Committee Meeting
Agenda & Minutes

Codes & Standards

Committee Meeting Objective: Report, discuss, and learn about the latest updates in national codes and standards affecting the EGSA members.

Date and Time: Monday, April 19, 2021

Location: Naples, FL– Room: Acacia 4-6

Time 1:00 - 5:30p.m.

Chairperson: Robert Simmons

Schedule

List leaders and a description for each topic or activity.

Item	Description	Conclusion
Welcome -	Robert Simmons	Meeting called to order
Review Mission statement, and initiatives of the C&SS committee	Robert Simmons	Done
Review and update of membership	Jeff Jonas Request any information relative to changes in personnel data from attendees	Membership spreadsheet passed around and members online email presence
Meeting minutes from the Fall 2020 meeting	Jeff Jonas Request any amendment to minutes previously distributed	No minutes as there was no Fall 2020 committee mtg
Officer update	Robert Simmons	Robert simmons rolls off as chair after this meeting. Jeff Jonas will roll on as chair, Keith Page will become Vice chair. We are in need of a secretary.
Presentation **–** ***Floods to Fukushima – Genset security for natural disasters***	James Carlson	Presentation very informative and timely. See attached copy of the presentation
Working Group update-Steve Sappington, UL 2200	Steve Sappington, Jeff Jonas	-Steve Evans, UL, is the new Principle Development Engineer for ULC 2200 -Steve Sappington and Herb Whittall attended the UL 2200 work group meeting Sunday afternoon. It was not possible to establish a virtual meeting. Steve updated Herb on changes in the 3rd Edition, ULC 2200. -Steve Sappington requested of the committee attendees to send a list of any issues they were experiencing with implementing ULC 2200, 3rd Edition, pledged his assistance with addressing those issues as an STP member, and reminded the attendees that UL has challenged EGSA to

		make the Standard its own; EGSA members are the subject matter experts on most relevant topics covered by the Standard.
Sound measurement best practices. Working Group update *Coordinate with ANSI Standard*	Brian Ponstein,	closed as this was adopted into the standards in 2018/19. Therefore no report or update on this topic
IBC, ASCE, BSSC, Seismic certification Working Group	Robert Simmons Report on update in the ASCE 7-16, 7-22. Progress on update and conversion to code language of EGSA best practice for seismic certification.	No Report
Update Diesel fuel working group (NFPA 110)	Steve Sappington	See notes for NFPA 110 below
PRODUCT CYBER SECURITY PRESENTATION	**Discuss future program**	Felt it was a good idea
CYBER SECURITY REQUIREMENTS PRESENTATION (IRL PERSPECTIVE)	**Discuss future program**	Felt it was a good idea
UL2201 (Portable Generators)	Jeff Jonas	No report
UL1008 (Transfer Switches)	Herb Daugherty	UL 1008 No meeting
UL1008M (Transfer Switch equipment, meter mounted)	Steve Sappington,	No report
UL/ULC 6200 (Standard for Controllers for Use in Power Production)	Jeff Jonas	No report
UL 1778 (Uninterruptable Power Systems 2nd Edition)	Jeff Jonas - Need volunteer for liaison position.	
UL 2900 Cyber Security	Rachel LaVoie	No report
Status new UL standard being developed UL3001- Distributed energy resources.		New Liaison – no report
NFPA 110 (Standard for Emergency and Standby Power Systems) *NFPA 111* (Standard on Stored Electrical Energy Emergency and Standby Power Systems)	Herb Daugherty	Note: We are still waiting for Herb's appointment as principle member which has still not been approved. This is the standard for Emergency and Standby Systems, and the committee feels it is unacceptable that EGSA is not represented. We will continue to push for approval and ask for EGSA to diligently follow up. Steve Sappington: -NFPA 110 contains condensed, less restrictive requirement for fuel quality than

		those proposed at the First Draft review. The technical committee did not want to overburden site owners, especially those who've invested in fuel polishing equipment and programs to ensure proper fuel quality. As a value added measure much good information was placed in the Appendix. Appendices include informative references and do not include requirements. -NFPA 110 will allow fuel cells to be a part of a site's emergency power supply system. A task group was formed to review the technology and draft requirements that were proposed to and evaluated, discussed, modified, and ultimately approved by the technical committee in about a two day session last year. Attendees were reminded to register with NFPA to receive email notifications for published errata and TIAs (temporary interim amendments) to the NFPA codes and standards of their interest. Becoming aware of and implementing errata and TIA may reduce project and operating costs.
NFPA 99 (Health Care facilities Code) NFPA 99 2nd draft meeting in Indianapolis in June 24-27th, 2019	Herb Daugherty Ron Schroeder	Herb: NFPA 99 No meeting. Still awaiting moved up from voting alternate to principle in replacing Herb Whittall.
NFPA Correlating Committee	Ron Schroeder	No report
IAEI (International Association of Electrical Inspectors) No codes or standards. IAEI uses the NEC. Chapter meetings are an outlet for manufacturers to share information about their product. They are open to a presentation at their local chapter meetings	Ron Schroeder	No Report
NFPA 70 (National Electrical Code) Panel 13	Herb Daugherty, Jeff Jonas	Herb: NFPA 70 (National Electrical Code) Code Panel. The First Draft of the next edition (2023) was held by conference call in January. 200 comments were balloted. As Jeff commented, a detailed report is available on the NFPA website and will be part of the fall conference report. The 2nd draft report will be in March 2022. Jeff: NFPA 70, NEC update. Q3-2020'. First draft meetings were held in January of 2021'. First draft is to be published no later than July 2, 2021. Public comment phase will be August 19, 2021. As a refresher NFPA 70-CMP 13 is responsible for the following articles; 445-Generators 455-Phase Converters 480-Stationary Standby Batteries 695-Fire pumps 700-Emergency Systems 701-Legally Required Standby Systems 702-Optional Standby Systems 706-Energy Storage Systems 708-Critical Operations Power Systems 712-Direct Current MicroGrids 750-Energy Management Systems

		Annex F-Availability and Reliability for Critical Operations Power Systems; and Development and Implementation of Functional Performance Tests (FPTs) for Critical Operations Power Systems Annex G-Supervisory Control and Data Acquisition (SCADA) There are several items related to the group's interest. All of the changes can be viewed on the NFPA website. If any issues with the proposed changes please enter a public comment on the NFPA website. I will provide a detailed update in Fall. If anybody has a specific question or need additional information I would be happy to answer it for them. Sincerely, Jeff Jonas
NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines) 1st draft meeting to be at the end of April in Savanah, GA. 2021 version. PI for placement related to CO will be reviewed.	Keith Page, Herb Daugherty	UL naming (drop ANSI) combustible mat'l def'n update Ch 4 Engines General Info clearances for engines and/or fire testing proving otherwise (explained in annex A) Ch 5 - Fuel Supply (Gaseous) gas piping install shall also be tested for gauge pressures some updated text for ASSV's text for overpressure protection device Ch 6 - Fuel Supply (Liquid) Excpt for listed secondary tanks meeting specific criteria for spill containment Ch 8 - Exhaust new text for listed factory-built chimneys clearances updated relative to NFPA 211 Ch 11 Fire Suppression Hybrid Systems text New Annex B Inspection, Maintenance, Testing section
IEEE 3000 Series (Color Books)	Herb Daugherty	IEEE 3000 No Activity
NECA: National Electrical Contractors Association	New Standard out – Tom Giordano	No Report
PGMA Portable Generator Manufacturers Association	Open	No report
Emergency Response Coordination NFPA 1600- Standard on Continuity, Emergency, and Crises Management FEMA – UL3741-PV emergency response UL fire research group – Tim Zgonena	Open Discussion	No report
Any Important News on Major EGSA Initiatives from other Committees	Robert Simmons	**Scott Anderson** With Marketing and Communications Committee shared that their committee is wanting to help C&SSC in getting the word out to the EGSA membership about important news that comes out of C&SSC. Members are encouraged to work with Marketing to increase the dissemination of important codes and standards information
Adjourn	Robert Simmons	

Action Items *(additional space on back)*

Item	Person Responsible	Deadline
Task	**Name of person assigned to complete task**	**Date and time task should be completed.**

Codes and Standards Surveillance Committee Mission Statement:

Represents EGSA and its members' interests on select national and international industry codes and standards committees and reports back to the membership through *Powerline* magazine, Committee meetings, Action Alerts, and e-mail blasts. The Committee also:

- Develops recommendations and provides action regarding industry codes and standards development and review by request and as needed

- Surveys the membership and other industry professionals to determine the applicable standards it should monitor

- Provides the Association with a platform from which it may develop Recommended Practices for the proper application of codes and standards within the industry

- Educates EGSA members on standards, their application and interpretation

Fukushima to Flooding

The Inside Story

James A Carlson, PE
Petra Seismic Design, LLC
Seismic Source International, LLC
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Agenda

- Fukushima Daiichi
  - Timeline
  - Insights of what went wrong
- FEMA P-1019
- Flooding
  - Events
  - Codes and Government Requirements
  - Design

Fukushima Daiichi Disaster 2011

Friday March 11

- 14:46: A 9.1 magnitude earthquake strikes.
  - Nuclear reactors 1, 2, and 3 are automatically shut down.
  - Nuclear reactors 4, 5, and 6 were down for maintenance.

  - **Japanese electricity grid is lost, and diesel generators started. Game changer but only lasts one hour.**

Operators Focused On Earthquake Damaged Reactor 2 Spent Fuel Pool.

Things are about to go from bad to really bad.

Fukushima Daiichi Disaster

Friday March 11

- 15:46: A **46 ft** tsunami overtops seawall designed for **19 ft**.
  - Diesel generators failed. Fuel tanks washed away.
  - Reactor 1 isolation condenser available.
  - Reactors 2 and 3 HPSI and core cooling system available.
  - Steam-powered cooling water pumps **(GO TO HELL PUMPS).**

LOST ABILITY TO REMOVE HEAT WITHOUT POWER

Fukushima Daiichi Disaster

Friday March 11

- Still day 1
- 18:00: Water level in reactor 1 reaches the top of the fuel.
- 19:30: Fuel in reactor 1 becomes fully exposed and **starts melting.**

Isolation condenser units were not tested/operated in over 40 years.

The town of Fukushima destroyed by Tsunami

Fukushima Daiichi (Day 2)

Saturday March 12

- 02:44: **Emergency battery power for reactor 3 runs out.**
- 04:15: Fuel rods in reactor 3 are exposed.
  - **HPSI Starts.**
- 05:30: Decision made to vent steam from reactor 1 into the air.
- 06:50: **Reactor 1 core is completely melted and falls to bottom of reactor vessel.**

What happens when the battery power runs out?

Fukushima Daiichi (Day 2)

Saturday March 12

- 10:58: Decision: vent steam from reactor 2 to air.
- 14:50: **Fresh water** injection into reactor 1 is halted.
- 15:36: Secondary structure of unit 1 **explodes**.
  - Concrete building around reactor vessel collapses; no damage is believed to have been sustained to the reactor itself.
- 19:00: **Seawater** injection into reactor 1 is started. Steam is vented into the air.

Fukushima Daiichi (Day 3)

Sunday March 13

- 02:42: **HPSI** for reactor 3 stops and water level within the reactor starts falling.
- 07:00: The water level in reactor 3 reaches the top of the fuel.
- 09:00: Reactor 3 Core **starts melting.**

Workers are hurt in the explosions.
2 operators killed from the initial Tsunami.

Fukushima Daiichi (Day 4)

Monday March 14

- 11:01: Reactor 3 secondary building **explodes**.
  - The blast affected the water supply to unit 2.
- 13:15: Reactor 2 reactor core isolation cooling system stops.
- 15:00: **Fuel in reactor 3 drops to the bottom of the reactor vessel.**
- 18:00: The water level in reactor 2 reaches the top of the fuel.
- 20:00: Reactor 2 Core **starts melting.**

Fukushima Daiichi (Day 5)

Tuesday March 15

- 06:00 An **explosion** damaged the 4th floor area above the reactor and spent-fuel pool of the Unit 4 reactor.
- **11:00: A second explosion of reactor 3. Melted fuel is released into the air.**
- 20:00: **Reactor 2 melted fuel drops to bottom of the reactor vessel.**

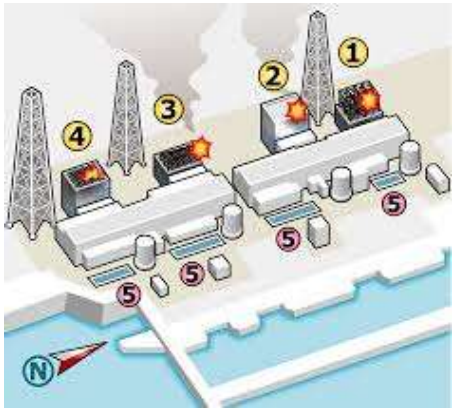
Fukushima Daiichi (Day 5)

Tuesday March 15

Temporary cooling systems on Reactor 2 are damaged from the explosion in unit 3.

An **explosion** in the "pressure suppression room" causes some damage to Reactor 2 containment system.

A **fire breaks** out at unit 4. Radiation levels at the plant rise significantly and subsequently fall.



WORST WEEK EVER.

Fukushima Daiichi (3 weeks)

- **The authorities discover that at reactor 2 highly radioactive water is running uncontrolled from the reactor through a manhole into the ocean.**
  - **The main leak is stopped with concrete.**
  - Smaller leaks from the reactor 2 to the ocean still existed.

Fukushima Daiichi (Finally)

- Months after the disaster it becomes crystal clear that the molten cores in the reactors 1, 2 and 3, lie as lava on the floors of the reactor buildings
- Further meltdowns can only be prohibited by constantly, 24/7, pumping large amounts of water into the buildings.

Fukushima Daiichi (Current)

- Earthquakes near the damaged nuclear plants.
  - **7.1 Earthquake February 13.**
  - **7.0 Earthquake March 20.**
- Water Tanks at Fukushima.

- **1m tones of contaminated water is held in about 1,000 tanks.**

  Solids can be removed.

  Problem is Tritium.

FEMA P-1019

FEMA P-1019

- Emergency Power Systems for Critical Facilities.
  - A Best Practice Guide to Improving Survival.
  - **Keep facilities operational after a major natural disaster.**
  - **Improve emergency power reliability.**
- Acknowledgements:
  - FEMA
  - ATC

Cover of the FREE Electronic File

Title: Emergency Power Systems for Critical Facilities: A Best Practices Approach to Improving Reliability

FEMA P-1019 / 2016

Available for free at FEMA website

Purpose of Manual

- **Examines vulnerability** of electrical power systems to natural hazards.
- Describes what **equipment** in critical facilities should be supplied by emergency power sources.
- **How long** power is needed.
- **How to operate/maintain** during an event.

Purpose of Manual

- Assess Risk.
- **Realistic** emergency management policies.
- Discusses advantages and limitations of redundant systems.
- Potential pitfalls when sizing system components.

Target Audience

- Owners, Facility Managers, and Operating Eng.
- Architect and Engineers (Structural, Electrical, Mechanical, and Fire Protection).
- First Responders.
- Contractors, Manufacturers and Suppliers.
- Maintenance Staff.

Manual Contents

- Chapter 1, Introduction.
- Chapter 2, electrical transmission.
- Chapter 3, disaster risks management.
- Chapter 4, **what needs emergency power and how long to keep operable.**
- Chapter 5, elements of a system.
- Chapter 6, design considerations (best practices).

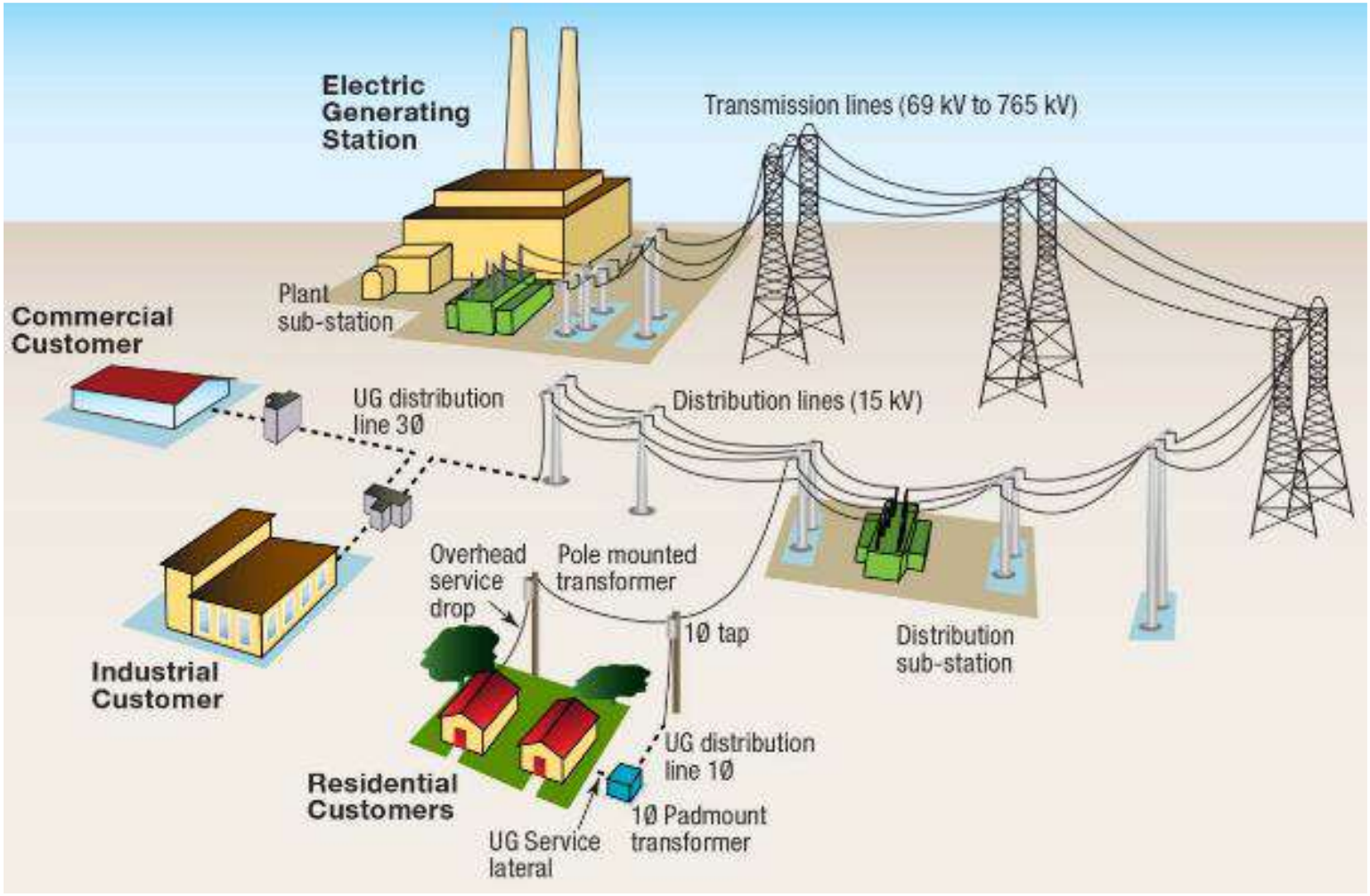
Manual Contents

- Chapter 7, guidance to provide reliability in the emergency power system.
- Appendix A, overview of codes.
- Appendix B, redundancy strategies **(N+1)**.
- Appendix C, selecting generators.
- Appendix D, **checklist** used before, during, and after events.

Lessons Learned Case Studies

- Case studies included:
  - Winter Storms (Ice and Snow)
  - High Winds
  - **Flooding (Power Lines and Building Systems)**
  - Earthquakes
  - Solar Storms (Electromagnetic Issues; 1989 and 2012)
  - Grid Failures (Northeast Blackout 2003)
- **Lessons learned discussed for each event.**

Why Transmission and Standby Fail



Critical Facility's Functions

- Hospitals and emergency medical treatment,
- Fire, rescue, ambulance and police stations, and emergency vehicle garages,
- Buildings designated as earthquake, hurricane, or other emergency shelters, and
- Emergency preparedness, communications systems, and operations centers and other facilities and sites required for emergency response command and control.

Chapter 5. Power Systems

- Engines.
  - Cooling (water or air).
  - **Enclosures** (Tornado and Earthquake Resistant).
- Location.
  - Usually not in the basement.
  - On site or off site.
  - **Fuel delivery capability.**
  - **Access by operations personnel** for during use.
  - **Replacement personnel.**

Chapter 5. Power Systems

- Diesel or Propane Supply.
- Generator Synchronizing.
- Load Shedding.
- Battery/Air Starting Systems.
- Power Distribution (NFPA 99).
- Vehicle Access.
- Connections (Cables).

Chapter 6. Design Considerations

- **Holistic Approach.** Design with all other building considerations.
- Determine Loads.
- Emergency System Type and Elements.
- Fire Protection.
- HVAC, Communication, and Controls.
- Electrical (lighting and elevators)
- **Location (Natural Hazards or Events).**

FEMA P-1019 Conclusions

- **Disaster Management and Preparation.**
- Natural hazards (i.e. winter storms, high winds, **flooding,** & earthquakes).
- Identifying power needs.
- Emergency power sources.
- Design Considerations.
- **Flooding: Biggest problem is knowing when to implement the plan.**

Flooding

- Source of Floods
- Building Construction
- Water Damage
- Staging
- Barriers
- Hazards
- Planning

Sources of Flooding

- Rain
  - "Australia, 2010"
- Snow melt with spring rain
  - "Missouri River, 2011"
- Storm
  - "Sandy, 2012"
- Seiches
  - A *seiche* must occur in an enclosed body of water such as a lake.

Australian Flood – Wettest Ever

2010 – Flood caused by rain and rain and more rain

Hurricane Sandy - Damage

Water surge can be devastating

Hurricane Sandy – Water Level

Buildings are not water-tight. Even Concrete structures will leak through cracks and seams.

Debris will act as a missile in moving water. Tree branches, empty tanks, and anything that floats is a problem.

Missouri Flood

2011

Missouri River System is a Source

Water from Colorado to Canada East of Rockies flow into the Missouri River.

Why Did The Missouri River Flood

- **Snow levels** were unprecedented.
- **Warm Spring**.
- Spring 2011 **rainfall** was immense.
  - Billings Montana had a years worth of rain fall in three days.

Flood Highway Damage Extensive

Flowing water can destroy just about anything.

Extensive Flooding Along Missouri

When water leaves the banks, it will go somewhere. Protecting Assets is key: Building and equipment.

Omaha Airport Stayed Open

Flood Resistant Design and Construction, ASCE/SEI 24-14

- Levees kept flood waters back.
- Need to maintain compaction on the levee system.
- Continuous inspections.
- Requires pumping in some cases – like at the Omaha Airport.

Nuclear Power Plants Are Targets

Fort Calhoun Nuclear Power Station

River Water is Highly Corrosive

Metal Strut Dissolves in 3 months.

Don’t Need to be Pretty

- Time is short.
- 2 week advanced notice.
- Preplanning and procedures help.
- Decisions for protecting assets.
- Supplies and how much.

Assets: Buildings and Equipment

Many methods for protecting buildings and equipment.

Rubber tubes, sand baskets, concrete can be used.

Tanks Need to be Addressed

- Contents may be hazardous, like fuel.
- Tanks, if possible, can be emptied or protected.
- If empty, tanks might be a risk and can become debris in water streams.
- If real hazardous, move out of flood zone.

Concrete Housing Techniques Used

Standard construction with foam forming materials filled with concrete is fast, safe, and will keep water back.

Sources of Water Inside Buildings

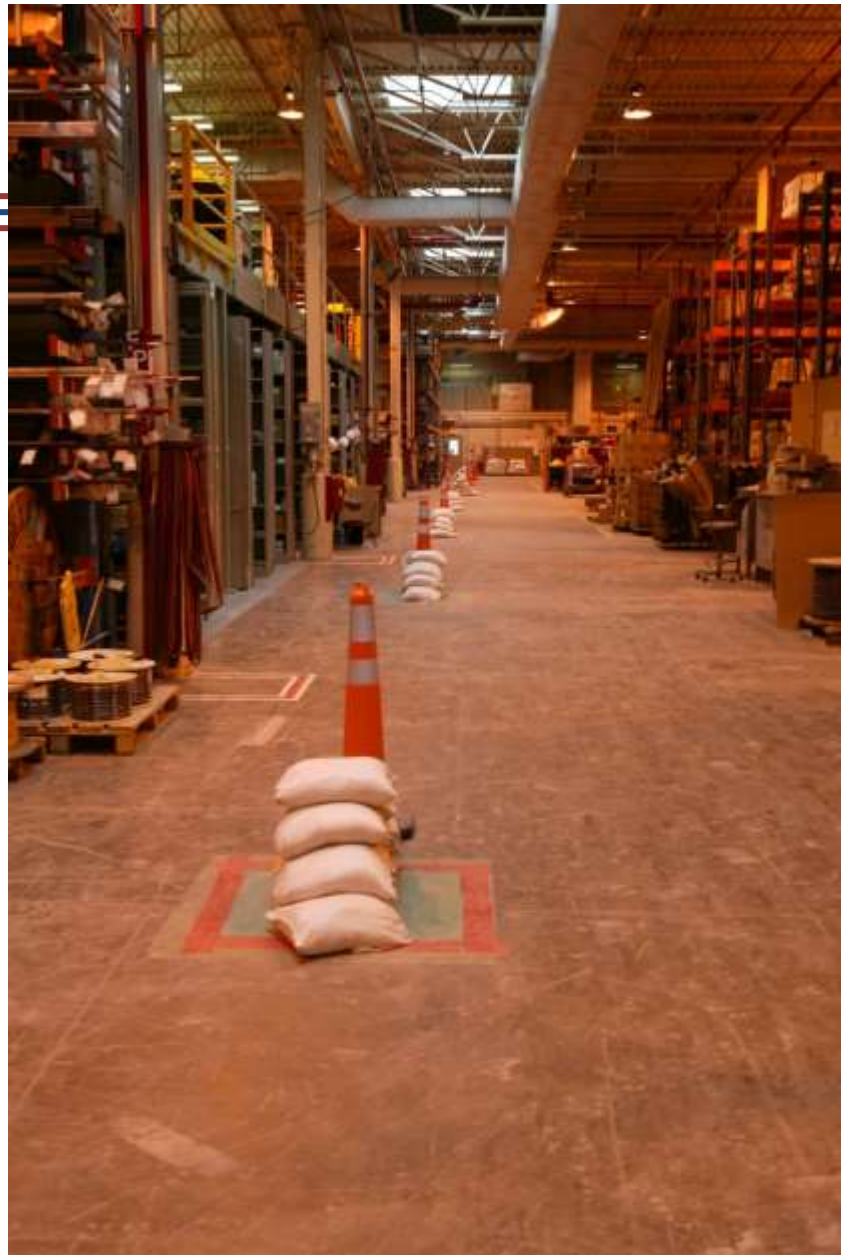
Ducts, Piping, and Conduit are all a conduit for water intrusion.

Staging Areas

- Stage all supplies.
- Wood and scaffold material.
- Food and water.
- Gas and Diesel.
- Containers.
  - Empty and filled.
- Ropes.

Plumbing

- Floor Drains are a source of leaks.
- Raised floors have lower concrete slabs and will leak.
- Standing water in building basements create mold issues.



Flood Plan

- Implement emergency plan
- Put building in safe operating condition
- Stage vital area flood mitigating equipment
- Install flood barriers
- Isolate flood boundaries
- Prepare floors and exterior boundaries
- Transfer power to diesel generators
- Arrange for supplies
- Initiate periodic inspections

Flood Plan

- Training conducted to install flood barriers
- Determine what your protecting
- Anticipate highest flood level
- Define engineered barriers
- Locate barrier penetrations
- Lesson Learned
- Stage flood mitigation
- Write protection procedures
  - **Penetration covers and verify they fit**

Evacuation Is Always an Option

Denial is not an option

Do not build in flood zone

Conclusions

- Fukushima Daiichi.
  - A disaster that changed the world.
- FEMA P-1019 is worth a read.
  - Keep as a good reference.
  - Update MFG documents.
- Flooding is Real.
  - Most frequent natural hazard.
  - Design and Plan for response to flooding.

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Questions?