

Matrix of Pressurized Water Reactor Licensee Modifications to Address Generic Safety Issue 191

Provided by Nuclear Energy Institute January 30, 2007

NRC Staff note: The attached document was provided by the Nuclear Energy Institute (NEI). The staff had requested NEI's assistance in obtaining the information from licensees to respond to the SRM for the staff's October 25, 2006 brief to the Commission on Generic Safety Issue 191. The SRM action was that the staff should work with industry to develop a matrix for all plants, listing their schedule for installing new strainers and other plant modifications that are part of their plan to resolve the sump issue. (The same SRM item called for the matrix to include plants that have requested and been granted extensions and the reasons for the extensions. That information is provided in a separate document provided contemporaneously.) The staff made minor edits to the information provided by NEI for clarity. The below note was provided by NEI.

The following provides data on plant activities to address GSI-191 as of January 15, 2007. This information was collected in response to an NRC request for assistance in responding to Commission SRM. The information is understood to be a snapshot of current activities that are subject to change. All information provided in the attachment is also understood to be tentative, subject to modification or cancellation and is not construed in any way to be a commitment on the part of any licensee or a modification of any prior commitments.

MATRIX OF LICENSEE MODIFICATIONS TO ADDRESS GENERIC SAFETY ISSUE 191

Plant (Note: Asterisk indicates extension request approved or requested - See following table)	Original Strainer Area (Ft2)	Estimated Total size of Replace-ment Strainer (Ft2)	Strainer vendor	Strainer area shared between trains? (Yes/No)	Planned or actual quarter / year for strainer installation	pH Buffer change being pursued? (Yes/No)	If Yes, planned or actual quarter / year for pH Buffer change	Major (20% or more) insulation change out planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the insulation change	Major ECCS system mods (e.g., throttle valve/pump changes and cyclone separator removal) planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the changes	Any major containment spray system modifications planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the changes
Arkansas Nuclear One 1	179	TBD	CCI	Yes	1Q07	TBD	N/A	TBD	N/A	TBD	N/A	Ongoing	N/A
Arkansas Nuclear One 2	154	~4600	CCI	Yes	3Q06	TBD	N/A	No	N/A	TBD	N/A	Ongoing	N/A
Beaver Valley 1	130	3000	CCI	Yes	4Q07	No	N/A	No	N/A	Yes - throttle valve replacement	4Q07	Yes	4Q07
Beaver Valley 2*	150	3300	Enercon	Yes	4Q06	No	N/A	Yes	1Q08	Yes - throttle valve replacement	1Q08	Yes	1Q08
Braidwood 1	150 (total two sumps)	3000 per sump (2 sumps)	CCI	No	4Q07	No	N/A	Yes	4Q07	Yes - throttle valve trim replacement; separator testing	4Q07	No	N/A
Braidwood 2*	150 (total two sumps)	3000 per sump (2 sumps)	CCI	No	4Q06	No	N/A	No	N/A	Yes - throttle valve trim replacement; separator testing	2Q08	No	N/A
Byron 1*	150 (total two sumps)	3000 per sump (2 sumps)	CCI	No	3Q06	No	N/A	Yes	3Q06	Yes - throttle valve trim replacement; separator testing	2Q08	No	N/A
Byron 2	150 (total two sumps)	3000 per sump (2 sumps)	CCI	No	2Q07	No	N/A	No	N/A	Yes - throttle valve trim replacement; separator testing	2Q07	No	N/A
Callaway	~400 total (both trains)	~6600 total (both trains)	PCI	No	2Q07	No	n/a	No	N/A	No, not currently. Potential minor modification to cyclone separators	N/A	No	N/A
Calvert Cliffs 1*	102	6000	CCI	Yes	1Q07	No	N/A	No	N/A	TBD	N/A	No	N/A
Calvert Cliffs 2	102	6000	CCI	Yes	1Q08	No	N/A	No	N/A	TBD	N/A	No	N/A
Catawba 1*	135	2441	Enercon	Yes	2Q08	No	N/A	TBD	TBD	Yes - ECCS Injection Line Orifice replacements	4Q06	Under consideration	TBD
Catawba 2	135	2441	Enercon	Yes	4Q07	No	N/A	TBD	TBD	Yes - ECCS Injection Line Orifice replacements	4Q07	Under consideration	TBD
Comanche Peak 1	260 per sump	3947 per sump	PCI	No	1Q07	Yes	4Q07 or later	No	N/A	No	N/A	No	N/A
Comanche Peak 2	260 per sump	3947 per sump	PCI	No	4Q06	Yes	4Q07 or later	No	N/A	No	N/A	No	N/A
Cook 1*	85	900 (Phase 1 installed); Approx 2000.final	CCI	Yes	Phase 1 - 4Q06; Phase 2 - 2Q08	No	N/A	No	N/A	No	N/A	Yes - Water Management Pilot Plant. Specifics of changes TBD	N/A
Cook 2	85	Approx 2000	CCI	Yes	4Q07	No	N/A	No	N/A	No	N/A	Yes - Water Management Pilot Plant. Specifics of changes TBD	N/A
Crystal River Unit 3	86	1139	Enercon	Yes	4Q05	No	N/A	Yes	4Q09	Yes - cyclone separator modification	4Q07	No	N/A
Davis-Besse	50	1230	Enercon	Yes	2004	No	N/A	No	N/A	Yes (completed rather than planned). Included HPI pump modifications and cyclone separator modifications	2004	No	N/A
Diablo Canyon 1	700	3400	GE	Yes	2Q07	No	N/A	Yes	2Q07	No	N/A	No	N/A
Diablo Canyon 2*	700	3400	GE	Yes	1Q08	No	N/A	Yes	1Q08	No	N/A	No	N/A
Farley 1	100 to 200	3000	GE	No	1Q07	No	N/A	No	N/A	Yes, branch line resistance flow orifices	2Q07	No	N/A
Farley 2	100 to 200	3000	GE	No	4Q07	No	N/A	No	N/A	Yes - branch line resistance flow orifices	4Q07	No	N/A

MATRIX OF LICENSEE MODIFICATIONS TO ADDRESS GENERIC SAFETY ISSUE 191

Plant (Note: Asterisk indicates extension request approved or requested - See following table)	Original Strainer Area (Ft ²)	Estimated Total size of Replacement Strainer (Ft ²)	Strainer vendor	Strainer area shared between trains? (Yes/No)	Planned or actual quarter / year for strainer installation	pH Buffer change being pursued? (Yes/No)	If Yes, planned or actual quarter / year for pH Buffer change	Major (20% or more) insulation change out planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the insulation change	Major ECCS system mods (e.g., throttle valve/pump changes and cyclone separator removal) planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the changes	Any major containment spray system modifications planned? (Yes/No)	If Yes, planned or actual quarter/year for completion of the changes
Fort Calhoun*	56	1100	GE	Yes	4Q06	Yes - complete	4Q06	Yes - complete	4Q06	No	N/A	Yes - Implementation of water management	2Q08
Ginna*	95	~700 (interim, installed); TBD (final)	GE (interim), TBD (final)	Yes	4Q06 (interim); 2Q08 (final)	No	N/A	No	N/A	No	N/A	No	N/A
Harris	796	6000	Enercon	Yes (2 sumps @ 3000 sq ft/sump)	4Q07	Yes, depending on results of chemical effects testing	4Q07	No	N/A	No. Ongoing evaluations of the pumps may identify needed modifications	N/A	No	N/A
Indian Point 2	61.6	TBD	Enercon	No	2Q06	Yes	2Q08	No	N/A	No	N/A	No	N/A
Indian Point 3	50	3156 (IR Sump)	Enercon	No (2 sumps)	1Q07	Not Sure	Not Sure	No	N/A	No	N/A	No	N/A
Kewaunee	39	Aprox 770	PCI	Yes	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
McGuire 1*	135	Targeted area 2000 (but actual 'how much will fit' may be closer to 1700)	Enercon	Yes	1Q07	No	N/A	No	N/A	No	N/A	Yes - A new water management initiative is underway, but the benefits of these changes are not being applied to GSI-191 resolution at this time	Water management changes are tied to completed of Alternative Source Term work, along with other issues. Completion likely late 2009 at the earliest
McGuire 2	135	Targeted area 2000 (but actual 'how much will fit' may be closer to 1700)	Enercon	Yes	Phase 1 4Q06, Phase 2 2Q08	No	N/A	No	N/A	No	N/A	Yes - A new water management initiative is underway, but the benefits of these changes are not being applied to GSI-191 resolution at this time	Water management changes are tied to completed of Alternative Source Term work, along with other issues. Completion likely late 2009 at the earliest
Millstone 2	115	6000	AECL	Yes	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
Millstone 3	240	5000	AECL	Yes	2Q07	No	N/A	No	N/A	No	N/A	Yes - Recirculation initiation by RWST level instead of by timer	2Q07
North Anna 1	Approx 1000	Approx 6500	AECL	Yes	4Q07	No	N/A	Yes	4Q07	No	N/A	Yes - RWST level change to RS pump actuation	4Q07
North Anna 2	Approx 1000	Approx 6500	AECL	Yes	2Q07	No	N/A	Yes	2Q07	No	N/A	Yes - RWST level change to RS pump actuation	2Q07
Oconee 1	93	~5000	CCI	Yes	4Q06	No	N/A	No	N/A	Yes - replace throttle bushing, eliminate cyclone separators, and replace the throttle orifice on the HPI, LPI, and BS pumps	Not sure yet	No	N/A

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Oconee 2	93	~5000	CCI	Yes	4Q05	No	N/A	No	N/A	Yes - replace throttle bushing, eliminate cyclone separators, and replace the throttle orifice on the HPI, LPI, and BS pumps	Not sure yet	No	N/A
Oconee 3	93	~5000	CCI	Yes	2Q06	No	N/A	No	N/A	Yes - replace throttle bushing, eliminate cyclone separators, and replace the throttle orifice on the HPI, LPI, and BS pumps	Not sure yet	No	N/A
Palisades	Approx 72	3509	PCI	Yes	4Q07	Yes	4Q07	No	N/A	Yes - cyclone removal on HPSI pumps. Possible new seal design on 2 HPSI and 3 CS pumps (or mission time change)	4Q07 for HPSI cyclone removal. Pump seals only if adequate design is available	Yes - New dual-position containment spray throttle valves that revert to throttle position on RAS	4Q07
Palo Verde 1	210 per train, 2 trains	3000 per train, 2 trains	CCI	No	2Q07	No	N/A	No, RMI plant	N/A	No	N/A	No	N/A
Palo Verde 2*	210 per train, 2 trains	3000 per train, 2 trains	CCI	No	1Q08	No	N/A	No, RMI plant	N/A	No	N/A	No	N/A
Palo Verde 3	210 per train, 2 trains	3000 per train, 2 trains	CCI	No	4Q07	No	N/A	No, RMI plant	N/A	No	N/A	No	N/A
Point Beach 1	~20 per train	~1500 per train	PCI	No	2Q07	No	N/A	No	N/A	No	N/A	No	N/A
Point Beach 2	~20 per train	~1500 per train	PCI	No	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
Prairie Island 1	60	827.3	PCI	Yes	2Q06	No	N/A	No	N/A	No	N/A	No	N/A
Prairie Island 2	60	827.3	PCI	Yes	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
Robinson 2	~100	4200	Enercon	Yes	3Q07	No	N/A	No	N/A	No	N/A	No	N/A
Salem 1	85	4854	CCI	Yes	2Q07	No	N/A	Yes	TBD	No	N/A	No	N/A
Salem 2*	85	4854	CCI	Yes	4Q/06	No	N/A	Yes	1Q08	No	N/A	No	N/A
San Onofre 2	Approx 120 total; one train with ~ 65, the other with ~ 55	1952 total; 976 per train	Enercon	No	4Q07	No	N/A	Yes	4Q07 and 2Q09	No	N/A	No	N/A
San Onofre 3	Approx 120 total; one train with ~ 65, the other with ~ 55	1952 total; 976 per train	Enercon	No	4Q06	No	N/A	Yes	4Q06 and 1Q10	No	N/A	No	N/A
Seabrook*	344	5430	GE	No	2Q08	No	N/A	No	N/A	No. Pump mission times may be re-defined	N/A	No	N/A
Sequoyah 1	51	1500	PCI	Yes	4Q07	No	N/A	No	N/A	No	N/A	No	N/A
Sequoyah 2	51	1500	PCI	Yes	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
South Texas Project 1	155.4 per sump; 3 sumps	1818.5 per sump; 3 sumps	PCI	No	4Q06	No	N/A	No	NA	No	N/A	No	N/A
South Texas Project 2	155.4 per sump; 3 sumps	1818.5 per sump; 3 sumps	PCI	No	2Q07	No	N/A	No	NA	No	N/A	No	N/A

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St. Lucie 1	366	8249	GE	Yes	2Q07	No	N/A	Yes	2Q07	TBD - Still evaluating removal of cyclone separators	TBD	Yes – stoppage of second operating train of spray flow at <= 100 F sump temperature	2Q07
St. Lucie 2	571	TBD	GE	Yes	4Q07	No	N/A	TBD	4Q07	TBD - Still evaluating removal of cyclone separators	TBD	Yes – stoppage of second operating train of spray flow at <= 100 F sump temperature	4Q07
Surry 1	Approx 1000	Approx 6500	AECL	Yes	3Q07	No	N/A	No	N/A	No	N/A	Yes - RWST level change to RS Pump actuation	3Q07
Surry 2*	Approx 1000	Approx 6500	AECL	Yes	3Q06 & 2Q08	No	N/A	No	N/A	No	N/A	Yes - RWST level change to RS Pump actuation	2Q08
Three Mile Island 1	224	2580	Enercon	Yes	4Q07	TBD	If change is made, likely 4Q07	TBD	If change is made, likely 4Q07	Yes - replace ECCS pump throttle valve internals. Cyclone separators being evaluated	4Q07	No	N/A
Turkey Point 3	64	Approx 4500, design not finalized	GE	Yes	3Q07	No	N/A	Yes	3Q07	TBD - Evaluating removal of cyclone separators	If required, 3Q07	No	N/A
Turkey Point 4*	52	Approx 4500, design not finalized	GE	Yes	2Q08	No	N/A	Yes	4Q06 & 2Q08	TBD - Evaluating removal of cyclone separators	If required, will be 2Q08	No	N/A
V.C. Summer	46 per train	Alpha Train – 2939' Bravo Train – 2379	AECL	No	4Q06	No	N/A	No	N/A	Yes - HHSI throttle valves	4Q06	No	N/A
Vogtle 1*	200	2710	GE	No	4Q06	No	NA	No	NA	Yes - Modifying/adding ECCS orifices to open throttle valves	2Q08	No	N/A
Vogtle 2	200	2710	GE	No	2Q07	No	N/A	No	NA	Yes - Modifying/adding ECCS orifices to open throttle valves	2Q07	No	N/A
Waterford 3	280	3699	GE	Yes	4Q06	No	N/A	No	N/A	No	N/A	No	N/A
Watts Bar	250	4550	PCI	Yes	4Q06	No	N/A	No	N/A	Not major, but installed smaller orifice in discharge of CVCS charging pump discharge to allow further opening of CVCS throttle valves	4Q06	No	N/A
Wolf Creek	~400 total (both trains)	6623 (both trains)	PCI	No	4Q06	No	N/A	No	N/A	No, not currently. Potential minor scope modification to cyclone separators-pending	N/A	No	N/A

ACRONYM LIST

AECL	Atomic Energy of Canada, Ltd.
BS	building spray
CS	containment spray
CVCS	chemical and volume control system
ECCS	emergency core cooling system
GE	General Electric
GSI	Generic Safety Issue
HHSI	high head safety injection
HPI	high pressure injection
HPSI	high pressure safety injection
IR	internal recirculation
LPI	low pressure injection
RAS	recirculation actuation signal
RMI	reflective metal insulation
RS	recirculation spray
RWST	refueling water storage tank
TBD	to be determined