Dominion Nuclear Connecticut, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
Web Address: www.dom.com

June 27, 2013

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 13-227A
NSSL/MLC R0
Docket No. 50-336
License No. DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
SUPPLEMENT TO LICENSE AMENDMENT REQUEST FOR CHANGES TO TECHNICAL SPECIFICATION 3/4.7.11, "ULTIMATE HEAT SINK"

By letter dated May 3, 2013, Dominion Nuclear Connecticut, Inc. (DNC) submitted a license amendment request (LAR) for Millstone Power Station Unit 2 (MPS2). The proposed amendment would modify Technical Specification (TS) 3/4.7.11, "Ultimate Heat Sink," to increase the current ultimate heat sink (UHS) water temperature limit from 75°F to 80°F and change the TS Action to state, "With the ultimate heat sink water temperature greater than 80°F, be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours." DNC requested approval of the LAR by May 5, 2014 with implementation within 60 days of issuance.

In a letter dated June 26, 2013, the NRC provided DNC an opportunity to supplement the LAR identified above. During a clarification call between the NRC and DNC on June 20, 2013, DNC agreed to provide the information to the NRC by July 3, 2013.

Enclosure 1 provides DNC's response to the NRC's request. The associated detailed information requested by the NRC is provided in Enclosure 2 and 3.

If you have any questions or require additional information, please contact Wanda Craft at (804) 273-4687.

Sincerely,

Eugene S. Grecheck
Vice President – Nuclear Engineering and Development

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

A001
NRR

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President – Nuclear Engineering and Development of Dominion Nuclear Connecticut, Inc. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 27th day of June, 2013.

My Commission Expires: 12/31/2016.

Notary Public

CRAIG D SLY
Notary Public
Commonwealth of Virginia
Reg. # 7518653
My Commission Expires December 31, 2016

Commitments made in this letter: None

Enclosures:

1. Supplement to License Amendment Request for Changes to Technical Specifications 3/4.7.11, "Ultimate Heat Sink."
2. DNC Response for Items A1 through A10
   - Attachment 1 – Calculated Heat Removal Capability
   - Attachment 2 – Description of Generic Letter 89-13 Testing/Cleaning Program
3. Service Water System, Piping and Instrumentation Drawing

cc: U.S. Nuclear Regulatory Commission
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2100 Renaissance Blvd
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James S. Kim
Project Manager
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One White Flint North, Mail Stop 08 C2A
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NRC Senior Resident Inspector
Millstone Power Station

Director, Radiation Division
Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

ENCLOSURE 1

Supplement to License Amendment Request for Changes to Technical Specifications 3/4.7.11, "Ultimate Heat Sink"

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

By letter dated May 3, 2013, Dominion Nuclear Connecticut, Inc. (DNC) submitted a license amendment request (LAR) for Millstone Power Station Unit 2 (MPS2). The proposed amendment would modify Technical Specification (TS) 3/4.7.11, "Ultimate Heat Sink," to increase the current ultimate heat sink (UHS) water temperature limit from 75°F to 80°F and change the TS Action to state, "With the ultimate heat sink water temperature greater than 80°F, be in HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours."

In a letter dated June 26, 2013, the NRC provided DNC an opportunity to supplement the LAR identified above. The NRC requested;

A) information needed for each safety related heat exchanger cooled by service water:

1) Design heat load
2) Design fouling factor
3) As-tested fouling factor
4) Tube plug allowance
5) Actual number of plugged tubes
6) Calculated heat removal capability
7) Design minimum flow rate
8) Actual flow rate
9) Vendor supplied heat exchanger specification sheet
10) Description of Generic Letter 89-13 testing/cleaning program for each heat exchanger, and

B) an 18 x 24 size piping and instrumentation diagram of service water system

C) a statement as to whether or not the increase in service water temperature from 75 °F to 80 °F will result in a derating of the emergency diesel generators.

DNC Response (Items A1 through A10)

The requested information for items A1 through A10 identified above, are provided in Enclosure 2 for the following service water cooled, safety-related, heat exchangers:

- Reactor Building Closed Cooling Water (RBCCW) – X-18A/B/C
- Emergency Diesel Generators (EDG) – X-83A/B, X-53A/B, X-45A/B
- Vital AC Switchgear Room Ventilation Coolers – X-181A/B, X-182, X-183
- Vital DC Switchgear Room Ventilation Chillers – X-169A/B

DNC Response (Item B)

A 17 x 22 size piping and instrumentation diagram of the MPS2 service water system is provided in Enclosure 3 as Drawing No. 25203-26008.

DNC Response (Item C)

The increase in service water temperature from 75°F to 80°F does not require derating of the MPS2 emergency diesel generators.

ENCLOSURE 2

DNC Response for Items A1 through A10

(Includes Attachments 1 and 2)

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

Reactor Building Closed Cooling Water Heat Exchangers			
Item	**X-18A (Facility 1)**	**X-18B**	**X-18C (Facility 2)**
A1) Design heat load	2.044 x10^8 BTU/hr	2.044 x10^8 BTU/hr	2.044 x10^8 BTU/hr
A2) Design fouling factor (1)	0.001075 (hr·ft²·°F/BTU)	0.001075 (hr·ft²·°F/BTU)	0.001075 (hr·ft²·°F/BTU)
A3) As-tested fouling factor	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5
A4) Tube plug allowance	1637 total tubes; Tube plugs allowed – 163 (10%)	1637 total tubes; Tube plugs allowed – 163 (10%)	1637 total tubes; Tube plugs allowed – 163 (10%)
A5) Actual number of plugged tubes	15	0	65
A6) Calculated heat removal capability	See Attachment 1	See Attachment 1	See Attachment 1
A7) Design minimum flow rate (gpm)	7570 (LOCA) 7500 (Normal Operation)	7570 (LOCA)	7570 (LOCA) 7650 (Normal Operation)
A8) Actual flow rate (gpm)	7655 (LOCA) 7529 (Normal Operation)	7721 (LOCA)	7735 (LOCA) 7689 (Normal Operation)
A9) Vendor supplied specification sheet	See Figure 1	See Figure 1	See Figure 1
A10) Description of Generic Letter 89-13 testing/cleaning program	See Attachment 2	See Attachment 2	See Attachment 2

(1) This is the total fouling factor used in the analysis of record to determine required service water flow rate.

Figure 1

Vendor Specification Sheet for Reactor Building Closed Cooling Water Heat Exchangers

X-18A/B/C

25203-ER-97-002 ATTACHMENT C P3 5 OF 25

Case VII - Loss of Coolant

SERVICE: REACTOR BUILDING CLOSED COOLING WATER H EXCH		EQUIPMENT NO. X18A, X18B, X18C	
		CONSISTS OF: 3 SHELLS	
PERFORMANCE: (1 SHELL)	SHELL SIDE	TUBE SIDE	
FLUID	Chemically treated water	Sea Water	
FLUID QUANT. ENTERING	3,500,000 LB/HR	6,000,000 LB/HR	
SPECIFIC HEAT BTU/LB/°F	1	.935	
VISCOSITY	0.7 CP AT 95 °F	1.1 CP AT 60 °F	
	AT °F	AT °F	
GRAVITY	1 AT 60 °F	1.027 AT 60 °F	
NUMBER OF PASSES		1 (one)	
VELOCITY FT/SEC.	3.7 AT 60 °F	Max. 7.0 AT 60 °F	
PRESSURE AT INLET PSIG	100		
PRESSURE DROP. PSI	6	4	
FOULING FACTOR	.0003	.0005	
TEMPERATURE IN - °F	158	75	
TEMPERATURE OUT - °F	112.3	103.5	
HEAT EXCHANGED - BTU/HR: 160,000,000	LOG. MTD °F 45.4	CORRECTED MTD °F 45.4 (2)	
TRANSFER RATE: SERVICE- 425	CLEAN- 600	FOULING FACTOR-OVERALL: .0008	
TRANSFER AREA: GROSS - 8548	SQ.FT.: EFFECTIVE 8300	SQ.FT.:	
CONSTRUCTION			
DESIGN PRESSURE - PSIG.	150	125	
TEST PRESSURE - PSIG.	225	(6) Channels 250/Tubes 150	
DESIGN TEMPERATURE - °F	250	120	
CORROSION ALLOWANCE			

TUBES - QUANT. 1637 O.D. 3/4" BWG 18 min. LENGTH 26'-7" PITCH 1" Triang.

SHELL - 47 (I.D.)(O.D.)

CONNECTIONS: -SHELL: INLET - 20" STD. B.W. OUTLET - 20" STD. B.W.

(SIZE & RATING) -CHANNEL: INLET - 24" 125 ASA F.F. Flg. OUTLET - 24" 125 ASA F.F. Flg.

CODES AND STANDARDS APPLIED TEMA - Class R; ASME Sections VIII & IX

WEIGHT: DRY: FLOODED:		OPERATING:	BUNDLE ONLY:
PART	MATERIAL	PART	MATERIAL
TUBES	ALUMINIUM BRASS	FLOAT. TUBE SHEET	
SHELL	ASTM-A 285, C	FIXED TUBE SHEET	ASTM-B-171 (ALU. BRONZE)
SHELL COVER		TUBE SUPPORTS	ASTM-A-285C
CHANNEL	ASTM-A278 C140, Ni	CROSS BAFFLE *	ASTM-A-285C
CHANNEL COVER	ASTM-A-278 C140, Ni	LONG BAFFLE	
FLOAT HEAD COVER		GASKETS	BUNA-N

MANUFACTURER	Struthers Nuclear	FOREIGN PRINT NO.	
MODEL	TEMA Type AEL		
VENDOR	Struthers Nuclear	LOCATION DWG. NO:	
PURCHASE ORDER NO.	7604-M-20	P. & I. DIAGRAM NO:	

REMARKS:

OVERALL LENGTH: Including tube pulling space 64'-0" max.

* Modified cross baffles SF-3

REV.	DESCRIPTION	APPROVALS	DATE
6	Incorporated SCN-M-20-4	ENG LBO, CHK 8550, SUPV RG	11/27/74
0	Issued for Bids		9/17/74
1	Issued for Purchase		
2	Design Press. Revised		

BECHTEL CORPORATION
POWER AND INDUSTRIAL DIVISION

R.B.C.C.W. HEAT EXCHANGER DATA SHEET
MILLSTONE NUCLEAR POWER STATION UNIT 2

JOB No 7604
7604-M-20
SHEET 7 OF 9
REV. 6

M-325-E 11-6-58

Emergency Diesel Generator Heat Exchangers						
Item	Jacket Water Coolers		Lube Oil Coolers		Air Coolers	
	X-45A	X-45B	X-53A	X-53B	X-83A	X-83B
A1) Design heat load[1]	2.823 x10^6 BTU/hr at 2750 kW	2.823 x10^6 BTU/hr at 2750 kW	2.279 x10^6 BTU/hr at 2750 kW	2.279 x10^6 BTU/hr at 2750 kW	2.067x10^6 BTU/hr at 2750 kW	2.067x10^6 BTU/hr at 2750 kW
A2) Design fouling factor[2]	0.001575 (hr·ft²·°F/BTU)	0.001575 (hr·ft²·°F/BTU)	0.001575 (hr·ft²·°F/BTU)	0.001575 (hr·ft²·°F/BTU)	0.001575 (hr·ft²·°F/BTU)	0.001575 (hr·ft²·°F/BTU)
A3) As-tested fouling factor	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5
A4) Tube plug allowance	110 total tubes; Tube Plugs Allowed - 5 (or 5%)	110 total tubes; Tube Plugs Allowed – 5 (or 5%)	188 total tubes; Tube Plugs Allowed – 9 (or 5%)	188 total tubes; Tube Plugs Allowed – 9 (or 5%)	110 total tubes; Tube Plugs Allowed – 5 (or 5%)	110 total tubes; Tube Plugs Allowed – 5 (or 5%)
A5) Actual number of plugged tubes	0	0	1	0	0	0
A6) Calculated heat removal capability	See Attachment 1	See Attachment 1	See Attachment 1	See Attachment 1	See Attachment 1	See Attachment 1
A7) Design minimum flow rate (gpm)	637	637	637	637	637	637
A8) Actual flow rate (gpm)	672	678	672	678	672	678
A9) Vendor supplied specification sheet	See Figure 2	See Figure 2	See Figure 3	See Figure 3	See Figure 4	See Figure 4
A10) Generic Letter 89-13 testing/ cleaning program	See Attachment 2	See Attachment 2	See Attachment 2	See Attachment 2	See Attachment 2	See Attachment 2

(1) X-83A/B are the limiting heat exchangers, so if the required heat load is achieved for X-83A/B, then it will also be achieved for X-53A/B and X-45A/B.

(2) This is the total fouling factor used in the analysis of record to determine required service water flow rate.

Figure 2

Vendor Specification Sheet for Emergency Diesel Generator Heat Exchangers X-45A/B, Jacket Water Coolers

BASCO Division AMERICAN PRECISION INDUSTRIES INC. 11906267

MEMBER OF TEMA

P.O. BOX 218 / 2777 WALDEN AVENUE / BUFFALO, NEW YORK 14225 / 716-684-6700 / TELEX: 91-395

			JOB NO.	PO #B-260641-0
CUSTOMER	Colt Industries - Fairbanks Morse		REFERENCE NO.	11906267
ADDRESS			PROPOSAL NO.	Basco 82-710085
PLANT LOCATION			DATE	11/11/71
SERVICE OF UNIT	Jacket Water Cooler		ITEM NO.	03 Rev. #2
SIZE	12096	TYPE 7 Removable Bundle	(HORIZ.) (VERT.) CONNECTED IN	Stacked/Top 02
SQ. FT. SURF./UNIT (GROSS) (EFF.)	172 sq.ft. Total	SHELLS/UNIT One	SQ. FT. SURF./SHELL (GROSS) (EFF.)	172 sq.ft. Total

PERFORMANCE OF ONE UNIT

	SHELL SIDE		TUBE SIDE	
FLUID CIRCULATED	Jacket Water		Sea Water	
TOTAL FLUID ENTERING	400 GPM		700 GPM	
VAPOR				
LIQUID	400 GPM		700 GPM	
STEAM				
NON-CONDENSABLES				
FLUID VAPORIZED OR CONDENSED				
STEAM CONDENSED				
SPECIFIC GRAVITY/DENSITY				
VISCOSITY				
MOLECULAR WEIGHT				
SPECIFIC HEAT		BTU/LB-°F		BTU/LB-°F
THERMAL CONDUCTIVITY		BTU/HR-FT-°F		BTU/HR-FT-°F
LATENT HEAT		BTU/LB		BTU/LB
TEMPERATURE IN	185	°F	91.6	°F
TEMPERATURE OUT	167	°F	101.5	°F
OPERATING PRESSURE		PSIG		PSIG
NO. PASSES PER SHELL	One		One	
VELOCITY		FT/SEC	6.1	FT/SEC
PRESSURE DROP	4	PSI	2	PSI
FOULING RESISTANCE (Min.)	.001		.0005	

HEAT EXCHANGED-BTU/HR 3,522,000 MTD CORRECTED °F 79.3 deg. F

TRANSFER RATE – SERVICE 258 CLEAN

CONSTRUCTION OF ONE SHELL

DESIGN PRESSURE	150	PSI	150	PSI
TEST PRESSURE	225	PSI	300	PSI
DESIGN TEMPERATURE	250	°F	200	°F

TUBES Aluminum Brass NO. 110 O.D. 3/4 BWG 18 LENGTH 8 ft. PITCH 15/16 TRI

SHELL	Shell A53 GR B I.D. O.D. 12" Nom.	SHELL COVER	(INTEG) (REMOV)
BONNET/CHANNEL	CL. 40 ASTM A 278	CHANNEL COVER	CL. 40 ASTM A 278
TUBESHEET – STATIONARY	Al. Bronze aSTM B 171	TUBESHEET - FLOATING	AL. Bronze ASTM B171
BAFFLES – CROSS	Steel A285 GR CTYPE	FLOATING HEAD COVER	
BAFFLES – LONG	TYPE Seg.	IMPINGEMENT PROTECTION	
TUBE SUPPORTS	Steel A 285 GR C		
TUBE TO TUBESHEET JOINT	Roller Expanded		
GASKETS	Non-Asbestos Fiber	PACKING	BUNA "N", O-Rings
CONNECTIONS-SHELL SIDE	IN 8" x 6" OUT 8" x 6"	RATING	Studded Domes
BONNET/CHANNEL SIDE	IN 6" OUT 6"	RATING	150# ANSI FF

CORROSION ALLOWANCE – SHELL SIDE 1/8" on C. Steel TUBE SIDE 1/8 on C. Steel

CODE REQUIREMENTS: COMMERCIAL STANDARD ☐ ASME SECTION VIII, DIV. 1 ☑ TEMA CLASS R

OTHER:

REMARKS Stacking assembly consisting of Items 01, 02 and 03.

Figure 3

Vendor Specification Sheet for Emergency Diesel Generator Heat Exchangers X-53A/B, Lube Oil Coolers

11 906 267

BASCO Division AMERICAN PRECISION INDUSTRIES INC.

MEMBER OF TEMA

P.O. BOX 218 / 2777 WALDEN AVENUE / BUFFALO, NEW YORK 14225 / 716-684-6700 / TELEX: 91-395

			JOB NO.	PO #B-260641-0
CUSTOMER	Colt Industries - Fairbanks Morse		REFERENCE NO.	11906267
ADDRESS			PROPOSAL NO.	Basco 82-710085
PLANT LOCATION			DATE	11/11/71
SERVICE OF UNIT	Lube Oil Cooler		ITEM NO.	02 Rev. #2
SIZE	16096	TYPE 7 Removable Bundle	(HORIZ.) (VERT.) CONNECTED IN	Stacked/Top 01
SQ. FT. SURF./UNIT (GROSS) (EFF.)	295 sq.ft Total	SHELLS/UNIT One	SQ. FT. SURF./SHELL (GROSS) (EFF.)	295 sq. ft. Total

PERFORMANCE OF ONE UNIT

	SHELL SIDE		TUBE SIDE	
FLUID CIRCULATED	Lube Oil SAE 40		Sea Water	
TOTAL FLUID ENTERING	500 GPM		700 GPM	
VAPOR				
LIQUID	500 GPM		700 GPM	
STEAM				
NON-CONDENSABLES				
FLUID VAPORIZED OR CONDENSED				
STEAM CONDENSED				
SPECIFIC GRAVITY/DENSITY				
VISCOSITY				
MOLECULAR WEIGHT				
SPECIFIC HEAT		BTU/LB-°F		BTU/LB-°F
THERMAL CONDUCTIVITY		BTU/HR-FT-°F		BTU/HR-FT-°F
LATENT HEAT		BTU/LB		BTU/LB
TEMPERATURE IN	215	°F	83	°F
TEMPERATURE OUT	189.3 Min.	°F	91.6	°F
OPERATING PRESSURE		PSIG		PSIG
NO. PASSES PER SHELL	One		One	
VELOCITY		FT/SEC	3.6	FT/SEC
PRESSURE DROP	12 Max.	PSI	One	PSI
FOULING RESISTANCE (Min.)	.001		.0005	

HEAT EXCHANGED-BTU/HR 2,890,000 MTD CORRECTED-°F 114.6

TRANSFER RATE – SERVICE 85.5 CLEAN

CONSTRUCTION OF ONE SHELL

DESIGN PRESSURE	150 PSI		150	PSI
TEST PRESSURE	225 PSI		300	PSI
DESIGN TEMPERATURE	250 °F		200	°F

TUBES Aluminum Brass NO. 188 O.D. 3/4 BWG 18 Ave. LENGTH 8 ft. PITCH 15/16 TRI

SHELL Shell A53 GR. B	I.D.	O.D. 16" Nom.	SHELL COVER (INTEG) (REMOV)
~~BONNET~~/CHANNEL CL 40 ASTM A 278			CHANNEL COVER CL 40 ASTM A 278
TUBESHEET – STATIONARY AL. Bronze ASTM B171			TUBESHEET - FLOATING AL. Bronze ASTM B171
BAFFLES – CROSS Steel A285GR C	TYPE Seg.		FLOATING HEAD COVER
BAFFLES – LONG	TYPE		IMPINGEMENT PROTECTION

TUBE SUPPORTS Steel A 285 GR C

TUBE TO TUBESHEET JOINT Roller Expanded

GASKETS Non-Asbestos Fiber		PACKING BUNA "N", O-Rings	
CONNECTIONS SHELL SIDE IN 8" x 6"	OUT 8" x 6"	RATING Studded Domes	
~~BONNET~~/CHANNEL SIDE IN 6"	OUT 6"	RATING 150# ANSI FF	

CORROSION ALLOWANCE – SHELL SIDE 1/8" on C. Steel TUBE SIDE 1/8" on C. Steel

CODE REQUIREMENTS: COMMERCIAL STANDARD ☐ ASME SECTION VIII, DIV. 1 ☒ TEMA CLASS R

OTHER:

REMARKS Stacking Assembly consisting of Items 01, 02 and 03.

11 906 267 REV. 1

Figure 4

Vendor Specification Sheet for Emergency Diesel Generator Heat Exchangers X-83A/B, Air Coolers

11906267

BASCO Division — AMERICAN PRECISION INDUSTRIES INC.

MEMBER OF TEMA

P.O. BOX 218 / 2777 WALDEN AVENUE / BUFFALO, NEW YORK 14225 / 716-684-6700 / TELEX: 91-385

CUSTOMER	Colt Industries - Fairbanks Morse		JOB NO.	PO #B-260641-0
ADDRESS			REFERENCE NO.	11906267
PLANT LOCATION			PROPOSAL NO.	Basco 82-710085
			DATE	11/11/71
SERVICE OF UNIT	Air Cooler Heat Exchanger		ITEM NO.	01 Rev. #2
SIZE	12096	TYPE 7 Removable Bundle	(HORIZ.) (VERT.) CONNECTED IN	Stacked on Btm.
SQ. FT. SURF./UNIT (GROSS) (EFF.)	172 sq.ft. Total	SHELLS/UNIT One	SQ. FT. SURF./SHELL (GROSS) (EFF.)	172 sq.ft. Total

PERFORMANCE OF ONE UNIT

	SHELL SIDE		TUBE SIDE	
FLUID CIRCULATED	Water		Sea Water	
TOTAL FLUID ENTERING	400 GPM		700 GPM	
VAPOR				
LIQUID	400 GPM		700 GPM	
STEAM				
NON-CONDENSABLES				
FLUID VAPORIZED OR CONDENSED				
STEAM CONDENSED				
SPECIFIC GRAVITY/DENSITY				
VISCOSITY				
MOLECULAR WEIGHT				
SPECIFIC HEAT		BTU/LB-°F		BTU/LB-°F
THERMAL CONDUCTIVITY		BTU/HR-FT-°F		BTU/HR-FT-°F
LATENT HEAT		BTU/LB		BTU/LB
TEMPERATURE IN	134	°F	75	°F
TEMPERATURE OUT	120	°F	83	°F
OPERATING PRESSURE		PSIG		PSIG
NO. PASSES PER SHELL	One		One	
VELOCITY		FT/SEC	6.1	FT/SEC
PRESSURE DROP	5.1	PSI	2	PSI
FOULING RESISTANCE (Min.)	.001		.0005	

HEAT EXCHANGED-BTU/HR 2,769,000 — MTD CORRECTED-°F 48 deg. F

TRANSFER RATE – SERVICE 335.4 — CLEAN

CONSTRUCTION OF ONE SHELL

	SHELL SIDE		TUBE SIDE	
DESIGN PRESSURE	150	PSI	150	PSI
TEST PRESSURE	225	PSI	300	PSI
DESIGN TEMPERATURE	250	°F	200	°F

TUBES Aluminum Brass NO. 110 O.D. 3/4 BWG 18 Ave. LENGTH 8 ft. PITCH 15/16 TRI

SHELL	Shell A 53 GR B I.D.	O.D. 12"	SHELL COVER (INTEG) (REMOV)
~~BONNET~~/CHANNEL	CL. 40 ASTM A 278		CHANNEL COVER CL 40 ASTM A 278
TUBESHEET – STATIONARY	AL Bronze ASTM B171		TUBESHEET - FLOATING AL Bronze ASTM B171
BAFFLES – CROSS	Steel A285 GR C TYPE Seg.		FLOATING HEAD COVER
BAFFLES – LONG	TYPE		IMPINGEMENT PROTECTION
TUBE SUPPORTS	Steel A285 GR C		
TUBE TO TUBESHEET JOINT	Roller Expanded		
GASKETS	Non-Asbestos Fiber		PACKING BUNA "N", O-Rings
CONNECTIONS-SHELL SIDE	IN 8" x 6"	OUT 8" x 6"	RATING Studded Domes
~~BONNET~~/CHANNEL SIDE	IN 6"	OUT 6"	RATING 150# ANSI FF
CORROSION ALLOWANCE – SHELL SIDE	1/8" on C. Steel	TUBE SIDE	1/8" on C. Steel

CODE REQUIREMENTS: COMMERCIAL STANDARD ☐ ASME SECTION VIII, DIV. I ☒ TEMA CLASS R

OTHER:

REMARKS Stacking assembly consisting of Item 01, 02 and 03

6 REV. 1

Vital AC Switchgear Room Ventilation Cooler Heat Exchangers				
Item	**West 480 Volt Load Center**		**Lower 4160 Volt**	**Upper 4160 Volt**
	X-181A	**X-181B**	**X-182**	**X-183**
A1) Design heat load	249,744 BTU/hr (LOCA) – total for both 194,172 BTU/hr (Seismic) – total for both		131,253 BTU/hr (LOCA) 131,253 BTU/hr (Seismic)	121,536 BTU/hr (LOCA) 93,949 BTU/hr (Seismic)
A2) Design fouling factor [1]	0.040102 (hr·ft²·°F/BTU)	0.040102 (hr·ft²·°F/BTU)	0.040102 (hr·ft²·°F/BTU)	0.040102 (hr·ft²·°F/BTU)
A3) As-tested fouling factor	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5	See Attachment 2, Item 5
A4) Tube plug allowance[2]	12.5% (2 of 16 tubes per row, 4 rows per coil, 3 coils)		13.6% (3 of 22 tubes per row, 4 rows)	13.6% (3 of 22 tubes per row, 4 rows)
A5) Actual number of plugged tubes	0	0	0	0
A6) Calculated heat removal capability	See Attachment 1	See Attachment 1	See Attachment 1	See Attachment 1
A7) Design minimum flow rate (gpm)	60 (LOCA) 26 (Seismic)	30 (LOCA) 13 (Seismic)	15 (LOCA) 15 (Seismic)	17 (LOCA) 10 (Seismic)
A8) Actual flow rate (gpm)	92 (LOCA) 76 (Seismic)	53 (LOCA) 44 (Seismic)	34 (LOCA) 28 (Seismic)	29 (LOCA) 23 (Seismic)
A9) Vendor supplied specification sheet	See Figure 5	See Figure 5	See Figure 6	See Figure 5
A10) Generic Letter 89-13 testing/cleaning program	See Attachment 2	See Attachment 2	See Attachment 2	See Attachment 2

(1) This is the total fouling factor used in the analysis of record to determine required service water flow rate.

(2) X-181 consists of three identical coils; two coils comprise X-181A, while one coil comprises X-181B.

Figure 5

Vendor Specification Sheet for Vital AC Switchgear Room Ventilation Cooler Heat Exchangers X-181A/B and X-183

ZACHRY NUCLEAR, INC.	CALC NO. 12-280	REV 0	PAGE 11 OF 22
	ORIGINATOR [redacted]	VERIFIER [redacted]	
	TITLE PROTO-HX Model Development of MP2 Room Coolers X-181A/B and X-183 and Evaluation of 80°F Service Water		

ZNI Document Type: QAPD

4.0 DESIGN INPUTS

4.1 Physical configuration data for coolers X-181 and X-183 are provided in Reference 9.2 as summarized in Table 1.

Table 1: Physical Configuration Data

Parameter	Cooler	
	X-181	X-183
Coils per Unit	3[a]	1
Coil Length (in)	60	51
Serpentines	1[b]	1[b]
Fin Pitch (fins per in)	9[c]	9[c]
Fin Conductivity (Btu/hr-ft-°F)	128.3	128.3
Fin Thickness (in)	0.0085	0.0085
Tube Rows	4	4
Tubes per Row	16	22
Tube Inner Diameter (in)	0.55	0.55
Tube Wall Thickness (in)	0.049	0.049
Tube Outside Diameter	0.648[d]	0.648[d]
Longitudinal Tube Pitch (in)	1.5	1.5
Transverse Tube Pitch (in)	1.5	1.5
Tube Conductivity (Btu/hr-ft-°F)	25.8	25.8

Table 1 Notes

(a) Room cooler X-181 consists of three identical coils. The PROTO-HX model is based on data for one coil. Heat transfer rates are multiplied by three to provide an equivalent cooler duty.

(b) The number of serpentines is the number of water circuits (16 for X-181 and 22 for X-183) divided by the number tubes per row (Reference 9.4).

(c) PROTO-HX requires the fin pitch to be specified in fins per inch. The vendor data sheet contained in Reference 9.2 states that the coils have 108 fins per foot which is equivalent to 9 fins per inch.

(d) The vendor data sheet contained in Reference 9.2 provides tube wall thickness and tube inner diameter. PROTO-HX requires tube wall thickness and tube outside diameter. The tube outside diameter is calculated as the tube inner diameter plus two times the tube wall thickness.

4.2 The conditions used to benchmark the models of room coolers X-181 and X-183 are provided in Attachment B of Reference 9.2 and are summarized in Table 2.

Table 2: Model Benchmark Conditions

Parameter	Cooler	
	X-181	X-183
Air Flow (scfm)	6,100[a]	6,000
Air Flow (acfm)	6,299[a]	6,197
Inlet Dry Bulb Temperature (°F)	104.0	104.0
Inlet Wet Bulb Temperature (°F)	58.36	58.36
Outlet Dry Bulb Temperature (°F)	86.51	86.57
Outlet Wet Bulb Temperature (°F)	51.29	51.32
Atmospheric Pressure (psia)	14.7	14.7
Coil DP (in WC)	0.6742[b]	0.5010[b]
Tube-Side Fluid	Seawater	Seawater
Tube Flow (gpm)	26.67[a]	25.00
Tube Inlet Temperature (°F)	75	75
Tube Outlet Temperature (°F)	83.86	84.26
Air-Side Fouling (hr-ft^2-°F/Btu)	0.0000	0.0000
Tube-Side Fouling (hr-ft^2-°F/Btu)	0.0005	0.0005
Coil Heat Duty (Btu/hr)	115,500[c]	113,200

Table 2 Notes

(a) Room cooler X-181 consists of three identical coils. Flow rates listed are per coil.

(b) PROTO-HX requires coil pressure drop to be specified in units of psi. The pressure drop specified in Reference 9.2 is converted to psi using the conversion factor given in Design Input 4.11.

(c) Cooler heat duty is per coil.

4.3 The conditions used to validate the benchmarked models of room coolers X-181 and X-183 are provided in Attachment C of Reference 9.2 and are summarized in Table 3.

Figure 6

Vendor Specification Sheet for Vital AC Switchgear Room Ventilation Cooler Heat Exchanger X-182

X182

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AEROFIN
Heat Transfer Products

PERFORMANCE VERIFICATION

-for-

AEROFIN TYPE "R" COIL

CA-1505, Rev. 3

November 18, 2010

JOB NAME:	Millstone Generating Station Unit 2
EQUIPMENT:	X-182 for Lower 4160V Vital Switchgear Emergency Cooling System
CUSTOMER:	Dominion Nuclear Connecticut, Inc.
PO NUMBER:	45652669
AEROFIN SO#	093814

Prepared By: [redacted] Date: 11/19/10

Verified By: [redacted] Date: 11/19/2010

Approved By: [redacted] Date: 11-19-2010

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X182

AEROFIN CALCULATION FILE CA-1505

Purpose: ③

The purpose of this report is to verify the heat exchanger performance for Millstone Generating Station Unit 2 as specified in Specification SP-M2-ME-1092 Revision 0; for coil X-182 for the Lower 4160V Vital Switchgear Emergency Cooling System (ESV) for Dominion Nuclear Connecticut, Inc, P.O. 45652669.

Heat Exchanger Coil Size

34.5" Casing Height
59.0" Fin Length
5 Row
4 Pass
12 FPI Aluminum "L", 0.012" Nominal Thk
5/8" x 0.049" Nominal Wall AL6XN

The performance verifications in this report are based on one (1) coil of each size, as above, piped in counter flow of air and water for optimum performance.

The thermal resistance values for the plate fin surface are based on test results in accordance with ARI Standard 410, "Forced Circulation Air-Cooling and Air-Heating Coils".

X182

AEROFIN CALCULATION FILE CA-1505

Performance Verification, continued ③

Millstone Unit 2, X-182, Case 5

Ao = Total External Surface, ft^2
D = Ao/Fa/Row = 1.8 * fpi + 1.4 (for helical fin configuration provided)

D = 1.8 * 12 + 1.4 = 23.0

K = D / R

K = 23 / 0.145 = 159 Btu/ft^2-Fa/Row/°F

Rc = Rows Calculated = Q / (Fa * K * Δtm)

Rc = 198,974 / (12.482 * 159 * 22.5) = 4.46

Because the rows calculated for the Case 5 heat load of 198,974 Btu/hr (which is based upon coil performance with water as the cooling medium and zero fouling) equals the rows calculated for the Case 1 design condition (which is based upon coil performance with seawater as the cooling medium and the design fouling factor), the heat load calculated for Case 5 (198,974 Btu/hr) is the basis used for expected minimum capacity for coil performance at the design temperatures and flowrates. The performance capacity test conducted at Intertek on 20 September 2010 yielded a cooling capacity (heat load) of 199,217 Btu/hr which validates that the cooling coil will perform as predicted and will satisfy the design performance requirements as specified.

X182

Intertek Report No.: 100208395CRT-001

Description of Test Setup

The test sample was installed with interconnecting ducts into a open-loop, air-flow measuring apparatus. The quality of the air entering and leaving the coil was determined by wet and dry-bulb Precision RTD's located in aspirating-type psychrometer samplers, each located at the inlet and outlet of the test coil.

The quality of water entering and leaving the coil was determined by Precision RTD's located in thermometer wells. The quantity of water was measured by Emerson Mass Flowmeters.

Description of Sample, Physical and Nameplate Data

1. General Description of Sample

The sample was a aluminum-finned cooling coil with AL6XN tubing. The coil was installed in a vertical position and air entered horizontally into the inlet side, and discharged from the opposite side. The water entered the coil at approximately the bottom of the inlet header, and exited from approximately the top of the outlet header.

2. Physical Data of Coil

Transfer Fluid	Water
Tubing Characteristics	
Position	Horizontal
Arrangement	Staggered
Nominal diameter, in O.D.	5/8"
Material	AL6XN
Spacing (nominal), in	1.39" FC x 1.28" RC
Tubeface	22/23
Circuit	1.25
Total Number of Tubes	113
Coil Depth (in rows of tubes)	5
Fin Characteristics	
Type	Helical "L"
Material	Aluminum
Fins per Inch	12
Casing Height, in	34.5"
Nominal Tube Length, in	59.0"

X182

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AEROFIN
Heat Transfer Products

Date: 10/14/2010
Job Name: Millstone Unit 2
System ID: Case 1 (New Design)

Model No.	Qty. In Face	NTL INCH
R-12.0AL-36.1 X 59.0-5-1.25	1	59.00

Totals: 1

Coil Type: R
TF: 22
Row: 5
Fin: 12.00 /IN
Circuit: 1-1/4 ,,

Tube: 0.625 inch X 0.049 inch
Fin Material: 3/8" High Aluminum 'L'
Thickness: 0.011 IN.
Csg Material: Standard with Galvanized Casings
Connection: (1) 2" Flanged Stainless Stl 150 lb RFSO
Hdr Material: Standard Stainless Stl with Rolled Joints

Rows Calc: 4.46

Dwg: NA

Performance NV

Pressure: 29.92 IN HG Elevation: Sea Level

Airflow:	7,200.0	LVG ACFM	Sea Water		
System Face Area:	12.5	FT^2	Flow Rate:	22.90	GPM
Standard Face Velocity:	547.6	FPM	Entering Temp:	77.0	°F
Entering Dry Bulb Temp:	122.0	°F	Leaving Temp:	93.5	°F
			Tube Velocity:	1.2	FPS
Leaving Dry Bulb Temp:	97.4	°F	Inside Surface Fouling:	0.0016	$HR{\cdot}FT^2{\cdot}°F/BTU$
Outside Surface Fouling:	0.0000	$HR{\cdot}FT^2{\cdot}°F/BTU$			
Sensible Heat Load:	182.0	MBH			
Total Heat Load:	182.1	MBH			

Losses
Air Friction: 0.50 IN H2O Pressure Drop: 0.9 FT H2O

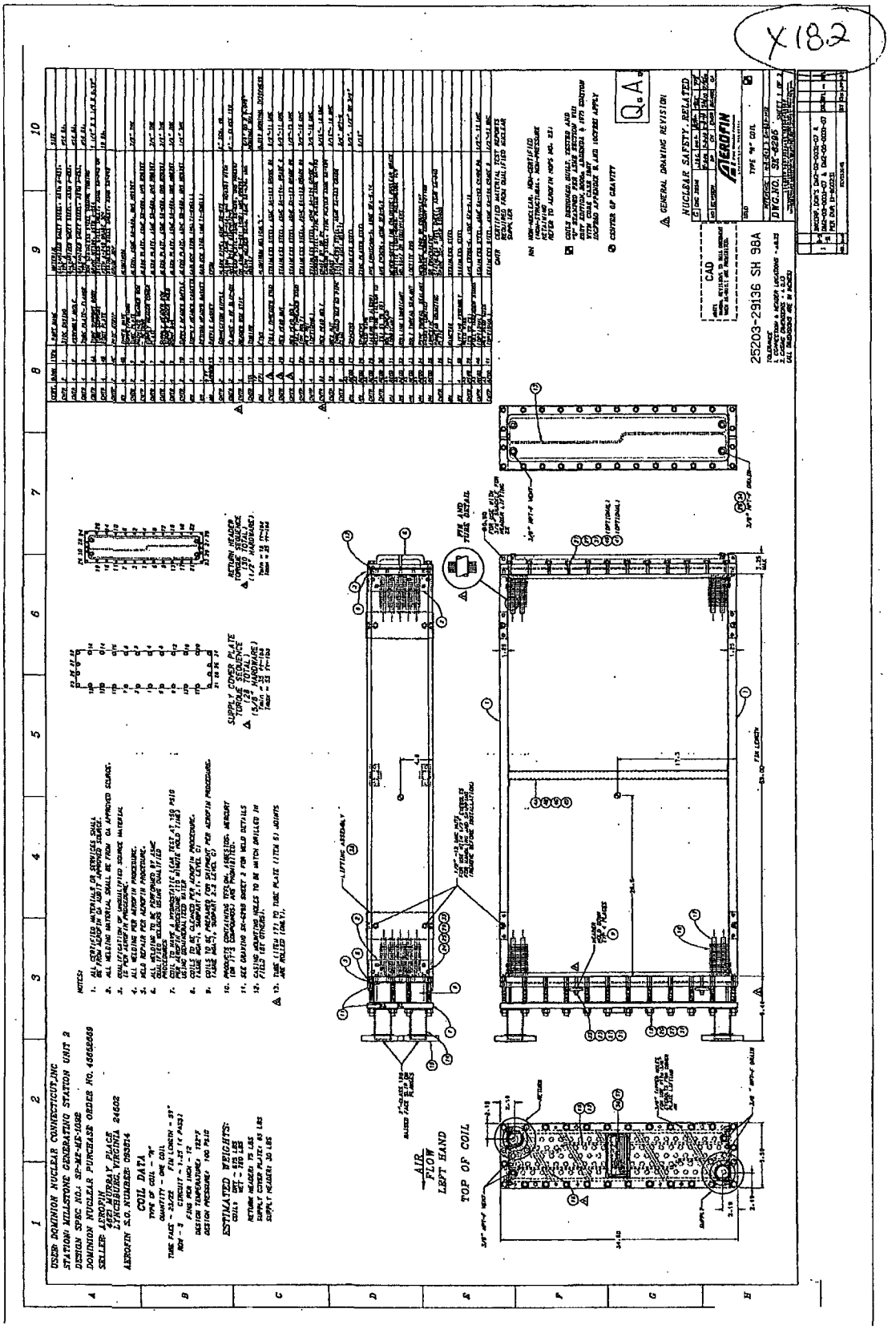
Comments:

Notes & Warnings:

96	You have selected a connection size smaller than the standard.
51	Outside the scope of AHRI standard 410.
29	Fluid properties: SG: 1.025 VI: 0.88 oP TK: 0.34 Btu/Hr-Ft^2 °F Cp: 0.94 Btu/lb °F
12	Circuit may not be available for coil type selected.
11	Special circ. requires fractional tubes fed. Contact Home Office.
7	Non standard circuit; special pricing/lead time required.
4	Coil 1 has a non standard tube face; special pricing/lead time required.

Program Version: 3.5.4 Millstone Unit 2- 09_20_2010.afn Dll Ver: PriceDB Ver:

AEROFIN CALCULATION FILE CA-1505


X18.2
25203-29136 SH 98A
TOP OF COIL
AIR FLOW
LEFT HAND

Vital DC Switchgear Room Ventilation Chiller Heat Exchangers		
Item	**X-169A**	**X-169B**
A1) Design heat load	244,096 BTU/hr	244,096 BTU/hr
A2) Design fouling factor [1]	0.002702 ($hr \cdot ft^2 \cdot °F/BTU$)	0.002702 ($hr \cdot ft^2 \cdot °F/BTU$)
A3) As-tested fouling factor	See Attachment 2, Item 5	See Attachment 2, Item 5
A4) Tube plug allowance	10% (4 tubes)	10% (4 tubes)
A5) Actual number of plugged tubes	0	0
A6) Calculated heat removal capability	See Attachment 1	See Attachment 1
A7) Design minimum flow rate (gpm)	26.9	26.9
A8) Actual flow rate (gpm)	30.1	30.1
A9) Vendor supplied specification sheet	See Figure 7	See Figure 7
A10) Generic Letter 89-13 testing/cleaning program	See Attachment 1	See Attachment 1

(1) This is the total fouling factor used in the analysis of record to determine required service water flow rate.

Figure 7

Vendor Specification Sheet for Vital DC Switchgear Room Ventilation Chiller Heat Exchangers X-169A/B

X-169

PAGE NO. A868
CALCULATION NO. 99-EME-0281-M2 A8
REV. NO. 2

AMTEK INC.
TRANSFER DIVISION
(214) 647-2626
TLX 73-0994

2300 W. MARSHALL DR.
P.O. BOX 534004

GRAND PRAIRIE, TX 75053-400
GRAND PRAIRIE, TX 75053-400
CABLE: AMTEK

EXCHANGER SPECIFICATION

1						JOB	
2	CUSTOMER NORTHEAST UTILITIES					REF WU-67652	
3	ADDRESS					INO	
4	PLANT LOC					DATE 15 DEC-1987	
5	SERVICE R-22					ITEM	
6	SIZE 8-BX-54	TYPE AMFC-4-40-CB					
7	SURFACE/UNIT 110.5	TOTAL 1	SHELL/UNIT			SURFACE/SHELL 102.3EFF	
8	PERFORMANCE OF ONE UNIT						
9		*	SHELL SIDE	*		TUBE SIDE	
10	FLUID CIRCULATED	*	R-22	*		SEA WATER	
11	TOTAL ENTERING	*	LB/HR	*	41	GPM	
12	VAPOR	*		*			
13	LIQUID	*		*	41	GPM	
14	STEAM	*		*			
15		*		*			
16		*		*			
17	VAPOR CONDENSED	*		*			
18	GRAVITY	*		*	1.0		
19	VISCOSITY	*		*	.95	CP	
20	MOLECULAR WT-VAPORS	*		*			
21	SPECIFIC HEAT	*		*	1.0	BTU/LB	
22	LATENT HEAT VAPORS	*	BTU/LB	*		BTU/LB	
23	TEMPERATURE IN	*	160 DEG F	*	75	DEG F	
24	TEMPERATURE COND/OUT	*	105.0C.T./102	*	86.6	DEG F	
25	OPERATING PRESSURE	*	PSIG	*	20	PSIG	
26	NUMBER OF PASSES	*	1	*	4		
27	VELOCITY	*	FT/SEC	*	5.6	FT/SEC	
28	PRESSURE DROP	*	PSI	*	4.7	PSI	
29	FOULING TOTAL	*	.0005	*	.001		
30	THERMAL CONDUCTIVITY	*		*			
31	HEAT EXCHANGED-BTU/HR 237600		MTD (CORRECTED) 23.73			DEG F	
32	TRANSFER RATE-SERVICE 97.3		CLEAN 180.3				
33	CONSTRUCTION						
34	DESIGN PRESSURE	*	350 PSI	*	150	PSI	
35	TEST PRESSURE	*	437 PNU PSI	*	225	PSI	
36	DESIGN TEMPERATURE	*	250 DEG F	*	200	DEG F	
37	TUBES 90/10 CU-NI.26F/I NO 40 OD .75 TK 0.049* LEN 54" .9375 TRI						
38	SHELL CARBON STEEL ID		OD 8.625 TKN				
39	SHELL COVER		FLOATING HEAD				
40	CHANNEL: CAST BRONZ		CHANNEL COVER				
41	TU SH--STAT 90/10 CU-NI		FLOATING				
42	BAF--CROSS		TYPE SEGMENT TKN				
43	BAF--LONG		TYPE TKN				
44	TU SUPPORTS C.S.		TKN				
45	GASKETS BLACK RUBBER						
46	CONN-SHELL-IN		OUT SERIES ODF SWEAT				
47	CHANNEL-IN , 2		OUT 2 SERIES NPT				
48	CORROSION ALLOW-SHELL SIDE		TUBE SIDE				
49	CODE REQUIREMENTS ASME CODE SECTION VIII ,DIV 1 "U" STAMP						
50	WEIGHT-EACH SHELL LB BUNDLE NA		FULL OF WATER				
51	NOTE--(SR) OR (XR) AFTER ANY PART = STRESS RELIEVED OR RADIOGRAPHED						
52	REMARKS-						

ATTACHMENT 1

Calculated Heat Removal Capability

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

Calculated Heat Removal Capability

Service water cooled heat exchanger calculations (using Proto-HX™) use the design heat load (or an assumed heat load greater than the design) and fouling factor, the heat exchanger characteristics (geometry, tube plugging limits, materials, etc.), process side parameters, and temperature of the sea water to determine the required seawater flow rate. The service water system flow calculation (using Proto-flo™) then determines the available flow. Therefore, there is no separate calculated heat removal capability – it's the same as the design heat load. The difference between the required flow and the available flow demonstrates the margin. Additional margin exists in the difference between the actual number of tubes plugged and the plugging allowance and the difference between the actual service water pump performance and the assumed degraded pump in the flow analysis. While these numbers can change over time, they are monitored to ensure that equipment is repaired or replaced before the margin is significantly challenged.

ATTACHMENT 2

Description of Generic Letter 89-13 Testing/Cleaning Program

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

Description of Generic Letter 89-13 Testing/Cleaning Program

Generic Letter (GL) 89-13 Elements

Five elements/items were required by GL 89-13. They are summarized below:

1) Implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. This program includes:

   a. Inspect the intake structure for macrofouling due to organisms, sediment and corrosion. Remove fouling accumulations.

   b. Continuously chlorinate the service water system.

   c. Flush and flow test infrequently used cooling loops and fill stagnant loops with chlorinated water prior to layup.

2) Conduct thermal performance testing of safety related heat exchangers to verify design heat transfer capability.

3) Perform routine inspection and maintenance on piping and components to ensure that corrosion, erosion, protective coating failure, silting and biofouling cannot degrade the performance of safety related systems cooled by service water. This program should include:

   a. Remove excessive accumulations of biofouling agents, corrosion products and silt.

   b. Repair defective coatings and corroded service water system piping and components that could adversely affect a safety related function.

4) Confirm the service water system will perform its intended function per the licensing basis for the plant.

5) Confirm that maintenance practices, operating and emergency procedures and training that involve the service water system are adequate to ensure that safety related equipment cooled by the service water system will function as intended and that operators of this equipment will perform effectively.

DNC Response

Millstone Power Station Unit 2 (MPS2) complies with GL 89-13 as follows. Note that item numbers below correspond to the requirements of GL 89-13 listed above.

Item 1:

a. The intake structure is inspected annually using divers and videotape during the annual intake bay outages in the winter.

b. The service water system is continually chlorinated by injecting hypochlorite through individual pumps to the service water pump suction bells. Automatic hypochlorite isolation is provided on strainer blowdown. Operations is procedurally driven to notify System Engineering if hypochlorite is suspended for more than 24 hours. Regularly scheduled heat exchanger flow (e.g., differential pressure across a flow orifice) versus differential pressure (d/p) surveillances (i.e., difference between the pressure upstream and downstream of the heat exchanger) ensures that system components are not clogged.

c. The service water system at MPS2 has two loops which are continually in service to all safety related heat exchangers, except for the emergency diesel generator (EDG) and vital chiller heat exchangers. Spare heat exchangers are provided in both the reactor building closed cooling water (RBCCW) system and the turbine building closed cooling water system. The spare heat exchangers are maintained in fresh water layup. Layup of heat exchangers require components to be placed in fresh water layup if they are idle for greater than 48 hours. Removing the salt water significantly reduces the possibility of fouling and thus additional chlorination is not needed. Trickle flow is provided to the EDG and vital chiller heat exchangers at times when they are not in service, and not in fresh water layup, to prevent fouling.

Item 2:

Heat exchanger capability at MPS2 is verified through frequent regular maintenance of the heat exchangers in lieu of testing. Heat exchangers are cleaned in accordance with the preventative maintenance program at regular intervals. In addition, periodic flow versus d/p surveillances for each heat exchanger, are performed. Results are trended and adverse trends can lead to increased cleaning frequencies.

Service water-cooled, safety-related heat exchangers were tested per commitments made in Northeast Utilities (NU) letter B15696, dated June 21, 1996 (Reference 1). Thermal performance tests were completed before and after cleaning on the RBCCW heat exchangers, EDG heat exchangers, switchgear coolers, and vital chillers. These tests validated that existing cleaning frequencies for the service water-cooled, safety-related heat exchangers maintain the capability to remove the design heat load under design limiting conditions.

Item 3:

Inspection and maintenance of service water system components includes direct visual examination of accessible piping and heat exchangers, inspection by remote camera of piping, components and heat exchangers (as needed), and cleaning and eddy current testing of heat exchangers. The results of the inspections determine the necessary maintenance on the affected components so that the safety-related function of the service water system is maintained. Safety-related piping is inspected on a one loop per outage frequency. Heat

exchangers are inspected on varying frequencies in accordance with the preventative maintenance program as discussed in Item 2.

Item 4:

The ability of the service water system to perform as licensed has been confirmed and reported in NU letter B14389, dated June 18, 1993 (Reference 2). Frequent regular maintenance of heat exchangers, as well as control over design changes (including analyses and tests to verify the design), ensure the system will continue to perform, as licensed.

Item 5:

Maintenance practices, procedures, and training all have been confirmed to adequately ensure that service water cooled equipment will perform as designed and that operators will operate the equipment effectively to maintain the safety-related function of the system.

The thermal performance tests described above in item 2 were used to determine a rate of change of fouling factor with respect to time to determine the adequacy of the cleaning frequency. There is, therefore, no direct correlation between the tested and the design fouling factors.

References

1) Northeast Utilities Letter B15696 to NRC, "Millstone Nuclear Power Station, Unit No. 2, Service Water System - Generic Letter GL 89-13, Update to the GL 89-13 Response (TAC No 74026)," dated June 21, 1996

2) Northeast Utilities Letter B14389 to NRC, "Millstone Nuclear Power Station, Unit No. 2, Service Water System - Response to Generic Letter 89-13 (TAC No. 74026)," dated June 18, 1993.

ENCLOSURE 3

Service Water System
Piping and Instrumentation Drawing

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

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