5, Implementation Guide for Use with DOE Orders 420.1 and 440.1, Fire Safety Program, dated 9-30-9
- Note that 10 CFR 851, Worker Safety and Health is not referenced in Section 7.c. of the Order since rule was passed about a year after the Order was issued.



## DOE O 420.1B - Order Observations



- Permits a single building code as the regulatory requirement
- Expands FHA requirement to Hazard Category 1, 2 and 3 nuclear facilities, significant new facilities per the AHJ, and for facilities that represent unique fire safety risks. Adds a review cycle
- Adds a BNA review cycle.
- DOE G 420.1-3, Implementation Guide for DOE Fire Protection and Emergency Services Programs for Use with DOE O 420.1B was recently published



## Future Regulatory Action



- Building Code Regulatory Requirement: revise to clear up confusing language.
- DNFSB Recommendation 2008-1: Establish design and operation criteria for safety class fire protection systems and include this in an upcoming revision to DOE-STD-1066



# Building Code Regulatory Requirement



## ■ Review

- The GDC originally referenced the UBC in its Regulatory Requirements (Section 0106) but designers were encouraged to include state and local requirements that did not conflict with the Department's requirements.
- DOE 5480.7A makes no mention of building requirements but does reference the GDC as mandatory.
- DOE 420.1 through DOE 420.1B Statement: All new construction shall, as a minimum, conform to the Model Building Codes applicable for the state or region, supplemented with additional safety requirements associated with the hazards in the facility in a graded manner.
- On January 8, 2008, Technical Position NSEP-TP-2007- 1 was issued that articulated the OPI's intent that facilities must, in part apply the national consensus industry standards and building codes (model codes) that are identified by the state or region



# Building Code Regulatory Requirement



- What are other Federal Organizations using:
  - GSA (PBS – P100)
    - ICC family of codes (IBC, IMC, IPC, IFC)
    - NFPA 101 in lieu of the technical egress requirements of the IBC
    - NFPA 70 in lieu of the ICC electrical code
  - VA (VIA task Order 006)
    - ICC Family of codes
    - NFPA 101
  - DOD (ufc\_1\_200\_01)
    - IBC with limits
    - NFPA 70
    - NFPA 54 & NFPA 58
    - UFC 3-600-01 in lieu of the IFC
    - References NFPA 101 for new construction and existing facilities
    - In the case of conflicts between the International Building Code and the military criteria, use the military requirements.



# Building Code Regulatory Requirement Recommendation



- Revise the Order to state that new building construction will be in accordance with the IBC under the following limitations:
  - Codes and Standards of the NFPA preside over IBC requirements. For example NFPA 70 should be used instead of the IEC;
  - Identify the Building Official as the Head of the Field Element and clarify post-occupancy provisions and other and other administrative features.
  - In the case of conflicts between the IBC and DOE criteria (order standard or Guide), use DOE criteria;,
  - Apply state modifications as guidance with language that is similar to the GDC Language
  - While it is not mandatory that DOE projects comply with such local codes and regulations, the design professional is encouraged to cooperate with local officials and DOE personnel to accommodate the intent of local codes and regulations as much as possible.
  
- Revise the Order to either defer to, reference or reflect new construction direction from the DOE office of Management and Construction (MA-50).



# DNFSB Recommendation 2008-1



- Establish design and operation criteria for safety class fire protection systems and include this in an upcoming revision to DOE-STD-1066
  - HSS is working on an implementation Plan to address the recommendation which may result in revised sections of STD 1066
  - In the mean time, HS-21 would like to proceed with a STD-1066 update through DOE Fire Safety Committee task assignments to incorporate any new and desirable technology into the Standard.