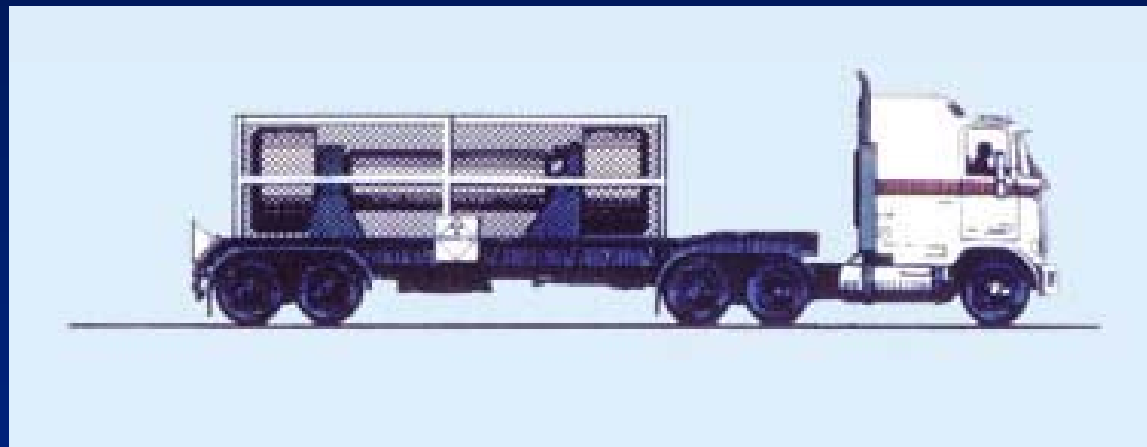




United States Nuclear Regulatory Commission

Protecting People and the Environment

Update on NRC Activities



**New England Radiological Health Committee
2009 Annual Meeting
Meriden, Connecticut
November 17-20, 2009**

**Earl Easton
Division of Spent Fuel Storage and Transportation
U.S. Nuclear Regulatory Commission**

Today's Topics

- Security Requirements for RAMQC
- Security Requirements for Spent Fuel Shipments
- Term Limits for Spent Fuel Storage
- Ongoing Activities
 - Yucca Mountain
 - Waste Confidence Decision
- Studies of Severe Fire Accidents

Security Requirements for Transport of RAMQC



Radioactive Material in Quantities of Concern (RAMQC)

CODE OF CONDUCT ON
THE SAFETY AND SECURITY OF
RADIOACTIVE SOURCES

放射源安全和保安行为准则

CODE DE CONDUITE SUR
LA SÛRETÉ ET LA SÉCURITÉ
DES SOURCES RADIOACTIVES

КОДЕКС ПОВЕДЕНИЯ ПО
ОБЕСПЕЧЕНИЮ БЕЗОПАСНОСТИ И
СОХРАННОСТИ РАДИОАКТИВНЫХ
ИСТОЧНИКОВ

CÓDIGO DE CONDUCTA
SOBRE SEGURIDAD TECNOLÓGICA
Y FÍSICA DE LAS FUENTES
RADIATIVAS

مدونة قواعد السلوك بشأن أمان المصادر
المتشعة وأمنها

- Materials and quantities that could be useful to a terrorist
- Based on IAEA Code of Conduct
- Sixteen radioactive materials
- Considers chemical, physical, and radiological characteristics.
- Thresholds determined for three categories of material based on potential consequences

Radioactive Material in Quantities of Concern (RAMQC)

- Category 1 sources, if not safely managed or securely protected would be likely to cause permanent injury to a person who handled them, or were otherwise in contact with them, for more than a few minutes.
- It would probably be fatal to be close to this amount of unshielded material for a period of a few minutes to an hour.
- Radiothermal generators, irradiators and radiation teletherapy.

Radioactive Material in Quantities of Concern (RAMQC)

- Category 2 sources, if not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for a short time (minutes to hours).
- It could possibly be fatal to be close to this amount of unshielded radioactive material for a period of hours to days.
- Industrial gamma radiography, high dose rate brachytherapy and medium dose rate brachytherapy.

Radioactive Material in Quantities of Concern (RAMQC)

- Category 3 sources, if not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for some hours.
- It could possibly — although it is unlikely — be fatal to be close to this amount of unshielded radioactive material for a period of days to weeks.
- Fixed industrial gauges involving high activity sources (for example, level gauges, dredger gauges, conveyor gauges and spinning pipe gauges) and well logging.

Radioactive Material in Quantities of Concern (RAMQC)

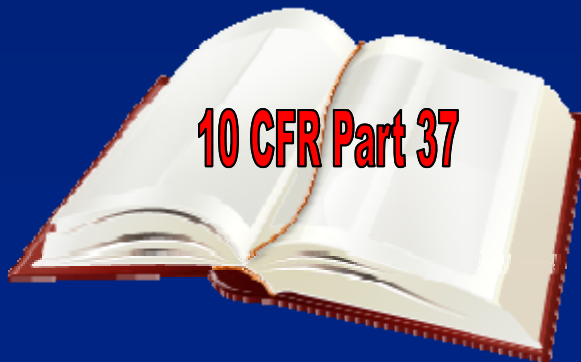
Radioactive Material	Category 1		Category 2	
	Terabequerels ¹ (TBq)	Curies (Ci)	Terabequerels (TBq)	Curies (Ci)
Americium-241	60	1,600	0.6	16
Americium-241 /Beryllium	60	1,600	0.6	16
Californium-252	20	540	0.2	5.4
Curium-244	50	1,400	0.5	14
Cobalt-60	30	810	0.3	8.1
Cesium-137	100	2,700	1.0	27
Gadolinium-153	1000	27,000	10.0	270
Iridium-192	80	2,200	0.8	22
Plutonium-238	60	1,600	0.6	16
Plutonium-239 /Beryllium	60	1,600	0.6	16
Promethium-147	40,000	1,100,000	400	11,000
Radium-226	40	1,100	0.4	11
Selenium-75	200	5,400	2.0	54
Strontium-90 (Yttrium-90)	1,000	27,000	10.0	270
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3.0	81

¹Terabequerel is the official value to be used for determination whether a material is a Category 1 or Category 2 quantity. Curie (Ci) values are provided for practical usefulness

Security Requirements for Transport of RAMQC



For Categories 1 and 2



Draft Rule
to Commission
by end of 2009

General Security Requirements for Transport of RAMQC



- **Licensee Verification**
- **Planning and Coordination**
- **Notifications**
- **Communications**



General Security Requirements for Transport of RAMQC



- **Drivers and Accompanying Individuals**
- **Procedures, Training and Control of Information**
- **Additional requirements for portable and mobile devices**



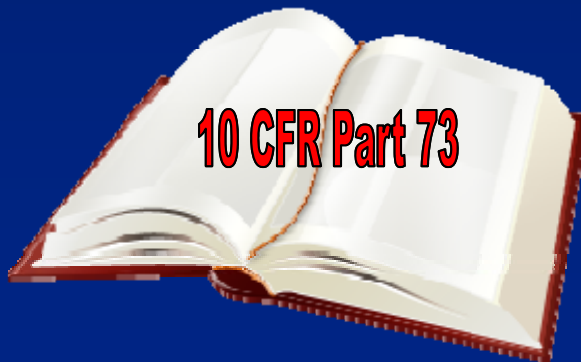
Security Requirements for Spent Fuel Shipments



Issued October
2002

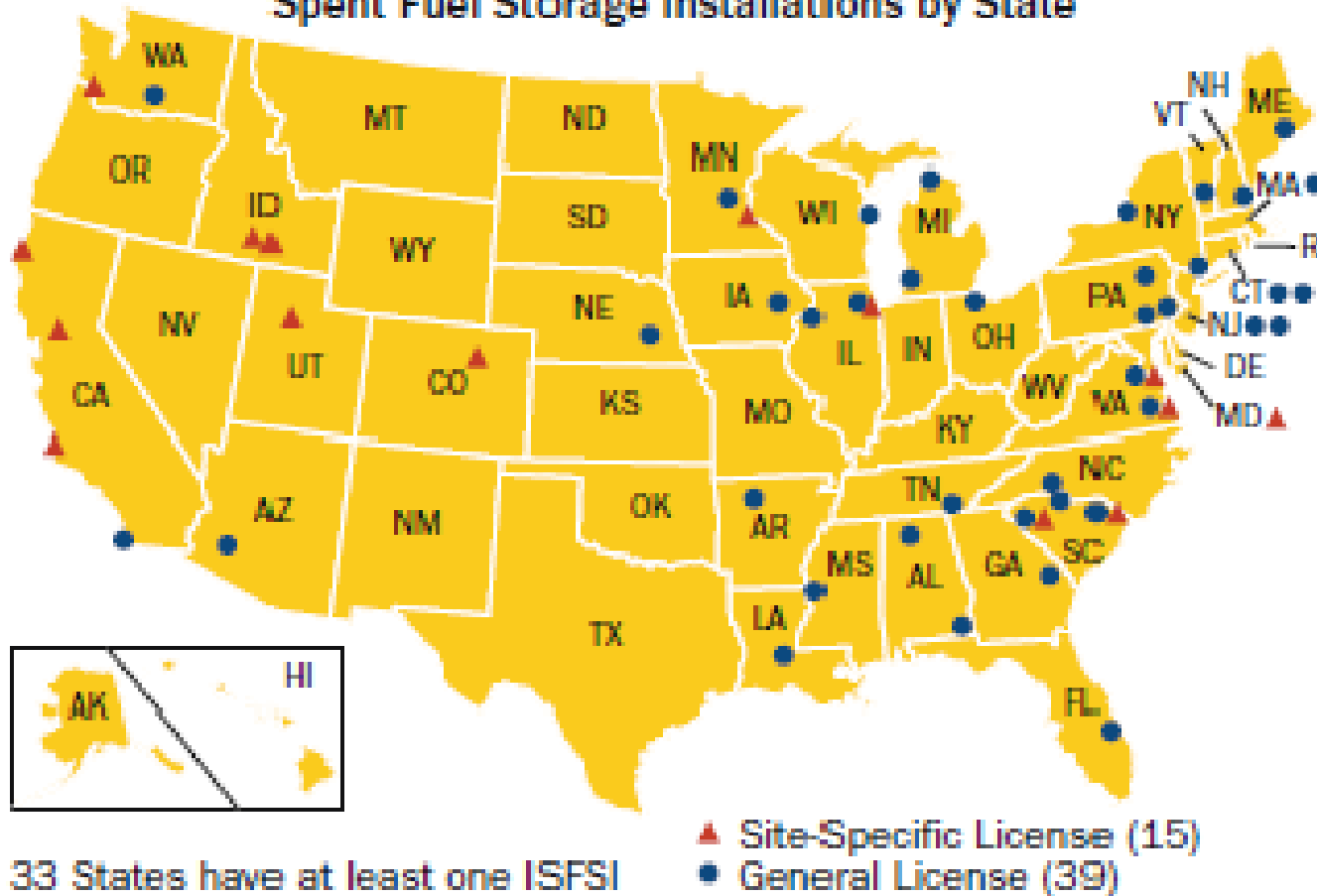


Draft Rule
to Commission
by end of 2009



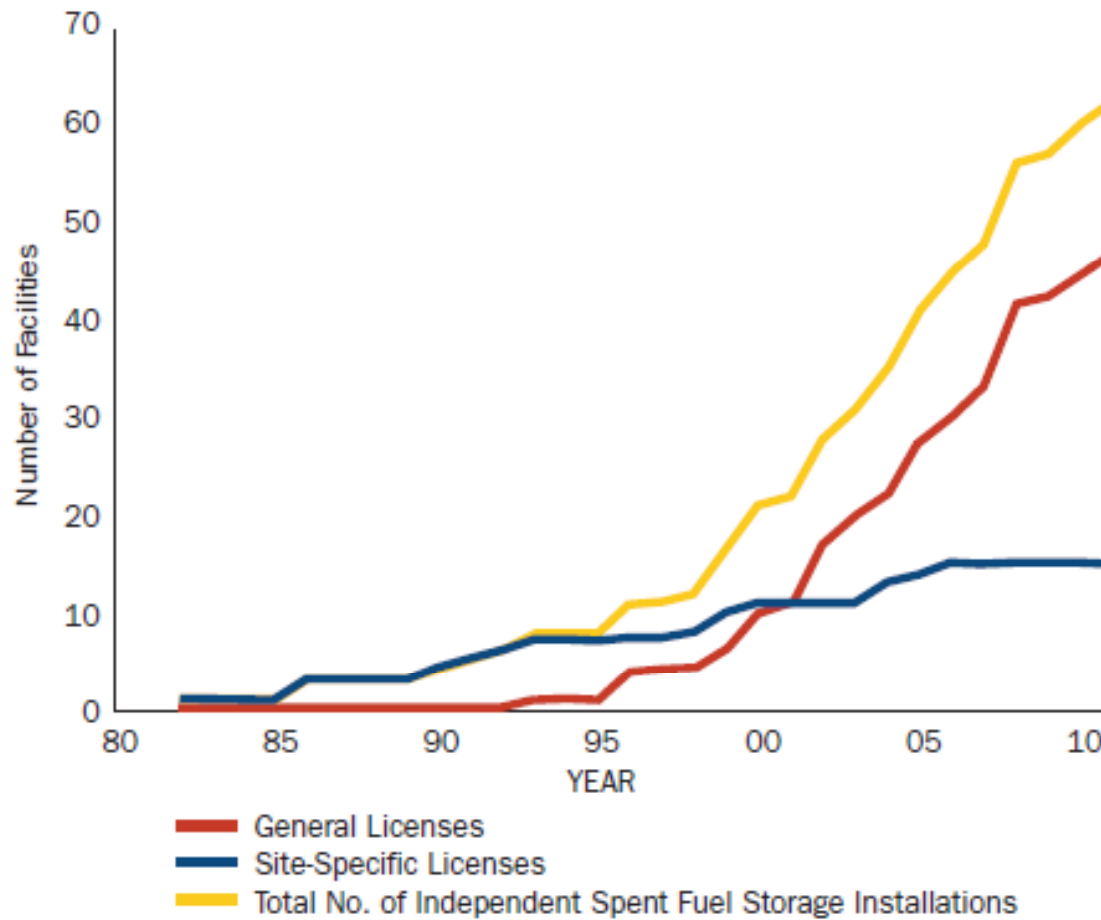
Location of Spent Fuel Storage Installations

Figure 44. Licensed/Operating Independent Spent Fuel Storage Installations by State



Growth of Spent Fuel Storage Installations with Time

Figure 45. Independent Spent Fuel Storage Installation Growth with Time



Source: U.S. Nuclear Regulatory Commission

Location of Spent Fuel Storage Installations

Figure 41. Storage of Commercial Spent Fuel by State through 2008

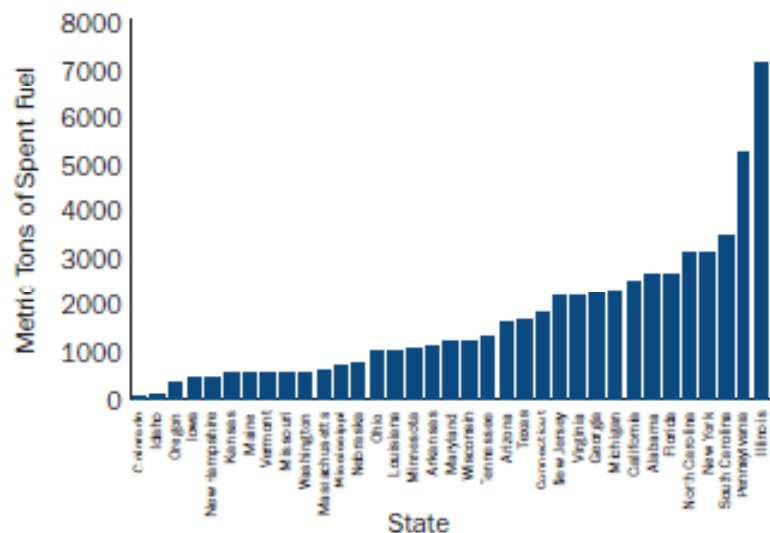


Table 15. Commercial Nuclear Spent Fuel and Payments to the Nuclear Waste Fund by State

State	Metric Tons of Uranium	Nuclear Waste Fund Contributions (\$ M)
Alabama	2,660	719.2
Arizona	1,620	508.7
Arkansas	1,120	285.6
California	2,510	795.7
Colorado	30	0.2
Connecticut	1,830	353.0
Florida	2,660	743.4
Georgia	2,210	662.3
Idaho	90	NA*
Illinois	7,120	1,706.9
Iowa	430	108.7
Kansas	530	180.9
Louisiana	1,010	309.5
Maine	550	65.5
Maryland	1,180	343.5
Massachusetts	610	156.8
Michigan	2,280	503.0
Minnesota	1,060	375.9
Mississippi	690	194.0
Missouri	570	187.3
Nebraska	740	252.5
New Hampshire	440	146.3
New Jersey	2,180	574.8
New York	3,130	762.9
North Carolina	3,100	801.7
Ohio	980	287.5
Oregon	350	75.5
Pennsylvania	5,240	1,502.4
South Carolina	3,460	1,197.9
Tennessee	1,280	439.5
Texas	1,660	580.3
Vermont	560	89.8
Virginia	2,180	672.1
Washington	570	152.8
Wisconsin	1,200	344.2
Other	NA	7.6
Total	57,650	16,088.3

Term Limits for Spent Fuel Storage



Rulemaking to extend the term limits
for storage certificates of compliance
from 20 to 40 years

NUCLEAR REGULATORY COMMISSION

10 CFR Part 72

[NRC-2008-0361]

RIN 3150-A109

License and Certificate of Compliance Terms

AGENCY: Nuclear Regulatory
Commission.

ACTION: Proposed rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations that govern licensing requirements for the independent storage of spent nuclear fuel. These proposed amendments include changes that would enhance the effectiveness and efficiency of the licensing process for spent nuclear fuel storage. Specifically, they would clarify the term limits for dry storage cask Certificates of Compliance (CoCs) and independent spent fuel storage installation (ISFSI) specific licenses. The proposed amendments would also provide consistency between the general and specific ISFSI license requirements, and allow general licensees subject to these regulations to implement changes authorized by an amended CoC to a cask loaded under the initial CoC or an earlier amended CoC (a "previously loaded cask").

DATES: The comment period expires November 30, 2009. Comments received after this date will be considered if it is practical to do so, but the NRC is able to assure consideration only for comments received on or before this date.

Term Limits for Spent Fuel Storage

- Stems from exemption request for Storage at Surry Nuclear Power Station
- Based on Spent Fuel Storage experiences at Surry and INEEL
 - Creep not a problem for fuel rods
- Requires Aging Management Plan
- May not be applicable to high burn-up fuel
 - Hydride reorientation

Ongoing Activities

- Yucca Mountain License Application
 - Schedule
 - Budget

- Waste Confidence Decision
 - Proposed Final Rule
 - Commission Vote Sheets



MacArthur Maze

- Opportunity to analyze real accident data
- Assess whether accident environment is more severe than tunnel fires
- Assess accident involving severe fire followed by impact
- Analysis based on input from multiple agencies

ANATOMY OF THE COLLAPSE

3:41 a.m.: James Mosqueda, pulling a full gasoline tanker, was speeding south along I-880 where it passes beneath eastbound I-580 when the truck overturned and caught fire, according to California Highway Patrol.

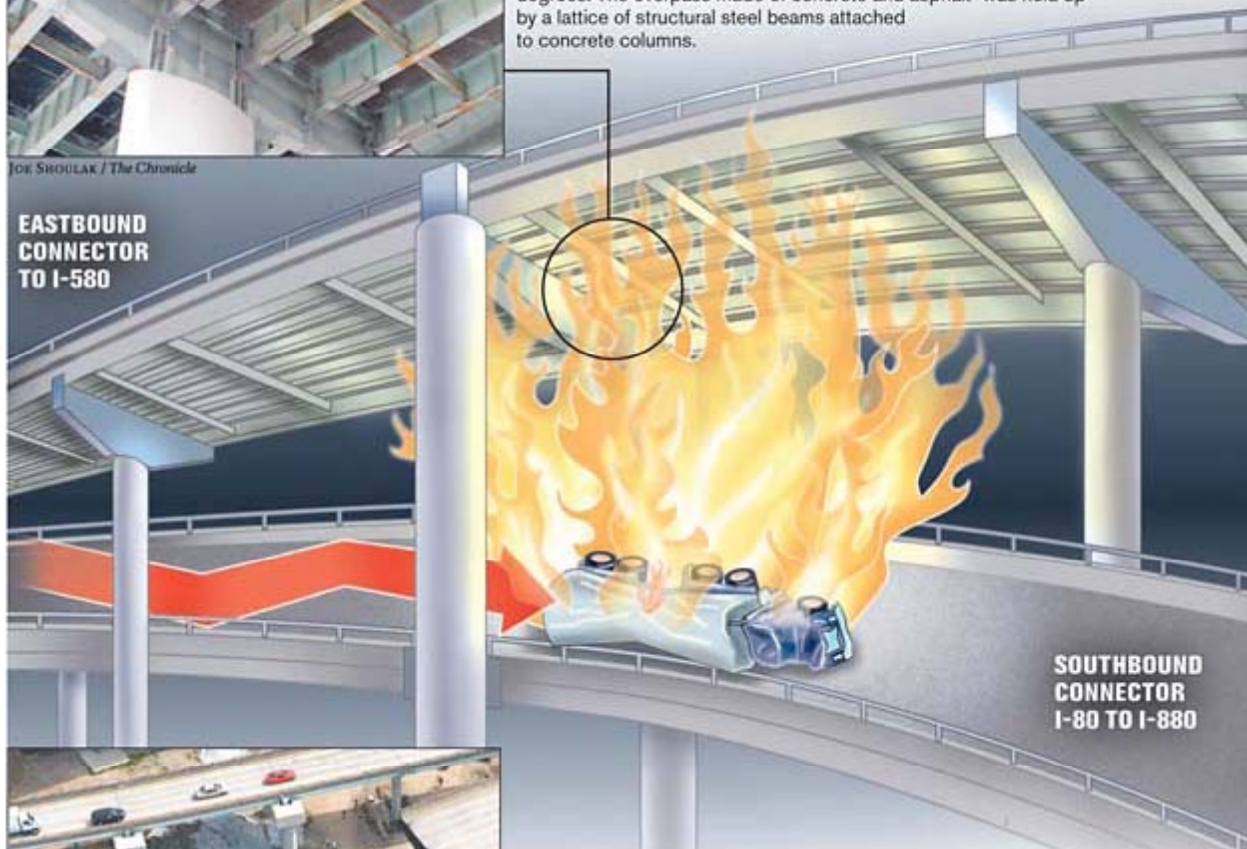
Underneath the roadway

The I-580 overpass was exposed to flames estimated to be about 3,000 degrees. The overpass made of concrete and asphalt was held up by a lattice of structural steel beams attached to concrete columns.



JOE SHOULAK / The Chronicle

EASTBOUND
CONNECTOR
TO I-580



SOUTHBOUND
CONNECTOR
I-80 TO I-880



ROBERT CAMPBELL / Special to The Chronicle

Route to disaster

3:55 a.m.: The overpass was buckling as firefighters arrived. Steel is known to lose half of its rigidity at 1,000 degrees and begins to melt at 2,750 degrees.

Fallen roadway

4:02 a.m.: The I-580 overpass collapsed onto the I-880. The driver had walked away from the accident and is being treated for burns to his face, head and neck.



JOHN BLANCHARD / The Chronicle

THE MAZE MELTDOWN

Heat transformations

Engineers estimate Sunday's flames reached close to 3,000 degrees. Here's a breakdown of heat's effects.

Molten lava: 3,140°

Iron melts: 2,797°

Steel melts: 2,750°

Gold melts: 1,947°

Silver melts: 1,763°

Steel loses half its rigidity: 1,000°

Lead melts: 622°

Water boils: 212°

0°

Source: "Comparisons" by the Diagram Group and Chronicle research

The Chronicle

SAFETY: Nuclear shipments questioned
[Keay Davidson, Chronicle Science Writer](#)
Wednesday, May 2, 2007

Sunday's fire reportedly grew as hot as 3,000 degrees -- almost one-third the surface temperature of the sun -- and burned for two hours. Federal agencies have tested nuclear shipments in so-called "fully engulfing" fires that last only 30 minutes and don't exceed 1,475 degrees.

Newhall Pass (I-5) Fire October 12, 2007



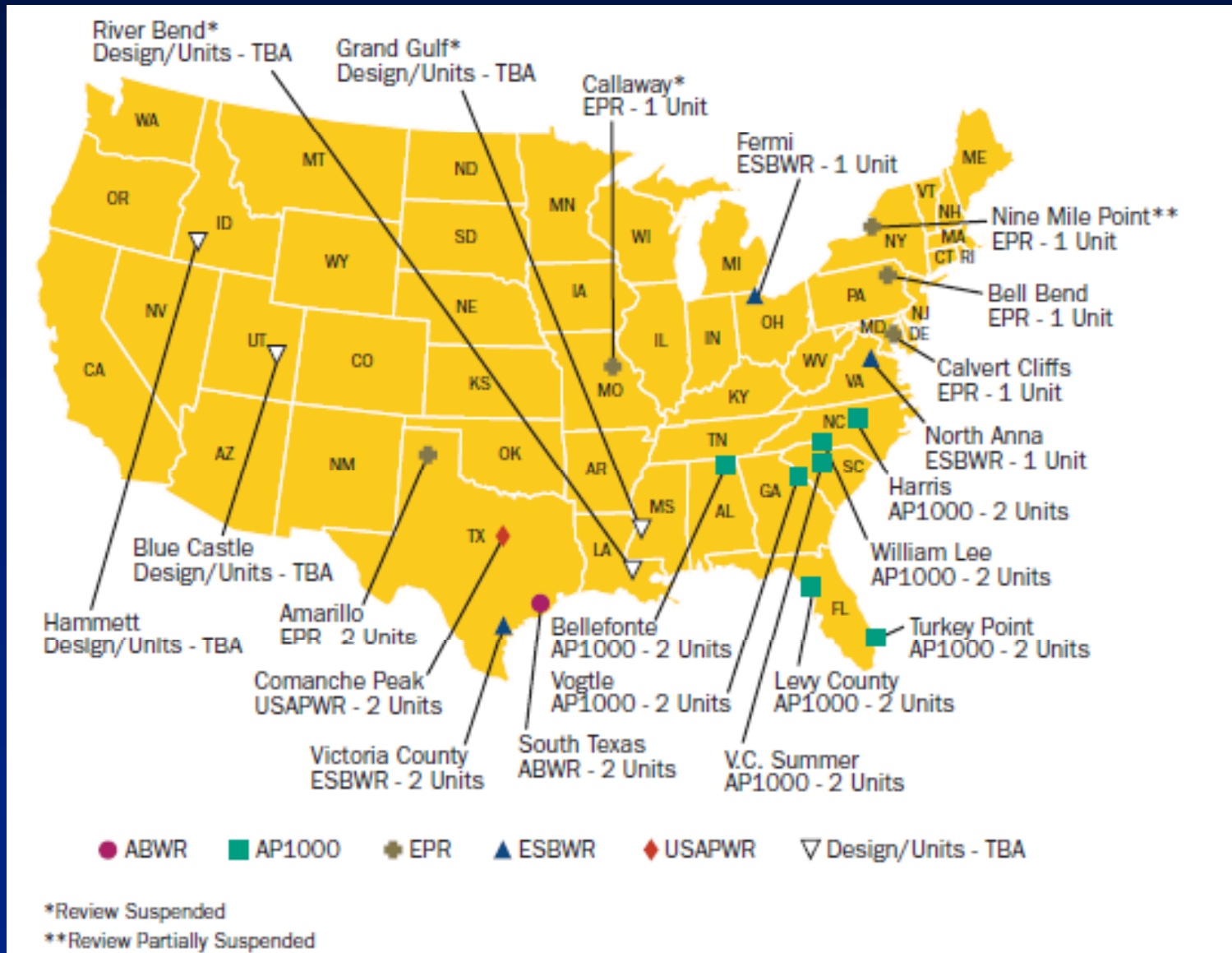
- 15 Tractor trailer rigs and 1 car involved
- Severe fire lasting several hours
- 3 deaths
- 1/10 mile (550 ft) tunnel (truck bypass)
- NRC Actions
 - Cooperate with Caltrans and CHP to review accident information and data
 - Develop fire model to assess cask performance







Location of Projected New Nuclear Power Reactors



Questions