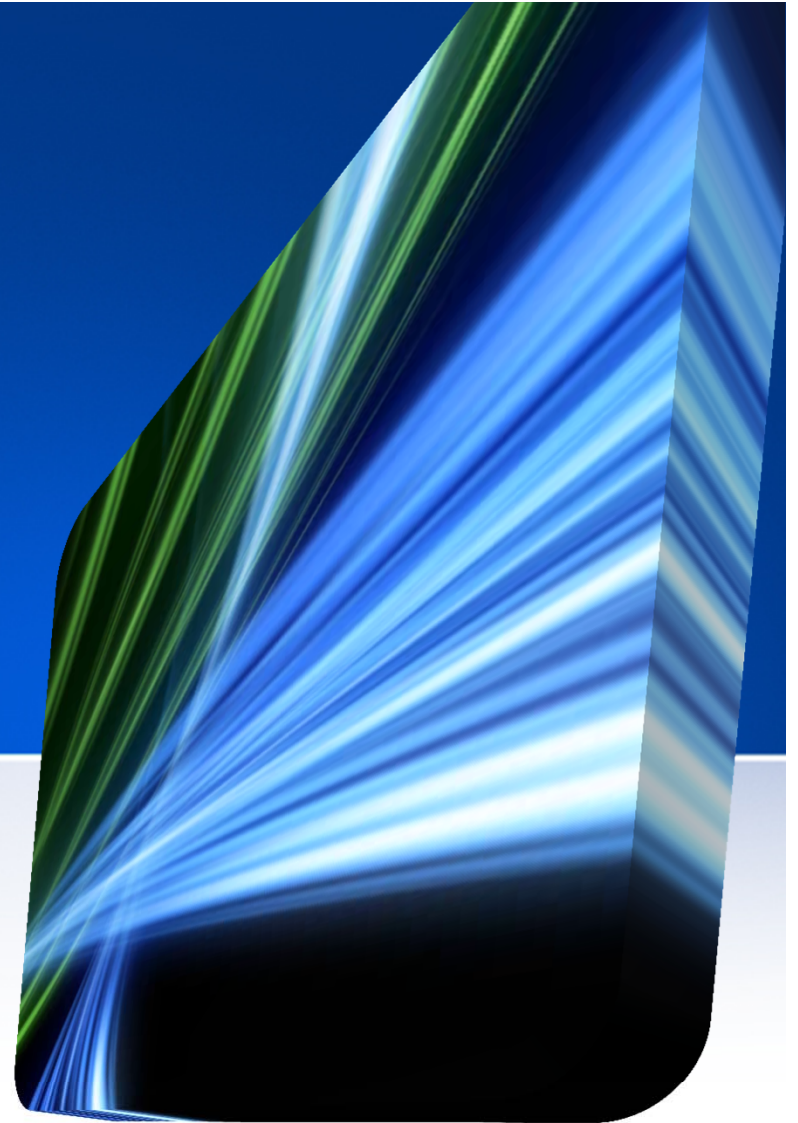


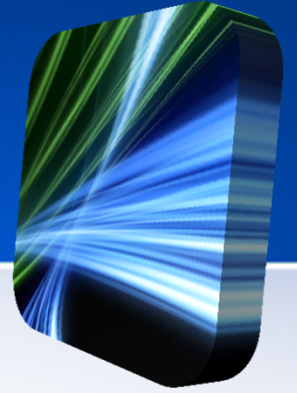
# Class 1E Class 1E-S

**Jim Gleason, P.E.**  
**6-4-2013**

**GLSEQ, LLC**

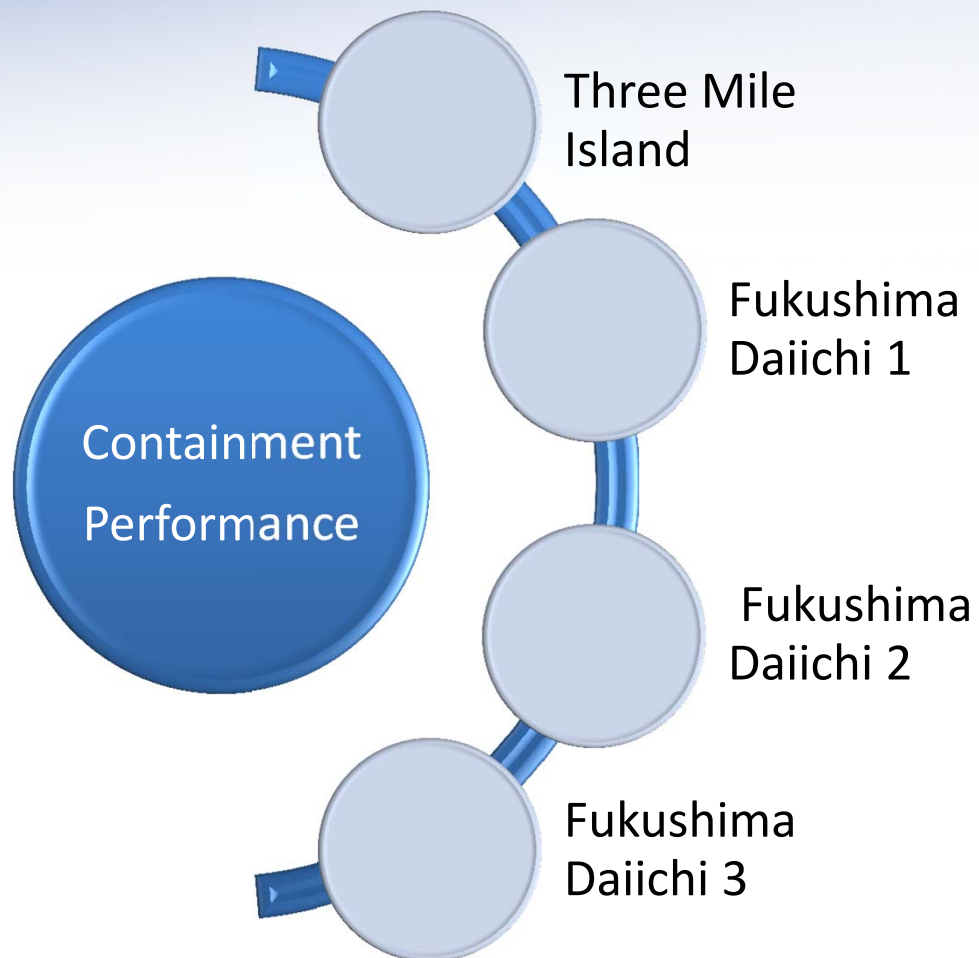


# Heritage of Class 1E



- **Class 1E:** The safety classification of the electric equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or are otherwise essential in preventing significant release of radioactive material to the environment.

# Environmental Stewardship

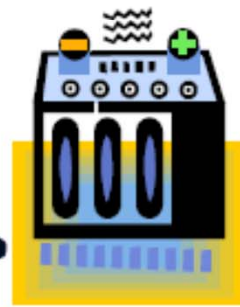
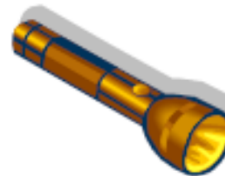


## What were available for the recovery work after the tsunami?

There were only the following limited number of devices and tools available !

- Fire Engines: only a few people knew how to operate them.
- Flashlights
- Cable
- Tools (screwdrivers, etc.)
- Batteries taken from cars
- Engine driven Generators\*
- Engine driven Air Compressors\*

\*They were in the warehouses of the affiliated companies and difficult to find.







## Post-Fukushima Plant Safety and Equipment Qualification at ASME Boiler Code Week ~ Miami, FL (May 2013)

**TITLE:** Post-Fukushima Plant Seismic Assessment (USNRC NTF 2.1)

**DATE:** May 15, 2013, Wednesday, 1:00pm – 5:00pm

**LOCATION:** Hyatt Regency - Miami

**PRESENTERS:** Dr. Ram Srinivasan, Technical Consultant & Senior Expert, AREVA, and  
Member, ASME Nuclear Quality Assurance

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### SESSION DESCRIPTION:

Since the Fukushima accident, the nuclear industry has developed substantial enhancements to safety. The NRC is requiring existing plants to assess their potential vulnerability to external



# ASME to Hold Symposium on Verification and Validation Methodologies

PRESS RELEASES

NEW YORK, Feb. 3, 2012 – The first large-scale conference dedicated entirely to verification, validation and uncertainty qualification of engineering-based computer simulations will be hosted by ASME (American Society of Mechanical Engineers), this May, in Las Vegas, Nev.

The ASME Verification and Validation Symposium (V&V 2012), set for May 2-4 at the Planet Hollywood Resort in Las Vegas, will convene engineers and scientists from a wide range of disciplines to discuss methodologies for the verification of codes and solutions, simulation validation, and for assessing uncertainties in mathematical models, computational solutions, and experimental data.

Consisting of plenary sessions and more than 220 technical paper presentations, V&V 2012 will report on best practices for verification and validation and new approaches, as well as future ideas and challenges. The symposium will feature a cross-disciplinary format, attracting technical professions from around the world and from diverse industry sectors including nuclear power, thermal and fluid mechanics, structural analysis, automotive, materials engineering, combustion, shock and vibration, energy systems, oil and gas, space science and astrophysics, medical device design, and others.

V&V 2012 also will include a distinguished lineup of keynote speakers including:





# ASME To Hold Symposium on Small Modular Reactors for the Nuclear Power Industry

PRESS RELEASES

NEW YORK, Sept. 26, 2011 – ASME will present a symposium on small modular reactors (SMR) Sept. 28-30, 2011, at the Hyatt Regency on Capitol Hill in Washington, D.C.

Combining technical presentations and workshops, the ASME 2011 Small Modular Reactors Symposium will support ten technical tracks and panel discussions covering a complete range of topics attending SMRs, from design and instrumentation to risk management and licensing, as well as materials, thermal hydraulics, fuel cycles, and codes and standards.

Small and medium modular reactors offer the promise of improved safety, short construction times, factory fabrication, and ready availability. SMRs can also be used for distributed generation applications and for repowering aging fossil fuel plants.

The symposium is aimed at government bodies, nuclear researchers, engineering practitioners, and other industry professionals seeking insights on SMRs currently under development and practical information on methods to manage new installations.





7590-01-P

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of )  
)  
ALL POWER REACTOR ) Docket Nos. (as shown in Attachment 1)  
LICENSEES AND HOLDERS ) License Nos. (as shown in Attachment 1) or  
OF CONSTRUCTION PERMITS IN ) Construction Permit Nos. (as shown in  
ACTIVE OR DEFERRED STATUS ) Attachment 1) )  
)  
) EA-12-049

**ORDER MODIFYING LICENSES  
WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES  
FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
(EFFECTIVE IMMEDIATELY)**





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 Responding to the 2011 disaster at Japan's Fukushima Dai-ichi nuclear station, the ASME Presidential Task Force on Response to Japan Nuclear Power Plant ...

[Fukushima: Where Do We Go from Here? - ASME](#)

[www.asme.org/kb/news.../fukushima--where-do-we-go-from-here-](http://www.asme.org/kb/news.../fukushima--where-do-we-go-from-here-)   
 When the Fukushima Daiichi nuclear power complex in Japan was hit by an earthquake and ... After Fukushima, ASME Task Force Challenges Nuclear

**IEEE NPEC Fukushima Task Force = 0**

ASME Nuclear Podcast on Nuclear Safety Guidelines to limit large scale problems like ... After Fukushima, ASME Task Force Challenges Nuclear Industry ...

[Lessons Learned in the Aftermath of Fukushima Dai-ichi ... - ASME](#)

[www.asme.org](http://www.asme.org) > About ASME > Press Releases   
 Jun 14, 2012 – The ASME Task Force built upon the growing body of technical assessments of these events and examined the Fukushima Dai-ichi accident in ...

[\[PDF\] Forging a New Nuclear Safety Construct - ASME](#)

[files.asme.org/asmeorg/Publications/32419.pdf](http://files.asme.org/asmeorg/Publications/32419.pdf)   
 Jun 14, 2012 – The ASME Presidential Task Force on Response to Japan Nuclear Power Plant Events .... 1.3 The Fukushima Dai-ichi Nuclear Accident .

[ASME Offers PostFukushima Workshops Next Month in Miami - AS...](#)

[www.asme.org/.../ASME.../ASME-Offers-Post-Fukushima-Workshops-N...](http://www.asme.org/.../ASME.../ASME-Offers-Post-Fukushima-Workshops-N...)   
 These Post- Fukushima Nuclear Plant Safety and Equipment Qualification ... 1.99) and 2.3 (Seismic Walkdowns) of the Post-Fukushima Near Term Task Force.



# Scorecard

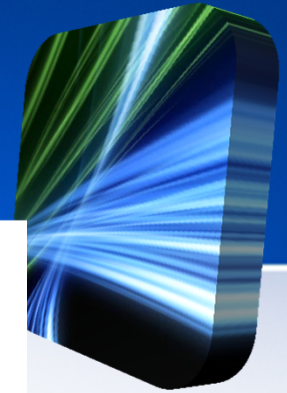


Plant	Severe Accident	Cause: Line Break	Cause: Seismic	Cause: NPH	Cause: Human Error	
TMI	Yes	No	No		Yes	✓
Fukushima D I	Yes	No	No	Yes		✗
FukushimaD II	Yes	No	No	Yes		✗
FukushimaD III	Yes	No	No	Yes		✗
Fort St Vrain	Near Miss	No	No	Yes		✗
Grand Gulf	Near Miss	No	No	Yes		✗
Forsmark	Near Miss	No	No	No	Yes	✗

# IEEE Std 308 Criteria for Class 1E Power Systems for Nuclear Power Generating Stations

FOR NUCLEAR POWER GENERATING STATIONS

IEEE  
Std 308-2001



**Table 2—Illustrative malfunctions, accidents, etc.**

Natural phenomena	
Earthquake	Rain, ice, and snow
Wind	Floods
Hurricane	Lightning
Tornado	Extreme temperature conditions
Postulated phenomena	
1) Postulated accident environment (humidity, temperature, pressure, chemical properties, radiation)	
2) Fires	
3) Accident-generated missiles, pipe whip	
4) Fire protection system operation	
5) Accident-generated flooding, sprays, or jets	
6) Postulated loss of the preferred power supply combined with any of the phenomena listed in item 1) through item 5) of this table.	
7) Postulated loss of all alternating current electric power (station blackout)	
8) Single equipment malfunction	
9) Single act, event, component failure, or circuit fault that can cause multiple equipment malfunctions	
10) Single equipment maintenance outage	



# Commissioner George Apostolakis April 2012

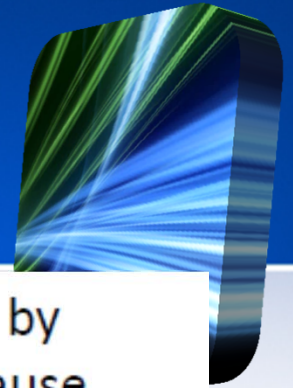


## A Proposed Risk Management Regulatory Framework





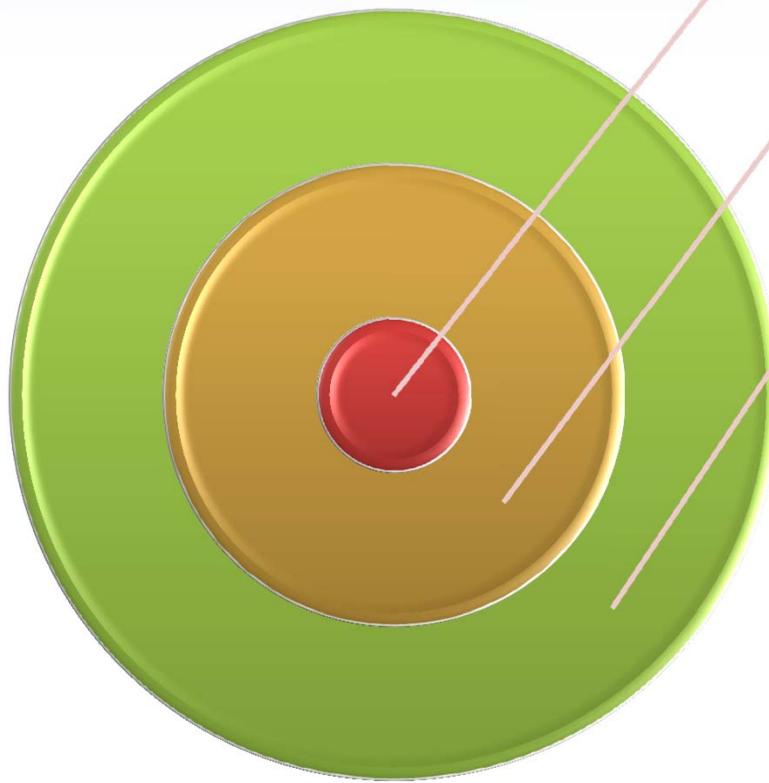
# The Accident at Fukushima Dai-ichi NPS



- The accident at Fukushima Dai-ichi NPS was caused by long lasting complete power loss due to common cause failure (CCF) of electrical equipment following tsunami, and insufficient provision against severe accident.
- It is temporarily rated at INES Level 7, and people where lived in the specific area including those within 20 km radius from the site are still not able to return home.



# Proposal to IEEE



Class 1E-S

Class 1E-H

Class 1E

# Class 1E-S



Severe Accident Capable

Electrical Power

I&C

# IEEE NPEC's Answer to SA



Applications  
of Standards

Process

Certification