Industry Proposal for EA-13-109 Phase 2

NRC Public Meeting

August 7, 2014

BWR OWNERS' GROUP

NEI

NUCLEAR ENERGY INSTITUTE

Phase 2 Discussion Agenda

- Fukushima Lessons-Learned Background
- BWR Vent Order Phase 2/Rulemaking Scope
- Phase 2 Compliance
- Water addition hardware
  - Water Addition Path
  - Water Addition Pump
  - Motive Force
  - Instrumentation
- Path Forward
- Schedule

Mitigation Lessons From Fukushima BWR Mark Is and IIs

- Mitigating possible dose exposure and land contamination requires:
  - Prevention of core damage – the first priority
  - Providing operators with diverse tools to cope with a beyond design basis event
  - Keeping the core or core debris cool
  - Active containment management to preserve the final fission product barrier and retain the radionuclides
- Integration of strategies, training, command and control (site leadership) is critical to success.

Protect Fission Barriers

- Protecting the three barriers to fission product release is our top priority:
  - Fuel Cladding, Reactor Coolant System, Containment
- If installed plant systems become inoperable, provide emergency water injection and power, using portable equipment
- The diverse and flexible coping strategy (FLEX) will provide emergency water and power to prevent core damage
  - Provides time for plant system recovery

Containment Protection and Radionuclide Retention

- An intact containment retains radionuclides through aerosol retention in the water, plate-out on containment surfaces, etc.
- If containment is compromised then uncontrolled release paths that bypass the vent are created.

Terminology

- Severe Accident Water Addition (SAWA)
  - Providing water to reactor vessel or drywell post-core damage.
- Severe Accident Water Management (SAWM)
  - Preserve wetwell vent path.

BWR Vent Order Phase 2 Options

Phase 1 – Severe Accident Wetwell Vent; Plans submitted June 30, 2014

Phase 2 – (1) Severe Accident Drywell Vent (SADV) OR **(2) Water Strategy that precludes the need for a SADV Implementation Due: 2017-19**

Order Option 2

Water Addition and Management

Plans Due: Dec 2015

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Water Addition and SADV (545F)

Plans Due: Dec 15

Order Option 1

SADV (≈1000F)

Plans Due: Dec 2015

Filtering Strategies Rulemaking

EA-13-109 Phase 2/Rulemaking Scope

	EA-13-109 Phase 2	Filtering Strategies Rulemaking

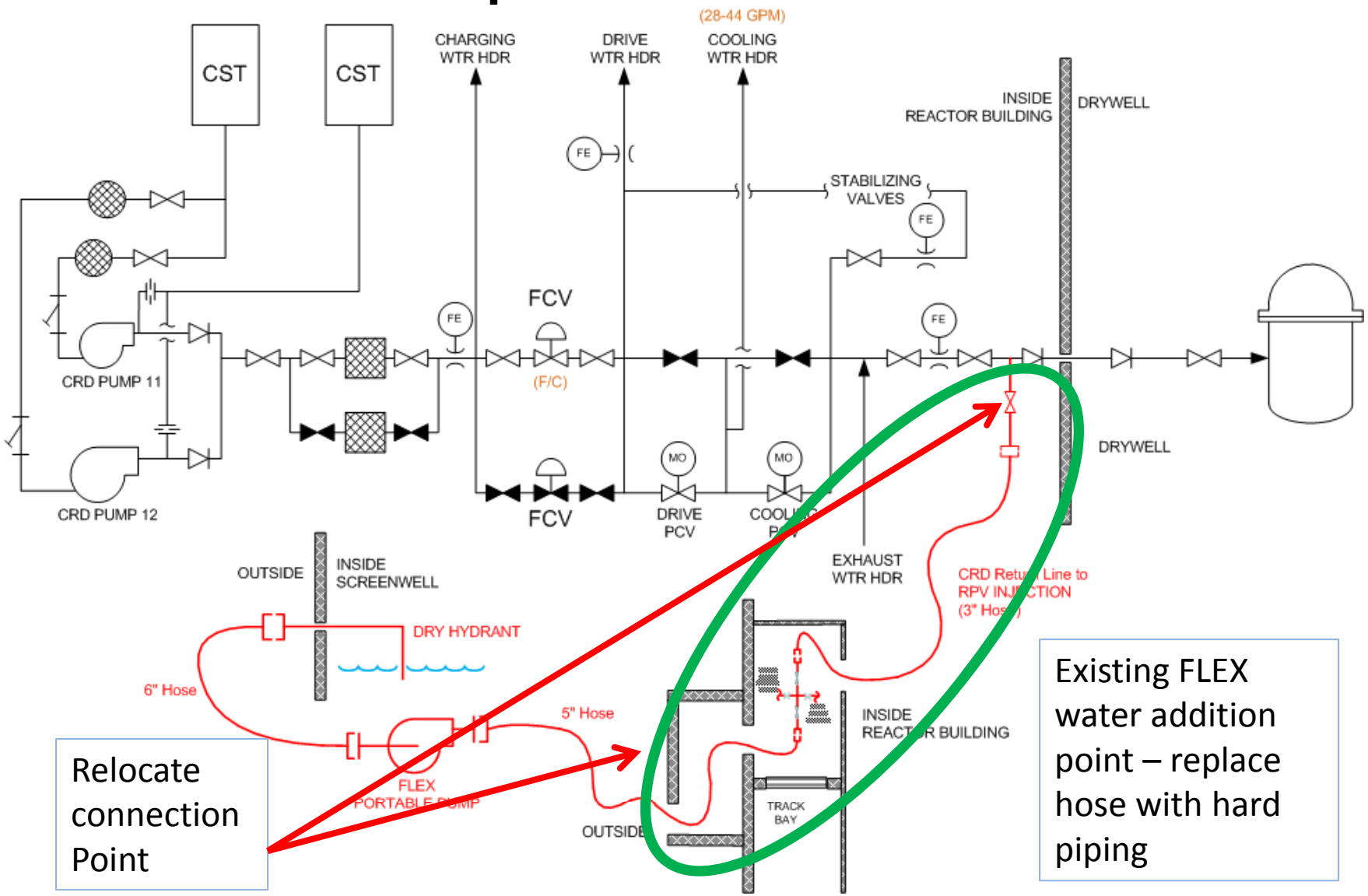
HARDWARE	Severe Accident Water Addition (SAWA)
	• Water addition path – RPV or Drywell
	• Water addition pump – delivery pressure and flow and timing
	• Utilization
	  • Motive force
	  • Instrumentation
	• Severe accident deployment considerations
	  • Temperature
	  • Radiation
		Codify EA-13-109 Phase 1 and 2

STRATEGY	Severe Accident Water Management (SAWM)
	• Sustained operation strategy using SAWA/WW vent
	  • Mitigate drywell temperature extremes
	  • Protect containment from over pressure failure
	• Preserve wetwell vent path until personnel and equipment resources are available to establish alternate decay heat removal and pressure control
		Severe Accident Management enhancements as determined by analysis.

SA Water Addition Path

- One connection accessible under severe accident conditions
- Reactor Pressure Vessel (RPV) addition path
  - Drywell addition path is also acceptable
  - RPV is the most likely path for the following reasons:
    - In-vessel retention for some accident sequences
    - Water follows core debris at exit location after vessel breach
    - Incremental safety benefit over drywell injection
- Most BWR Mark I and II have multi-function Residual Heat Removal (RHR) systems

Example Plant - SAWA



Relocate connection Point

Existing FLEX water addition point – replace hose with hard piping

SA Water Addition Pump

- Use of portable pump satisfying 50.54 (hh)(2) or EA-12-049 is acceptable provided:
  - Pump meets pressure and flow rate required for SAWA/SAWM as determined by analysis
    - FLEX analysis should be sufficient
  - Minimum pressure and flow requirements may be determined generically
  - Pump support functions implemented under EA-12-049 are acceptable provided these functions can be implemented under severe accident conditions

Motive Force

- Phase 2 motive force and instrumentation criteria same as Phase 1
  - Wetwell vent motive force requirements comply with NEI 13-02 Rev 0 and HCVS-WP-01
  - Motive force for pumps, valves, instrumentation and controls supporting SAWA comply with NEI 12-06 Rev 0

SAWA Instrumentation

- Instrumentation necessary to support SAWA already included in EA-12-049:
  - Containment Pressure
    - may be drywell, wetwell or HCVS vent line (Phase 1) provided communication with containment volume is maintained while HCVS venting is required
  - Suppression pool level
- Instrumentation necessary to support wetwell venting is addressed by Phase 1

Path Forward

- No anticipated schedule change for EA-13-109 Phase 1
- Achieve NRC/industry alignment on SAWA/SAWM strategy for Phase 2 compliance
  - No anticipated schedule change for EA-13-109 Phase 2 provided NRC endorsement of Phase 2 proposed scope as identified on slide 8 and schedule on slide 15
  - NEI letter will formally request endorsement

Estimated Phase 2 Guidance Schedule

Date	Action
Jun – Jul 2014	NEI working group develop draft 13-02 Phase 2 scope (complete)
Jul – Sep 2014	NRC/NEI review draft 13-02 Phase 2 scope – public meetings
Oct 2014	NEI/BWROG industry comment and feedback
Nov 2014	NEI Phase 2 draft revision provided to NRC for reference in ISG
Dec 2014	NRC publish draft ISG for public comment
Feb 2015	NRC public comment period closed
Mar 2015	**NRC issues approved ISG**
Mar 2015	NEI/NRC workshop on Phase 2
Apr – May 2015	NRC/NEI OIP template structure and content without pilots
May – Jul 2015	NRC/NEI OIP template pilots
Aug 2015	NEI/BWROG draft OIP to industry for comment for workshop
Sep 2015	NEI/NRC OIP workshop on pilots and template use
Oct 2015	NEI OIP finalized and included in a revision to NEI 13-02
Dec 2015	**Station OIPs submitted to NRC**

- Questions?