US-APWR

GSI-191 Closure Plan

March 29, 2011

Mitsubishi Heavy Industries, Ltd.

Introduction

- A Sump Strainer Task Force has been formed to address US-APWR Standard Plant issues, specifically related to NRC Staff questions and RAIs related to GSI-191.
- Task Force Membership
  - MHI
  - MNES
  - Luminant
  - Dominion
- Presentation is a joint effort from the Sump Strainer Task Force

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Submittals Supporting GSI-191

MHI submittals supporting DC Application

- Six Technical Reports (TeRs) have been submitted to NRC

MUAP-08001(R3)	Sump Strainer Performance	Nov 2010
MUAP-08006(R1)	Chemical Effects Test Plan	Dec 2008
MUAP-08011(R0)	Chemical Effects Test Result	Nov 2008
MUAP-08012(R0)	Sump Strainer Stress Report	Dec 2008
MUAP-08013(R1)	Downstream Effects	Jan 2011
MUAP-10021(R0)	Core Inlet Blockage Test	Nov 2010

- TeRs were prepared in accordance with GL 2004-02 Contents Guide with attention to March 2008 Guidance

Submittals Supporting GSI-191

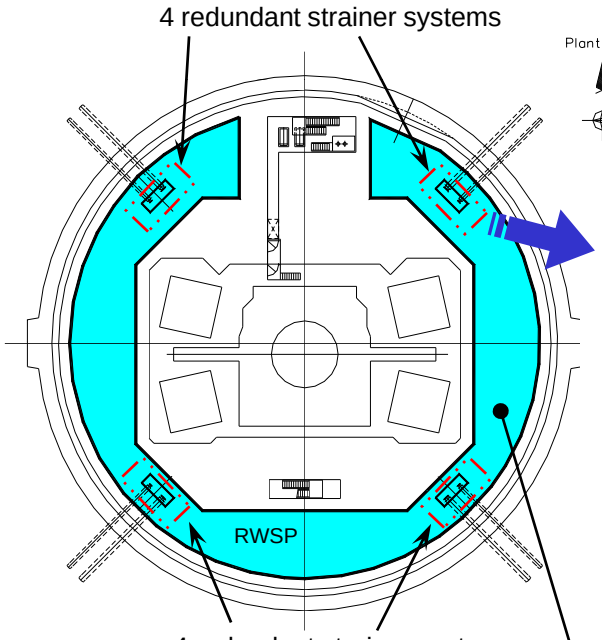
GL 2004-02 Revised Content Guide	MUAP-08001 Sump Strainer Performance	MUAP-08006 MUAP-08011 Chemical Effect Test Plan & Results	MUAP-08012 Sump Strainer Stress Report	MUAP-08013 Downstream Effect MUAP-10021 CIB Test
1. Debris Source Term	X	(X)		
2. Break Selection	X			
3. Debris Generation/ZOI	X			
4. Debris Characteristics	X			
5. Latent Debris	X			
6. Debris Transport	X			
7. HL and Vortexing	X			
8. NPSH	X			
9. Screen Modification Package	X (strainer description provided)		(X)	
10. Sump Structural Analysis			X	
11. Upstream Effect	X			
12. Downstream Effect (In/Ex-vessel)				X
13. Chemical Effects	(X)	X		(X)
14. Licensing Basis (Changes)	N/A	N/A	N/A	N/A

Note : (X) Includes supplemental information

Current Design Features

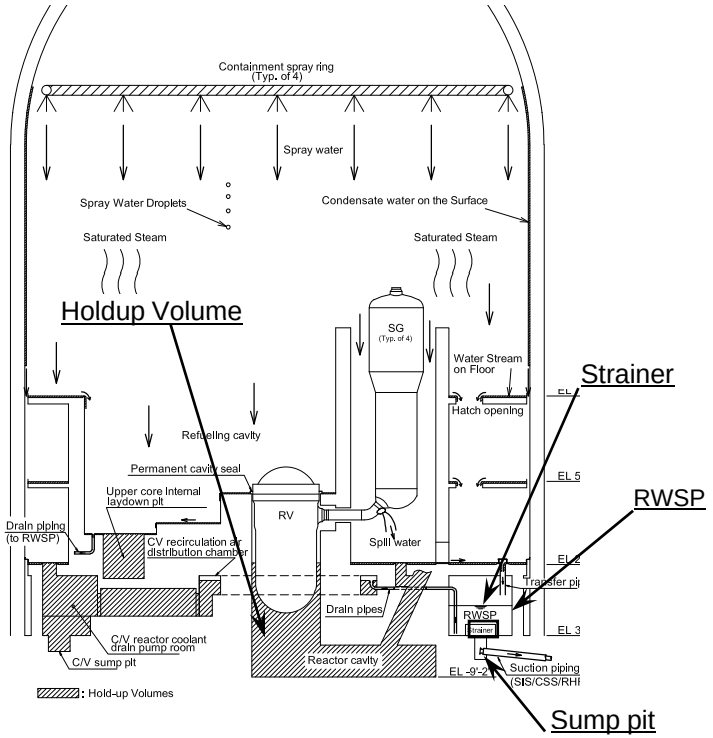
Strainer Design

- Four independent safety trains and sumps
- Passive strainer modules with 2,754 (ft^2) surface area per sump
- No “switch-over” for recirculation



Plan view RWSP

PCI Sure Flow Strainer



Section view of Containment

Current Design Features

Debris Sources and Generation

- Maximize Reflective Metal Insulation (RMI)
- Restrict fibrous insulation in containment
- Use DBA-qualified epoxy coating
- Use ZOIs recommended by SE of NEI 04-07

Debris Transport

- 100% debris transport was assumed for conservatism
- 70% / 30% debris split between two of four sumps (two assumed inoperable)

NPSH

- Supported by US-APWR Strainer Head Loss Test Program
- Assumes containment pressure equivalent to vapor pressure of the sump fluid for temperatures > 212F

Downstream Effects

- In/Ex-Vessel effects evaluated
- Core Inlet Blockage (CIB) tests performed to support the downstream effects evaluation

NRC Review Status

RAI Interactions (as of March 25, 2011)

- 98 RAI questions issued by the NRC
- 98 responses submitted by MHI
- 1 draft RAI question issued by the NRC

NRC Review Status (as of March 25, 2011)

- 25 identified as “resolved/closed”
- 73 identified as “responded”

MHI reviewed the current status and found that

- MHI needs to take further action to resolve NRC concerns
- The NRC is requested to confirm RAI status

NRC Review Status

RAI Map Regarding GS-191 Issue (as of March 25, 2011)

GL 2004-02 Revised Content Guide	Issued/Responded RAIs	NRC Review Status		
		"Accepted/Closed" RAIs	"Responded"	
			MHI Action	Requested NRC Action
1. Debris Source Term	1/1	1	0	0
2. Break Selection	3/3	2	0	1
3. Debris Generation/ZOI	1/1	1	0	0
4. Debris Characteristics	3/3	1	2	0
5. Latent Debris	0/0	0	0	0
6. Debris Transport	2/2	0	2	0
7. HL and Vortexing	6/6	0	1	5
8. NPSH	6/6	0	1	5
9. Strainer Description	1/1	0	0	1
10. Sump Structural Analysis	0/0	0	0	0
11. Upstream Effect	7/7	2	0	5
12. Downstream Effect (In/Ex-vessel)	37/37	6	1	30
13. Chemical Effects	10/10	10	0	0
14. ITAAC/COL item	11/11	2	0	9
15. Administrative	10/10	0	2	8
TOTAL	98/98	25	9	64

MHI Actions

The following are issues where MHI will take action:

- Floating debris observed at Head Loss Test
  - Concern that floating debris resulted in non-conservative strainer head loss (06.02.02-58)
- Debris Allocation
  - Concern the basis of 70%/30% split for break-generated debris (06.02.02-61).
- Erosion Factor
  - Need further evaluation of industry test applicability to the US-APWR (06.02.02-61).
- Gap issue of Core Inlet Blockage Test
  - Concern that mockup fuel assembly with full-gap was non-conservative with respect to debris bypass of the fuel region (06.02.02-98)
- Air ingestion impact on NPSHreq
  - NPSH calculation should consider the penalty due to calculated air ingestion ratio (06.02.02-28)
- Administrative
  - Describe sump strainer performance basis in the DCD (06.02.02-44,-55,-62)

Requested NRC Action

The NRC is requested to confirm the acceptability of the responses to the following RAIs which impact the Closure Plan:

- Upstream effects evaluation — 06.02.02-24, -25, 04.04-40
- Containment pressure — 06.02.02-60, -62, 06.03-87
- Bypass debris — 06.03-99

NRC confirmation is requested by the first conference call after this public meeting in order to support the test schedule.

Closure Plan

Closure Plan

- MHI will revise debris source term.
- MHI will perform additional strainer test using an improved test procedure to address floating debris issue.
- Additional CIB tests will be performed using half-gap configuration.
- MHI will submit amended TeRs and DCD Tracking Report providing additional information to resolve NRC concerns.
- MHI proposes weekly conference calls with the staff to resolve any questions, and to accelerate closing of all RAIs.

Schedule

- Amended TeRs and DCD Tracking Report will be submitted to the NRC following testing.
- Additional test schedules will be discussed in the closed session.