Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

April 29, 2011

10 CFR 50.4(b)
10 CFR 50.34(b)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: **Watts Bar Nuclear Plant (WBN) Unit 2 – Response to Requests for Additional Information (RAIs) Regarding Generic Letter 2004-02, Potential Impact of Debris Blockage of Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC No. MD6726)**

References:
1. NRC to TVA letter dated April 19, 2011, "Watts Bar Nuclear Plant, Unit 2 - Request for Additional Information Regarding Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC No. MD6726)"
2. NRC to TVA letter dated April 25, 2011, "Watts Bar Nuclear Plant, Unit 2 - Request for Additional Information Regarding Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors Round 2 (TAC No. MD6726)"

NRC's letters to TVA dated April 19, 2011 (Reference 1) and April 25, 2011 (Reference 2) contained several RAIs related to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The RAIs and the responses to Reference 1 and Reference 2 questions are provided in Enclosures 1 and 2, respectively.

There are no new commitments made in this letter. If you have any questions, please contact Bill Crouch at (423) 365-2004.

A116
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 29th day of April, 2011.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosures:

1. Response to RAIs Related to April 19, 2011 Letter
2. Response to RAIs Related to April 25, 2011 Letter

Attachment:

1. TVA Specification, SQN-WBN-DS-2005-063-001, Rev. 2, "Advanced Design Containment Building Sump Strainers for Sequoyah Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Units 1 and 2"

cc (Enclosures):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

ENCLOSURE 1

Response to RAIs Related to NRC's April 19, 2011 Letter

Tennessee Valley Authority - Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

Requests for Additional Information (RAI)

EMCB RAI 1

In response to Item 3.k.1 of the Watts Bar Nuclear Plant (WBN), Unit 2, supplemental Generic Letter (GL) 2004-02 response (Reference 1), four out of the six load combinations for which the strainers were structurally qualified include loads due to either an operating basis earthquake (OBE) or a safe shutdown earthquake (SSE). However, no information was provided regarding the structural damping values used in the seismic analyses of the strainers, including their individual components, as part of the structural qualification of these components. Please provide the OBE and SSE damping values used for the strainer structures in the aforementioned analysis.

TVA Response

The WBN Unit 2 OBE and SSE damping values used in the sump strainer were 2% and 3%, respectively, per the TVA Advanced Design Containment Building Sump Strainer Design Specification, SQN-WBN-DS-2005-063-001, Rev. 2. Refer to Attachment 1 for excerpts from this specification which provide the WBN Unit 2 seismic spectra. These response spectra are similar to spectra used for analysis of the WBN Unit 1 strainer assemblies. The slight difference is due to steam generator replacement for Unit 1 which added mass to the reactor building.

These damping values are the same as used for Category I Equipment Seismic/Structural Qualification (ESQ).

EMCB RAI 2

Note 3 accompanying the loading combinations in Reference 1, which were considered in the structural analyses of the WBN Unit 2 sump strainers, indicates that loads due to jet impingement and debris impact were not considered in the final strainer design. The response to Item 3.k.3 of the WBN Unit 2 supplemental GL 2004-02 response clearly articulates that loads due to jet impingement are not credible, due to the location of the sump strainers. However, there is little justification for neglecting the postulated loads due to debris impact. Please provide additional justification and/or explanation regarding the conclusion of debris impact loads from the applicable loading combinations considered in response to Item 3.k.1.

TVA Response

Debris impact loads were included in Load Combination 6, but determined to be negligible based on the location of the WBN Unit 2 strainer assembly relative to postulated pipe breaks inside containment. This is the same reasoning as used for jet impingement loads, as stated in the response to Item 3.k.3.

Note that Load Combination 6 conservatively combines Safe Shutdown Earthquake (SSE) with applicable debris impact and jet impingement loads from postulated pipe breaks at the location of the component (i.e., the strainer assembly). The load combinations and allowable stresses used for strainer assembly structural analysis are consistent with WBN design criteria WB-DC-20-21 for miscellaneous steel components.

EMCB RAI 3

Note 6 accompanying the aforementioned loading combinations considered in the structural analyses of the WBN Unit 2 sump strainers, indicates that loads due to hydrostatic or hydrodynamic effects were not considered in the final strainer design. There is no accompanying justification for the exclusion of the effects of these loads in the sump strainer structural analyses. Please provide additional justification regarding the exclusion of hydrostatic and hydrodynamic loads. This justification should include, but not be limited to, whether submergence, sump strainer construction, or the bounding of these effects by other loads account for the absence of hydrostatic and hydrodynamic loads in the current structural analysis.

TVA Response

Contrary to the above NRC question, Note 6 does not say that hydrostatic or hydrodynamic loads are excluded from the design. Instead, Note 6 states that these loads are not considered in combination with seismic Operating Basis Earthquake (OBE) or SSE loads. The WBN Unit 2 containment sump design basis does not require consideration of a seismic event during recovery from a design basis LOCA. As the containment sump strainers will only be subjected to accident hydrostatic or hydrodynamic loading during the recovery from a design basis event, application of hydrostatic or hydrodynamic loads to load combinations which include seismic loads is beyond the current design and licensing basis of the plants.

Hydrostatic loads are included in the differential pressure (DP) load as discussed in response to Item 3.k.1. The strainers are designed for a strainer maximum submergence of 14.42 ft above floor elevation at the top of the sump pit. These static loads to the strainer assembly and plenum were considered in determining the DP load. The DP load acts during accident conditions when the strainers are covered with debris. This is conservatively based on the maximum allowable hydrostatic pressure drop across the debris covered strainers of 3.5 feet of water.

ENCLOSURE 2

Response to RAIs Related to NRC's April 25, 2011 Letter

Tennessee Valley Authority - Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

Debris Generation (DG)

DG RAI-1

According to the Break Selection Evaluation, mineral wool is installed in limited locations, but was stated to not be within any loss-of-coolant accident (LOCA) zone of influence (ZOI). No ZOI size was provided for the mineral wool material. The basis for excluding the mineral wool as potential debris was not provided. Provide information to justify that the mineral wool cannot become transportable debris. Alternately, provide information to justify that the design basis debris load bounds any alternate debris load that includes the mineral wool.

TVA Response

As stated in the response to Item 3.a.2, some mineral wool insulation is used inside containment but it is not in locations within the ZOI for any LOCA. A small quantity of mineral wool (1.57 ft3) is used where the under vessel in-core instrument tubes penetrate the crane wall. Mineral wool is also used inside the guard pipes on the main feedwater lines outside of the crane wall where the lines penetrate the steel primary containment. Upon blowdown, if this material were to fail, the mineral wool in the under vessel in-core instrument tube crane wall penetrations would be blown to the area outside the crane wall, which has no communication with the emergency sump inside the crane wall. Mineral wool inside the guard pipes on the main feedwater lines outside of the crane wall would remain outside the crane wall. Therefore, mineral wool is not considered transportable debris.

Head Loss and Vortexing (HLV)

HLV RAI-1

The design basis assumes 750 ft^2 sacrificial strainer area for miscellaneous debris (Section 3.b of submittal), During testing, the NRC staff understood that scaling included a 200 ft^2 sacrificial area, as documented in the staff's trip report (ML102160226). Please reconcile this discrepancy.

TVA Response

An initial conservative allowance of 1,000 ft^2 of total surface area was used for signs, placards, tags, tape, etc., inside the containment. The initial assumption was used in the design of the strainers. The entire quantity of signs, placards, tags, tape and similar miscellaneous materials was conservatively assumed in the analysis to be transported to the sump intake. Based on Section 3.5.2.2.2 of the NRC SER for NEI-04-07, a 75 percent packing ratio was applied to this debris. Thus, 750 ft^2 represents the strainer area assumed to be blocked by signs, placards, tags, tape, and similar miscellaneous materials in containment in response to Item 3.b.5. Based on containment walkdown results documented in WAT-D-11530 for Unit 1, a conservative estimate of the actual total surface area of all signs, placards, tags, tape and similar miscellaneous materials in containment was established as 697 ft^2; thereby confirming the adequacy of the original design allowance. The allowance will be the same for Unit 2. It was later determined that this type of debris does not get transported to the sump screens due to the geometry of the containment and thus the final test did not include these types of debris.

The WBN Unit 2 strainer surface area is about 4,600 ft^2. For the purpose of test scaling, the total surface area was assumed to be only 4,400 ft^2 in order to add 200 ft^2 of margin to the

strainer flow test results. The AREVA Debris Allocation Table for the WBN Unit 1 strainer performance test erroneously stated that this 200 ft^2 area was removed for tags and labels. This 200 ft^2 does not represent a direct correlation to signs, placards, tags and tape, but as described above, was an assumed clean strainer area reduction to provide margin. Results from AREVA strainer prototype testing confirmed that tag and label debris does not readily transport to the sump strainer assemblies and thus, tags and label debris were not included in the testing.

HLV RAI-2

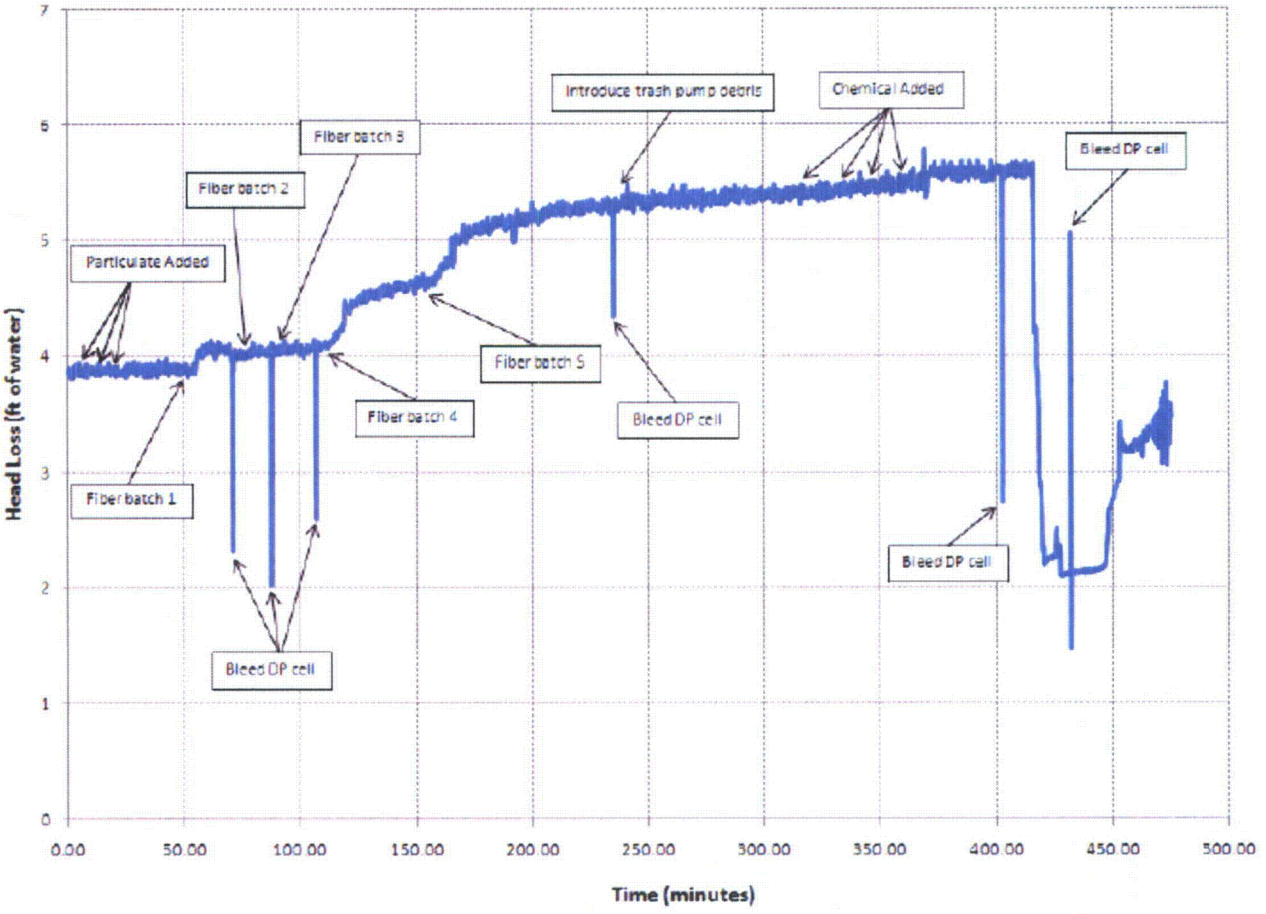
The application did not include a plot of the test strainer head loss as a function of time for the design basis test, annotated with significant events during the test, as described in the revised content guide for GL 2004-02 supplemental responses (ADAMS Accession No. ML07311 0278). The NRC staff reviews the plot to validate extrapolation of test results to the mission time, and to ensure that pressure-driven bed discontinuities did not affect the debris head loss (such that temperature scaling may be inappropriate). Provide an annotated plot of the design basis test.

TVA Response

The third Thin Bed Test was performed on July 16, 2010. This thin bed test represents the design basis test for WBN Unit 2 debris loaded head loss.

Figure 6-6 below from AREVA document number 66-9144025-000, Watts Bar Unit 1 Emergency Core Cooling System Strainer Performance Test Report, presents a plot of the head loss data versus time for the duration of Test 4C.

Figure 6-6: Test 4C Head Loss vs. Time



HLV RAI-3

Provide the methodology used for extrapolation of head loss values to the 30-day mission time, including any statistical methodology employed.

TVA Response

Figure 6-5 below from AREVA document number 66-9144025-000, Watts Bar Unit 1 Emergency Core Cooling System Strainer Performance Test Report, presents a plot of the extrapolated head loss data versus time for the duration of Test 4C. As can be seen, the head loss after 15 flume turnovers is constant and therefore is bounding for the 30 day mission time.

Figure 6-5: Test 4C Head Loss Data

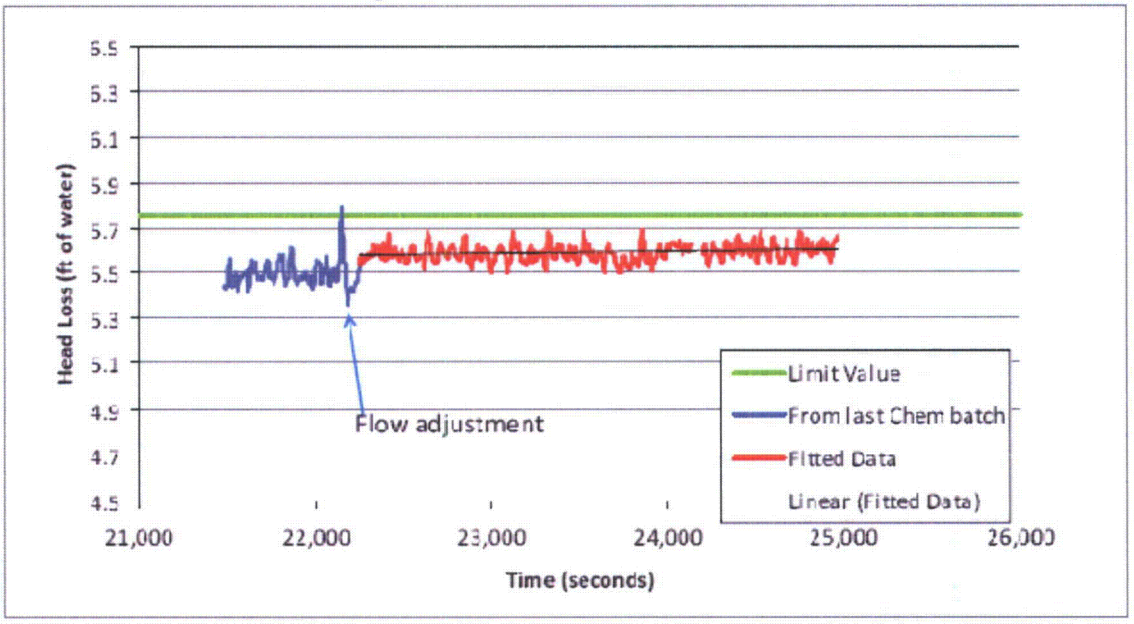


Table 6-7 below from AREVA document number 66-9144025-000, Watts Bar Unit 1 Emergency Core Cooling System Strainer Performance Test Report, presents the data used to calculate the upper limit head loss for Test 4C. The upper limit with maximum deviation determined below bounds the 30 day mission time.

Table 6-7: Upper Limit Head Loss

Averaging Time (minutes)[1]	Average Head Loss (ft. of water)	Standard Deviation (ft)	Upper Limit for 95% Confidence (ft)	Upper Limit with Maximum Deviation (ft)
45.2	5.59	0.038	5.66	5.76

[1]Note 45.2 minutes is the time duration for the last 15 flume turnovers.

Table 6-8 below presents the clean strainer and thin bed temperature corrected head losses.

Table 6-8: Temperature Corrected Head Losses

	Test Temperature (°F)	Test Temperature Dynamic Viscosity (lb s/ft^2)	Reference Temperature (°F)	Reference Temperature Dynamic Viscosity (lb s/ft^2)	Head Loss (ft of water)	Temperature Corrected Head Loss (ft of water)
Clean Strainer Average	120.0	1.164×10^{-5}	190.0	6.775×10^{-6}	3.88	2.26
Thin Bed Upper Limit	120.0	1.164×10^{-5}	190.0	6.775×10^{-6}	5.76	3.35

Note: The clean strainer average head loss is the average head loss before debris was introduced during Test 4C.

Using the clean strainer and thin bed upper limit head losses from Table 6-8, the thin bed upper limit debris loaded head loss is:

5.76 (ft of water) – 3.88 (ft of water) = 1.88 (ft of water)

The temperature corrected thin bed upper limit debris loaded head loss is:

3.35 (ft of water) – 2.26 (ft of water) = 1.09 (ft of water)

Net Positive Suction Head (NPSH)

NPSH RAI-1

It is unclear how the margins reported for residual heat removal switchover time and containment spray system (CSS) switchover time are consistent with the strainer submergence values reported in section 3.f.2 of the Watts Bar 2 submittal. For the limiting case of small-break LOCA (SBLOCA), the minimum sump level is stated to increase from 5.78 ft to 6.91 ft from the time of emergency core cooling system recirculation to the time of CSS recirculation. This would contribute to a net positive suction head (NPSH) margin of 1.1 ft. The NPSH section of the submittal states that NSPH margin increases by about 3.7 ft when comparing similar conditions. The change in submergence for a large-break LOCA reported in section 3.f.2 (3.4 ft) is closer to this value. There may be a discrepancy in the reported minimum sump level at CSS recirculation for the SBLOCA case. Clarify the water levels and discuss how the NPSH margins reported in section 3.g.16 were calculated. Clarify the water levels and and discuss how the NPSH margins reported in section 3.g.16 were calculated.

TVA Response

The value for minimum sump level for the SBLOCA case reported in response 3.f.2 is incorrect. The 3.f.2 response erroneously stated the sump level at the time of entering containment spray system (CSS) recirculation mode is 6.91 feet. The correct value is 9.39 ft which is the result of a 3.61 ft increase in sump water level. This 3.61 ft increase corresponds to the 3.7 ft NPSH margin increase seen in the 3.g.16 response as described below. Note 2 in the original 3.f.2 response states, "SBLOCA results are for the 120 gpm SBLOCA case. 2000 gpm SBLOCA was also examined in sump water inventory calculations for NPSH." The minimum sump level of 6.91 ft is actually the sump level at the time of emergency core cooling system (ECCS) recirculation for the 2000 gpm SBLOCA. The corrected values, including the values for the 2000 gpm SBLOCA case and the large break LOCA case from the latest revision of the analysis for minimum sump level, are shown below:

Containment Sump Strainer Minimum Submergence			
Conditions	**Minimum Sump Level**	**Strainer Assembly Height**	**Minimum Submergence**
Large Break LOCA			
ECCS Recirculation	8.5 ft	Short: 4.81 ft	3.69 ft
	8.5 ft	Tall: 5.52 ft	2.98 ft
CSS Recirculation	11.85 ft	Short: 4.81 ft	7.04 ft
	11.85 ft	Tall: 5.52 ft	6.33 ft
Small Break LOCA (2000 gpm)			
ECCS Recirculation	6.91 ft	Short: 4.81 ft	2.1 ft
	6.91 ft	Tall: 5.52 ft	1.39 ft
CSS Recirculation	12.07 ft	Short: 4.81 ft	7.26 ft
	12.07 ft	Tall: 5.52 ft	6.55 ft
Small Break LOCA (120 gpm)			
ECCS Recirculation	5.78 ft	Short: 4.81 ft	0.97 ft
	5.78 ft	Tall: 5.52 ft	0.26 ft
CSS Recirculation	9.39 ft	Short: 4.81 ft	4.58 ft
	9.39 ft	Tall: 5.52 ft	3.87 ft

The available NPSH is calculated using standard equations with the NPSH margin being the mathematical difference between the available NPSH and the required NPSH. The sump level is an input to the MULTIFLOW model. The model is based on a maximum sump temperature of 190°F. Thus, a 3.61 ft change at 60°F and 1 atmosphere converts to 3.73 ft at 190°F, which rounds to 3.7 ft of NPSH margin.

NPSH RAI-2

For SBLOCAs, Enclosure 3 indicates that the minimum water level calculation assumes the reactor coolant system (RCS) will contribute inventory to the reactor cavity. The applicant calculates RCS shrinkage, due to cooling of the primary inventory, and subtracts this value to reduce the amount of water that reaches the containment sump. It is not clear to the staff that the calculations account for the inventory required to refill the RCS, such that the stated amounts provide for conservative estimates of minimum sump level. The NRC staff's position is that the applicant should account for the potential for the RCS to become completely filled with water at it's ultimate equilibrium temperature. The staff understands that the levels may have been calculated correctly and that ice melt will contribute inventory at a rate required to account for RCS refill and cooldown. Provide information to demonstrate that the minimum sump level has determined properly considering the above discussion.

TVA Response

Considering only the water inventory that spills from the RCS into the reactor cavity does not result in a level that will cause reactor cavity overflow to the sump for all SBLOCA minimum sump level determinations. The Reactor Cavity inventory is 128,000 gallons. The diversion of sump inventory from ECCS to maintain the Reactor Vessel filled was determined for a 4 inch SBLOCA of 2,000 gpm based upon the WBN Unit 1 SBLOCA Accident Analysis Parameter Checklist. As WBN Unit 1 RCS inventory is greater than WBN Unit 2, this is considered a conservative assumption. Initial RCS specific volume is based upon 2,235 psig and 586.2˚F. The cooldown is postulated to occur until RCS achieves 600 psia, the accumulator injection setpoint, as accumulator injection is not credited as a sump or RCS makeup source. The RCS remains at the equilibrium RCS hot and cold leg temperatures of 489˚F and 260˚F for an average RCS temperature of 374.5˚F. This temperature and pressure were used to determine the RCS specific volume and shrinkage at ECCS and CSS recirculation initiation. The ECCS makeup due to RCS shrinkage for ECCS and CSS recirculation were the same since no further RCS shrinkage occurs to permit accumulator injection after ECCS recirculation initiation.

The diversion of ECCS sump inventory for a 2 inch SBLOCA of 120 gpm assumes the initial RCS specific volume is based upon 2235 psig and 586.2˚F. The diversion of sump inventory from ECCS to maintain the Reactor Vessel filled was determined for a 2 inch SBLOCA of 120 gpm based upon WCAP-11145, Westinghouse Small Break LOCA ECCS Model Generic Study with NOTRUMP Code. RCS cooldown does not achieve equilibrium at the time of ECCS recirculation initiation. The RCS hot and cold leg temperatures at initiation of ECCS recirculation were 561.0°F and 474.7°F for an average RCS temperature of 517.8°F. The RCS pressure at initiation of ECCS recirculation was 1,167 psia.

The long-term cooldown is postulated to occur until RCS achieves 610 psig, the accumulator injection setpoint, as accumulator injection is not credited as a sump or RCS makeup source. The long-term equilibrium RCS hot and cold leg temperatures were 509.4°F and 362.2°F for an average RCS temperature of 435.8°F. This temperature and pressure were used to determine the RCS specific volume and shrinkage at CSS recirculation initiation.

Attachment 1

TVA Specification, SQN-WBN-DS-2005-063-001, Rev. 2, "Advanced Design Containment Building Sump Strainers for Sequoyah Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Units 1 and 2"

T03 _ 080429 001

TENNESSEE VALLEY AUTHORITY

SPECIFICATION NO.
SQN/WBN-DS-2005-063-001, Revision 02

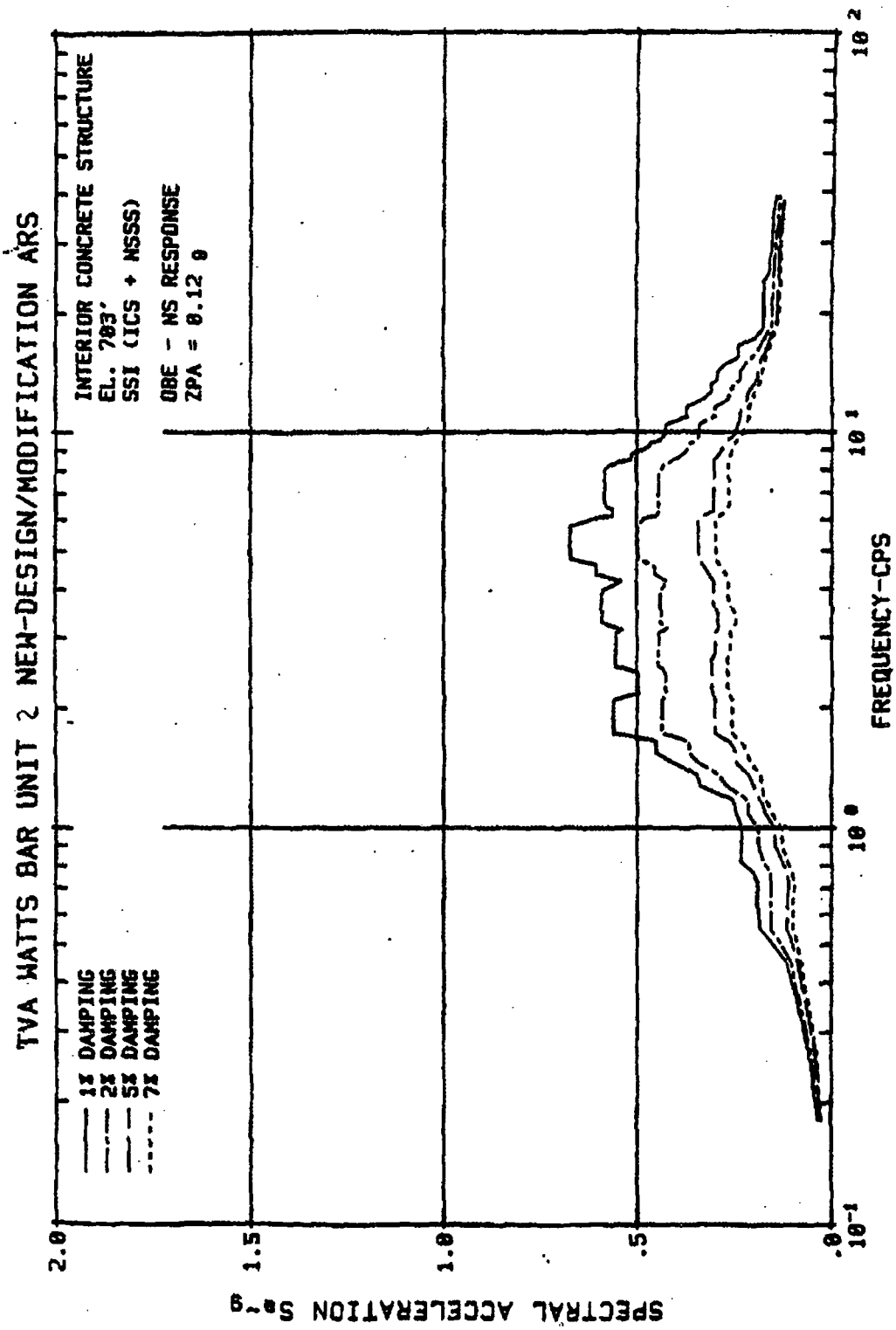
FOR

ADVANCED DESIGN CONTAINMENT BUILDING SUMP STRAINERS

FOR

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2
AND
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2

Prepared	Date	Reviewed	Date	Approved	Date
Jeffery S Thompson	4/23/08	[signature]	4/24/08	William [signature]	4/24/08



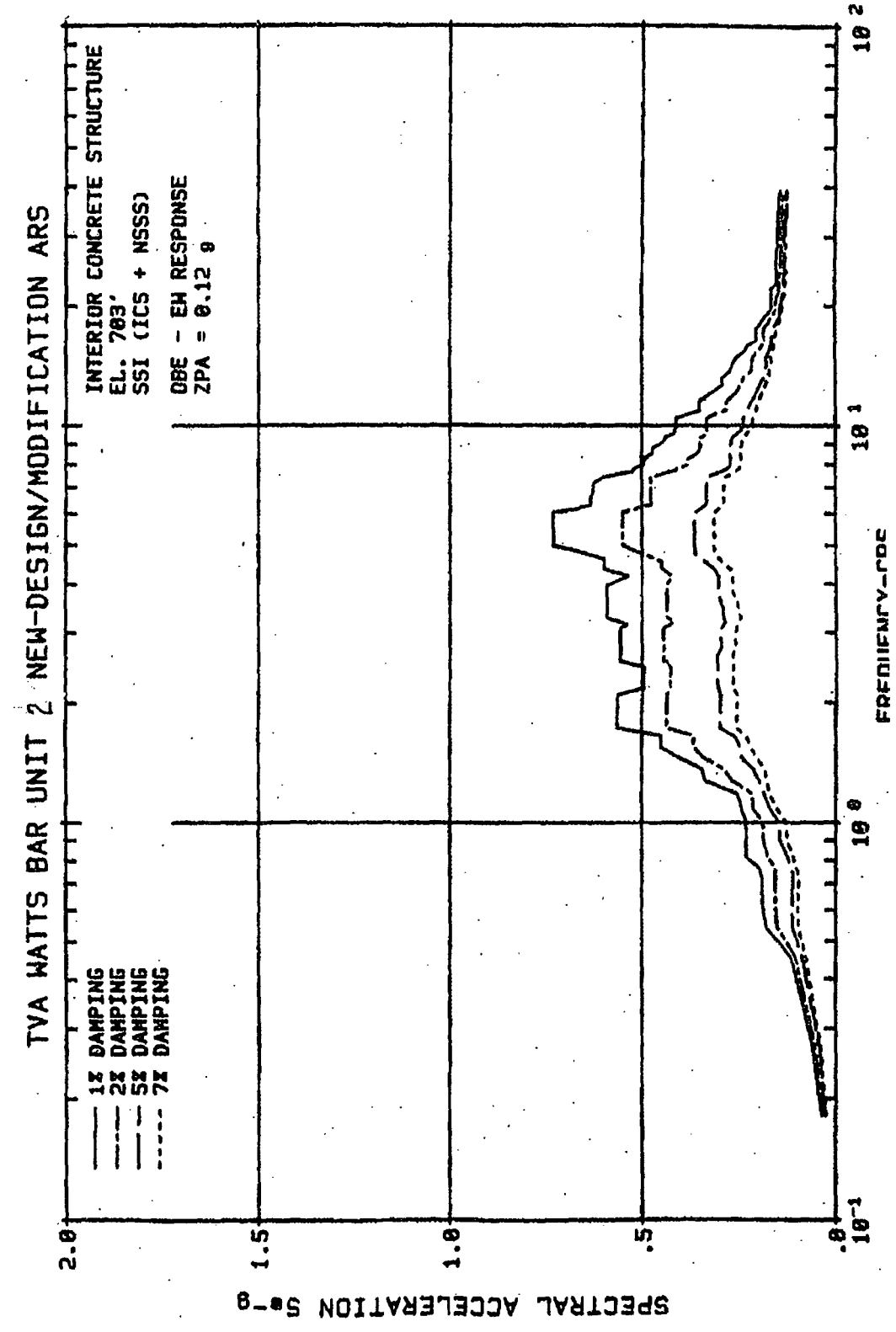
Appendix D- Figure 13

Appendix D- Figure 13

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
OBE - N-S - ELEVATION 703
FIXED DAMPING RATIO 0.02

Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)
.18180	.03150	1.27270	.26620	3.30000	.43920	6.59090	.44400	11.00000	.29590	17.82000	.16080
.22000	.04150	1.30440	.27400	3.30430	.43920	6.87500	.44400	11.30440	.29590	18.18180	.15490
.23000	.04360	1.32000	.27780	3.33500	.43920	6.90000	.44400	11.36360	.29590	18.26090	.15410
.26090	.05020	1.36360	.28820	3.45000	.43920	6.95650	.44400	11.50000	.29590	18.40000	.15250
.27270	.05270	1.38000	.29780	3.45450	.43920	7.04540	.44400	11.55000	.29590	18.63000	.15000
.33000	.07150	1.39130	.30450	3.46500	.43920	7.15000	.44400	11.73910	.28420	18.70000	.14930
.34500	.07580	1.43000	.32730	3.47830	.43920	7.18750	.44400	11.81820	.27930	19.09090	.14930
.34780	.07660	1.45450	.34130	3.62250	.43920	7.27270	.44400	12.07500	.26370	19.13040	.14930
.36360	.08110	1.47830	.34760	3.63000	.43920	7.70000	.44400	12.10000	.26220	19.55000	.14930
.43480	.09850	1.49500	.35210	3.63640	.43920	7.72730	.44360	12.17390	.26160	19.80000	.14930
.44000	.09980	1.54000	.36420	3.65220	.43920	7.76250	.44300	12.27270	.26090	20.00000	.14930
.45460	.10300	1.54550	.36560	3.79500	.43920	7.81000	.44220	12.60870	.25840	20.70000	.14930
.46000	.10590	1.56520	.36560	3.81820	.43920	7.82610	.44190	12.65000	.25800	21.23000	.14930
.52170	.13860	1.61000	.36560	3.96000	.43920	7.97500	.43850	12.72730	.25630	21.73910	.14840
.54550	.15110	1.63640	.36560	3.96750	.43860	8.05000	.43620	13.04350	.24920	22.00000	.14800
.55000	.15130	1.65000	.36560	4.00000	.43590	8.13050	.43370	13.18180	.24610	22.19500	.14800
.57500	.15220	1.65220	.36760	4.14000	.42470	8.18180	.43210	13.20000	.24570	22.72730	.14800
.60870	.15340	1.72500	.43340	4.17390	.42200	8.25000	.42990	13.22500	.24480	23.00000	.14800
.63640	.15440	1.72730	.43540	4.18000	.42150	8.26090	.42890	13.63640	.23030	23.10000	.14800
.66000	.15440	2.09000	.43540	4.18180	.42150	8.33750	.42160	13.75000	.23030	24.15000	.14580
.69000	.15440	2.09090	.43510	4.34780	.45130	8.52500	.40370	13.80000	.23030	24.20000	.14570
.69560	.15440	2.17390	.42720	4.36360	.45420	8.62500	.39430	13.91300	.23030	24.34780	.14570
.72730	.15440	2.18180	.42640	4.37000	.45420	8.63640	.39330	14.08700	.23030	25.30000	.14570
.77000	.15500	2.45450	.42640	4.40000	.45420	8.69560	.38780	14.30000	.23030	25.45460	.14570
.78260	.15990	2.52170	.43410	4.54540	.45420	8.80000	.37820	14.37500	.22890	25.56520	.14570
.80500	.16870	2.53000	.43500	4.56520	.45660	8.91250	.37370	14.54540	.22560	26.72730	.14570
.81820	.17390	2.54550	.44380	4.60000	.46090	9.09090	.36650	14.72730	.22220	27.50000	.14570
.86960	.18100	2.64000	.44380	4.62000	.46340	9.13040	.36550	14.78260	.22110	28.18180	.14390
.88000	.18240	2.64500	.44380	4.75650	.49490	9.20000	.36380	14.85000	.21990	28.63640	.14270
.90910	.18620	2.72730	.44380	4.77270	.49860	9.24000	.36280	14.95000	.21690	28.75000	.14270
.92000	.18620	2.73910	.44380	5.77500	.49860	9.35000	.36280	15.40000	.20350	29.56520	.14230
.95650	.18620	2.75000	.44380	5.86960	.49210	9.54540	.34300	15.45460	.20210	30.80000	.14180
.99000	.18620	2.86000	.44380	5.90910	.48940	9.56520	.34280	15.52500	.20020	32.34000	.14180
1.00000	.18620	2.86360	.44380	6.03750	.48080	9.64850	.34160	15.65220	.19690	33.81000	.13650
1.03500	.19650	2.86960	.44380	6.05000	.47990	9.77500	.33990	15.95000	.18910	34.10000	.13550
1.04350	.19900	2.87500	.44380	6.08700	.46670	9.90000	.33820	16.10000	.18640	34.65000	.13550
1.09090	.21300	2.97000	.44380	6.13640	.44910	10.00000	.33820	16.36360	.18160	35.65000	.13540
1.10000	.21300	3.08000	.44380	6.14780	.44860	10.35000	.33820	16.50000	.17920	36.22500	.13540
1.13040	.21300	3.10500	.43700	6.29050	.44230	10.43480	.33820	16.67500	.17700	36.36360	.13540
1.15000	.21300	3.13040	.43020	6.30440	.44160	10.45000	.33820	16.78260	.17560	37.40000	.13530
1.18180	.21300	3.13640	.42860	6.32500	.44070	10.45460	.33780	17.25000	.16960	39.10000	.13320
1.21000	.22720	3.19000	.41990	6.36360	.44400	10.86960	.30550	17.39130	.16780		
1.21740	.23180	3.22000	.42690	6.45460	.44400	10.90910	.30240	17.54540	.16580		
1.26500	.26140	3.27270	.43920	6.52170	.44400	10.92500	.30130	17.60000	.16510		



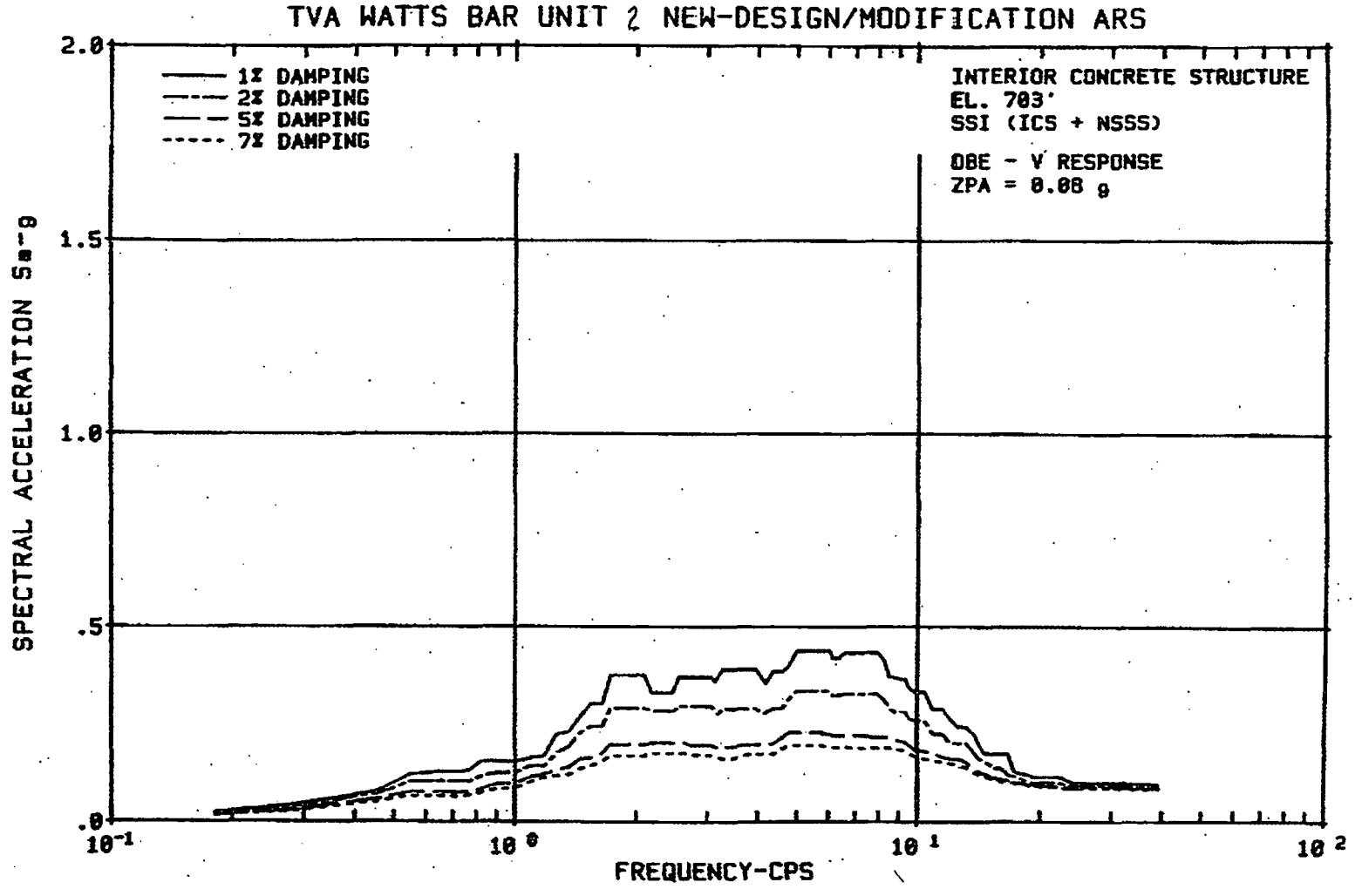
Appendix D- Figure 14

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
OBE - E-W - ELEVATION 703
FIXED DAMPING RATIO 0.02

Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)
.18180	.03150	1.27270	.26630	3.30000	.43530	6.32500	.47700	10.43480	.33220	16.67500	.18420
.22000	.04150	1.30440	.27400	3.30430	.43530	6.36360	.47700	10.45000	.33220	16.78260	.18420
.23000	.04360	1.32000	.27780	3.33500	.43530	6.45460	.47700	10.45460	.33180	17.25000	.18420
.26090	.05020	1.36360	.28810	3.45000	.43530	6.52170	.47700	10.86960	.29350	17.39130	.18420
.27270	.05270	1.38000	.29770	3.45450	.43530	6.59090	.47700	10.90910	.28990	17.54540	.18420
.33000	.07150	1.39130	.30440	3.46500	.43530	6.60000	.47700	10.92500	.28840	17.60000	.18420
.34500	.07580	1.43000	.32730	3.47830	.43530	6.61250	.47700	11.00000	.28170	17.82000	.17900
.34780	.07660	1.45450	.34130	3.62250	.43530	6.73910	.47700	11.30440	.28120	18.18180	.17330
.36360	.08110	1.47830	.34770	3.63000	.43530	6.81820	.47700	11.36360	.28110	18.26090	.17210
.43480	.09860	1.49500	.35230	3.63640	.43530	7.15000	.47700	11.50000	.28090	18.40000	.17000
.44000	.09980	1.54000	.36440	3.65220	.43530	7.18750	.47700	11.55000	.28080	18.63000	.16640
.45460	.10310	1.54550	.36590	3.79500	.43530	7.27270	.47700	11.73910	.27190	18.70000	.16530
.46000	.10590	1.56520	.36590	3.81820	.43530	7.29570	.47700	11.81820	.26820	19.09090	.16010
.52170	.13860	1.61000	.36590	3.96000	.43530	7.39130	.47700	12.07500	.25640	19.13040	.15950
.54550	.15110	1.63640	.36590	3.96750	.43480	7.42500	.47700	12.10000	.25530	19.55000	.15400
.55000	.15130	1.65000	.36590	4.00000	.43280	7.47500	.46610	12.17390	.25390	19.80000	.15290
.57500	.15220	1.65220	.36780	4.14000	.42410	7.63640	.43080	12.27270	.25210	20.00000	.15290
.60870	.15340	1.72500	.43340	4.17390	.42200	7.70000	.41710	12.60870	.24600	20.70000	.15290
.63640	.15440	1.72730	.43540	4.18000	.42170	7.72730	.41440	12.65000	.24520	21.23000	.15010
.66000	.15440	2.09000	.43540	4.18180	.42160	7.76250	.41100	12.72730	.24390	21.73910	.14610
.69000	.15440	2.09090	.43520	4.34780	.44600	7.81000	.40630	13.04350	.23870	22.00000	.14550
.69560	.15440	2.17390	.42700	4.36360	.44830	7.82610	.40380	13.18180	.23640	22.19500	.14500
.72730	.15440	2.18180	.42620	4.37000	.44830	7.97500	.38080	13.20000	.23610	22.72730	.14500
.77000	.15500	2.45450	.42620	4.40000	.44830	8.25000	.38080	13.22500	.23530	23.00000	.14500
.78260	.15990	2.52170	.43400	4.54540	.44830	8.26090	.37980	13.63640	.22130	23.10000	.14500
.80500	.16870	2.53000	.43500	4.56520	.45240	8.33750	.37340	13.75000	.21750	24.15000	.14500
.81820	.17390	2.54550	.44350	4.60000	.45970	8.52500	.35760	13.80000	.21740	24.20000	.14420
.86960	.18100	2.64000	.44350	4.62000	.46380	8.62500	.35310	13.91300	.21710	24.34780	.14190
.88000	.18240	2.64500	.44350	4.75650	.49840	8.63640	.35250	14.08700	.21660	25.30000	.14030
.90910	.18620	2.72730	.44350	4.77270	.50250	8.69560	.35140	14.30000	.21610	25.45460	.14030
.92000	.18620	2.73910	.44350	4.78260	.50460	8.80000	.34940	14.37500	.21570	25.56520	.14030
.95650	.18620	2.75000	.44350	4.83000	.51470	8.91250	.34940	14.54540	.21490	26.72730	.14030
.99000	.18620	2.86000	.44350	4.84000	.51680	9.09090	.34940	14.72730	.21410	27.50000	.14030
1.00000	.18620	2.86360	.44350	5.00000	.55010	9.13040	.34940	14.78260	.21380	28.18180	.13980
1.03500	.19650	2.86960	.44350	5.77500	.55010	9.20000	.34940	14.85000	.21350	28.63640	.13980
1.04350	.19900	2.87500	.44350	5.86960	.55010	9.24000	.34940	14.95000	.21070	28.75000	.13980
1.09090	.21290	2.97000	.44350	5.90910	.55010	9.35000	.34930	15.40000	.19820	29.56520	.13980
1.10000	.21290	3.08000	.44350	6.03750	.55010	9.54540	.33220	15.45460	.19720	30.80000	.13980
1.13040	.21290	3.10500	.43670	6.05000	.55010	9.56520	.33220	15.52500	.19600	32.34000	.13980
1.15000	.21290	3.13040	.42980	6.08700	.53850	9.64850	.33220	15.65220	.19380	33.81000	.13700
1.18180	.21290	3.13640	.42810	6.13640	.52300	9.77500	.33220	15.95000	.18870	34.10000	.13640
1.21000	.22710	3.19000	.41780	6.14780	.52020	9.90000	.33220	16.10000	.18700	34.65000	.13640
1.21740	.23180	3.22000	.42420	6.29050	.48540	10.00000	.33220	16.36360	.18420	37.40000	.13640
1.26500	.26150	3.27270	.43530	6.30440	.48200	10.35000	.33220	16.50000	.18420	39.10000	.13320

Appendix D- Figure 14



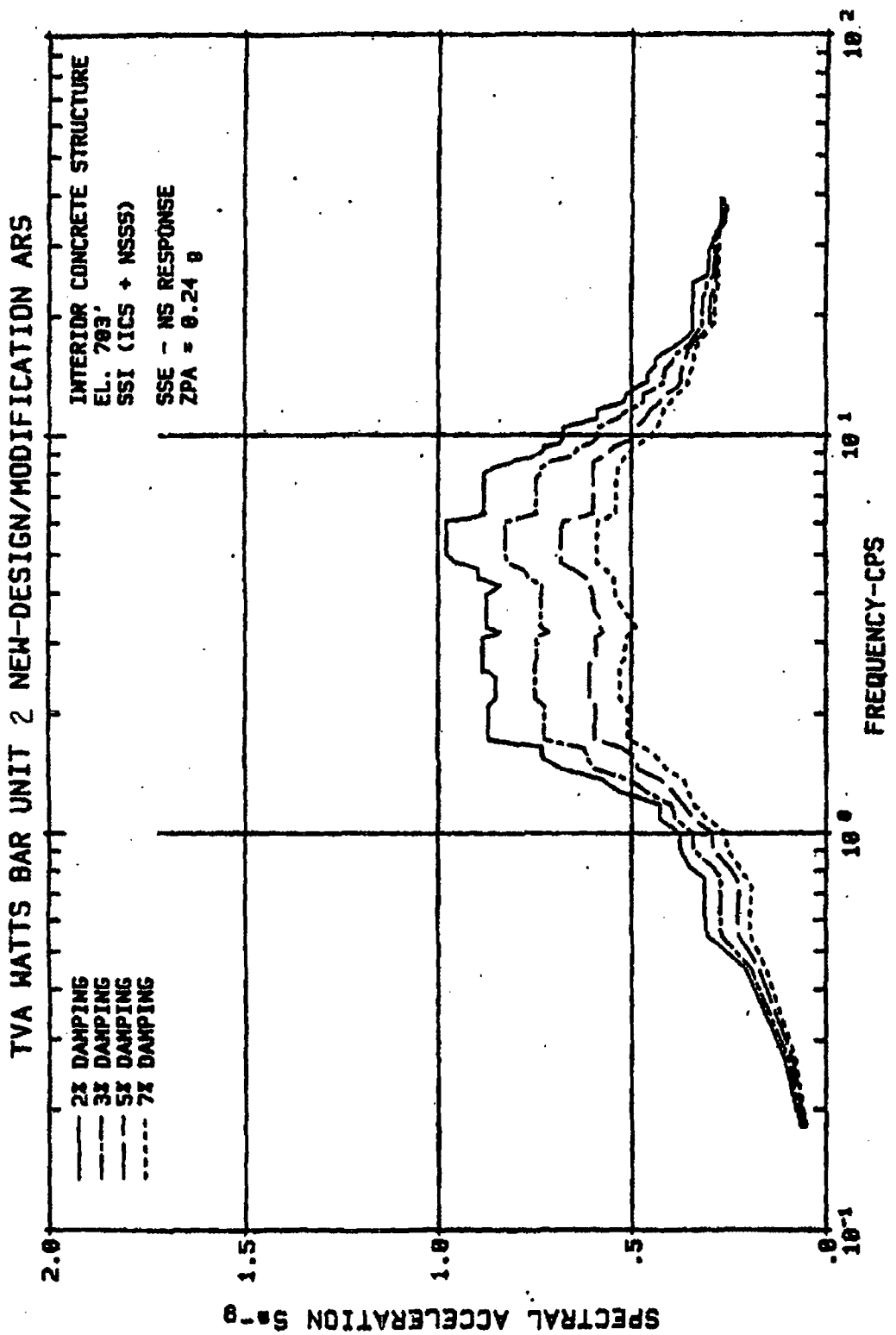
Appendix D- Figure 15

Appendix D- Figure 15

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
OBE - VERTICAL - ELEVATION 703
FIXED DAMPING RATIO 0.02

Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)
.18180	.02100	1.27270	.17750	3.33500	.28830	6.45460	.32410	10.90910	.22750	17.54540	.11540
.22000	.02770	1.30440	.18260	3.45000	.28830	6.52170	.32500	10.92500	.22710	17.60000	.11520
.23000	.02910	1.32000	.18510	3.45450	.28830	6.59090	.32580	11.00000	.22530	17.82000	.11150
.26090	.03350	1.36360	.19200	3.46500	.28830	7.15000	.32580	11.30440	.22530	18.18180	.10670
.27270	.03520	1.38000	.19840	3.47830	.28830	7.18750	.32580	11.36360	.22530	18.26090	.10570
.33000	.04770	1.39130	.20280	3.62250	.28830	7.27270	.32580	11.50000	.22530	18.40000	.10390
.34500	.05050	1.43000	.21800	3.63000	.28830	7.29570	.32580	11.55000	.22530	18.63000	.10100
.34780	.05110	1.45450	.22730	3.63640	.28830	7.39130	.32580	11.73910	.21720	18.70000	.10010
.36360	.05410	1.47830	.23160	3.65220	.28830	7.42500	.32580	11.81820	.21380	19.09090	.09940
.43480	.06570	1.49500	.23470	3.79500	.28830	7.47500	.32580	12.07500	.20300	19.13040	.09940
.44000	.06660	1.54000	.24290	3.81820	.28830	7.63640	.32580	12.10000	.20200	19.55000	.09940
.45460	.06870	1.54550	.24390	3.96000	.28830	7.70000	.32580	12.17390	.20190	19.80000	.09940
.46000	.07060	1.56520	.24390	3.96750	.28790	7.72730	.32580	12.27270	.20180	20.00000	.09940
.52170	.09240	1.61000	.24390	4.00000	.28630	7.76250	.32580	12.60870	.20150	20.70000	.09940
.54550	.10080	1.63640	.24390	4.14000	.27930	7.81000	.32580	12.65000	.20140	21.23000	.09940
.55000	.10090	1.65000	.24390	4.17390	.27760	7.97500	.32580	12.72730	.20140	21.73910	.09940
.57500	.10150	1.65220	.24510	4.18000	.27730	8.05000	.32190	13.04350	.20120	22.00000	.09940
.60870	.10230	1.72500	.28860	4.18180	.27730	8.13050	.31770	13.18180	.20110	22.19500	.09940
.63640	.10300	1.72730	.29000	4.34780	.28780	8.18180	.31500	13.20000	.20110	22.72730	.09690
.66000	.10300	2.09000	.29000	4.36360	.28880	8.25000	.31150	13.22500	.19990	23.00000	.09570
.69000	.10300	2.09090	.28980	4.37000	.28880	8.26090	.31080	13.63640	.18080	23.10000	.09490
.69560	.10300	2.17390	.28390	4.40000	.28880	8.33750	.30580	13.75000	.17570	24.15000	.09220
.72730	.10300	2.18180	.28340	4.54540	.28880	8.52500	.29360	13.80000	.17370	24.20000	.09220
.77000	.10330	2.45450	.28340	4.56520	.28990	8.62500	.28580	13.91300	.16930	24.34780	.09220
.78260	.10660	2.52170	.28850	4.60000	.29180	8.63640	.28490	14.08700	.16260	25.30000	.09220
.80500	.11250	2.53000	.28910	4.62000	.29290	8.69560	.28350	14.30000	.15900	25.45460	.09220
.81820	.11590	2.54550	.29490	4.75650	.31100	8.80000	.28090	14.37500	.15820	25.56520	.09230
.86960	.12070	2.64000	.29490	4.77270	.31320	8.91250	.28090	14.54540	.15530	26.72730	.09360
.88000	.12170	2.64500	.29490	4.78260	.31410	9.09090	.28090	14.72730	.15220	27.50000	.09360
.90910	.12420	2.72730	.29490	4.83000	.31850	9.13040	.28090	14.78260	.15120	28.18180	.09360
.92000	.12420	2.86000	.29490	4.84000	.31940	9.20000	.28090	14.85000	.15010	28.63640	.09360
.95650	.12420	2.86360	.29490	5.00000	.33400	9.24000	.28090	14.95000	.14840	30.80000	.09360
.99000	.12420	2.86960	.29490	5.77500	.33400	9.35000	.28090	15.40000	.13910	30.90910	.09360
1.00000	.12420	2.87500	.29490	5.86960	.33400	9.54540	.26430	15.45460	.13790	32.20000	.09360
1.03500	.13100	2.97000	.29490	5.90910	.33400	9.56520	.26400	15.52500	.13650	32.34000	.09360
1.04350	.13270	3.08000	.29490	6.03750	.33400	9.64850	.26280	15.65220	.13640	33.81000	.09090
1.09090	.14200	3.10500	.29030	6.05000	.33400	9.77500	.26090	15.95000	.13610	34.10000	.09040
1.10000	.14200	3.13040	.28560	6.08700	.32880	9.90000	.25900	16.10000	.13590	37.40000	.09030
1.13040	.14200	3.13640	.28450	6.13640	.32180	10.00000	.25900	16.36360	.12910	39.10000	.08910
1.15000	.14200	3.19000	.27670	6.14780	.32190	10.35000	.25900	16.50000	.12550		
1.18180	.14200	3.22000	.28090	6.29050	.32290	10.43480	.25900	16.67500	.12100		
1.21000	.15140	3.27270	.28830	6.30440	.32300	10.45000	.25900	16.78260	.11900		
1.21740	.15450	3.30000	.28830	6.32500	.32320	10.45460	.25870	17.25000	.11650		
1.26500	.17430	3.30430	.28830	6.36360	.32350	10.86960	.23020	17.39130	.11590		



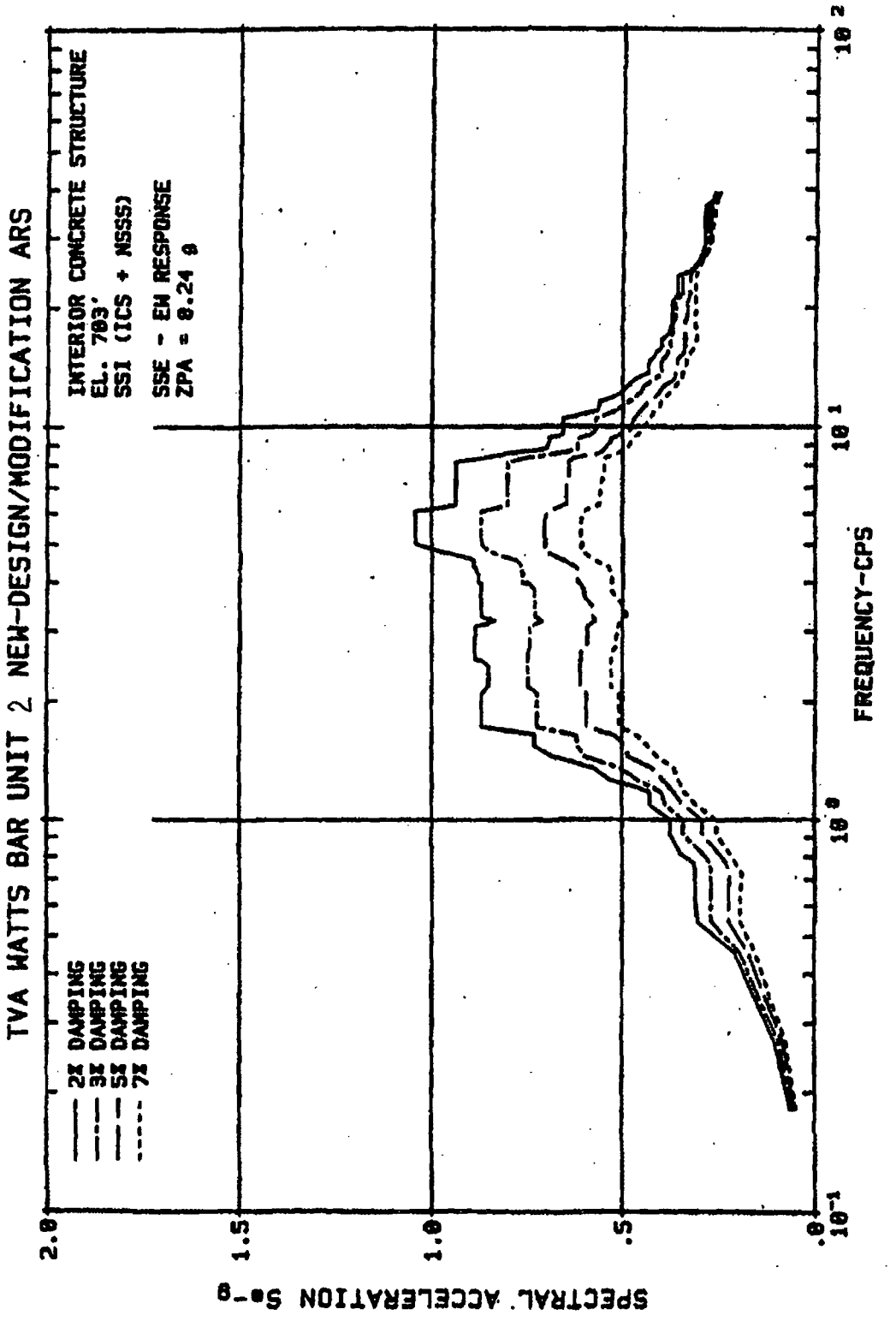
Appendix D- Figure 16

Appendix D- Figure 16

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
SSE - N-S - ELEVATION 703
FIXED DAMPING RATIO 0.03

Frequency (Hz)	Acceleration (G's)
.18180	.05850
.22000	.07550
.23000	.07920
.26090	.09040
.27270	.09470
.33000	.13160
.34500	.14000
.34780	.14160
.36360	.15040
.43480	.18400
.44000	.18640
.45460	.19260
.46000	.19700
.52170	.24760
.54550	.26700
.55000	.26710
.57500	.26750
.60870	.26800
.63640	.26840
.66000	.26840
.69000	.26840
.69560	.26840
.72730	.26840
.77000	.26840
.78260	.27370
.80500	.28320
.81820	.28880
.86960	.31770
.88000	.32360
.90910	.33910
.92000	.33910
.95650	.33910
.99000	.33910
1.00000	.33910
1.03500	.35670
1.04350	.36100
1.09090	.38490
1.10000	.38610
1.13040	.38980
1.15000	.39220
1.18180	.39610
1.21000	.41640
1.21740	.42150
1.26500	.45450
1.27270	.45980
1.30440	.47610
1.32000	.48410
1.36360	.50590
1.38000	.52280
1.39130	.53450
1.43000	.57470
1.45450	.59930
1.47830	.60390
1.49500	.60710
1.54000	.61570
1.54550	.61670
1.56520	.61750
1.61000	.61940
1.63640	.62050
1.65000	.63660
1.65220	.63910
1.72500	.72270
1.72730	.72530
2.09000	.72530
2.09090	.72510
2.17390	.74750
2.18180	.74960
2.45450	.74960
2.52170	.74960
2.53000	.74960
2.54550	.74960
2.64000	.74960
2.64500	.74940
2.72730	.74620
2.73910	.74620
2.75000	.74620
2.86000	.74620
2.86360	.74620
2.86960	.74620
2.87500	.74620
2.97000	.74620
3.08000	.74620
3.10500	.73870
3.13040	.73110
3.13640	.72940
3.19000	.71370
3.22000	.72130
3.27270	.73480
3.30000	.73480
3.30430	.73480
3.33500	.73480
3.45000	.73480
3.45450	.73480
3.46500	.73480
3.47830	.73480
3.62250	.73480
3.63000	.73480
3.63640	.73480
3.65220	.73480
3.79500	.73480
3.81820	.73480
3.82610	.73480
3.96000	.73480
3.96750	.73460
4.00000	.73370
4.14000	.73370
4.17390	.73370
4.18000	.73370
4.18180	.73370
4.34780	.76450
4.36360	.76740
4.37000	.76780
4.40000	.76930
4.54540	.77660
4.56520	.78030
4.60000	.78680
4.62000	.79060
4.75650	.81560
4.77270	.81850
4.78260	.81890
4.83000	.82040
4.84000	.82080
5.00000	.82600
5.77500	.82600
5.86960	.82600
5.90910	.82600
6.03750	.82600
6.05000	.82600
6.08700	.80990
6.13640	.78840
6.14780	.78580
6.29050	.75310
6.30440	.74990
6.32500	.74520
6.36360	.74620
7.15000	.74620
7.18750	.74620
7.27270	.74620
7.70000	.74620
7.72730	.74540
7.76250	.74450
7.81000	.74310
7.82610	.74220
7.97500	.73320
8.05000	.73320
8.13050	.73320
8.18180	.73320
8.25000	.73320
8.26090	.73240
8.33750	.72690
8.52500	.71360
8.62500	.69300
8.63640	.69070
8.69560	.67870
8.80000	.65770
8.91250	.65330
9.09090	.64650
9.13040	.64500
9.20000	.64240
9.24000	.64090
9.35000	.63530
9.54540	.60600
9.56520	.60500
9.64850	.60080
9.77500	.59440
9.90000	.58810
10.00000	.58810
10.35000	.58810
10.43480	.58810
10.45000	.58810
10.45460	.58770
10.86960	.54920
10.90910	.54560
10.92500	.54410
11.00000	.53740
11.30440	.52150
11.36360	.51850
11.50000	.51150
11.55000	.50900
11.73910	.49470
11.81820	.48870
12.07500	.47090
12.10000	.46920
12.17390	.46920
12.27270	.46920
12.60870	.46920
12.65000	.46920
12.72730	.46410
13.04350	.44350
13.18180	.43450
13.20000	.43340
13.22500	.43230
13.63640	.41410
13.75000	.41410
13.80000	.41410
13.91300	.41410
14.08700	.41410
14.30000	.41410
14.37500	.41340
14.54540	.41170
14.72730	.41000
14.78260	.40950
14.85000	.40890
14.95000	.40320
15.40000	.39020
15.52500	.39020
15.65220	.38790
15.95000	.38290
16.10000	.38030
16.36360	.37030
16.50000	.36510
16.67500	.35840
16.78260	.35580
17.25000	.34450
17.39130	.34190
17.54540	.33920
17.60000	.33820
17.82000	.33430
18.18180	.32790
18.26090	.32650
18.40000	.32410
18.63000	.31490
18.70000	.31490
19.09090	.31490
19.13040	.31490
19.55000	.31490
22.19500	.31490
22.72730	.30840
23.00000	.30510
23.10000	.30510
24.15000	.30510
24.20000	.30400
24.34780	.30080
25.30000	.28660
28.75000	.28660
29.56520	.28590
30.80000	.28490
30.90910	.28480
32.20000	.28380
32.34000	.28220
33.81000	.26600
34.10000	.26600
34.65000	.26600
35.65000	.26600
39.10000	.26600



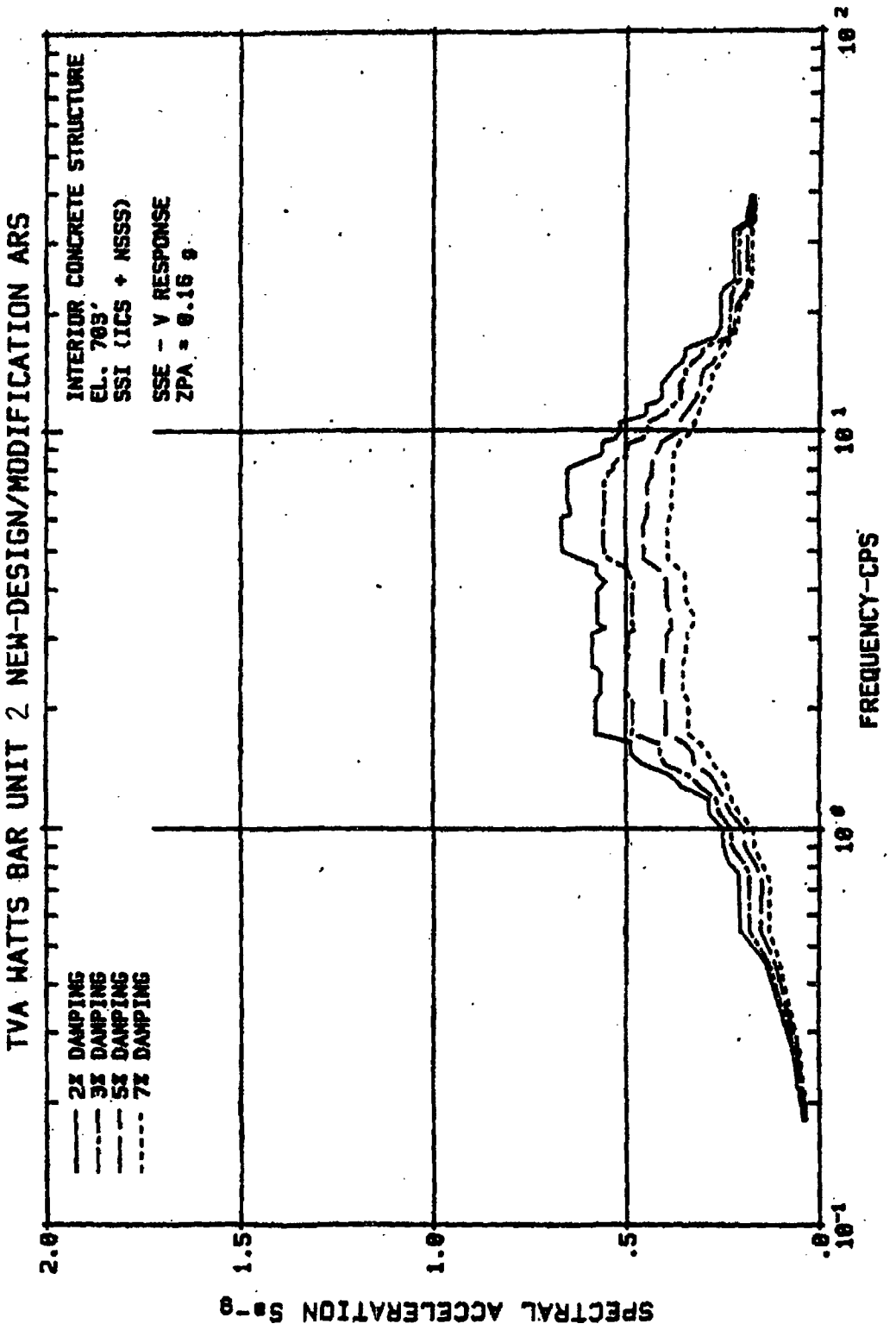
Appendix D- Figure 17

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
SSE - E-W - ELEVATION 703
FIXED DAMPING RATIO 0.03

Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)
.18180	.05850	1.26500	.45460	3.22000	.71960	6.30440	.80260	10.45460	.57050	16.78260	.37270
.22000	.07550	1.27270	.45990	3.27270	.73220	6.32500	.80260	10.86960	.53010	17.25000	.36910
.23000	.07920	1.30440	.47610	3.30000	.73220	6.36360	.80260	10.90910	.52630	17.39130	.36910
.26090	.09040	1.32000	.48410	3.30430	.73220	6.45460	.80260	10.92500	.52480	17.54540	.36910
.27270	.09470	1.36360	.50570	3.33500	.73220	6.52170	.80260	11.00000	.51770	17.60000	.36910
.33000	.13160	1.38000	.52270	3.45000	.73220	6.59090	.80260	11.30440	.50020	17.82000	.36910
.34500	.14000	1.39130	.53450	3.45450	.73220	7.15000	.80260	11.36360	.49680	18.18180	.36910
.34780	.14160	1.43000	.57470	3.46500	.73220	7.18750	.80260	11.50000	.48910	18.26090	.36910
.36360	.15040	1.45450	.59930	3.47830	.73220	7.27270	.80260	11.55000	.48630	18.40000	.36910
.43480	.18400	1.47830	.60410	3.62250	.73220	7.29570	.80260	11.73910	.47500	18.63000	.36290
.44000	.18650	1.49500	.60740	3.63000	.73220	7.39130	.80260	11.81820	.47030	18.70000	.36250
.45460	.19260	1.54000	.61630	3.63640	.73220	7.42500	.80260	12.07500	.45900	19.09090	.36050
.46000	.19700	1.54550	.61730	3.65220	.73220	7.47500	.80260	12.10000	.45710	19.13040	.36030
.52170	.24760	1.56520	.61800	3.79500	.73220	7.63640	.80260	12.17390	.45280	20.70000	.36030
.54550	.26700	1.61000	.61940	3.81820	.73220	7.70000	.80260	12.27270	.45130	21.23000	.35200
.55000	.26710	1.63640	.62020	3.82610	.73220	7.72730	.80260	12.60870	.44640	21.73910	.34410
.57500	.26750	1.65000	.63630	3.96000	.74660	7.76250	.80260	12.65000	.44580	24.15000	.34410
.60870	.26810	1.65220	.63890	3.96750	.74990	8.05000	.80260	12.72730	.44180	24.20000	.34280
.63640	.26850	1.72500	.72280	4.00000	.76400	8.13050	.80260	13.04350	.42600	24.34780	.33910
.66000	.26850	1.72730	.72540	4.18180	.76400	8.18180	.79090	13.18180	.41910	25.30000	.31560
.69000	.26850	2.09000	.72540	4.34780	.76400	8.25000	.77550	13.20000	.41820	25.45460	.31350
.69560	.26850	2.09090	.72520	4.36360	.76400	8.26090	.77300	13.22500	.41710	25.56520	.31210
.72730	.26850	2.17390	.74730	4.37000	.76400	8.33750	.75590	13.63640	.39770	26.72730	.29740
.77000	.26850	2.18180	.74950	4.40000	.76550	8.52500	.68160	13.75000	.39700	26.95650	.29450
.78260	.27380	2.45450	.74950	4.54540	.78010	8.62500	.64720	13.80000	.39700	27.39130	.28920
.80500	.28330	2.52170	.74950	4.56520	.78630	8.63640	.64500	13.91300	.39700	27.50000	.28880
.81820	.28880	2.53000	.74950	4.60000	.79720	8.69560	.63550	14.08700	.39700	28.18180	.28620
.86960	.31780	2.54550	.74950	4.62000	.80340	8.80000	.61880	14.30000	.39700	28.63640	.28450
.88000	.32360	2.64000	.74950	4.75650	.84520	8.91250	.61880	14.37500	.39690	28.75000	.28410
.90910	.33920	2.64500	.74920	4.77270	.85010	9.09090	.61880	14.54540	.39650	29.56520	.28410
.92000	.33920	2.72730	.74520	4.78260	.85100	9.13040	.61880	14.72730	.39620	30.80000	.28410
.95650	.33920	2.73910	.74520	4.83000	.85540	9.20000	.61880	14.78260	.39610	30.90910	.28410
.99000	.33920	2.75000	.74520	4.84000	.85630	9.24000	.61880	14.85000	.39600	32.20000	.28410
1.00000	.33920	2.86000	.74520	5.00000	.87080	9.35000	.61500	14.95000	.39090	32.34000	.28380
1.03500	.35680	2.86360	.74520	5.77500	.87080	9.54540	.58240	15.40000	.38190	33.81000	.28110
1.04350	.36100	2.86960	.74520	5.86960	.87080	9.56520	.58180	15.45460	.38190	34.10000	.28110
1.09090	.38480	2.87500	.74520	5.90910	.87080	9.64850	.57910	15.52500	.38190	34.65000	.28110
1.10000	.38600	2.97000	.74520	6.03750	.87080	9.77500	.57500	15.65220	.37610	35.65000	.28110
1.13040	.38980	3.08000	.74520	6.05000	.87080	9.90000	.57100	15.95000	.37470	36.22500	.28110
1.15000	.39220	3.10500	.73770	6.08700	.85890	10.00000	.57100	16.10000	.37400	36.36360	.27880
1.18180	.39620	3.13040	.73010	6.13640	.84300	10.35000	.57100	16.36360	.37400	37.40000	.26180
1.21000	.41650	3.13640	.72830	6.14780	.84000	10.43480	.57100	16.50000	.37400	39.10000	.25610
1.21740	.42160	3.19000	.71240	6.29050	.80290	10.45000	.57100	16.67500	.37400		

Appendix D- Figure 17



Appendix D- Figure 18

DIGITIZED DATA FOR
BROADENED SPECTRUM

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
PRE-STEAM GENERATOR REPLACEMENT
INTERIOR CONCRETE STRUCTURE
SSE - VERTICAL - ELEVATION 703
FIXED DAMPING RATIO 0.03

Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)	Frequency (Hz)	Acceleration (G's)
.18180	.03900	1.26500	.30290	3.22000	.47730	6.14780	.55680	9.90000	.44340	16.36360	.28880
.22000	.05040	1.27270	.30650	3.27270	.48450	6.29050	.55680	10.00000	.44340	16.50000	.28360
.23000	.05280	1.30440	.31720	3.30000	.48450	6.30440	.55680	10.35000	.44340	16.67500	.27700
.26090	.06030	1.32000	.32260	3.30430	.48450	6.32500	.55680	10.43480	.44340	16.78260	.26870
.27270	.06320	1.36360	.33690	3.33500	.48450	6.36360	.55680	10.45000	.44340	17.25000	.23340
.33000	.08780	1.38000	.34820	3.45000	.48450	6.45460	.55680	10.45460	.44310	17.39130	.23140
.34500	.09340	1.39130	.35600	3.45450	.48450	6.52170	.55680	10.86960	.41140	17.54540	.23120
.34780	.09440	1.43000	.38270	3.46500	.48450	6.59090	.55680	10.90910	.40840	17.60000	.23110
.36360	.10030	1.45450	.39900	3.47830	.48450	7.15000	.55680	10.92500	.40720	17.82000	.23080
.43480	.12270	1.47830	.40220	3.62250	.48450	7.18750	.55680	11.00000	.40160	18.18180	.23020
.44000	.12430	1.49500	.40450	3.63000	.48450	7.27270	.55680	11.30440	.39000	18.26090	.23010
.45460	.12840	1.54000	.41060	3.63640	.48450	7.29570	.55680	11.36360	.38770	19.55000	.23010
.46000	.13140	1.54550	.41130	3.65220	.48450	7.39130	.55680	11.50000	.38260	19.80000	.22940
.52170	.16510	1.56520	.41170	3.79500	.48450	7.42500	.55680	11.55000	.38080	20.00000	.22890
.54550	.17800	1.61000	.41270	3.81820	.48450	7.47500	.55480	11.73910	.37130	20.70000	.22700
.55000	.17810	1.63640	.41330	3.96000	.48450	7.63640	.54860	11.81820	.36740	21.23000	.22680
.57500	.17840	1.65000	.42400	3.96750	.48400	7.70000	.54700	12.07500	.35880	21.73910	.22660
.60870	.17870	1.65220	.42560	4.00000	.48200	7.72730	.54700	12.10000	.35880	22.00000	.22650
.63640	.17910	1.72500	.48120	4.14000	.48030	7.76250	.54700	12.17390	.35880	22.19500	.22650
.66000	.17910	1.72730	.48300	4.17390	.47990	7.81000	.54700	12.27270	.35880	22.72730	.22200
.69000	.17910	2.09000	.48300	4.18000	.47980	7.82610	.54550	12.60870	.35880	23.00000	.21970
.69560	.17910	2.09090	.48280	4.18180	.47980	7.97500	.53220	12.65000	.35880	23.10000	.21820
.72730	.17910	2.17390	.49690	4.34780	.49190	8.05000	.53220	12.72730	.35880	24.15000	.20280
.77000	.17910	2.18180	.49830	4.36360	.49300	8.13050	.53220	13.04350	.35880	24.20000	.20340
.78260	.18260	2.45450	.49830	4.37000	.49330	8.18180	.53220	13.22500	.35880	24.34780	.20510
.80500	.18880	2.52170	.49830	4.40000	.49470	8.25000	.53220	13.63640	.34830	25.30000	.20510
.81820	.19250	2.53000	.49830	4.54540	.50130	8.26090	.53150	13.75000	.34540	25.45460	.20510
.86960	.21190	2.54550	.49830	4.56520	.50540	8.33750	.52660	13.80000	.34410	25.56520	.20510
.88000	.21580	2.64000	.49830	4.60000	.51260	8.52500	.51460	13.91300	.34410	26.72730	.20510
.90910	.22620	2.64500	.49810	4.62000	.51670	8.62500	.49950	14.08700	.34410	26.95650	.20510
.92000	.22620	2.72730	.49450	4.75650	.54420	8.63640	.49780	14.30000	.34410	32.20000	.20510
.95650	.22620	2.73910	.49450	4.77270	.54750	8.69560	.49610	14.37500	.34410	32.34000	.20250
.99000	.22620	2.75000	.49450	4.78260	.54800	8.80000	.49320	14.54540	.33910	33.81000	.17550
1.00000	.22620	2.86000	.49450	4.83000	.55070	8.91250	.49320	14.72730	.33370	34.10000	.17550
1.03500	.23780	2.86360	.49450	4.84000	.55130	9.09090	.49320	14.78260	.33210	34.65000	.17550
1.04350	.24070	2.86960	.49450	5.00000	.56010	9.13040	.49320	14.85000	.33020	35.65000	.17550
1.09090	.25640	2.87500	.49450	5.77500	.56010	9.20000	.49320	14.95000	.32730	36.22500	.17550
1.10000	.25720	2.97000	.49450	5.86960	.56010	9.24000	.49320	15.40000	.31060	36.36360	.17410
1.13040	.25970	3.08000	.49450	5.90910	.56010	9.35000	.48140	15.45460	.30860	37.40000	.17400
1.15000	.26130	3.10500	.48960	6.03750	.56010	9.54540	.45750	15.52500	.30590	39.10000	.17240
1.18180	.26390	3.13040	.48470	6.05000	.56010	9.56520	.45670	15.65220	.30430		
1.21000	.27740	3.13640	.48350	6.08700	.55870	9.64850	.45340	15.95000	.30070		
1.21740	.28090	3.19000	.47320	6.13640	.55680	9.77500	.44840	16.10000	.29880		

Appendix D- Figure 18