September 29, 2011

Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021 MHI Ref: UAP-HF-11327

Subject: MHI's Response to US-APWR DCD RAI No. 820-6009 REVISION 3 (SRP

18)

Reference: 1) "Request for Additional Information No. 820-6009 REVISION 3, SRP

Section: 18 - Human Factors Engineering, Application Section: 18.2"

dated August 30, 2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 820-6009 Revision 3."

Enclosed is the response to the RAI contained within Reference 1.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

Yoshiki Ogata,

General Manager- APWR Promoting Department

Mitsubishi Heavy Industries, LTD.

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Enclosure:

1. Response to Request for Additional Information No. 820-6009 REVISION 3

CC: J. A. Ciocco C. K. Paulson

Contact Information

C. Keith Paulson, Senior Technical Manager Mitsubishi Nuclear Energy Systems, Inc. 300 Oxford Drive, Suite 301 Monroeville, PA 15146 E-mail: ck_paulson@mnes-us.com Telephone: (421) 373-6466

Docket No. 52-021 MHI Ref: UAP-HF-11327

Enclosure 1

UAP-HF-11327 Docket No. 52-021

Response to Request for Additional Information No. 820-6009 REVISION 3

September, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

9/29/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No 52-021

RAI NO.:

NO. 820 COLP 6009 REVISION 3

SRP SECTION:

18 - HUMAN FACTORS ENGINEERING

APPLICATION SECTION:

18.2- OPERATING EXPERIENCE REVIEW

DATE OF RAI ISSUE:

8/30/2011

QUESTION NO.: 18-186

Section 3.3 "Data Documentation," in Part 2 of MUAP-08014, provides citation summaries in Tables 3 and 4 of the OER source documents. Table 4 provides a citation summary for OER sources outside of the nuclear industry (non-nuclear). On pages 145 and 147, there are three references (below) to documents the staff did not find in Section 9 "References." Please address this discrepancy.

- Page 145 DNFSB Report, DWPF DCS, Reference 5.2-1
- Page 145 DNFSB Report, Pantex Fire Issues, Ref. 5.2-2
- Page 147 U.S.-Can Task Force Report, Reference 5.2-3

ANSWER:

The references identified by the staff are from two DNFSB Reports and the U.S.-Can Task Force Report.

To resolve this discrepancy, MHI will revise Table 4 of MUAP-08014 to identify the original source document names and correct reference numbers, and will add these references to Section 9 as shown in Attachment 1.

Impact on DCD

There is no impact on the DCD

Impact on R-COLA

There is no impact on the R-COLA

Impact on S-COLA

There is no impact on the S-COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's response to the NRC's question.

Table 4 OER Information Sources (Non-nuclear industries)

Source Document Citation	Source Doc ID	Brief Summary of background information/scenario obtained from source document
Chemical Plants	CP-	
CSB Report 2003-13-I-LA	Α	Honeywell Chemical Incidents, Baton Rouge, LA, July/August 2003
CSB Report 2004-11-I-CA	В	Sterigenics Ethylene Oxide Explosion, Ontario, CA, August 19, 2004.
CSB Report 2005-04-I-TX	С	BP America Refinery Explosion, Texas City, TX, March 23, 2005.
CSB Report 2006-01-I-TX	D	Formosa Plastics Propylene Explosion, Point Comfort, TX, October 06, 2005.

Nuclear Processing	NP-	
Defense Nuclear Facilities Safety Board, Staff Issue Report, Subject: Distributed Control Systems at Savannah River Site (Reference 9-4) DNFSB Report, DWPF DCS, Reference 5.2-1	Α	Human Factors Issues - DWPF DCS for inadvertent activation.
Defense Nuclear Facilities Safety Board, Staff Issue Report, Subject: Distributed Control Systems at Savannah River Site (Reference 9-5) DNFSB Report, Pantex Fire Issues, Ref. 5-2-2	В	Pantex Fire Response Issues, Missed fire alarms.

Marine Events	M-	
NTSB Report	Α	Accident Report Grounding of the Panamanian

Source Document Citation	Source Doc ID	Brief Summary of background information/scenario obtained from source document
MAR-97-01		Passenger Ship ROYAL MAJESTY on Rose and Crown Shoal near Nantucket, Massachusetts.
NTSB Report MAR-01-01	В	Marine Accident Report: Fire On Board Liberian Passenger Ship <i>Ecstasy</i> , Miami, Florida.
NTSB Report MAB-07-02	С	Grounding of the Hong Kong-Registered Container Ship New Delhi Express New York Harbor, Kill Van Kull Waterway,
NTSB Report MAR-08-01	D	Marine Accident Report: Heeling Accident on M/V Crown Princess, Atlantic Ocean Off Port Canaveral, Florida.

Railroad Events	RR-	
NTSB Report RAB-08-03	Α	Railroad Accident Brief: Collision of Two Southeastern Pennsylvania Transportation Authority Trains, Abington, Pennsylvania.
NTSB Report RAR-08-01	В	Railroad Accident Report: Collision of Massachusetts Bay Transportation Authority Train 322 and Track Maintenance Equipment Near Woburn, Massachusetts.

Aircraft Events	AC -	
Aviation Safety Network(Flight Safety Foundation)	·	Air France Flight 296 Airbus A320 Airline Crash, Mulhouse-Habsheim Airport, France, June 26, 1988
http://aviationsafe ty.net/database/re cord.php?id=198 80626-0	A	
Aviation Safety Network(Flight Safety Foundation) http://aviationsafe ty.net/database/re cord.php?id=199 40323	В	Aeroflot Flight 593 Airbus A310-304 Airline Crash on March 23,1994
Ministry of Transport Japan, Aircraft Accident Investigation	С	China Airlines Flight 140 Airbus A300 Airline Crash in Nagoya, Japan on April 26, 1994

Source Document Citation	Source Doc ID	Brief Summary of background information/scenario obtained from source document
Commission (1996). China Airlines Airbus Industries A300B4-622R, B1816, Nagoya Airport, April 26, 1994. Report 96- 5.		
"Final Report on the Investigation into the accident involving the Armavia A320 near Sochi Airport on 2 May 2006", Interstate Aviation Committee, Air Accident Investigation Commission, Moscow, 2006	D	Armavia Airlines Flight 967 Airbus A320 Airline Crash into the Black Sea off the coast of Sochi, Russia, May 2, 2006

Chemical Plants	CP-	
CSB Report 2003-13-I-La	Α	Honeywell Chemical Incidents, Baton Rouge, LA, July/August 2003
CSB Report 2004-11-I-CA	В	Sterigenics Ethylene Oxide Explosion, Ontario, CA, August 19, 2004.
CSB Report 2005-04-I-TX	С	BP America Refinery Explosion, Texas City, TX, March 23, 2005.
CSB Report 2006-01-I-TX	D	Formosa Plastics Propylene Explosion, Point Comfort, TX, October 06, 2005.

Electrical Transmission	ET-	
Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and	А	Electrical System Blackout in the U.S. and Canada, August 14, 2003.

Source Document Citation	Source Doc ID	Brief Summary of background information/scenario obtained from source document
Recommendation s (Reference 9-6)		
U.S. Can Task		
Force Report,		
Reference 5.2-3		

Pipeline Events	PL-	
NTSB Report PAB-99-03	Α	Hazardous Liquid Petroleum Products Overpressure Rupture, Murfreesboro, Tennessee.
NTSB Report PAB-01-01	В	Hazardous Liquid Petroleum Products Pipeline Rupture, Colonial Pipeline Company, Knoxville, Tennessee.
NTSB Report PAB-01-02	С	Hazardous Liquid Pipe Failure and Leak, Marathon Ashland Pipe Line, LLC Winchester, Kentucky.
NTSB Report PAB-01-03	D	Hazardous Liquid Pipe Failure and Leak, Explorer Pipeline Company, Greenville, Texas.
NTSB Report PAR-02-01	E	Pipeline Accident Report: Rupture of Piney Point Oil Pipeline and Release of Fuel Oil Near Chalk Point, Maryland.
NTSB Report PAR-02-02	F	Pipeline Accident Report: Pipeline Rupture and Release of Gasoline, Olympic Pipeline Company, Bellingham, Washington.
NTSB Report PAR-04-02	G	Pipeline Accident Report: Storage Tank Explosion and Fire in Glenpool, Oklahoma.
NTSB Report PAB-07-02	Н	Pipeline Accident Brief: Anhydrous Ammonia Pipeline Rupture Near Kingman, Kansas.
NTSB Report SS- 05-02		Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines

Japanese industries		
Japanese industries applied by Mitsubishi System	-	Thermal power station and Manufacturing factories

Note)

Source Document Citation - Formal reference format

Source Document ID (X) – Number assigned of the Source Document Citation in the "Item" column in Table 8.1

Brief Summary of background information/scenario obtained from source document – Summary description of scenario with emphasis on HFE aspects

Table 6 through table 10 consists of the same format as shown in table 5.

Contents of each table are as follows;

No. - Sequential Row Number

Item – Item number link to information source, X-YY, where X=source document, and YY= item in source document.

Issue/Scope - General HFE categorization from Section 4.2

Human Factors Aspect Issue – Brief description of the HFE issue from Section 4.2.

Human Factors Issue Addressed by US-APWR - Brief description of the HFE issue potentially impacting the US-APWR Specific Design as determined by the OER Team.

Table 5 Example of OER Issues and Resolutions List

No.	Item	Issue/Scope	Human Factors Aspect Issue	Human Factors Issue addressed by Basic HSI System or US-APWR
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9. References

- 9-1. Design Control Document for the US-APWR, Chapter 18, Human Factors Engineering, MUAP DC018, Rev. 1, August 2008.
- 9-2. Higgins, J. and Nasta, K., HFE Insights For Advanced Reactors Based Upon Operating Experience, NUREG/CR-6400, December, 1996.
- 9-3. Quality Assurance Program (QAP) Description for Design Certification of the US-APWR, PQD-HD-19005, Rev. 2, Part II, Document Control, Section VI.
- 9-4. <u>Defense Nuclear Facilities Safety Board, Staff Issue Report, Subject: Distributed Control Systems at Savannah River Site, December 22, 1999.</u>
- 9-5. <u>Defense Nuclear Facilities Safety Board, Staff Issue Report, Subject: Fire Protection at the Pantex Plant, August 28, 2002.</u>
- 9-6. Final Report on the August 14, 2003 Blackout in the United States and Canada:
 Causes and Recommendations, U.S. Canada Power System Outage Task Force,
 April 2004.