VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 19, 2007

10CFR50.92

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Serial No.	07-0364
NL&OS/GDM	R1
Docket Nos.	50-280
	50-281
License Nos.	DPR-32
	DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
PROPOSED LICENSE AMENDMENT REQUEST
CONTAINMENT SUMP INSPECTION SURVEILLANCE
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

In a letter dated October 3, 2006 (Serial No. 06-791), Virginia Electric and Power Company (Dominion) requested amendments, in the form of changes to the Technical Specifications (TS) to Facility Operating License Numbers DPR-32 and DPR-37 for Surry Power Station Units 1 and 2, respectively. The proposed amendment would revise the TS surveillance requirements related to inspection of the containment sump trash racks and screens, Inside Recirculation Spray (RS) pump wells, and Outside RS and Low Head Safety Injection (LHSI) pump suction inlets. The revised TS surveillance requirements are necessary to accommodate inspection of the new RS and LHSI strainer assemblies that are being installed as part of Dominion's resolution of the issues raised in NRC Generic Safety Issue 191 and Generic Letter 2004-02.

In a letter dated May 3, 2007, the NRC staff requested additional information to facilitate their review of the proposed license amendment. Dominion's response to the staff's request is included in the attachment.

As discussed in the attachment, the additional information provided herein does not affect the significant hazards consideration determination or environmental assessment that were previously provided in support of the proposed license amendment request.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,

G. T. Bischof
Vice President – Nuclear Engineering

Attachment

Response to NRC Request for Additional Information, Containment Sump Inspection Surveillance Requirements, License Amendment Request dated October 3, 2006 (Serial No. 06-791)

Commitment made in this letter:

1. An Engineering Transmittal will be prepared to formally document the review of missiles, high energy line breaks (HELB) and the potential effects of pipe whip and jet impingement on the newly designed Surry Units 1 and 2 containment sump strainer assemblies.

cc: U.S. Nuclear Regulatory Commission
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COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Gerald T. Bischof, who is Vice President – Nuclear Engineering, of Virginia Electric and Power Company. 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 19TH day of June, 2007.

My Commission Expires: May 31, 2010.

Vicki L. Hull
Notary Public

(SEAL)

VICKI L. HULL
Notary Public
Commonwealth of Virginia
140542
My Commission Expires May 31, 2010

ATTACHMENT

Response to NRC Request for Additional Information

Containment Sump Inspection Surveillance Requirements
License Amendment Request dated October 3, 2006 (Serial No. 06-791)

Virginia Electric and Power Company
(Dominion)
Surry Power Station Units 1 and 2

Response to NRC Request for Additional Information Containment Sump Inspection Surveillance Requirements

Surry Power Station Units 1 and 2

NRC Comment:

In Attachment 1, "Discussion of Change," Section 5.0, page 5 of 11 to the licensee's letter dated October 3, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML062770208), the licensee stated that the modified sump strainer assemblies for recirculation spray and low head safety injection systems are designed to be mounted in a modular format on the containment floor around the containment sump. Each module contains a number of fins attached to the body of the module, and each module is bolted to the containment floor and connected to each other by flexible metal seals. The following additional information is requested.

1. *Provide a simple sketch of the layout showing the arrangement for the existing and modified containment sump designs. What is the total strainer area of the modified sump strainer design compared with the total area of the existing sump strainer design?*

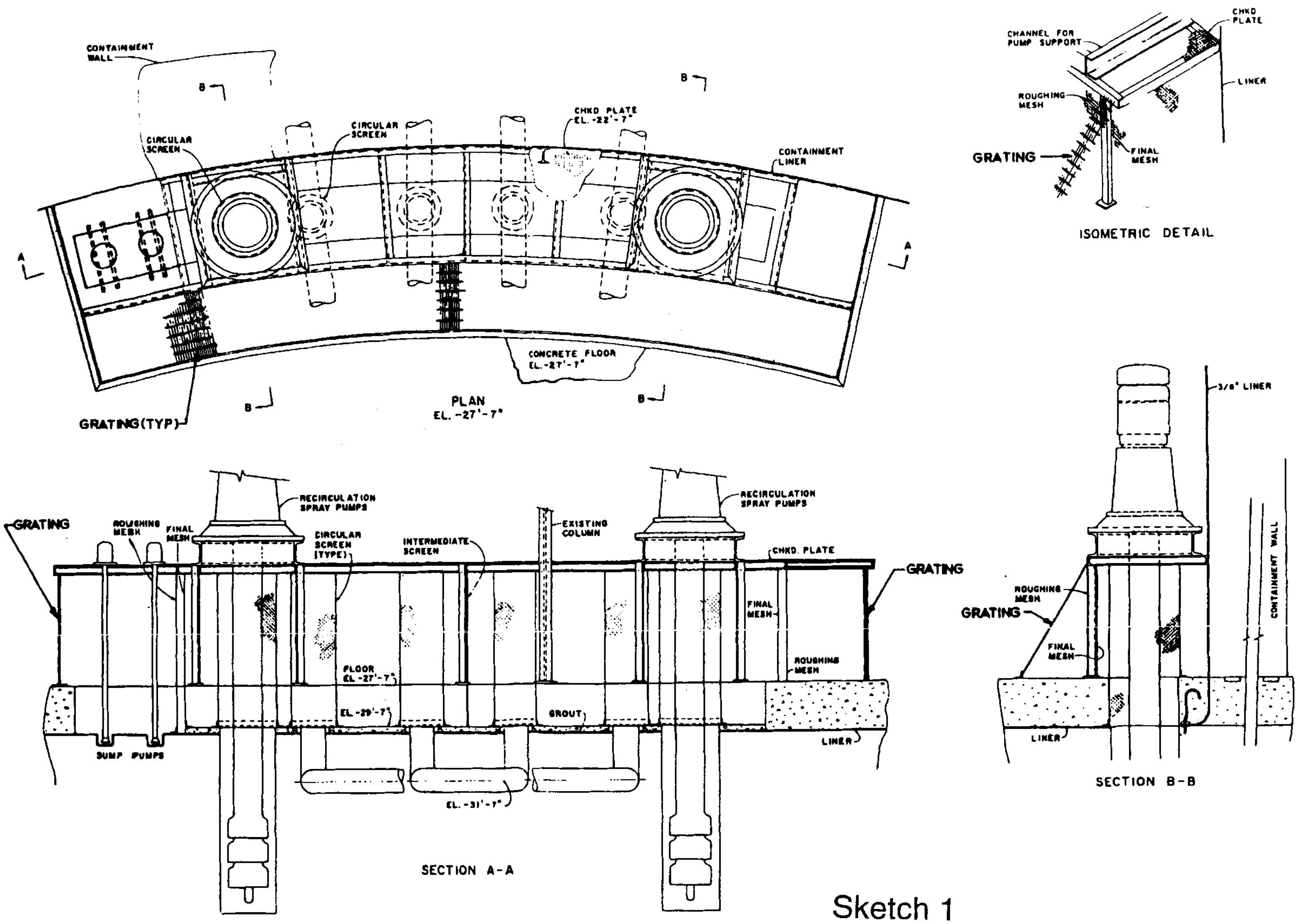
Dominion Response

The configuration of the Surry containment sump strainer is shown in Sketch 1. The sketch reflects the existing Surry Unit 1 strainer arrangement. The Unit 2 strainer configuration (prior to the implementation of the partial strainer replacement modification performed during the fall 2006 refueling outage) was similar to Unit 1. Sketch 2 shows the current configuration of the containment sump strainer pump suction header that was installed in Surry Unit 2 during the fall 2006 refueling outage. Sketch 3 shows one of the four installed modules. Sketch 4 shows the final configuration of the containment sump strainers that will be installed in Surry Units 1 and 2. (Note: Surry Unit 1 shown.)

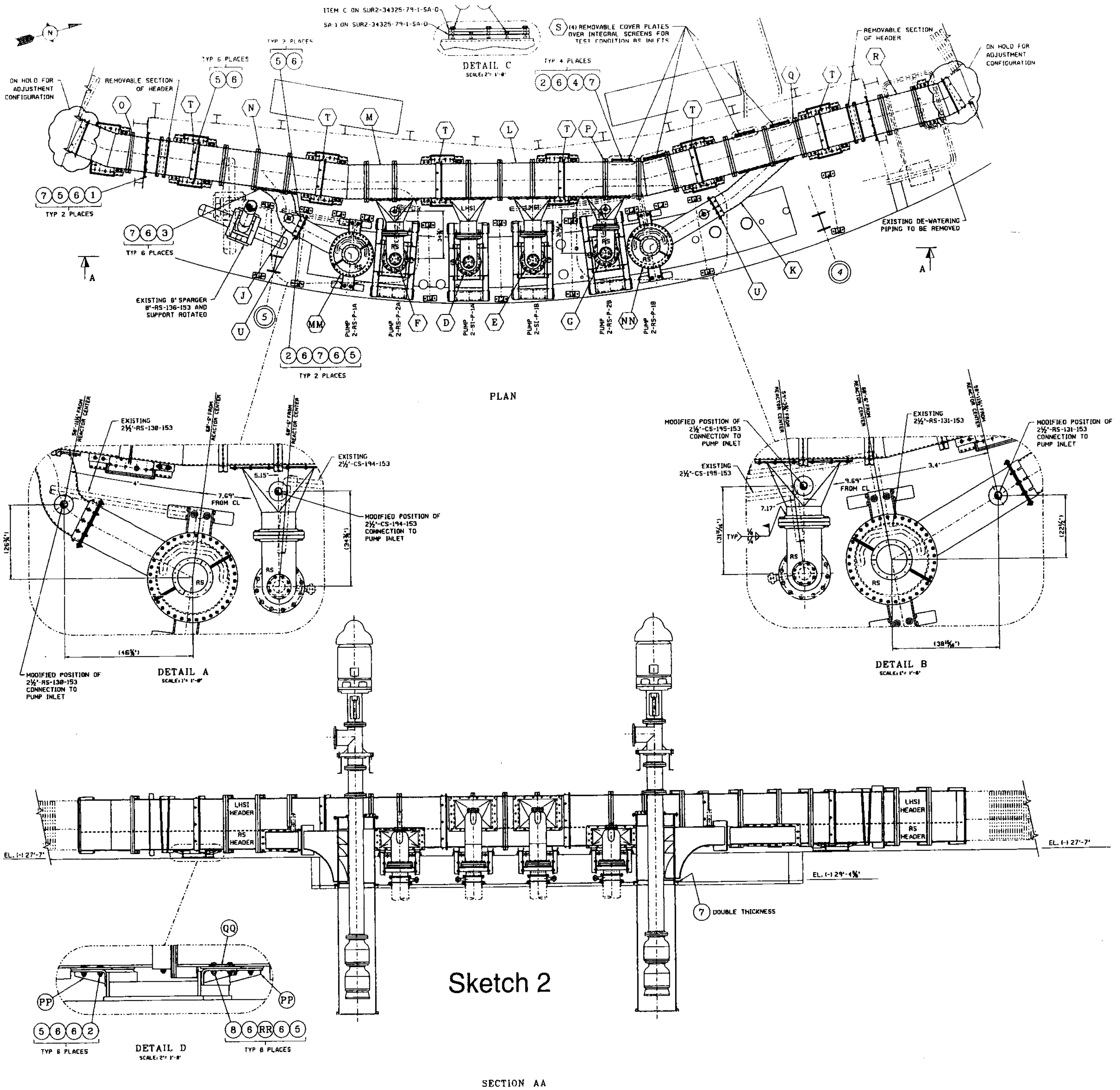
Comparison of Total Strainer Areas

Station	Recirculation Spray		Low Head Safety Injection	
	Pre-mod	Post-mod	Pre-mod	Post-mod
SPS1	162.02 ft.^{2}	6220 ft.^{2}	55.02 ft.^{2}	2180 ft.^{2}
SPS2	162.02 ft.^{2}	6240 ft.^{2}	55.02 ft.^{2}	2230 ft.^{2}

CONTAINMENT SUMP SCREEN (UNIT 1 ONLY)

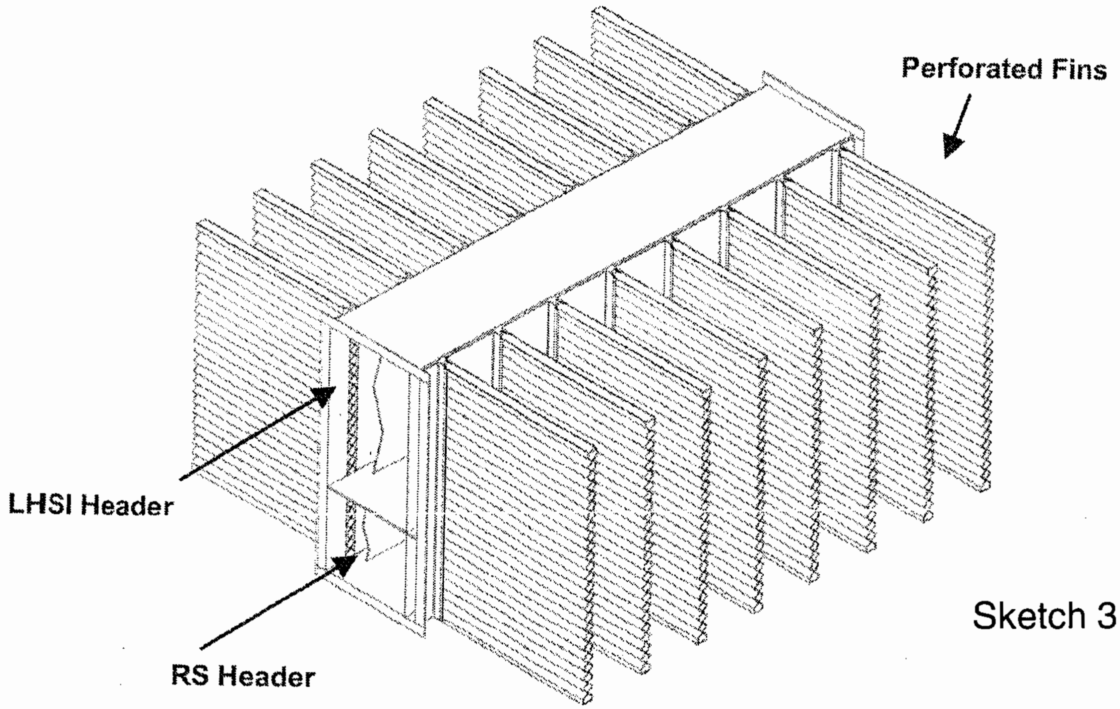


Sketch 1

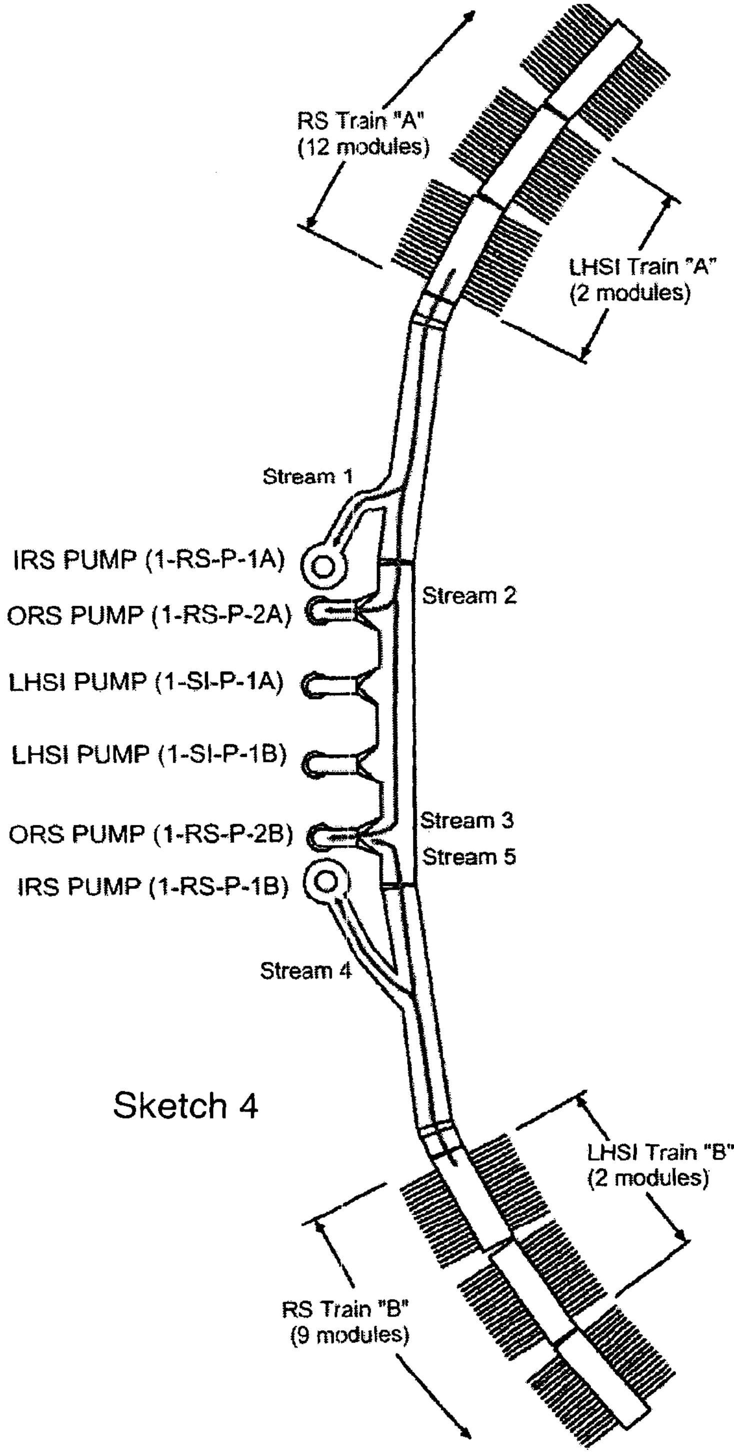


1	½"-13 UNC STUD 2" LG ST. STEEL ASME SA193 GR. B8	C OF C SEE NOTE 2.2		48
2	½"-13 UNC HEX BOLT 1¾" LG ST. STEEL ASME SA193 GR. B8	C OF C SEE NOTE 2.2		92
3	½"-13 UNC HEX BOLT 1¼" LG ST. STEEL ASME SA193 GR. B8	C OF C SEE NOTE 2		104
4	½"-13 UNC C'SUNK BOLT 1¼" LG ST. STEEL ASME SA193 GR. B8	C OF C SEE NOTE 2.2		32
5	½"-13 UNC HEX NUT ST. STEEL ASME SA194 GR. 8	C OF C SEE NOTE 2.2		220
6	½" NORD-LOCK WASHER, NL1/2 SP ST. STEEL TYPE 316	CMTR SEE NOTE 2.2		444
7	⅛" KNITTED ST. STEEL GASKET	CMTR SEE NOTE 2.2	EMI GASKETING SUPPLIED BY INSTRUMENT SPECIALTIES	AS REQ'D
8	½"-13 UNC HEX BOLT 2" LG ST. STEEL ASME SA193 GR. B8X	C OF C SEE NOTE 2.2		64

ITEM	DESCRIPTION	DRAWING No.	QTY
D	INLET PUMP 2-SI-P-1A GENERAL ASS'Y	SUR2-34325-86-1-GA-E	1
E	INLET PUMP 2-SI-P-1B GENERAL ASS'Y	SUR2-34325-86-1-GA-E	1
F	INLET PUMP 2-RS-P-2A GENERAL ASS'Y	SUR2-34325-85-1-GA-E	1
G	INLET PUMP 2-RS-P-2B GENERAL ASS'Y	SUR2-34325-85-1-GA-E	1
J	SUBASSEMBLY 41-2-J	SUR2-34325-84-1-SA-E	1
K	SUBASSEMBLY 41-2-K	SUR2-34325-83-1-SA-E	1
L	SUBASSEMBLY 41-2-L	SUR2-34325-71-1-SA-E	1
M	SUBASSEMBLY 41-2-M	SUR2-34325-73-1-SA-E	1
N	SUBASSEMBLY 41-2-N	SUR2-34325-75-1-SA-E	1
O	SUBASSEMBLY 41-2-O	SUR2-34325-76-1-SA-E	1
P	SUBASSEMBLY 41-2-P	SUR2-34325-72-1-SA-E	1
Q	SUBASSEMBLY 41-2-Q	SUR2-34325-74-1-SA-E	1
R	SUBASSEMBLY 41-2-R	SUR2-34325-77-1-SA-E	1
S	TEST INLET SCREEN (ITEM SA-1) & COVER (ITEM C)	SUR2-34325-79-1-SA-D	4
T	ADJUSTABLE END FLANGE	SUR2-34325-88-1-SA-D	6
U	ADJUSTABLE END FLANGE	SUR2-34325-103-1-DD-D	2
MM	HOUSING GENERAL ASSEMBLY	SUR2-34325-97-1-GA-E	1
NN	HOUSING GENERAL ASSEMBLY	SUR2-34325-97-1-GA-E	1
PP	HEADER SUPPORT PLATE	SUR2-34325-68-1-DD-D (DETAIL B)	14
QQ	WASHER PLATE	SUR2-34325-63-1-DD-D (DETAIL A)	14
RR	EXPANSION BUSHING	SUR2-34325-63-1-DD-D (DETAIL B)	28



Sketch 3



RS Train "A"
(12 modules)
LHSI Train "A"
(2 modules)
Stream 1
IRS PUMP (1-RS-P-1A)
Stream 2
ORS PUMP (1-RS-P-2A)
LHSI PUMP (1-SI-P-1A)
LHSI PUMP (1-SI-P-1B)
Stream 3
ORS PUMP (1-RS-P-2B)
Stream 5
IRS PUMP (1-RS-P-1B)
Stream 4
LHSI Train "B"
(2 modules)
RS Train "B"
(9 modules)

Sketch 4

2. *Discuss the load components (such as dead weight load, debris loads, hydrodynamic mass, thermal, seismic load, loads due to differential pressure or head loss, loads due to any other dynamic effects, etc.) and load combinations that are used in the structural design of the modified modular sump strainer components and the floor-mounted bolted connections.*

Dominion Response

General

The sump replacement strainers have been analyzed, as required, for the specified normal and accident conditions inside containment. Stresses and stability were determined to be in accordance with the 1989 Edition of the ASME NF Code for Class 3 Component Supports.

Dead Weight Loads

Dead weight load due to debris on the strainer was determined by calculating the maximum quantity of debris that would be transported to the strainer by the most limiting break. In addition to the analysis, Atomic Energy of Canada Ltd. performed hydraulic testing which simulated the actual debris loading conditions specific to Surry Power Station. The analysis and testing demonstrate that the full strainer installation design ensures that the strainers are capable of withstanding the force of full debris loading in conjunction with design basis conditions, including seismic activity.

Debris Load

The strainers were designed to ensure that they are capable of withstanding the force of full debris loading, in conjunction with design basis conditions. The effect of the debris load is reflected in the dead weight and suction pressure terms of the analysis. A sacrificial area of 150 $ft.^2$ has been considered to include foreign materials such as labels, stickers, signs, tags, tape, tie wrap and miscellaneous materials. These foreign materials are considered to fully transport to the sump strainer. The strainers are capable of withstanding the force of full debris loading in conjunction with design basis conditions, including seismic activity.

Hydrodynamic Mass

Hydrodynamic forces are considered in the seismic analysis of the strainer. Specifically, the dynamic effects of surrounding water on the submerged strainer structure during an earthquake, i.e., added water mass, inertia coupling, impulse, sloshing, wave actions, damping and participation of added water mass in the forcing term were considered. The benefit of increased damping was not credited in the present analysis. For additional conservatism, full participation of added water mass in the forcing term was assumed.

Thermal Loads

Thermal loads are considered in the seismic analysis. To allow for relative thermal expansion between the strainer modules and the reactor building, adjacent modules are installed with a gap between them, which is sealed with a flexible metallic seal. Engineered slots are provided to accommodate thermal expansion. Thermal expansion of the header between slots under maximum Reactor Building air temperature following a Loss of Coolant Accident (LOCA) is 0.2". Furthermore, there is an installation requirement that at least ¼" is to be left in the slot to accommodate thermal expansion. As a result, thermal stress due to constraint did not need to be considered.

Seismic Loads

The strainer design specification states that the strainer is designed to withstand the effects of five (5) Operating Basis Earthquake (OBE) events and one (1) Design Basis Earthquake (DBE) event in accordance with the requirements of IEEE Std. 344-1975 as endorsed by NRC RG 1.100, Revision 1, or IEEE Std. 344-1987 as endorsed by RG 1.100, Revision 2. Static or dynamic analysis and/or seismic testing was required to ensure the strainers meet these requirements. The strainer purchase specification included the amplified response spectra used in the seismic analysis, which are the DBE and OBE seismic response spectra for all three directions at 2% damping.

The seismic analysis report for the replacement sump strainers stated that the strainers have been analyzed, as required, for the specified normal and accident conditions inside containment, and the strainer stresses and stability were determined to meet the 1989 Edition of the ASME NF Code for Class 3 Component Supports.

Differential Pressure Loads

A calculation was performed to determine the structural differential pressure for the containment sump strainers and concluded that 9.0 psi was to be used for the strainer design differential pressure.

Head Loss Loads

The seismic analysis uses different terminology for the maximum head loss loads. The analysis uses suction pressure, instead. The effects on stress due to suction pressure are presented in the seismic analysis by finite element analysis models of the strainer components. The strainer components were determined to be within their allowable stress limits.

Other Dynamic Effects

The assessment of bleed line piping loads is also included in the strainer seismic analysis. The bleed line piping loads were applied in one separate load case and their effects on the strainer header were determined to be small. Dominion calculations reflect the modified design and configuration of the bleed line piping.

Load Combinations

The loading combinations from the seismic analysis and are:

Service Limits	Load Cases	Loading Combination	Category	Sump Condition	Comment
Level A	LC-1	DW+LL	Normal	Dry	Material Properties at T1
Level B	LC-2	DW+OBE	Upset	Dry	Material Properties at T1
Level C	LC-3	DW+SP+SSE+Hydrodynamics	Accident	Wet Submerged	Material Properties at T2

Notations used in Table 1-2:
DW = Deadweight
LL = Live Load = 60 psf from cover platform
OBE = Operating Basis Earthquake
SP = Differential suction Pressure = 9 psi
SSE = Safe Shutdown Earthquake
Hydrodynamics = Forces from water acting on the strainer during an earthquake
T1 = Maximum air temperature under normal condition = 125°F
T2 = Maximum sump water temperature under accident condition = 280°F

3. *In reference to the calculation for the evaluation to establish the structural adequacy of the modified sump strainer assemblies, provide a summary of the structural adequacy evaluation of the modified sump strainer highlighting the design margins. Also, identify the design codes that were utilized in the structural design.*

Dominion Response

Structural Evaluation Summary

The design conditions for the strainer modules, as defined in the strainer procurement specification, include the live load, suction pressure (maximum head loss for the screen), thermal loading, and seismic events (OBE and DBE).

The specific condition considered is a DBE during which a Safe Shutdown Earthquake (SSE) occurs while the strainer is in a submerged condition after a LOCA. The ability of the strainers to perform their safety functions during and/or after 5 OBE (Operating Basis Earthquake) and one SSE has been demonstrated in the seismic analysis report for Surry Unit 2 which concludes that:

- The stress levels meet the 1989 Edition of ASME Section III, Subsection NF for Class 3 Component Supports, and

- Deflection of the strainers during a DBE and LOCA will not open up additional leakage paths.

The seismic analysis report for the Surry Unit 1 strainer is currently undergoing technical review; however, the results are expected to be similar to the Surry Unit 2 analysis results.

Design Margins

Hundreds of stresses were calculated in the strainer seismic analysis report. By comparing the calculated stresses to the allowable stresses, the margin for each strainer component was determined. Most components were determined to have significant margin, and every analyzed strainer component was determined to be within its allowable stress limits.

Codes

The design codes used in the structural design of the strainer include the following:

- ASME III subsection NF Class 3,
- AWS D1.1, 2004, American Welding Society Structural Welding Code-Steel,
- AWS D1.6, 1999, American Welding Society Structural Welding Code- Stainless Steel,
- ASME Boiler and Pressure Vessel Code, Section III, 1971 through 1980,
- ASME NQA-1-1994 edition, "Quality Assurance Requirements for Nuclear Facility Applications," and
- The cover plate design shall be based on the AISC, Manual of Steel Construction, 7th Edition.

NRC Comment:

Regarding item No. 6 of the licensee's letter dated March 28, 2007 (ADAMS Accession No. ML070871222), clarify whether the drawing reviews and evaluations performed to determine the absence of any missiles, high energy lines and associated dynamic effects due to pipe whip and jet impingement on the modified strainer assemblies are documented in calculations or reports. Provide references by citing the specific document and a summary of these evaluations.

Dominion Response

The reviews and evaluations performed to determine the absence of any missiles, high energy lines and associated dynamic effects due to pipe whip and jet impingement on the modified strainer have not been specifically documented at this time other than the general conclusions that were included in the design change package that was prepared to partially install the Surry Unit 2 strainer during the fall 2006 refueling outage, and as provided in our previous letter dated March 28, 2007 (Serial No. 06-0117). Consequently, an Engineering Transmittal will be prepared to formally document the review of missiles, high energy line breaks (HELB) and the potential effects of pipe whip and jet impingement on the newly designed Surry Units 1 and 2 containment sump strainer assemblies. Once completed, this document will be maintained in station records and will be available for future NRC audit.