Integration of Accident Management Strategies into Station Operation

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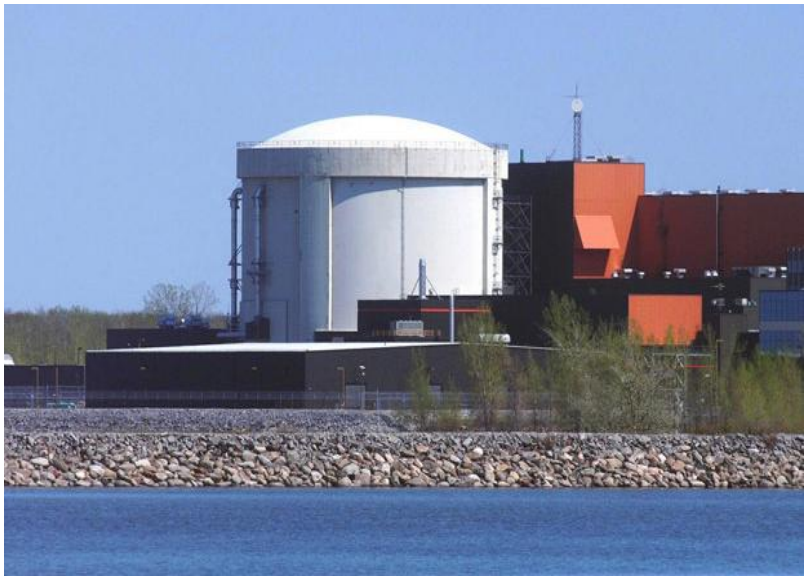
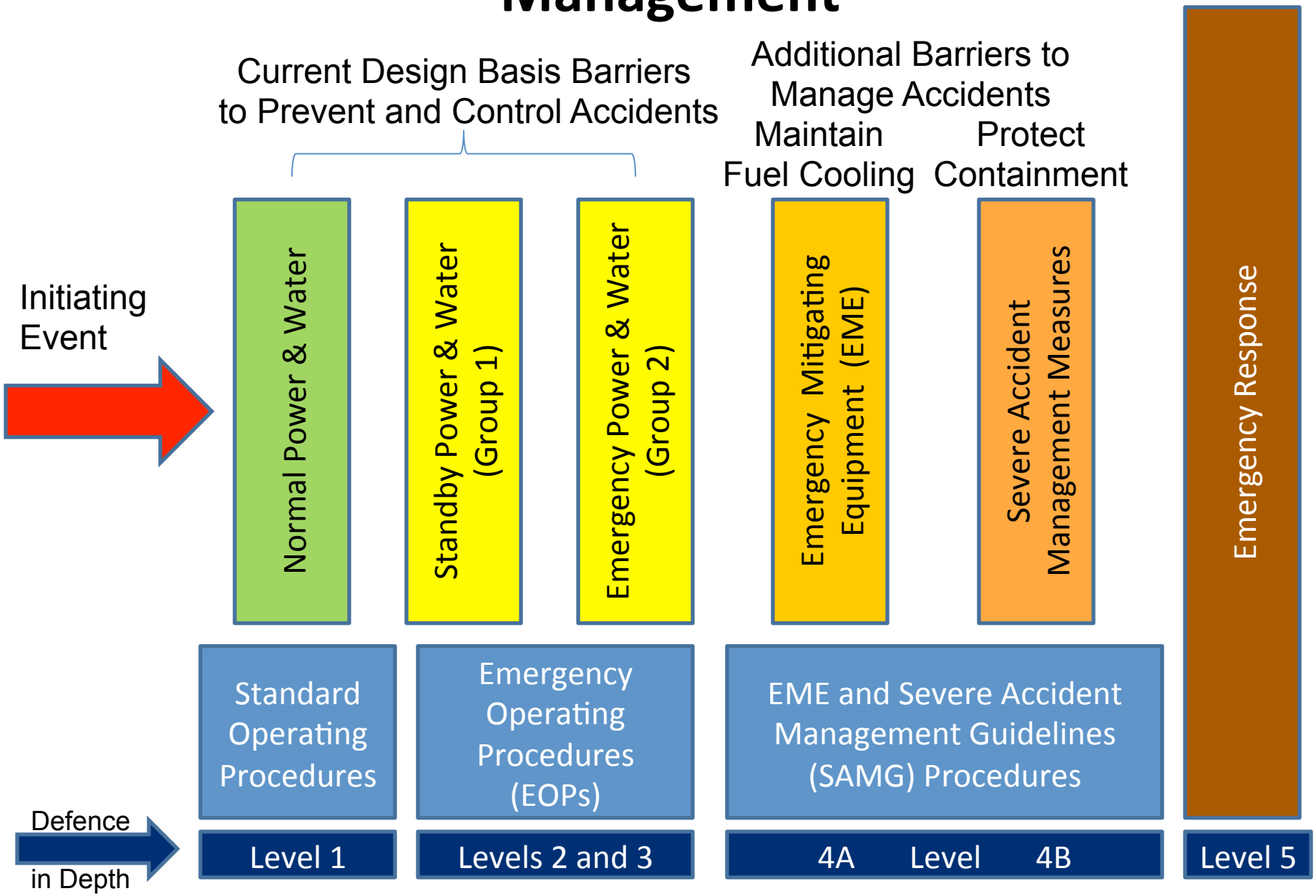
Presentation Outline

- Framework
- Challenges
- Enablers
- Lessons Learned



Framework for Accident Prevention, Control and Management



Post-Fukushima Improvements

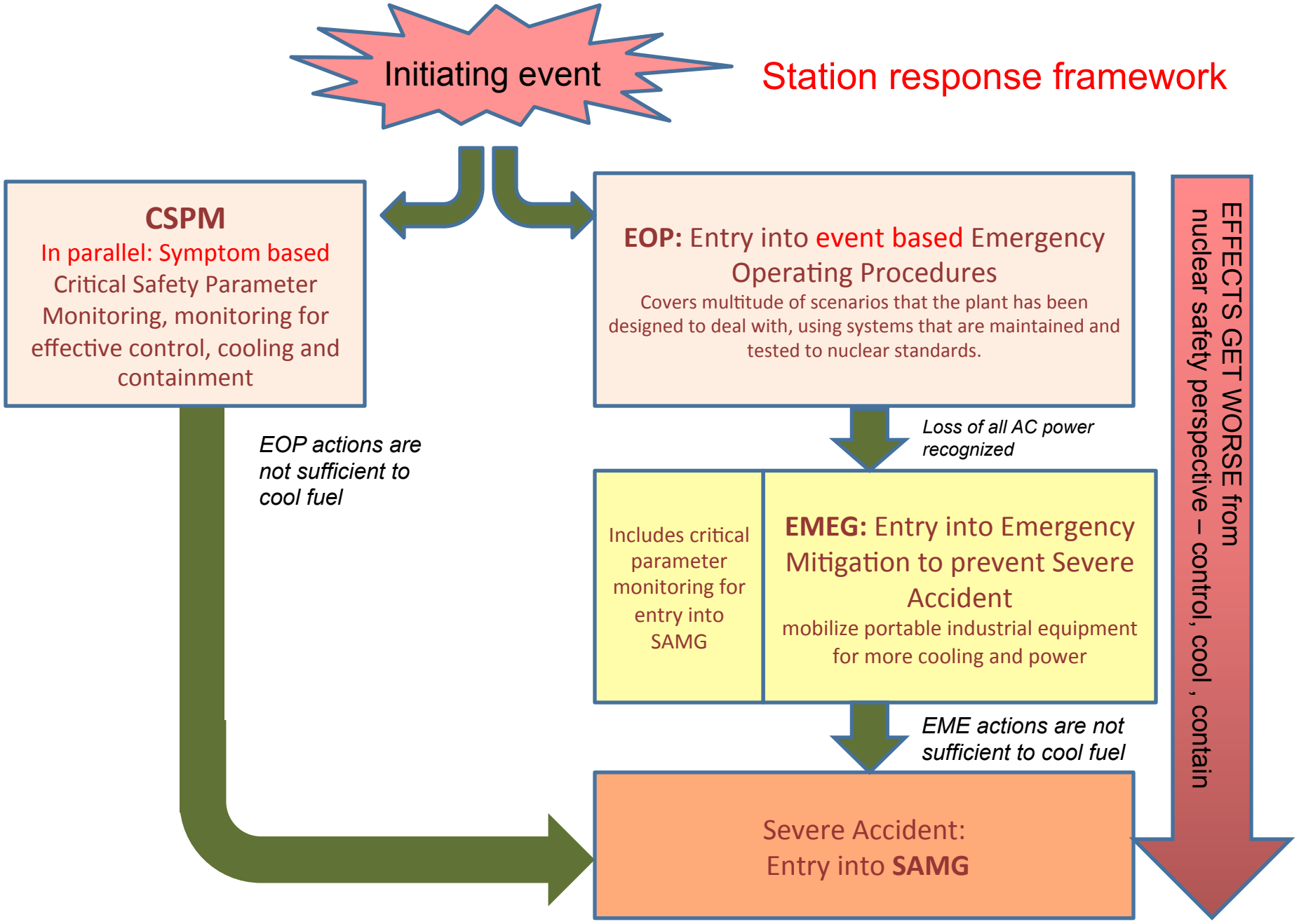
Passive Autocatalytic Recombiners

Portable diesel pumps, hoses and generators

Additional flood barriers around essential equipment

Challenges

- *From Rule-Based EOPs to Knowledge-Based Accident Management*
- Command and Control during Accident Management
- Staff complement
- Aligning plant systems in configurations outside current design and licensing rules.
- Ability to deploy EME in time to prevent fuel failure, regardless of plant or site conditions


Initiating event
Station response framework
CSPM
In parallel: Symptom based Critical Safety Parameter Monitoring, monitoring for effective control, cooling and containment
EOP: Entry into event based Emergency Operating Procedures
Covers multitude of scenarios that the plant has been designed to deal with, using systems that are maintained and tested to nuclear standards.
Loss of all AC power recognized
EOP actions are not sufficient to cool fuel
Includes critical parameter monitoring for entry into SAMG
EMEG: Entry into Emergency Mitigation to prevent Severe Accident
mobilize portable industrial equipment for more cooling and power
EME actions are not sufficient to cool fuel
Severe Accident:
Entry into SAMG
EFFECTS GET WORSE from nuclear safety perspective – control, cool , contain

Challenges

- From Rule-Based EOPs to Knowledge-Based Accident Management
- *Command and Control during Accident Management*
- Staff complement
- Aligning plant systems in configurations outside current design and licensing rules.
- Ability to deploy EME in time to prevent fuel failure, regardless of plant or site conditions

Challenges

- From Rule-Based EOPs to Knowledge-Based Accident Management
- Command and Control during Accident Management
- *Staff complement*
  - *Prioritization Matrix*
  - *Training Flexibility*
  - *Emotional support*
- Aligning plant systems in configurations outside current design and licensing rules.
- Ability to deploy EME in time to prevent fuel failure, regardless of plant or site conditions

Challenges

- From Rule-Based EOPs to Knowledge-Based Accident Management
- Command and Control during Accident Management
- Staff complement available may be affected by casualties / limited site access.
- *Aligning plant systems in configurations outside current design and licensing rules.*
- *Ability to deploy EME in time to prevent fuel failure, regardless of plant or site conditions*

System Alignment / Equipment Deployment

- Prior regulatory approval
- Pre-approved system alignments for accident management strategies

- Maximize time margin for equipment deployment
  - Emergency Mitigating Equipment stored near site.
  - Toolkits stored and deployed with equipment
  - SAT-based training developed and executed
  - Quick Connects – being installed at standard tie-in locations
  - Diverse connection methods and locations

Drills for Beyond Design Basis

- Mar 2012 – NB Power
- Oct 2012 – Bruce Power
- Nov 2012 – Darlington
- Feb 2013 – Pickering

- Two more planned for 2013
- May 2014 – Darlington
  - Major exercise involving all levels of government

Lessons Learned from Drills

- Weather-related vulnerabilities
- Improve training of authorized staff
- Simplify instructions

- Importance of realism
- Communication
- Metrics for drill evaluation

Summary

- Human Performance and Nuclear Safety
- Framework
- Prior approvals

- Efficiency
- Drills
- Focus