GULF STATES UTILITIES COMPANY

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AREA CODE 504 635-6094 346-8651

May 15, 1985
RBG- 20,996
File No. G9.5, G9.19.2,
G9.20.8

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington D.C. 20555

Dear Mr. Denton:

River Bend Station Unit 1
Docket No. 50-458

This response supplements Gulf States Utilities Company's (GSU) March 29, 1985 letter to your office. The attached information addresses the Seismic Qualification Review Team (SQRT) and the Pump and Valve Operability Review Team (PVORT) specific comments as discussed during the May 10, 1985 meeting with the Nuclear Regulatory Commission (NRC) Equipment Qualification Branch (EQB).

A proposed program for the GSU seismic and pump and valve sample walkdown, to be completed prior to exceeding 5% of rated power, will be provided by May 24, 1985.

Sincerely,

J. E. Booker

J. E. Booker
Manager -
Engineering, Licensing &
Nuclear Fuels
River Bend Nuclear Group

JEB/RJK/rg

Attachment

A048
1/40

B O P

SQRT - SSER

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-3

Applicant ID No.: 1EHS*MCC15B

Finding No. 1

Qualification of devices apparently covered by Gould Reports R-STS-16 and 31 and analysis was not available for review.

Response

Seismic qualification of motor control center 1EHS*MCC15B is covered by Gould reports:

R-STS-16
R-STS-25
R-STS-31
SC-289

All these reports, with the exception of report SC-289, have been claimed by Gould as proprietary and as such could not be produced for the NRC's review. Report SC-289 is the Gould seismic certification report, which was approved by SWEC on October 27, 1984 (reference SWEC File No. 4242.562.082.002E). This report contains seismic qualification of the MCC enclosure and 24 of the 30 Class 1E devices. Proprietary report R-STS-25, qualifying the HE43 circuit breaker, was reviewed by SWEC on May 23, 1984, and the results were accepted. Report SC-289 and SWEC's trip report on R-STS-25 were made available to the NRC auditors.

Proprietary Reports R-STS-16 and R-STS-31 contain qualification results for the remaining five Class 1E devices. Based on, (i) Gould's use of SWEC approved test procedure, (ii) Gould's certification of the qualification results of the remaining five devices in Report SC-289, and (iii) Gould's demonstrated capability to provide an acceptable qualification program, results of these five devices were accepted without an RBS-specific review of Reports R-STS-16 and R-STS-31. This acceptance basis was discussed by the SWEC engineer with the NRC reviewer during the audit.

It should be pointed out that the same SWEC engineer had previously reviewed Report R-STS-16 and many other Gould proprietary reports for other SWEC projects. Some of the reviewed reports are listed below:

Gould Report No.	Wyle Report No.	Date Reviewed
R-STS-11	42926-1	July 12, 1983
R-STS-16	43472-1	August 22, 1983
R-STS-23	44519-1	May 23, 1984
R-STS-33	45483-1	May 23, 1984

GSU had also informed the NRC during the preaudit discussions that some proprietary documents would not be available to the NRC during the audit. Instead, if the NRC found it necessary, special arrangements could be made with Gould for the audit of these documents.

Seismic qualification analysis of terminal blocks and power resistors was made available for the NRC review. This analysis is contained in Section 4.0 of Report SC-289. This analysis was based on a comparison of the terminal blocks and power resistors installed in RBS with those tested along with 24 other devices listed in Table 1 of Report SC-289. SWEC had evaluated the adequacy of this combined analysis and testing approach during the review of Report SC-289 and found it to be acceptable, considering the passive nature of the devices (see Telemecanique letter dated April 1, 1985,).

Corrective Action

Gould proprietary Reports R-STS-16 and R-STS-31 were subsequently reviewed by SWEC on November 28, 1984, to reconfirm compliance. Results were found to be acceptable and are documented in the attached SWEC File No. 4242.562.082.003A. With respect to the RBS terminal blocks and the power resistors qualified by combined analysis and testing, no further action is deemed necessary.

Conclusion

Since the NRC reviewer believed that Reports R-STS-16 and R-STS-31 should be reviewed, SWEC proceeded with this review. The judgment of the original SWEC reviewer to accept these documents without review was proven to be correct.

GSU believes that the original course of action pursued by the SWEC reviewer was appropriate and justified.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-3

Applicant ID No.: 1EHS*MCC15B

Finding No. 2

Test mounting was not documented.

Response

Test mounting details are shown on page 76 of Gould Report SC-289, SWEC File No. 4242.562.082.002E . This report was made available to the NRC during the audit. As a result of the NRC question, Gould has reconfirmed that the welding details on page 76 of Report SC-289 reflect test mounting condition (reference: Gould Electronics letter dated February 27, 1985).

Corrective Action

Not applicable.

Conclusion

This finding only required reconfirmation of the information presented at the audit.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-3

Applicant ID No.: 1EHS*MCC15B

Finding No. 3

It is not clear from the test report whether the MCC was tested for five OBEs and one SSE for both the energized and deenergized conditions.

Response

The MCC was tested for five OBEs and one SSE in both energized and deenergized conditions. This information was compiled through SWEC's review of several Gould proprietary MCC qualification documents listed in the response to Finding No. 1.

In each of the tests covered in the above reports, the equipment was tested in both energized and deenergized conditions during the five OBE and one SSE tests. Confirmation of this test condition was requested and received from Gould through a letter dated February 27, 1985.

Corrective Action

Not applicable.

Conclusion

This finding required further clarification of information presented at the audit. The results of the original qualification review performed by SWEC remain unchanged.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-3

Applicant ID No.: 1EHS*MCC15B

Finding No. 4

Supplemental evaluation report for HE43 circuit breaker was not part of the qualification documentation package.

Response

The supplemental evaluation referenced in the finding was included as part of the SWEC-prepared qualification review summary. The text of this evaluation was intended as an aid to the SWEC reviewer in completing the review and was not intended to become an addendum to the vendor's qualification report.

The NRC reviewer believed, however, that this information should be included as part of the vendor's report. Accordingly, SWEC has included this information in the qualification documentation package (reference: SWEC File No. 4242.562.082.003A).

GSU believes that the data contained in Gould Reports SC-289 and R-STS-25 provide an adequate basis for qualification of the HE43 circuit breaker.

Corrective Action

Not applicable.

Conclusion

The addition of the SWEC supplemental evaluation to the vendor-prepared qualification package is an enhancement to the original data provided by Gould and has no impact on the seismic qualification of the HE43 circuit breaker.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP 4

Applicant ID No.: 1E12*PC003

Finding

The site inspection revealed the following deficiencies:

1. The shim stack was loose.

2. One nut in the seal housing was loose, and another was missing.

3. The motor nameplate was missing.

Response

During the NRC site inspection, the NRC questioned the reason for the reject tag affixed to the subject pump. Unsatisfactory quality assurance inspection report (IR) Type A M4000947 dated October 24, 1984, was presented to the NRC to explain the rejection. This normal inspection was accelerated for the NRC audited item. The Unsat IR lists five deficient conditions including those listed above. A copy of the inspection report is attached for reference.

As can be seen from the IR, the loose shim stack problem applies to pump 1E12*PC003, the pump included within the scope of the audit. The IR also identified deficiencies with an additional pump, 1E51*PC003 (loose nuts, missing nameplate), which was not included within the original audit scope. The deficiencies for pump 1E12*PC003 were corrected on October 26, 1984, prior to the NRC site inspection, in association with Construction Work Request (CWR) No. 4545. However, because the work associated with pump 1E51*PC003 had not been completed, the Unsat IR remained open and the REJECT tag remained affixed to pump 1E12*PC003. SWEC's QA program requires all deficiencies on any Unsat IR to be corrected prior to removal of any REJECT tags associated with the IR. The conditions cited by the NRC in the audit report were those noted by the Inspector on the SWEC Unsat IR. All deficiencies noted on the Unsat IR have now been corrected.

Corrective Action

None required.

Conclusion

The condition cited above, and documented on SWEC Unsat IR prior to the NRC audit, provides another example demonstrating that an effective quality assurance program exists on the River Bend Project, which results in detecting and correcting deficiencies.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-8

Applicant ID No.: 1SCM*XRC14

Finding No. 1

Dynamic similarity between the tested specimen and the River Bend transformer was not established.

Response

The vendor seismic qualification report (SWEC File No. 6244.512.271.008A) did not clearly establish dynamic similarity between the tested specimen and the River Bend transformer. Although characteristic transformer parameters were compared to establish similarity, no natural frequency comparisons were performed. SWEC commented on this during the normal review process on October 24, 1984, and requested that the vendor provide additional dynamic data. The Seismic Qualification Master List, submitted to the NRC prior to the audit, indicated that the transformer was not as yet fully qualified (status shown was "test complete but test report not approved").

SWEC therefore performed a calculation to estimate the natural frequency of the River Bend equipment. The result, together with the vendor evaluation cited above, convinced SWEC that similarity did exist.

Corrective Action

At SWEC's request, the vendor provided additional information to establish similarity. The additional information, together with the SWEC calculation, was documented as part of the review of the vendor's resubmittal of the seismic qualification report, and the report was approved on March 21, 1985 (SWEC File No. 6244-512-271.008F).

Conclusion

The concern noted in the finding had been identified by SWEC through the normal SWEC review and approval process in accordance with the SWEC equipment qualification program and procedure, and the seismic qualification of the device was not considered complete until the SWEC concern was resolved.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-8

Applicant ID No.: 1SCM*XRC14

Finding No. 2

Test mounting was not completely documented in the test report.

Response

Wyle test report No. 58733 states that the seismic test of Model No. 253-1-101 was performed in accordance with Elgar's Seismic Test Plan Document No. 543-288-92 and that "the test specimen was attached to the test fixture in a manner that simulates normal in-service use" (reference SWEC File No. 6244.512-271-008A, Appendix N, pages 3, 4, and 2-1,). Elgar's Test Plan 543-288-92 requires that the specimen be attached to the test machine in a manner that simulates normal in-service attachment, as shown on Drawing No. 543-288-71 (reference SWEC File No. 6244.512-271-008A, Appendix P, page P-3).

Based on these statements, it is concluded that the equipment was welded to the test fixture in a manner similar to that shown on Elgar Drawing No. 543-288-71, attached.

No other documented evidence of test-mounting condition is readily available. Since the qualification test was sponsored and managed by Elgar as part of its generic program, GSU did not have any control over the degree of mounting details which were included in the test documents.

It should be noted that River Bend equipment Model No. 503-1-1 is qualified through its similarity to Model No. 253-1-101 (also see Response to Finding No. 1). Model No. 503-1-1 has a slightly different base than Model No. 253-1-101, and therefore the mounting weld details are different. Justification and reconciliation of the differences between the base of these models are discussed below.

Elgar-recommended installation details for Model No. 503-1-1, shown on Drawing No. 7481014-02, are 4 1/4-in. fillet welds, 2 in. long, and 4 1/4-in. fillet welds, 4 in. long typically at each corner.

River Bend installation, shown on Drawing No. 0244.512-271-005D, provides 4 1/4-in. combined flare-fillet welds, 5 in. long, and 4 1/4-in. combined flare-fillet welds, 1 in. long at each corner. Adequacy of the River

Bend weld installation was verified through Calculation No. 12210-SEG-STRU-S-E82(27), Rev. 1, dated June 3, 1983.

This calculation also demonstrates structural adequacy of the base plate. Adequacy of the base with respect to stiffness was assumed using engineering judgment.

The seismic test results (reference SWEC File Nos. 6244.512-271-008A through F) indicate that the equipment is rigid, i.e., fn > 10 Hz. Since the River Bend installation is adequate to meet the Elgar requirements, it was concluded that the River Bend installation would result in a rigid installation equivalent to the vendor's installation drawing. Based on this result, and the natural frequency of 12.2 Hz based on analysis, it was further concluded that the equipment dynamic response due to seismic loading would not change as a result of the differences in the installation details.

Corrective Action

To satisfy NRC's concern about possible introduction of flexibility as a result of the use of the base plate, a frequency analysis of the transformer-base plate assembly was performed. Results of this analysis (Calculation No. 12210-NM(C)-SQE-2101) indicate about 5-percent reduction in the fundamental frequency with the introduction of the base plate. The fundamental frequency reduced from 12.2 Hz to 11.6 Hz, which is higher than 10 Hz, and, therefore, the previous conclusion of rigidity remains unchanged.

Conclusion

This concern was found to have no effect on River Bend qualification, since an independent verification of the adequacy of the River Bend installation had been addressed.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-8

Applicant ID No.: 1SCM*XRC14

Finding No. 3

Test anomalies were mentioned, but neither described nor justified in the test report.

Response

A thorough review of the test report presented to the NRC during the audit reveals no mention of anomalies recorded during or as a result of the test. Following NRC identification of this concern in the SSER, the vendor was requested to provide a response and also indicate if any anomalies were observed during the test (SWEC File No. 6244.512.271.008F).

Additionally, copies are attached of referenced Report No. 80202, page 11, and the applicable data sheets, which clearly do not list any anomalies.

Corrective Action

Not applicable.

Conclusion

Based on all available documentation, no anomalies were observed during the test program.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-8

Applicant ID No.: 1SCM*XRC14

Finding No. 4

Site inspection revealed the following:

1. There was no contact between the base plate and concrete in most places.

2. Side panels were loose.

3. Base plate was not addressed in the qualification documents presented.

Response

It is GSU's understanding that each of the above findings were responded to and resolved satisfactorily during the audit. Responses provided to the NRC reviewer during the audit for each of the findings are as follows:

1. SWEC inspected the equipment on November 1, 1984, and found the base plate properly mounted to the floor with no gaps. Photographs taken during the inspection on November 1, 1984, indicating no gaps, were provided to the NRC on November 2, 1984.

2. This equipment was undergoing preoperational testing at the time the NRC inspected it. The side panels were removed and put in place temporarily during this test phase, explaining the looseness. Quality Assurance Inspection Report No. E440927, which was issued to monitor the testing being conducted, was provided and discussed with the NRC on November 2, 1984. Work is still in progress.

3. The base plate is considered to be part of the floor support system and, therefore, is not addressed in the equipment qualification documentation.

   Design adequacy and structural integrity of the base plate is addressed in Structural Engineering Calculation No. 12210-SEG-STRU-S-E82(27), Revision 1, dated June 3, 1983

(SWEC File No. 6244.512-271-008F). Also see response to Finding No. 2 of BOP-8 for additional discussion.

Corrective Action

None required.

Conclusion

Based on the responses given, it can be concluded that findings similar to the above are normally detected and corrected by programs in place at the site or substantiated by existing calculations. Therefore, no programmatic deficiencies exist.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP 9

Applicant ID No.: 1EJS*LDC1A

Finding

Only a summary of the test report was available. The original Wyle Test Report is needed for review and documentation.

Response

The Powell Electric Manufacturing Company Qualification Report No. 0984-J.O. No. 12210-QR, Revision 0 (SWEC File No. 4242.533-265-005A), which was reviewed and approved by SWEC on October 15, 1984, contains results of a seismic test performed by Wyle Laboratories. The test results were relevant data considered by SWEC during the review of the Powell qualification report. The SWEC reviewer considered the test results to be credible information and did not believe it was necessary to review the Wyle seismic test report before completing the review/approval of the Powell qualification report.

Corrective Action

A copy of the Wyle seismic test data was obtained at the request of the NRC reviewer. This data was reviewed by SWEC and found to be consistent with the information provided in the Powell qualification report and documented under SWEC File No. 6242.533-265-012B.

Conclusion

The SWEC reviewer of the Powell qualification report believed that sufficient information was available to complete the qualification report review/approval without reviewing the Wyle seismic test data. This judgment was subsequently proven to be correct.

GSU believes that since Powell qualified the equipment in question utilizing an approved 10CFR50 Appendix B QA program and certified that the qualification report results were correct and accurate, the SWEC reviewer acted prudently and correctly in this matter.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-10

Applicant ID No.: 1SWP*P2B

Finding No. 1

Torsional frequency of assembly needs to be computed and compared to motor's operational speed.

Response

It is SWEC's conclusion that torsional frequency would be of no concern for this pump, since it is a constant speed pump with a solid coupling between the motor and the pump shafts. However, as the result of the NRC reviewer's concern, the pump manufacturer, Hayward Tyler Pump Company, was contacted for its position on this issue. The manufacturer indicated that it has never experienced torsional frequency problems with its pumps. It should be noted that the pump was operational at the time of the audit with no evidence of problems of this type. The industry relies more on the functional test of the pump to identify and correct any resonance problems than on analytical data.

Corrective Action

To comply with the NRC request concerning a possible torsional resonance problem, the torsional natural frequency of the pump assembly was calculated and compared to the operating speed (reference: SWEC Calculation No. 12210-NM(C)-SQE-2073). The operating speed of the pump is 1180 rpm, and the calculated torsional frequency is 828 rpm, which is 29.8 percent lower than the operating speed. This exceeds the 25-percent margin recommended by the Hydraulic Institute (reference: Hydraulic Institute Standards for Centrifugal Rotary and Reciprocating Pumps, Hydraulic Institute, 13th Edition, 1975).

Conclusion

The qualification review and approval process, in combination with testing conducted as part of the preoperational test program, is considered adequate to identify and correct any problems of this nature.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: BOP-10

Applicant ID No.: 1SWP*P2B

Finding No. 2

Operability of pump under seismic load needs to be ensured.

Response

The program for ensuring operability of pumps and motors under seismic loads is described in the River Bend FSAR, Subsection 3.9.3.2.1A.

The following documents, supporting pump operability, were submitted during the audit:

SWEC File Nos.

4232.920-257.001B, C
0232.920-257-018B, -019C, -020B
0232.920-257-021A, -022A
6232.920-257-001B, -002C, -003B
6232.920-257-004C, -005D
6232.920-257-006A, -008A

NRC reviewer's concern about the effects of building displacement and thereby the pump support displacements due to seismic loading was already factored into the seismic loads used in the qualification.

A small relative displacement at the pump supports, excluding that due to the rigid body rotation of the building, was anticipated.

Since the specification and the qualification analysis of the pump under seismic load considered 40-percent higher seismic loads than the River Bend requirements, effects of the relative displacements were more than adequately addressed.

Corrective Action

As a result of the NRC's concern over the effects on pump operability due to building displacement, an analysis was performed to calculate the responses in the various pump critical components. Results of this analysis (reference SWEC Calculation No. 12210-NM(c)-SQE-2100), indicate that:

1. The building displacements at all the pump supports are in-phase due to seismic loading.

2. The resultant pump column stress is increased by approximately 500 psi, which is less than 10 percent over the previously calculated stress of 5,200 psi, and compares with an allowable stress of 27,000 psi.

3. Stress in the pump shaft is increased by approximately 95 psi, which is less than 1 percent over the previously calculated stress of 10,560 psi, and compares with an allowable stress of 31,500 psi.

4. The maximum load on the bearing is increased by approximately 13 lb, which is less than 3 percent over the previously calculated load of 448 lb.

Conclusion

The use of 40 percent higher than the required seismic loads in the pump qualification analysis more than adequately accounts for the building relative displacement.

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SQRT - SSER

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-1

Applicant ID No.: C11-D001

Finding

The additional brace used during qualification testing of the equipment was missing from the installed unit.

Response

The seismic qualification test on the hydraulic control unit (HCU) was performed to an SRV fatique RRS that significantly exceeds the RBS requirements. As the result of this very conservative test, a hanger holding the N_2 bottle on the HCU broke. Analysis of the hanger attributed the failure to fatigue. The test specimen was modified by replacing the broken hanger and adding a second brace to the unit, which reduced the deflection of the hanger, and the test was continued and successfully completed.

Since the RBS RRS for SRV fatigue is significantly less severe than the tested RRS, RBS decided not to add a second brace to the HCU brace already installed but to analyze the fatigue load on the hanger using RBS specific requirements. The analysis demonstrated acceptability of the hanger for a lifetime in excess of 40 years. To establish dynamic similarity between the test unit and the RBS installed unit, a finite element analysis was performed which demonstrated that there was no significant difference in the dynamic response of the units. In GSU's judgment, this analysis, in conjunction with the fatigue analysis of the bottle hanger, was sufficient to justify applicability of the test data on the double-braced test specimen to the single-braced RBS HCU. The above analyses were presented to the NRC reviewer during the audit, and although the fatigue analysis was accepted, the reviewer requested further proof of dynamic similarity which would have required GSU to refine the three-dimensional computer model of the HCU and perform additional analyses.

Instead, GSU elected to pursue an alternate approach of qualifying the HCU to a limited life using the test data accumulated on the single-braced test unit prior to failure of the hanger. This approach is described in the attachment and was provided to the NRC in GSU's previous response to SSER open items (reference RBG-20594 dated March 29, 1985).

In response to an additional question raised by the NRC following the review of the information presented above, the following is provided. The design basis for RBS (BWR 6) postulated 1,800 SRV actuations over the life of the plant (reference RBS FSAR 6A.17.2.4). Each SRV actuation results in approximately seven pressure oscillations (reference FSAR Figure A.6A.5-13) equivalent to three fatigue stress cycles (total of 3 x 1,800 = 5,400 cycles). The qualification report for the HCU states that the 15 minutes of SRV fatigue aging subjected the test specimen to an excess of four times the number of required fatigue stress cycles (reference NEDC-30820, Vol 1, p 14).

Corrective Action

None required.

Conclusion

This concern was found to have no effect on River Bend qualification. GSU's conservative approach qualifies the HCU for a limited life, at the expiration of which the units will be refurbished, as required, under the RBS maintenance/surveillance program.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-2

Applicant ID No.: H13-P680

Finding No. 1

The dynamic similarity between the test specimen and the River Bend equipment shall be demonstrated in order to utilize the existing test results.

Response

The SQRT qualification report that was presented to the NRC reviewer during the audit states the RBS panel as assembly Drawing No. 914E519. The subtier RBS drawing for the center console is 914E541. The tested panel is Drawing No. 865E499 (reference DRF No. A00-1138-T). These drawings were available at the audit. The criteria used by GE in establishing dynamic similarity for RBS between tested and installed units have been utilized for other plants, discussed with the SQRT reviewers, and found acceptable in previous audits at the following plants:

Susquehanna	March 1981
Shoreham	April 1981
Grand Gulf	July 1981
Hanford	November 1982
Limerick	January 1984
Perry	July 1984

The same procedures were used for RBS. The SQRT reports for the above plants included a written discussion of these criteria. The corresponding writeup was omitted from the RBS package. The writeup will now be added to the RBS SQRT report.

The RBS control console (H13-P680) consists of a center section, two transition sections, and two wing sections. The two wing sections are sturcturally similar to the center section.

The dynamic test was conducted on a test panel assembly consisting of the center section and the two transition sections. The test panel assembly is structurally similar to the RBS control console center section and transition sections. The fundmental frequency of the test panel assembly is 19.5 HZ.

The addition of the wing sections, which are bolted to the transition sections, stiffens the RBS control console assembly. Therefore, the RBS control console assembly will have a greater fundamental frequency than the test panel assembly.

Also, the cutoff frequency of the RBS input motion is around 10 HZ. Therefore, the dynamic test response level of the test panel assembly will bound the inservice response level of the RBS console assembly.

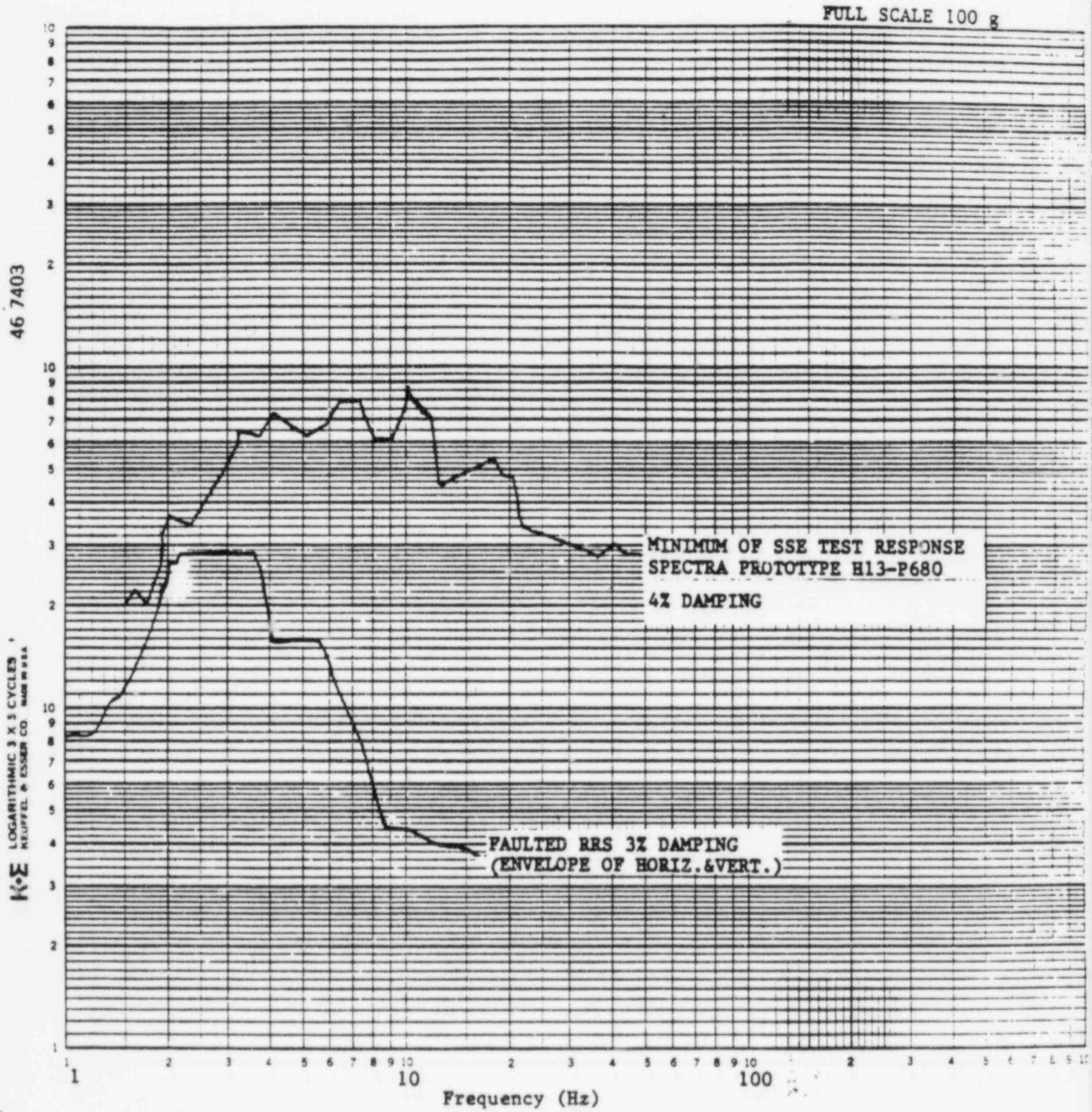
Finally, there is a greater than 100% margin between the TRS and the RBS RRS.

Corrective Action

A writeup outlining the criteria used to establish similarity between tested and installed panels will be added to the SQRT report.

Conclusion

Dynamic similarity between the tested and the installed panel was established using criteria that were found acceptable for other NTOL plants.


FULL SCALE 100 g
46 7403
K·E LOGARITHMIC 3 X 3 CYCLES
KEUFFEL & ESSER CO.
MINIMUM OF SSE TEST RESPONSE
SPECTRA PROTOTYPE H13-P680
4% DAMPING
FAULTED RRS 3% DAMPING
(ENVELOPE OF HORIZ.&VERT.)
1
10
100
Frequency (Hz)

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-2

Applicant ID No.: H13-P680

Finding No. 2

The test mounting should be completely documented in the test reports and compared with the inservice mounting for acceptability.

Response

The test report states that "in the field, the console is welded with 1/4-in. by 4-in. welds to the PGCC frame at each angle on the base. Since this could not be done on the seismic table, clamps were used at each weld location." (Reference: DRF No. A00-1138-T, Item 5.0.) The field mounting is specified in Drawing No. 944E109 and shows two 1/4-in. by 4-in. welds for each corner of the console assembly.

The bottom structural member of the RBS panel is angle steel 0.25 inches thick. This is sufficient to preclude overstresses for the welded configuration at RBS.

Corrective Action

None required.

Conclusion

The test mounting is representative of the field installation. This concern was found to have no effect on River Bend qualification.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-2

Applicant ID No.: H13-P680

Finding No. 3

For devices qualified separately, the complete test report should be available to define the capability g-values and to demonstrate that the RRS is enveloped over the entire frequency range.

Response

Complete test reports for devices qualified separately were made available to the NRC reviewer during the SQRT audits. The reports express the equipment capability in terms of g-values based on single-frequency testing. The methodology for arriving at these g-values is described in RBS FSAR Section 3.10.2.2B. While single-frequency testing is generally not used to establish qualification in accordance with IEEE 344-1975 and Regulatory Guide 1.100, IEEE 344-1975 and the GE SQRT program permit the use of such test data for devices under any of the following conditions:

1. The device input motion is dominated by one frequency.

2. The device is rigid, or its response is adequately represented by one mode.

3. The device can be characterized as passive, in which case its safety function is satisfied by maintaining structural integrity.

4. The device is similar to another device that has been tested to IEEE 344-1975 requirements.

5. The device was tested to a sufficiently high acceleration level to excite all modes over the frequency range of interest.

The above criteria were used in the GE seismic qualification reevaluation program for each of the six projects previously audited and accepted by the NRC SQRT (see SSER response to SQRT ID No. NSSS-2, Finding No. 1). The same criteria were used for RBS.

The capability g-values are compared to the required accelerations at the equipment mounting location. These are obtained as the product of the maximum panel transmissibilities measured at the mounting location at the panel resonance and the ZPA of the applicable RBS floor response spectra. GE has performed studies to show that this is a very conservative approach to determine maximum required accelerations.

In addition to the above arguments, supplemental arguments can be applied to the River Bend control room panels. A review of the River Bend panels (see Exhibit A, Table 1) shows that the lowest natural frequency for all but two panels is 12 HZ or higher. This compares to a cutoff frequency of 8 HZ (conservatively rounded up to 10 HZ) for the River Bend floor response spectra. Therefore, all but two panels behave as rigid bodies at River Bend, and the device RRS are the same as the floor response spectra. Panels H13-P651 and H13-P652, with natural frequencies less than 10 HZ, were tested to floor TRS which envelop the River Bend floor response spectra, so they are qualified as an assembly.

For the devices in the remainder of the panels, all but two were tested to the multi-frequency, multi-axis requirements of IEEE 344-1975 (see Exhibit A, Table 2). Comparison of the device TRS to the River Bend device RRS (which are the same as the floor response spectra) shows that all devices are qualified. (Exhibit A, Attachment 1 presents the River Bend floor response spectra, and Attachment 2 presents samples of the representative device TRS). For the two devices tested to single-frequency requirements, resonance search data show they are rigid to 26 HZ with a loading capability far in excess of the River Bend floor ZPA. (Exhibit A, Attachment 2, Enclosure 11)

It is therefore concluded that all River Bend control room panels and devices are qualified to the requirements of IEEE 344-1975.

Corrective Action

None required.

Conclusion

The qualification for devices mounted in control room panels was established using the same criteria that were found acceptable for other NTOL plants.

Exhibit A

Table of Contents:

TABLE 1

LOWEST NATURAL FREQUENCY BY PANEL

CONTROL ROOM PANEL	LOWEST NATURAL FREQUENCY (hz)*
H13-P601	14.0
618	19.0
621	14.0
622	14.0
623	14.0
626	19.0
628	19.0
629	19.0
631	19.0
632	19.0
642	19.0
651	9.0
652	9.0
654	14.0
655	14.0
669	14.0
670	14.0
671	14.0
672	14.0
680	19.0
691	21.0
692	21.0
693	21.0
694	21.0
808	14.0
819	18.0
820	18.0
841	12.0
842	12.0
851	12.0
852	12.0
863	14.0
870	14.0
877	14.0
951	18.0
962	18.0
C61-P001	22.0

* Note: Data from River Bend SQRT Report: DRF A00-02200

TABLE 2

DEVICE PPD NUMBER	344-1975 Tested	lowest f_n 344-1971 TESTED
136B3137	X	
145C3040	X	
145C3043	X	
145C3209	X	
145C3230	X	
159C4251	X	
159C4486	X	
159C4659	X	
159C4660	X	
163C1392	X	
164C5150	X	
164C5257	X	
164C5258	X	
164C5628		26.0 hertz
164C5630		26.0 hertz
164C5687	X	
164C5288	X	
169C9481	X	
169C9488	X	
169C9489	X	
160C9490	X	
169C8124	X	
174B9070	X	
184C4571	X	
184C4723	X	
184C5506	X	
184C5988	X	
184C5213	X	
184C5568	X	
184C4689	X	
188C8035	X	
198B6203AA	X	
204B6186AA	X	
204B6188AA	X	
204B6208AA	X	
204B6220AA	X	
204B6616	X	
213A7492	X	

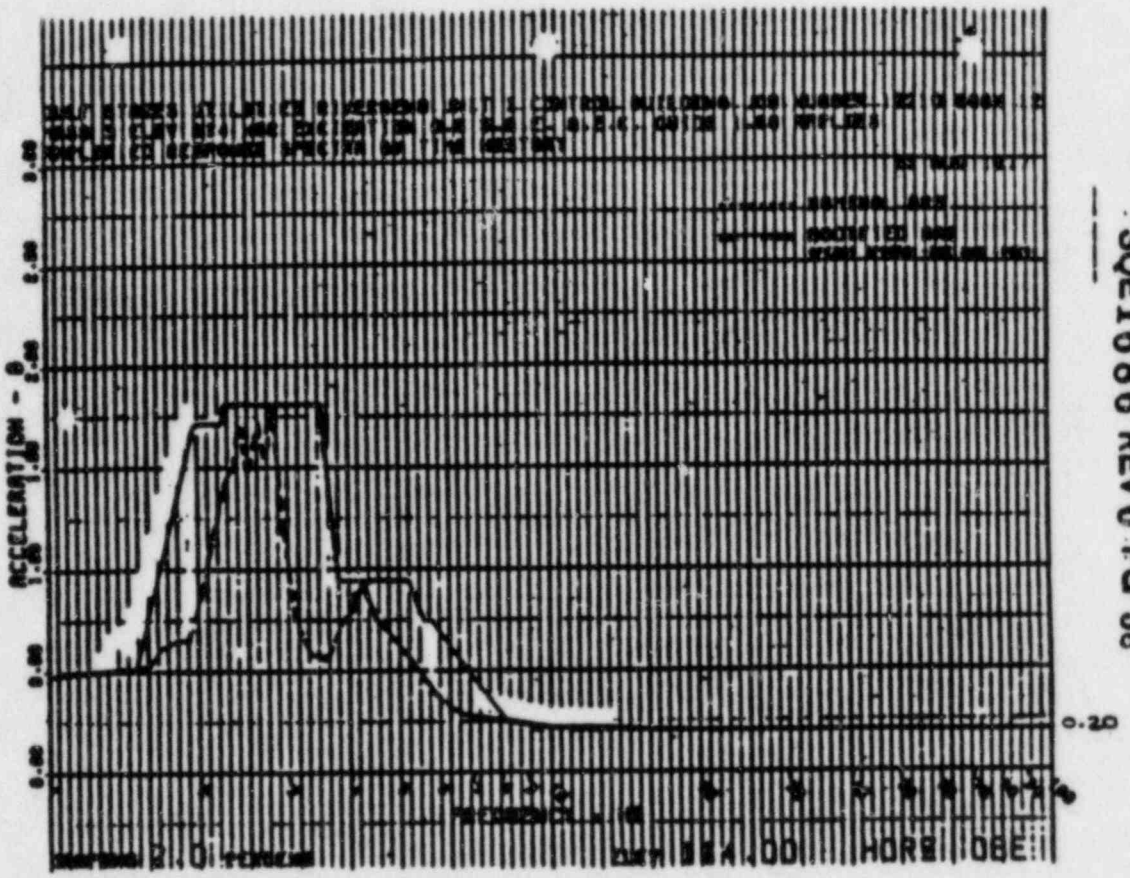
TABLE 2 (continued)

DEVICE PPD NUMBER	344-1975 Tested	lowest f_n 344-1971 TESTED
228B1470	X	
234A9327	X	
234A9329	X	
238X660	X	
262A7132	X	
262A7144	X	
262A7713	X	
262A7722	X	
336X101BB	X	
368X102BB	X	
386X234	X	
851E341	X	
861E603	X	

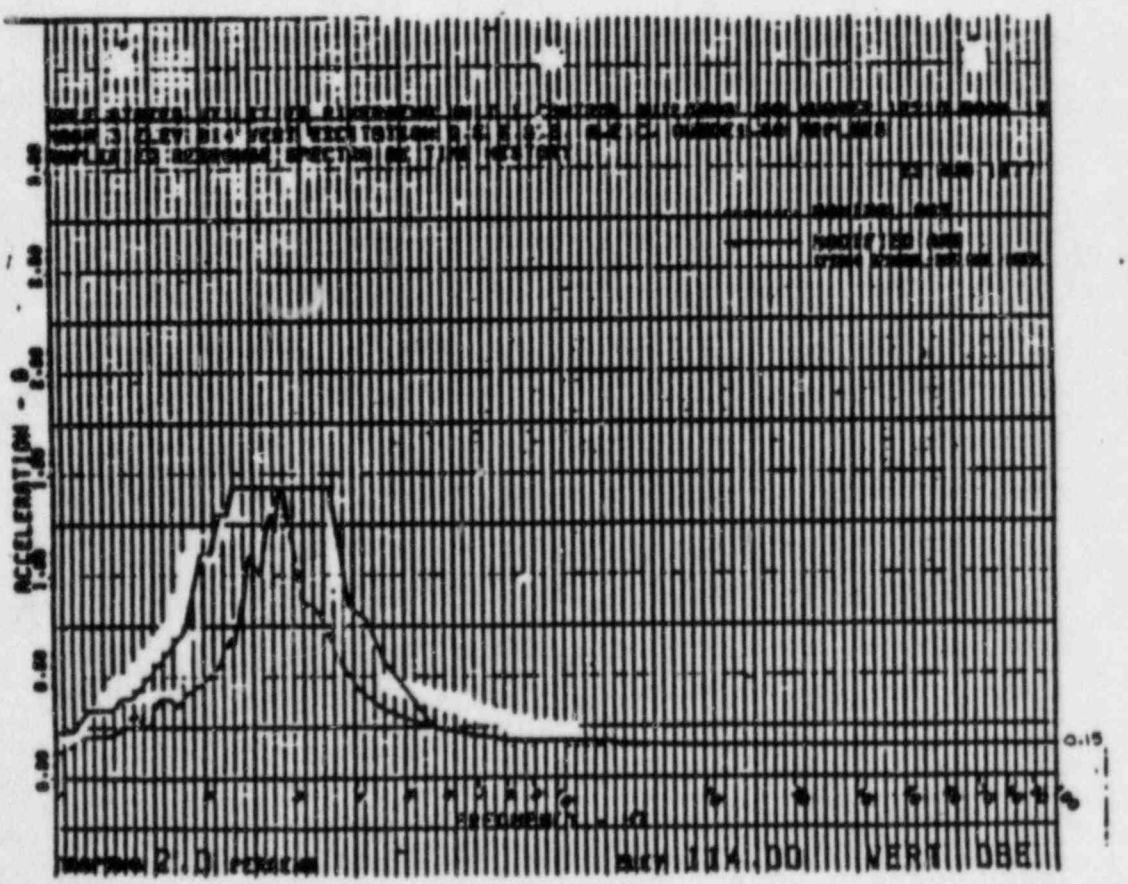
ATTACHMENT 1

RBS RRS (FLOOR)

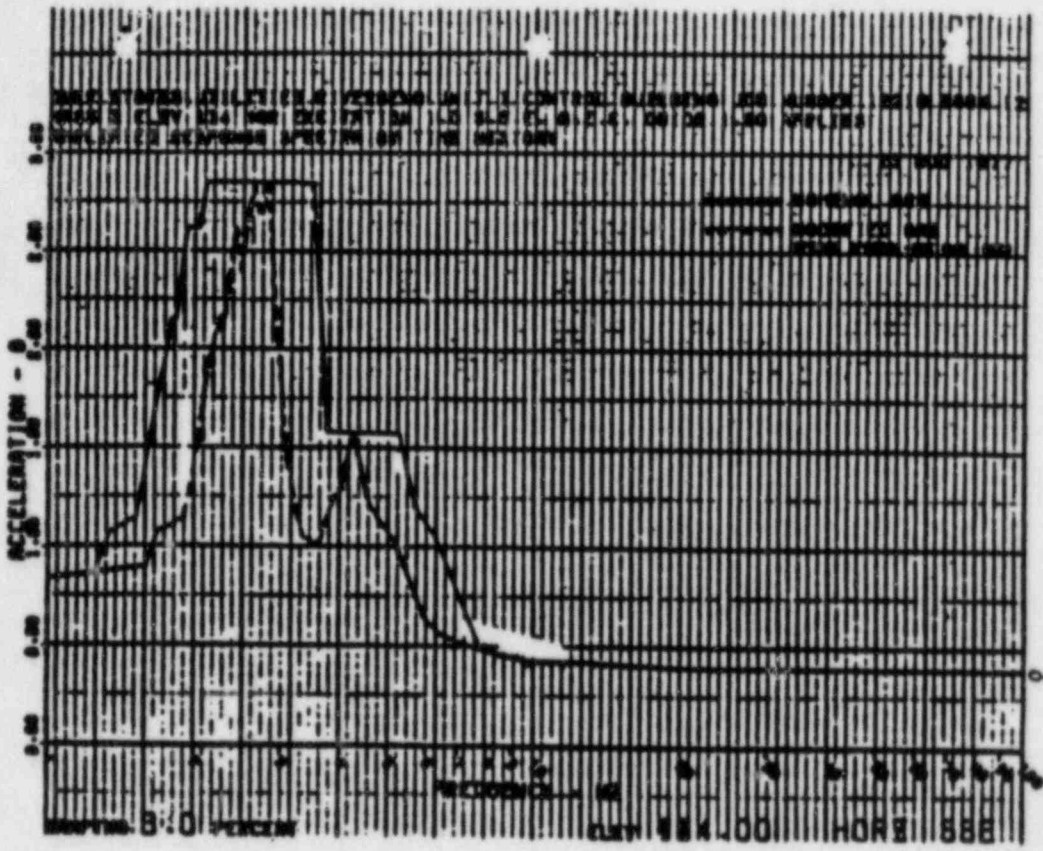
ATTACHMENT (1)



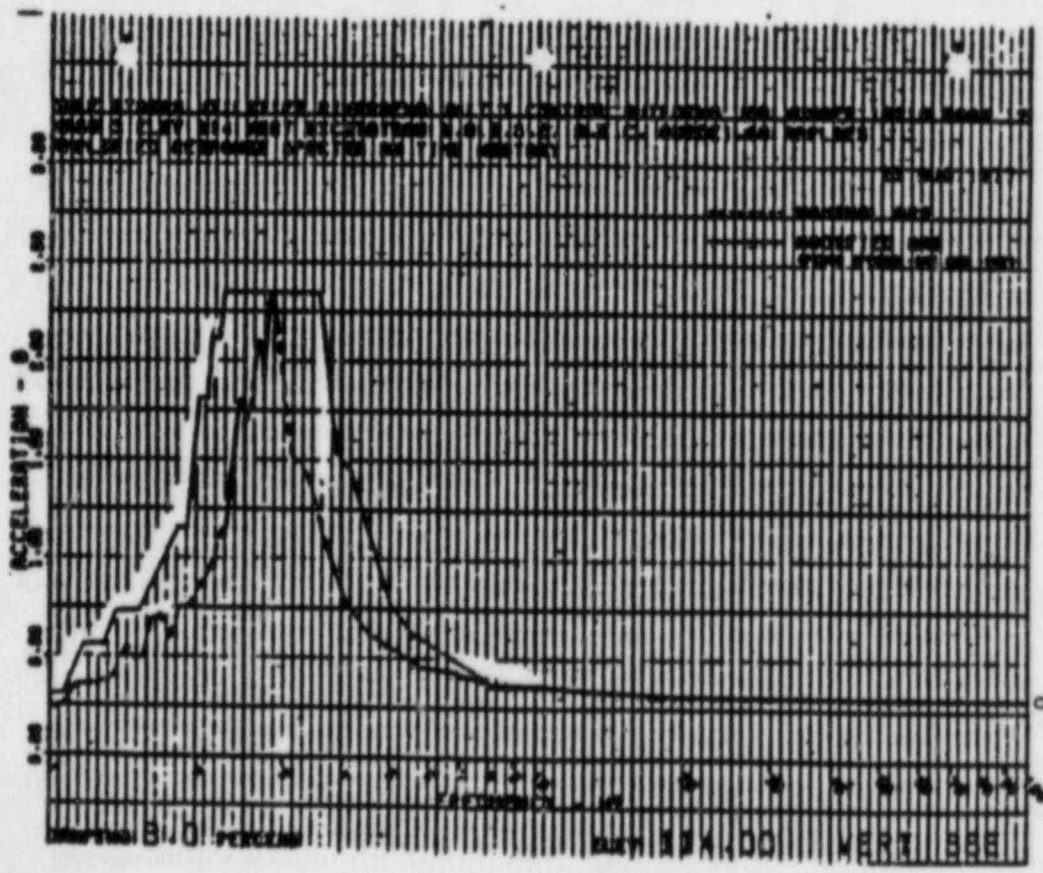
SQE1686 REV 0 PG 35



SQE1686 REV 0 PG 43



SQE1686 REV 0 PG 26



SQE1686 REV 0 PG 33

ATTACHMENT 2

DEVICE TRS

ENCLOSURES 1 thru 10

EXAMPLES OF DEVICE MULTIAXIS, RANDOM FREQUENCY TESTS WHICH ENVELOPE THE RIVERBEND RRS.

ARROW(S) SHOW RIVER BEND DEVICES.

EXAMPLES PROVEDED FOR THE FOLLOWING DEVICES

Enclosure	#1	136B3137
		145C3040
		164C5258
		164C5150
		262A7144
		164C5257
		204B6186
		204B6188
	#2	159C4486
		164C5288
	#3	163C1392
		262A7713
		262A7722
	#4	164C5687
	#5	145C3230
		204B6616
	#6	198B6203
		204B6186
		204B6188
		204B6208
		204B6220
	#7	169C9481
		169C9488
		184C4689
		184C5988

Enclosure	#8	
		136B3137
	#9	159C4660
		159C4486
		159C4659
	#10	
		188C8035

ENCLOSURE 1

DRF# A00-1138
DRF# H13-42

NUCLEAR ENERGY BUSINESS GROUP

GENERAL ELECTRIC

SH NO.
REV

TEST REPORT

COFRENTES

H13-P618

PREPARED BY:

H. L. OCCHI

VERIFIED:

B. J. UEBELHOER

APPROVED:

R. A. PARKER 12/1/78

NEBG 807

e.	Residual Heat Removal System	828E246AD
f.	Automatic Depressurization System	851E225AD
g.	Reactor Core Isolation Cooling System	828E251AD
h.	Rod Control and Information System	851E478AD
i.	Standby Liquid System	828E234AD
j.	Remote Shutdown	828E239AD

3. ESSENTIAL DEVICES

	Device	Drawing	Quantity
3.1	Relay, panel auxiliary	136B3137P001	2
3.2	Relay	164C5257P007	2
3.3	Switch type CR2940	145C3040P006	2
3.4	Switch type CR2940	145C3040P010	2
3.5	Relay	145C3217P010	2
3.6	Relay, panel auxiliary	159C4251P001	4
3.7	Relay	164C5258P001	5
3.8	Relay	164C5258P004	31
3.9	Trip unit	164C5150P216017	1
3.10	Trip unit	164C5150P116016	2
3.11	Trip unit	164C5150P170002	2
3.12	Trip unit	164C5150P170159	2
3.13	Trip Unit	164C5150P170007	2
3.14	Trip unit	164C5150P170012	1
3.15	Trip unit	164C5150P170017	4
3.16	Trip unit	164C5150P170023	4
3.17	Trip unit	164C5150P270026	2
3.18	Trip unit	164C5150P170066	1
3.19	Trip unit	164C5150P179028	1
3.20	Trip unit	164C5150P270017	2
3.21	Trip unit	164C5150P277043	2
3.22	Trip unit	164C5150P279058	2
3.23	Trip unit	164C5150P700000	13
3.24	Inverter	164C5243P008	1
3.25	Calibration unit	262A7144P001	5
3.26	Switch (type CR2940)	145C3040P001	2
3.27	Relay	145C3217P047	2

Device	Drawing	Quantity
3.28 Trip unit	164C5150P216004	1
3.29 Trip unit	164C5150P216026	1
3.30 Relay	164C5257P010	40
3.31 Relay	164C5258P002	3
3.32 Field Contact Input Isolator	204B6186AAG002	8
3.33 Field Contact Input Isolator	204B6186AAG003	11
3.34 High Level Output Isolator	204B6188AAG001	

4. TEST ARTICLE

H13-P618 is a Division 2 Residual Heat Removal Control panel measuring 72 in. in width, 36 in. deep and 90 in. in height. Sides of this panel are reinforced by mid-plane diagonal bracing with gussets. Diagonal bracing is fabricated from structural steel square tubing and measures 36 in. on each side. Tie-down holes at the base of the panel are 12 in. from center to center and extend to 6 in. from the corners of the panel.

5. ATTACHMENT TO SEISMIC TABLE

Panel was mounted on Seismic Table per Seismic Qualification Procedure 22A4320, Paragraph 5.1. For the performance of Longitudinal testing, the panel was rotated 90° and remounted per the aforementioned procedure.

6. INSTRUMENTATION

6.1 ACCELEROMETER MOUNTING

Initial accelerometer mountings are as shown in Figure 6-1.. During the lateral dual axis test, accelerometer No. 3 was removed in order that it might be used to measure floor motion (vertical). For longitudinal testing accelerometer No. 8 was added to the right rear of the panel (as shown in Figure 6-1) approximately 4 ft from the bottom. This was done to measure high accelerations noted at the

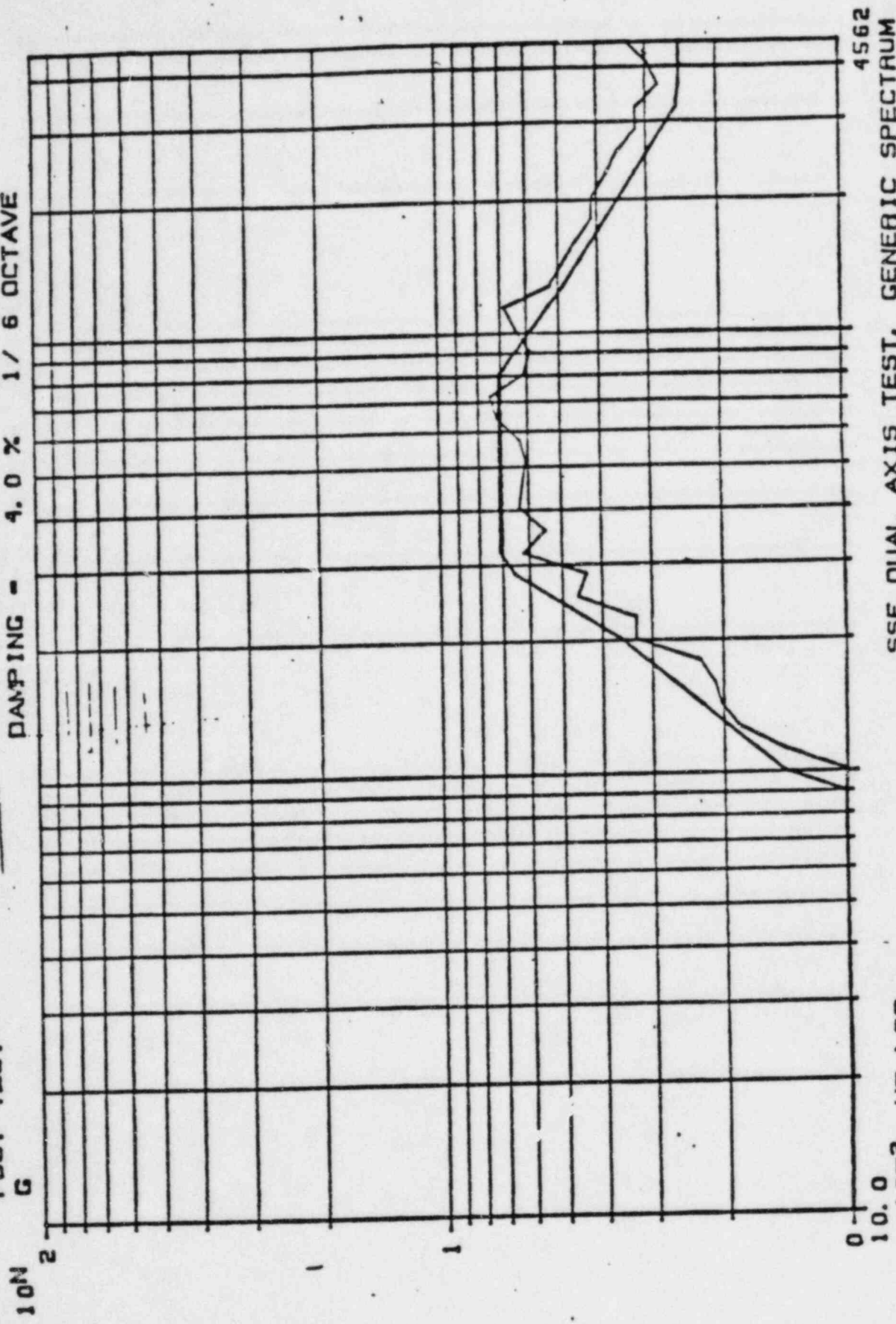

COFRENTSE P618 LATERAL INPHASE 3/20/78.
POST TEST
G
OF PULSES AT 0 DB = 3
DAMPING = 4.0 % 1/6 OCTAVE
10^N
2
1
0
10.0
10^-2 HZ LOG
4562
SSE DUAL AXIS TEST, GENERIC SPECTRUM

Figure 8-3

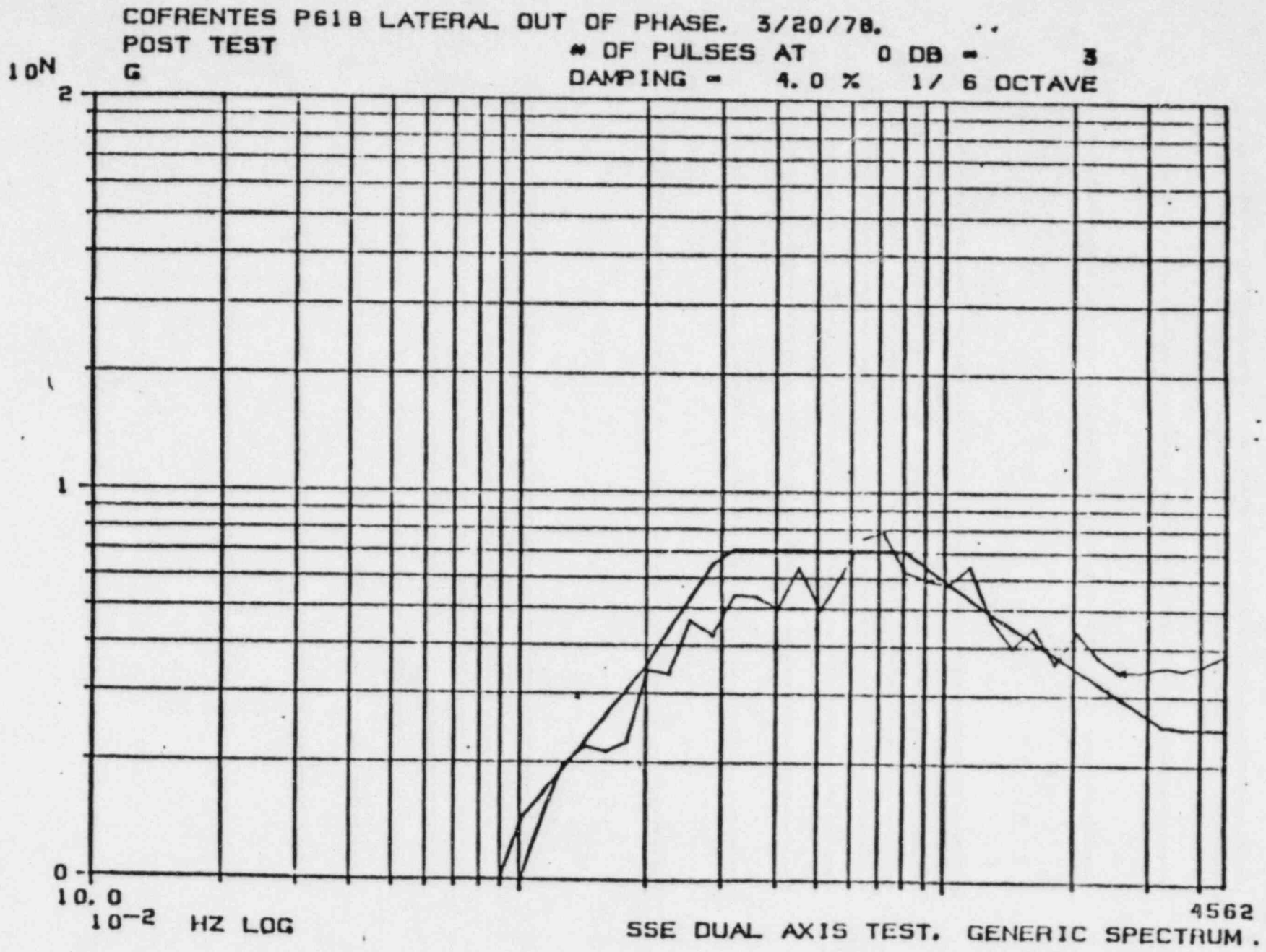
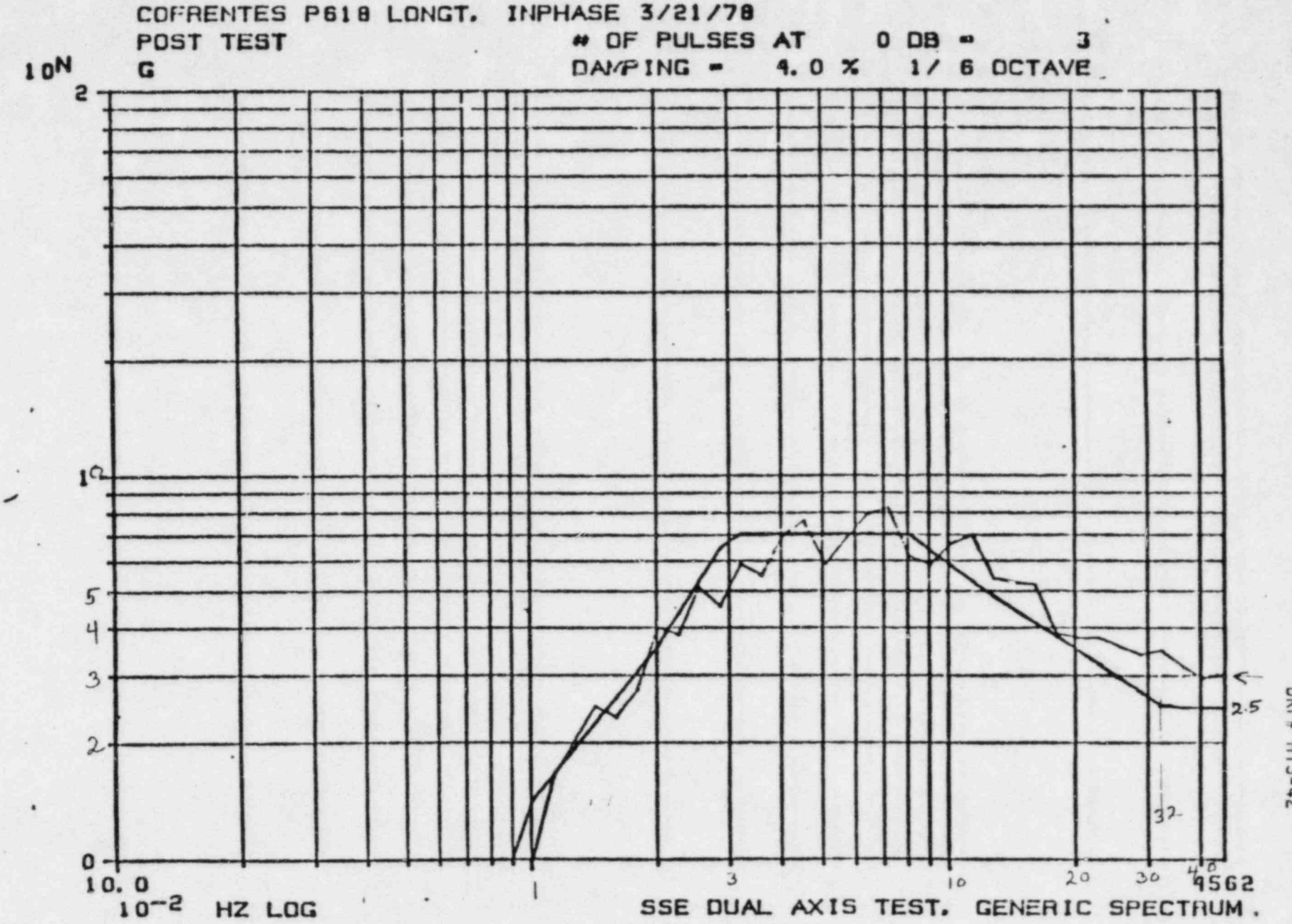


Figure 8-4



DRF# H13-42

Figure 8-7

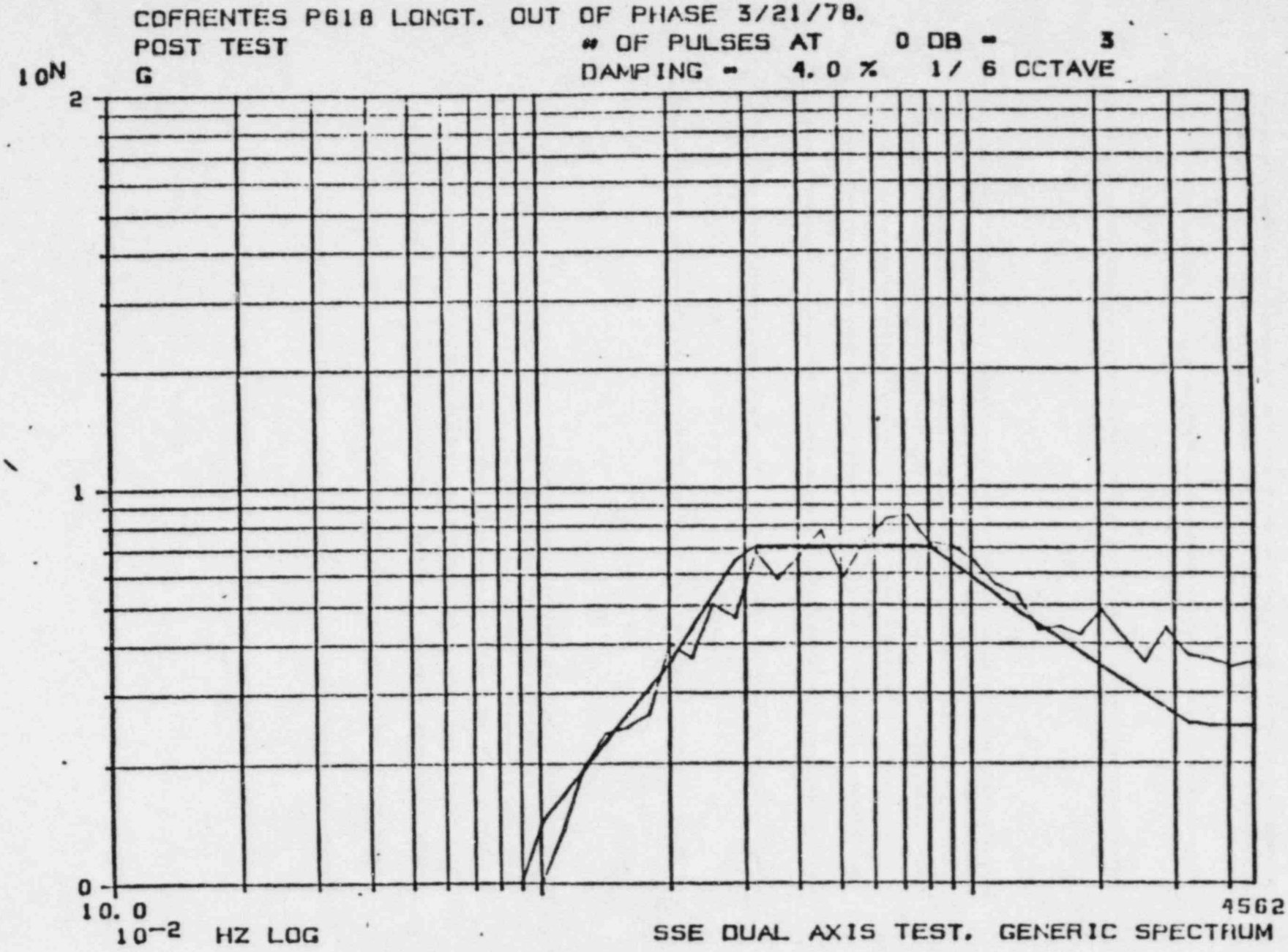

COFRENTES P618 LONGT. OUT OF PHASE 3/21/78.
POST TEST
OF PULSES AT 0 DB = 3
DAMPING = 4.0 % 1/ 6 OCTAVE
G
10^N
2
1
0
10.0
10^-2 HZ LOG
4562
SSE DUAL AXIS TEST. GENERIC SPECTRUM

Figure 8-8

ENCLOSURE 2

DRF# A00-1138

DRF H13-61

NUCLEAR ENERGY BUSINESS GROUP

GENERAL ELECTRIC

REV | SH NO.

TEST REPORT

COFRENTES

H13-P601

post-dated 11/22/78

PREPARED BY: H L Occhi 11/7/78

H. L. Occhi
Requisition Design Engineering

PREPARED BY: B. J. Uebelhoer

B. J. Uebelhoer, Engineer
Experimental Mechanics

VERIFIED BY: J. D. Heald 11/21/78

JD Heald, Senior Engineer
Experimental Mechanics

APPROVED BY: J N Kass

J. N. Kass, Manager
Experimental Mechanics

APPROVED BY: R A Parker 11/22/78

R. A. Parker, Manager
Requisition Design Engineering

NEBG 807

2.2 Institute of Electrical & Electronic Engineers (IEEE)

a.	IEEE Recommended Practices for Seismic Qualification of Class 1E Electrical Equipment for Nuclear Power Generating Stations Protection Systems	IEEE 344-1971 IEEE 344-1975

2.3 Drawings

a.	Arrangement	828E352AD
b.	Assembly	328X501ADG001
c.	Connection Diagram	828E381AD
d.	Elementary Drawing	851E225AD
e.	" "	828E227AD
f.	" "	828E234AD
g.	" "	828E247AD
h.	" "	828E248AD
i.	" "	828E249AD
j.	" "	828E251AD
k.	" "	828E225

3.0 NUCLEAR SAFETY RELATED DEVICES

Switch (Type CR2940)	(18)	145C3040P001
Switch "	(08)	145C3040P002
Switch "	(23)	145C3040P003
Switch "	(12)	145C3040P004
Switch "	(16)	145C3040P006
Switch "	(08)	145C3040P007
Switch "	(12)	145C3040P010
Switch "	(80)	145C3040P013
Switch "	(08)	145C3040P015
Switch "	(09)	145C3040P017
Switch "	(07)	145C3040P018
Switch "	(02)	145C3040P027
Switch (Push Button)	(04)	145C3230P003
Switch "	(10)	145C3230P004
Square Root Converter	(01)	159C4486P001
Controller	(01)	163C1392P013
Switch	(02)	174B9070G004
Switch, SBM Control	(04)	234A9326P003
Switch, "	(01)	249A1390P002
Switch, "	(01)	249A1391P002
Switch, "	(01)	249A1391P003
Switch, "	(01)	249A1392P002
Switch, "	(02)	249A1394P002
Switch, "	(01)	249A1395P002
Switch, "	(01)	249A1396P002
Switch, "	(03)	249A1396P003
Switch (Type CR2940)	(06)	145C3040P009
Switch "	(16)	145C3040P002
Switch "	(01)	145C3040P049
Indicator	(01)	164C5288P193036

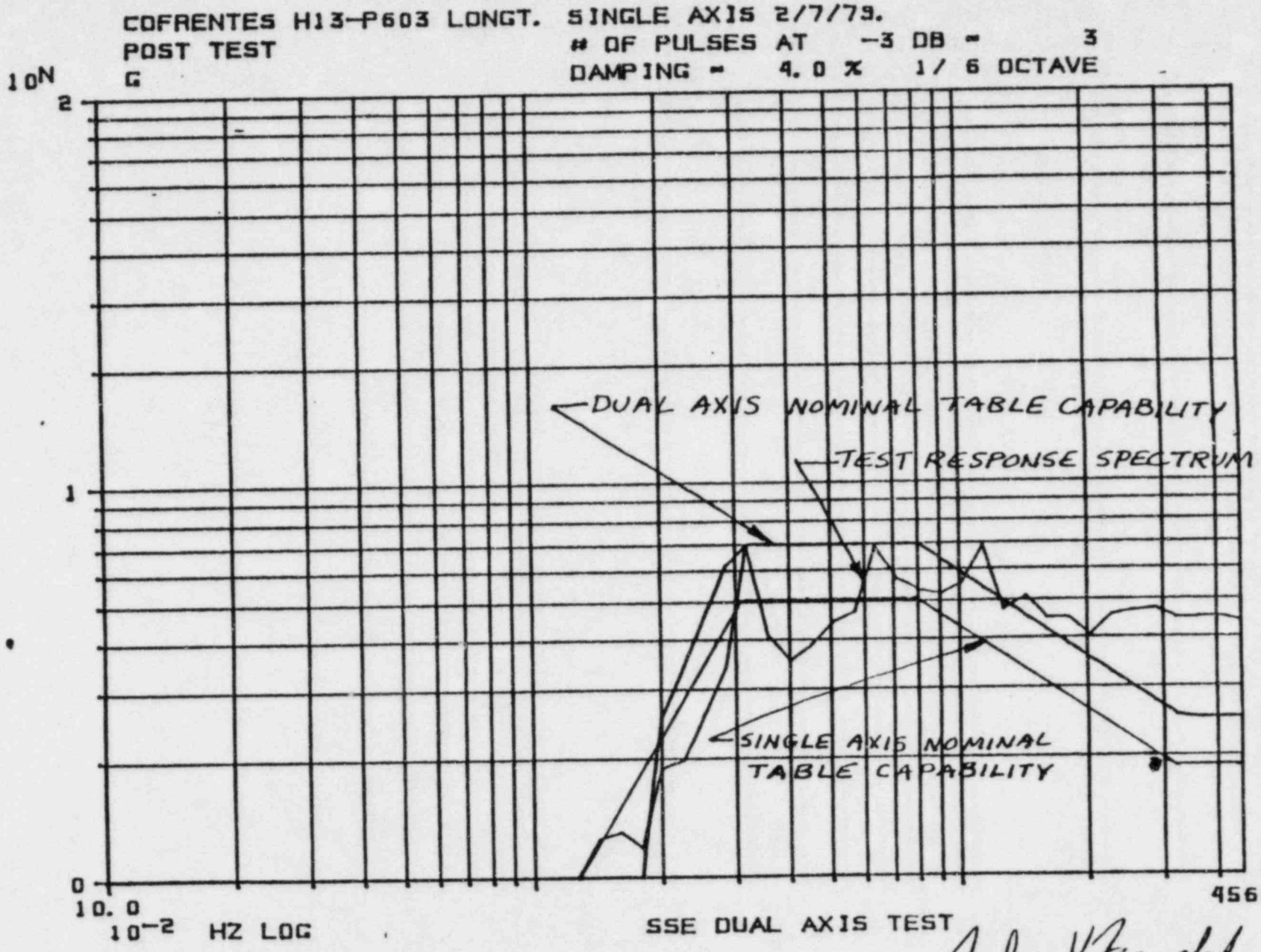


FIGURE 7

Aubrey V French 2/7/79
B. J. Uebelhoer 2/7/79

DRF# A00-579

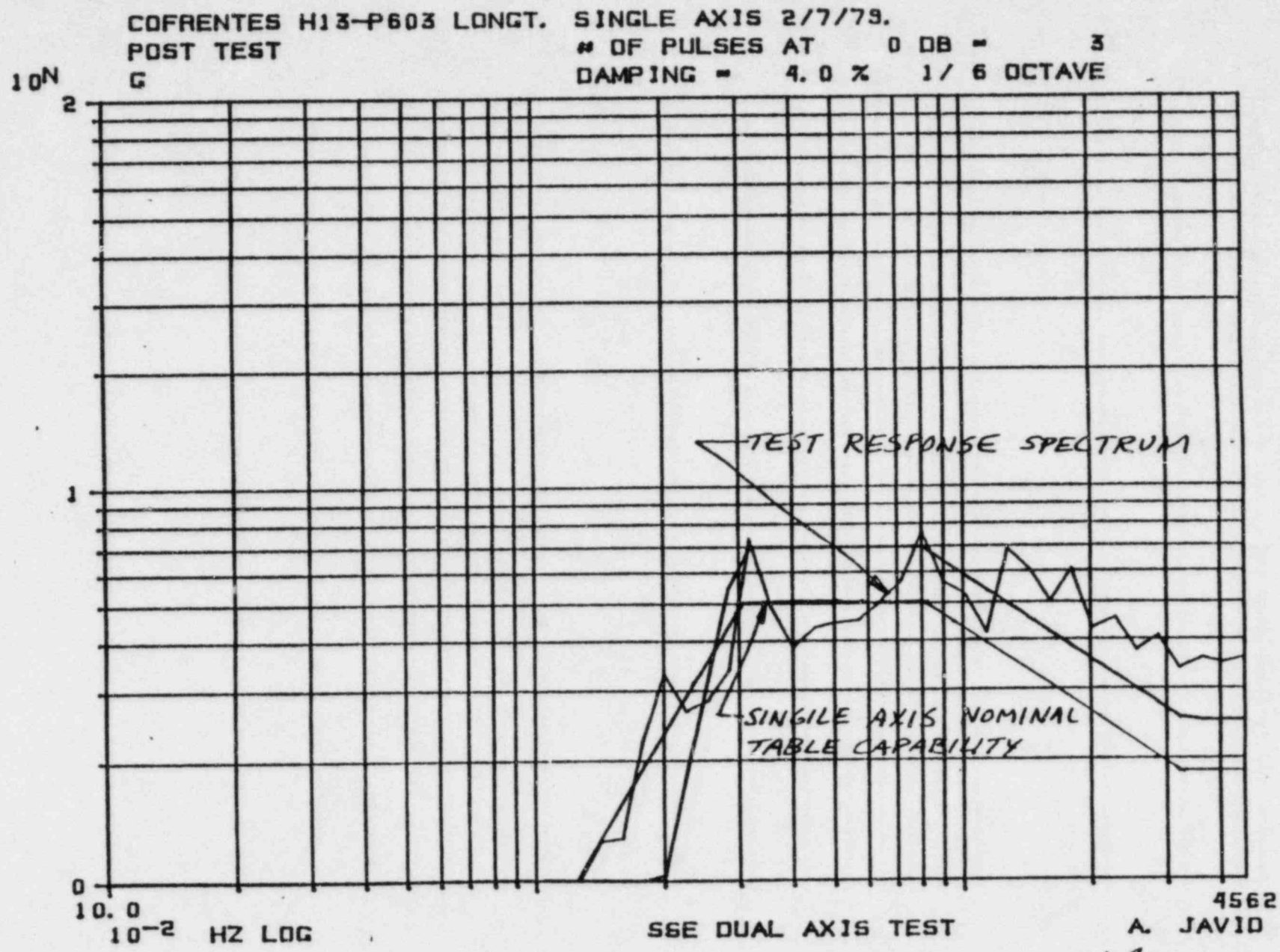
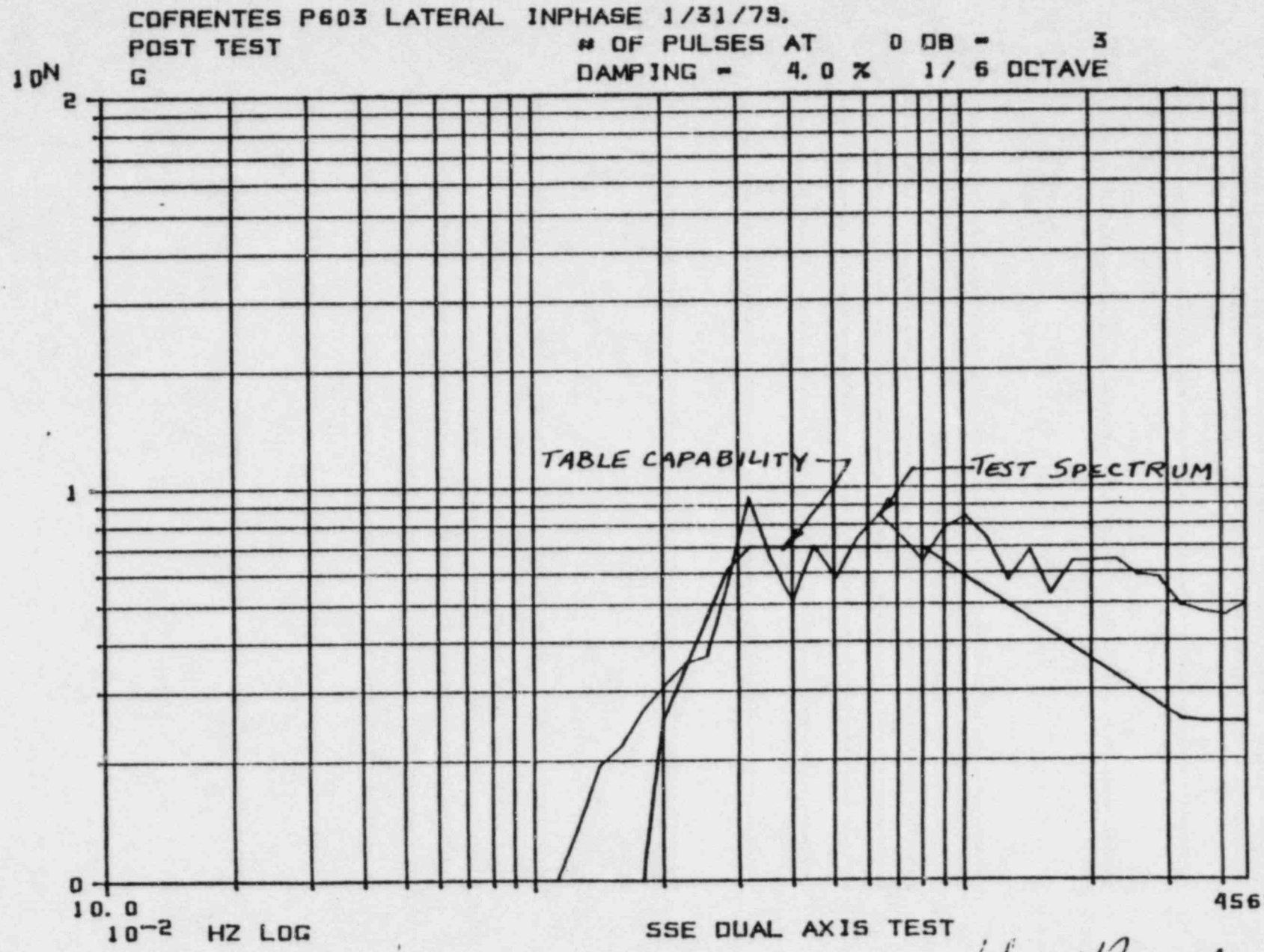


FIGURE 8

DRF# A00-579

J Vfrench 2/5/79

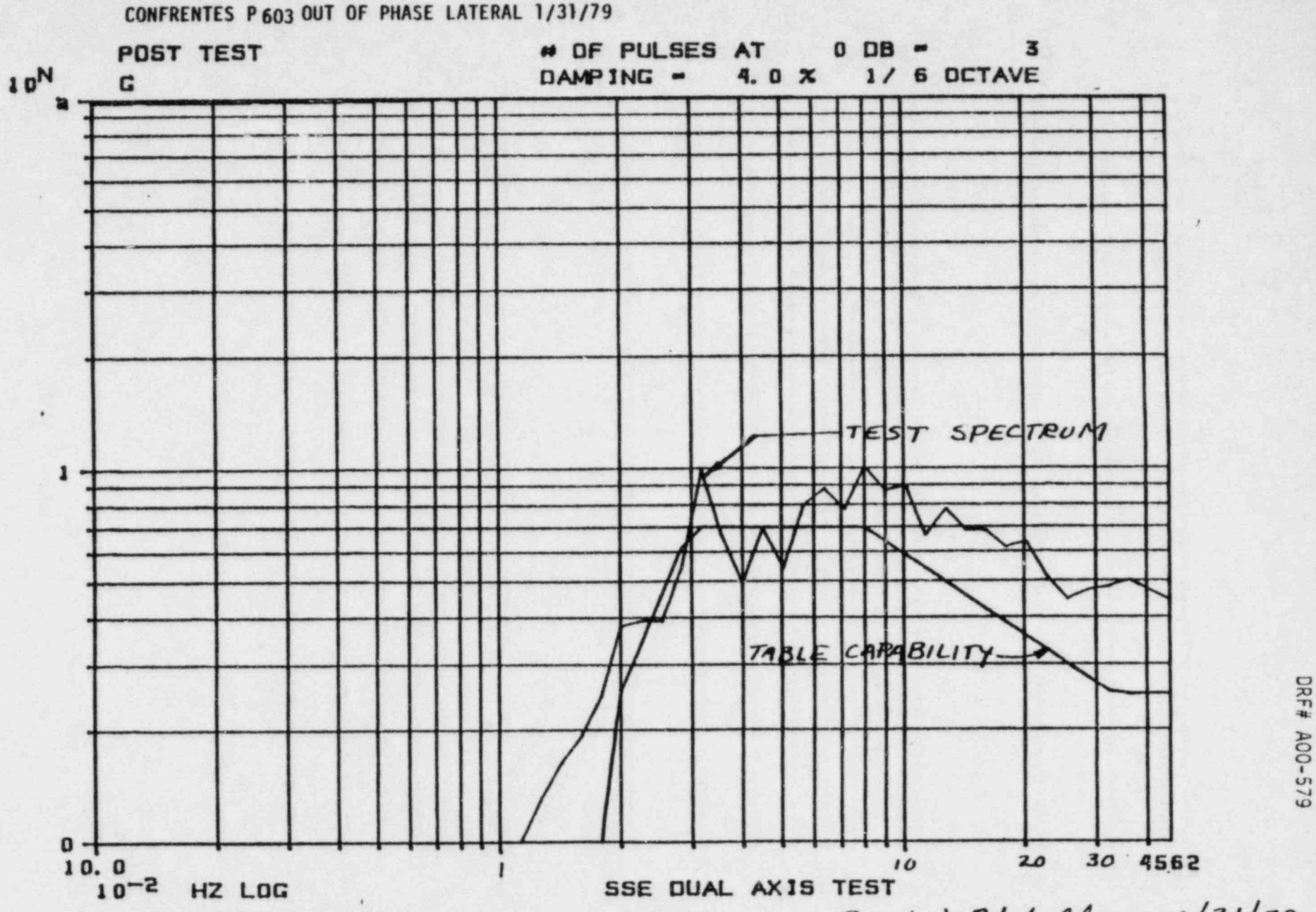
R L Gilbert 2/7/79



DRF# A00-579

FIGURE 3

Jeffrey V. Farrell 1/31/79
Burt J. Uebelhoer 1/31/79



Burt J. Uebelhoer 1/31/79

FIGURE 4

DRF# A00-579

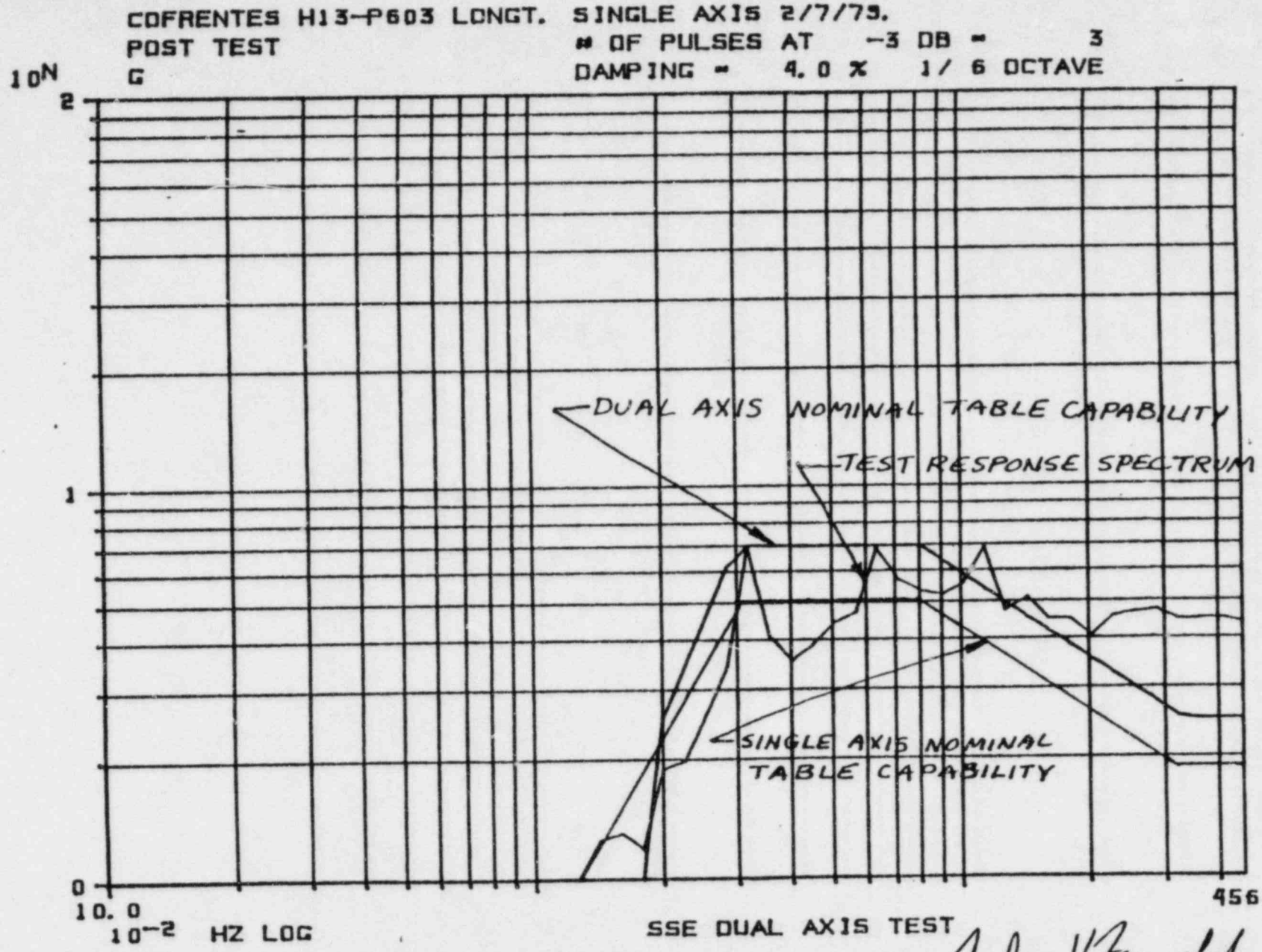


FIGURE 7

Aubrey V Trenchf 2/7/79
B. J. Uebelhoer 2/7/79

DRF# A00-579

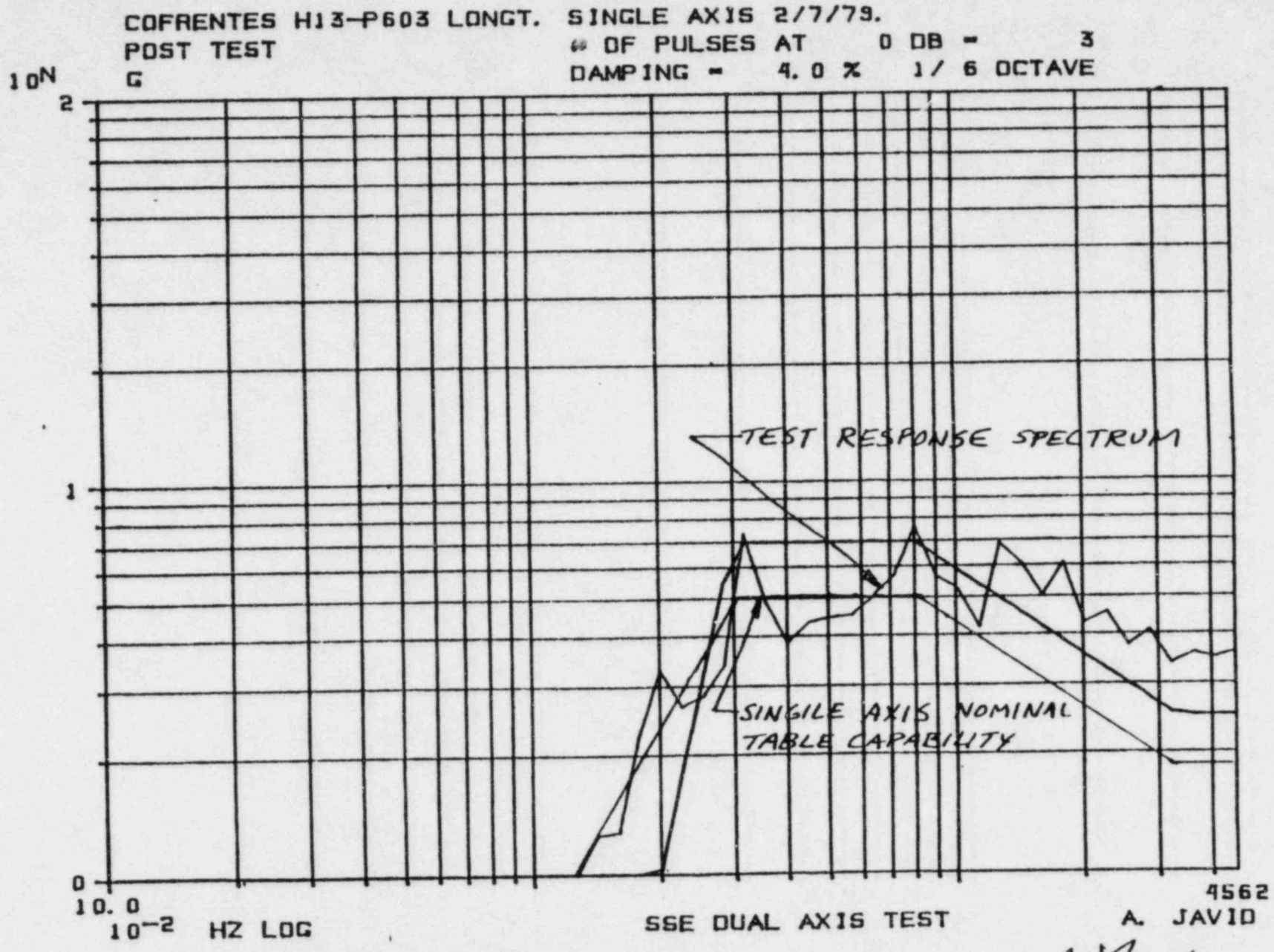


FIGURE 8

DRF# A00-579

J Strenk 2/5/79

R D Hollihan 2/7/79

ENCLOSURE 3

NUCLEAR ENERGY
BUSINESS GROUP

GENERAL ELECTRIC

REV	SH NO.

TEST REPORT

COFRENTES

C61-P001

SEISMIC TESTS

post dated 12/11/79

PREPARED BY:	VERIFIED:	APPROVED:
H. L. Occhi	B. J. Uebelhoer	R A Parker — 12/11/79
H. L. OCCHI	B. J. UEBELHOER	R. A. PARKER

NEBG 807

GENERAL ELECTRIC

NUCLEAR ENERGY DIVISION

COFRENTES: C61-P001
SEISMIC TEST
DOCUMENT NO.
SHEET NO. 2
REV. NO.

3.0 NUCLEAR SAFETY RELATED DEVICES

Square Root Converter	159C4486P001	(1)
Power Supply	159C4487P005	(3)
Controller	163C1392P012	(1)
Inverter (DC to AC)	163C1565P002	(1)
Switch, SBM Control	234A9329P005	(7)
Switch, SBM Control	234A9329P011	(2)
SB-9 Control Switch	262A7713P001	(9)
SB-9 Control Switch	262A7722P001	(3)
Switch, SBM Control	234A9327P005	(1)
Switch, SBM Control	234A9327P003	(33)
Switch (Type CR2940)	145C3040P004	(2)
Switch	164C5069P001	(2)
Switch	272A8211P001	(1)

4.0 TEST ARTICLE

The C61-P001 Panel is a vertical panel (4 Bays) measuring 96 inches in width, 36 inches in depth and 90 inches in height. This panel houses 60 switches, 3 - 24VDC power supplies, 1 - Square Root Converter, 1 - Controller, one Inverter, 6 - Meter Panels, 3 - Millivolt Converters and associated cabling, terminal boards and fuses. This panel features tie-down holes 12 inches apart ending at 6 inches from the corners. It is reinforced with mid plane diagonal bracing which is fabricated from structural steel square tubing.

5.0 ATTACHMENT TO SEISMIC TABLE

Panel C61-P001 was mounted on the table per Seismic Qualification Procedure 22A4320, Paragraph 5.1.

6.0 INSTRUMENTATION

6.1 ACCELEROMETER MOUNTING

Accelerometers were mounted on the panel as shown in Figure 1. Accelerometer #5 was removed during dual axis tests in order to be used for in-phase and out of phase measurements. Accelerometer #2 was added to the upper right rear side during the longitudinal tests only to measure accelerations due to the torsional mode.

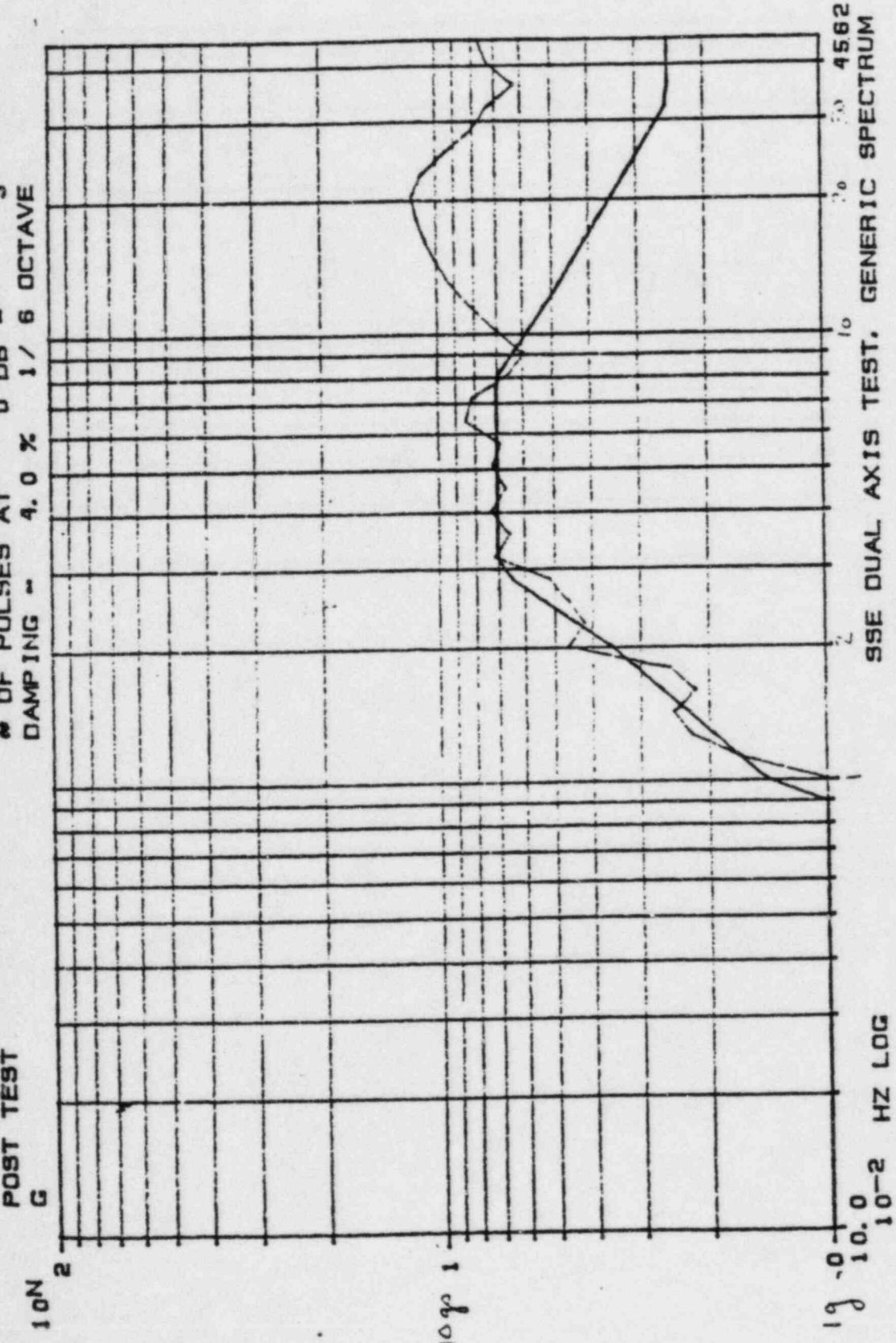

COFRENTES C61P001 LATERAL INPHASE 4/19/78.
POST TEST
G
OF PULSES AT 0 DB = 3
DAMPING = 4.0 % 1/6 OCTAVE
10^2
10^1
10^0
10.0
10^-2 HZ LOG
SSE DUAL AXIS TEST. GENERIC SPECTRUM
4562

FIGURE 2

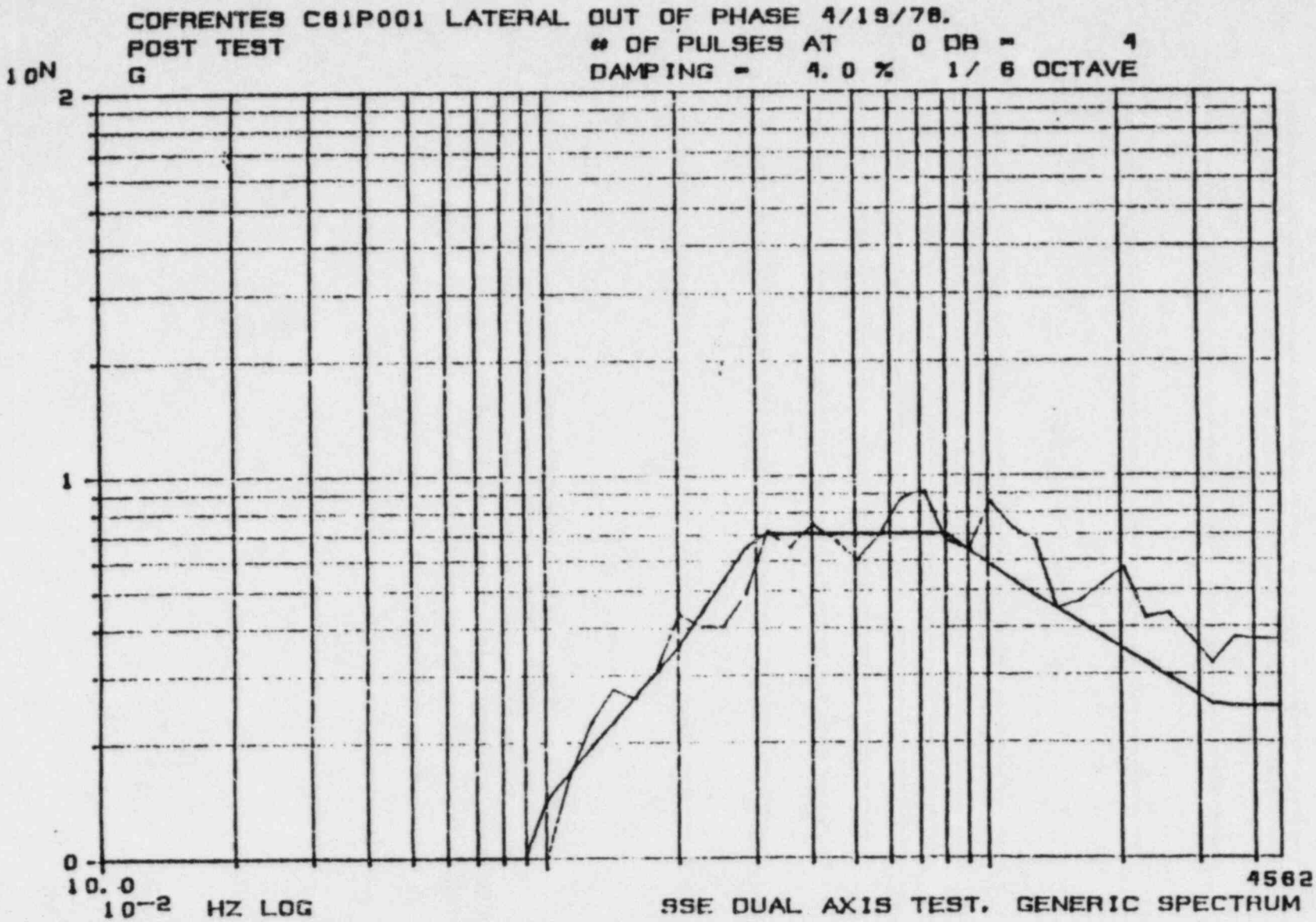

COFRENTES C61P001 LATERAL OUT OF PHASE 4/19/78.
POST TEST
G
OF PULSES AT 0 DB = 4
DAMPING = 4.0 % 1/ 6 OCTAVE
10^N
2
1
0
10.0
10^-2 HZ LOG
4562
SSE DUAL AXIS TEST. GENERIC SPECTRUM

FIGURE 3

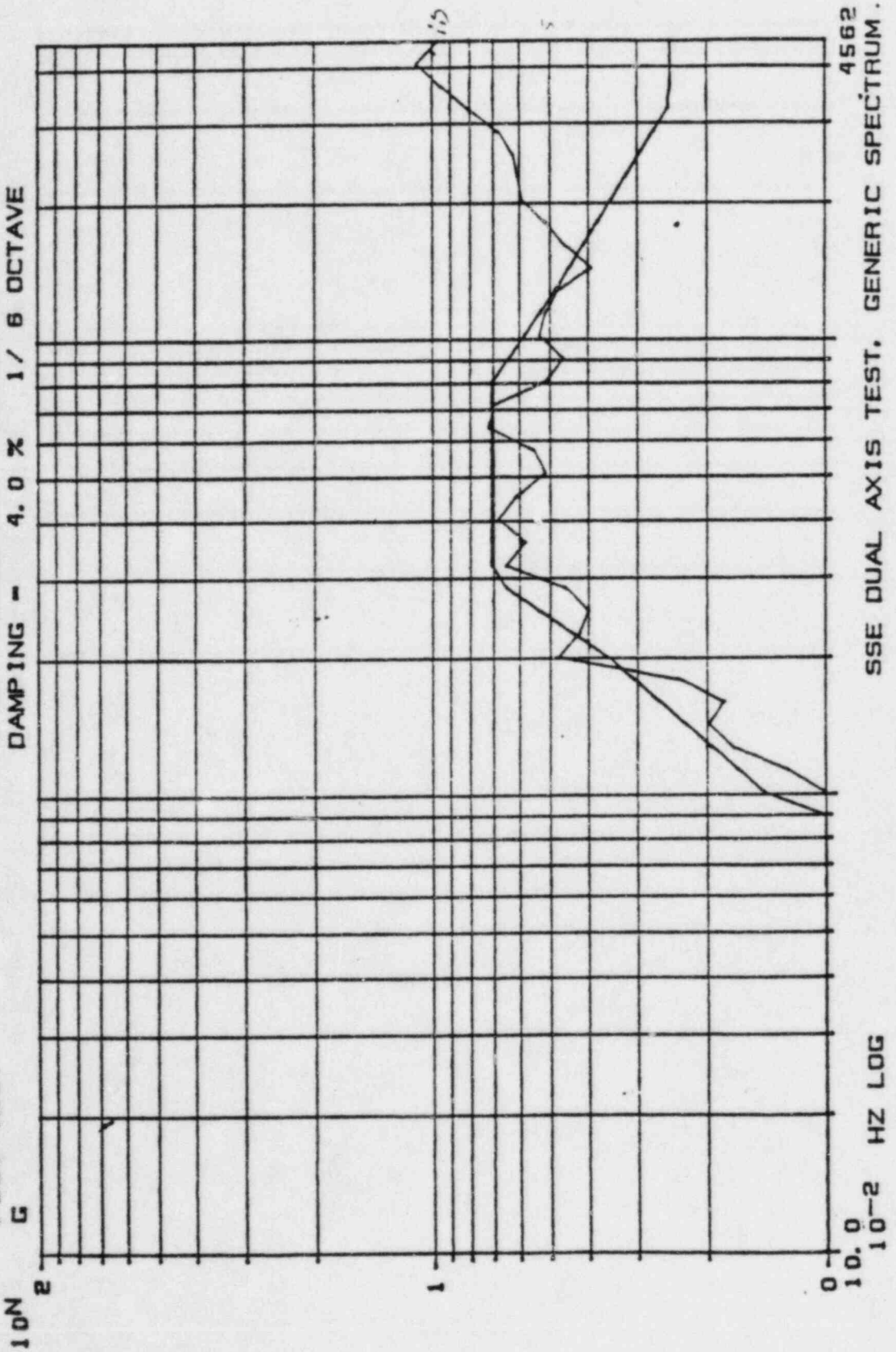

CONFRENTES INPHASE C61P001 LONGT. 4/24/78.
POST TEST
OF PULSES AT 0 DB = 3
DAMPING = 4.0 % 1/ 6 OCTAVE
G
10^N
2
1
0
10.0
10-2 HZ LOG
4562
SSE DUAL AXIS TEST, GENERIC SPECTRUM.

FIGURE 4

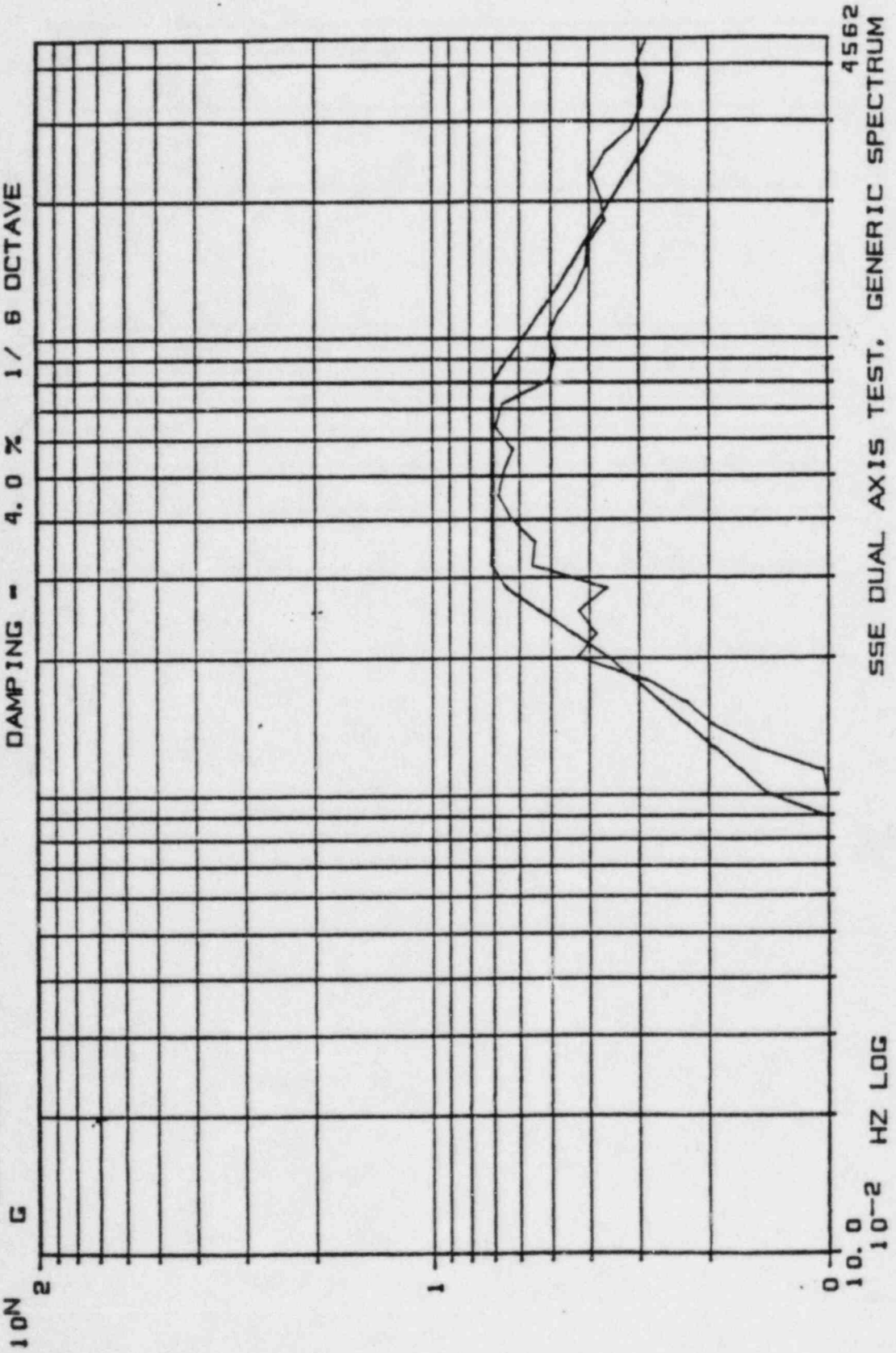

COFRENTES C61P001 OUT OF PHASE LONGT. 4/24/78.
POST TEST
OF PULSES AT 0 DB = 4
DAMPING = 4.0 % 1/6 OCTAVE
G
10^N
2
1
0
10.0
10^-2 HZ LOG
4562
SSE DUAL AXIS TEST, GENERIC SPECTRUM

FIGURE 5

ENCLOSURE 4

4.0 EQUIPMENT DESCRIPTION

IEEE 344-1975 document were followed in performing the testing. The report is presented in an orderly manner which provides verification that the objectives of the testing were met.

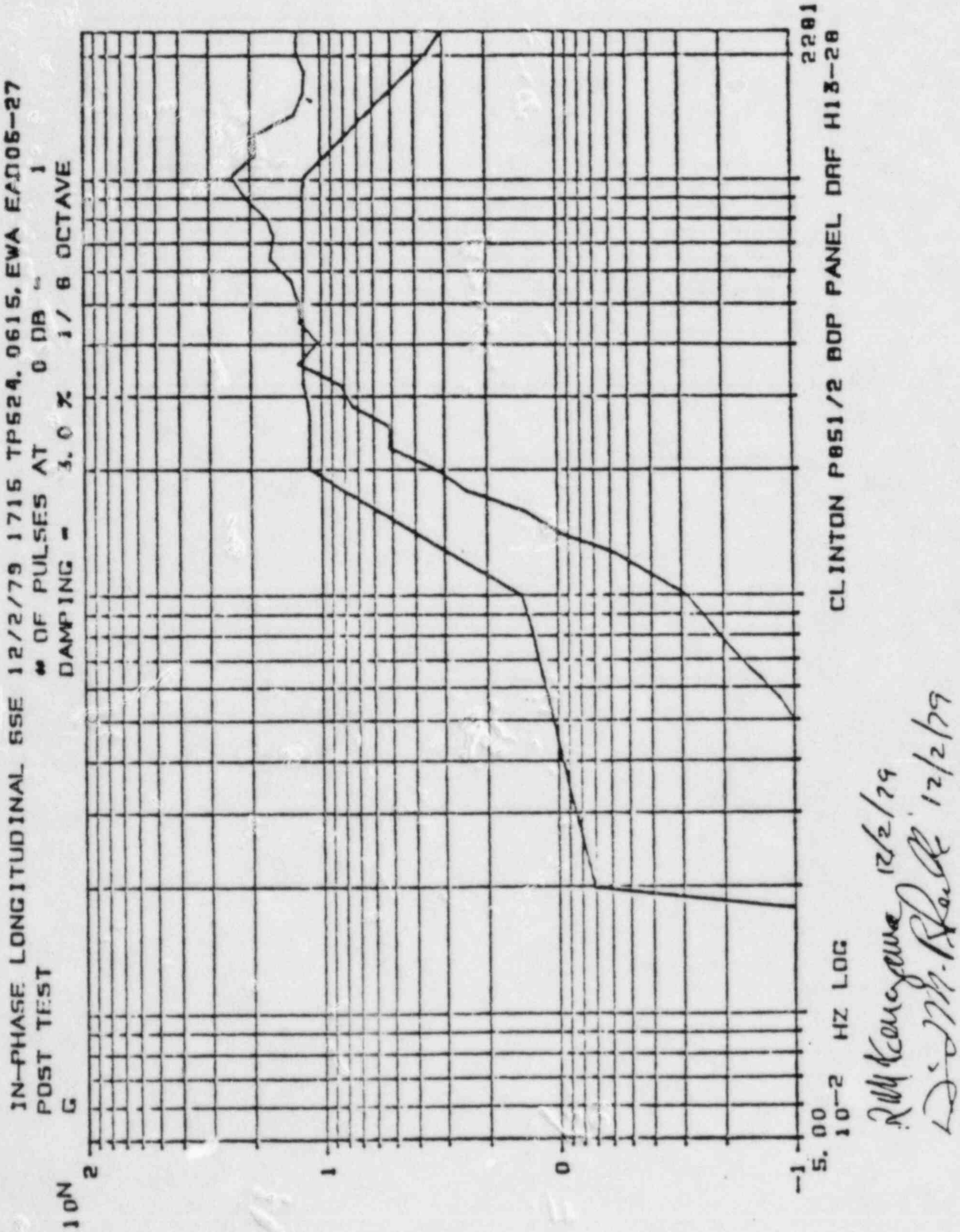
The subject P851/P852 panel which was evaluated by test, was a deliverable end-item panel which encompassed 19 safety-related devices, some of which were qualified by earlier testing. The test sample unit panel is identified on GE drawing No. 915E110. The safety-related devices are listed and identified on the GE parts list No. PL 284X461G001. The listing of the safety-related devices is shown below.

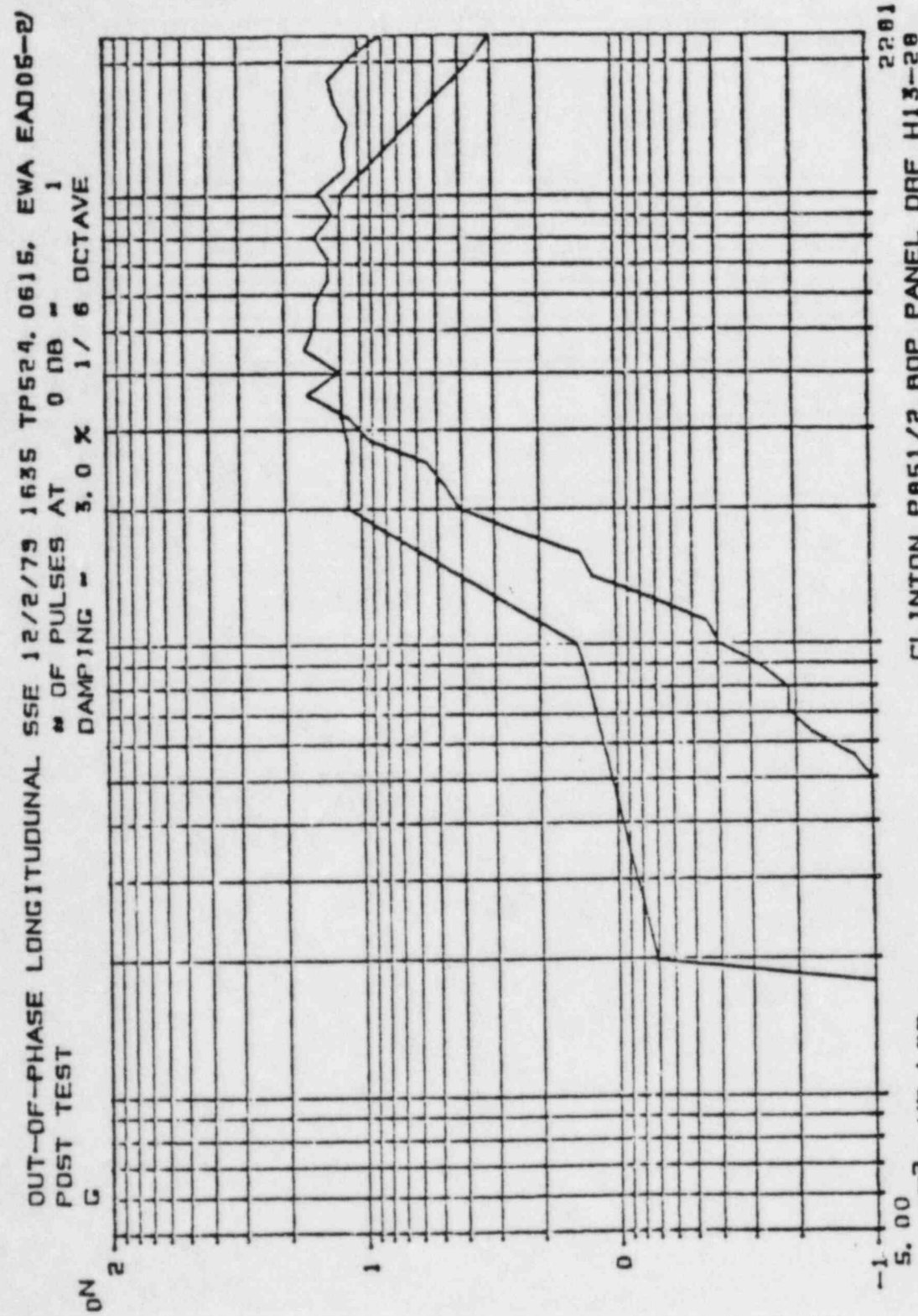
4.1 Pre-Qualified Devices

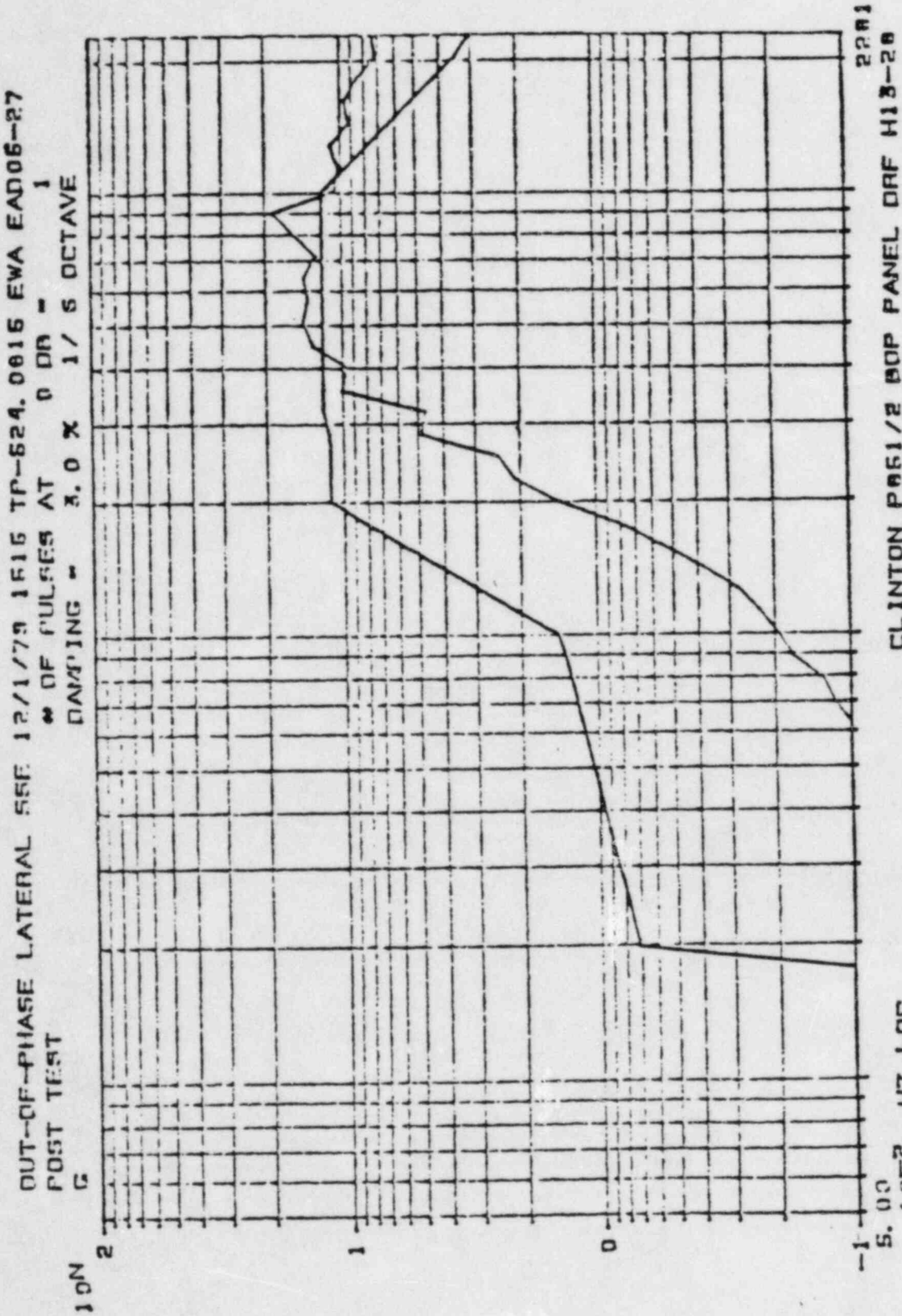
4.1.1	Temperature Switch	164C5687
4.1.2	Meter Module	164C5686
4.1.3	Trip Unit	164C5150
4.1.4	Calibration Unit	262A7144
4.1.5	Power Supply	164C5261
4.1.6	Relay	164C5258
4.1.7	Relay	145C3217
4.1.8	Relay	136B3137
4.1.9	Indicator	164C5288

4.2 Devices Requiring Qualification Testing

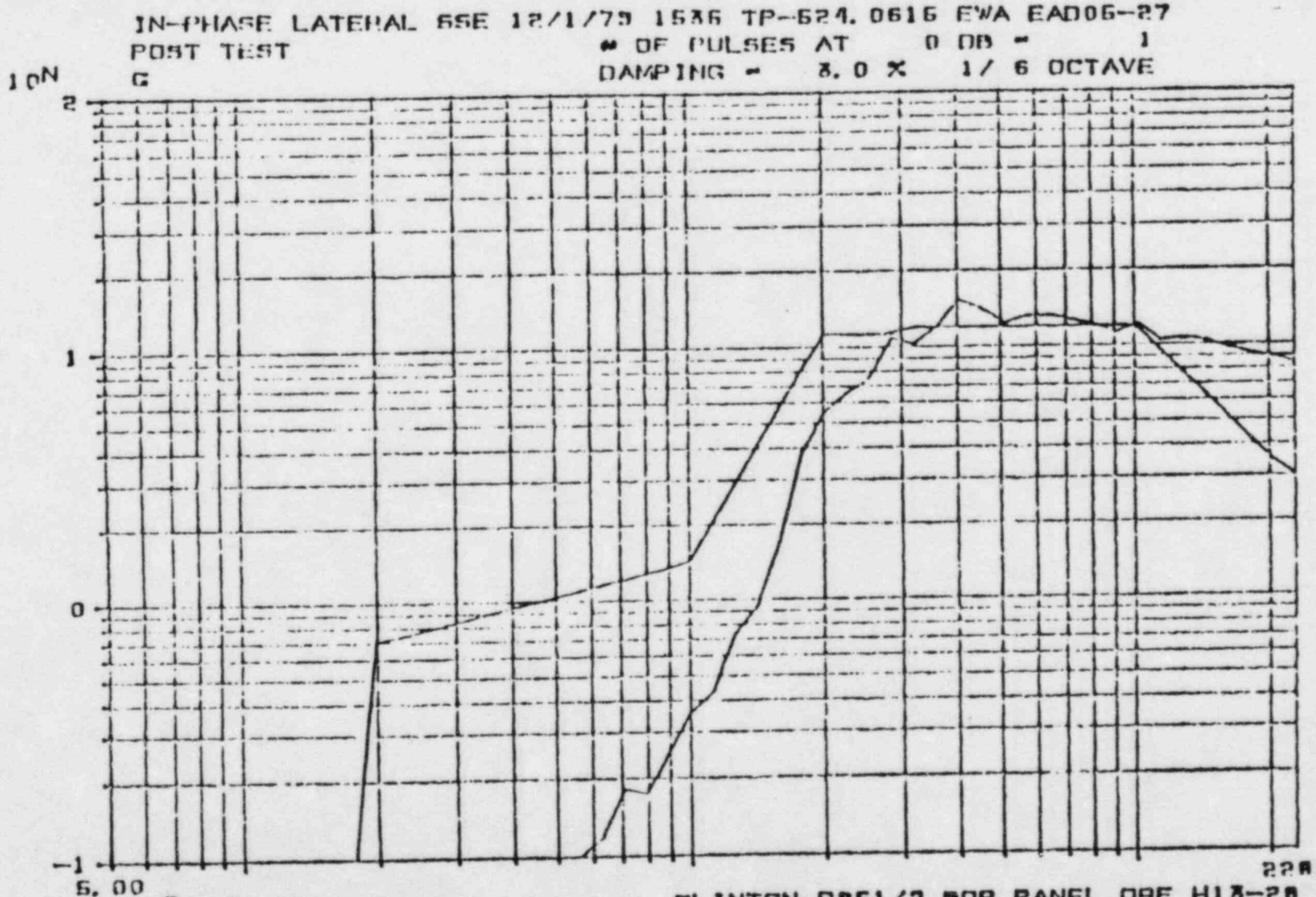
4.2.1	RTD Transmitter	169C9493P001
4.2.2	Transducer V-2	213A7679P001
4.2.3	Test Switch FT-1	272A7550P001
4.2.4	Transducer V14-841	213A7682P001
4.2.5	Transducer VE4-841	213A7682P002
4.2.6	Transducer VP4-846	213A7682P003
4.2.7	Transducer VV4-846	213A7682P004
4.2.8	Watt-Hour Meter	225A4778P014
4.2.9	Time Delay Relay	145C3217P067
4.2.10	BOP Load Drivers	198B6288AAG002
4.2.11	BOP Buffer Amplifier	198B6706AAG001
4.2.12	Card File	147D7663G001


IN-PHASE LONGITUDINAL SSE 12/2/79 1715 TP524.0615.EWA EAD05-27
POST TEST # OF PULSES AT 0 DB = 1
G DAMPING = 3.0 % 1/6 OCTAVE
10N
2
1
0
-1
5.00
10-2
HZ LOG
2281
CLINTON P851/2 BOP PANEL DRF H13-28
12/2/79
12/2/79


OUT-OF-PHASE LONGITUDUNAL SSE 12/2/79 1635 TP524.0615, EWA EA006-2/
POST TEST
OF PULSES AT 0 DB = 1
DAMPING = 3.0 % 1/6 OCTAVE
G
10^N
2
1
0
-1
5.00
10-2 HZ LOG
2281
CLINTON P851/2 BOP PANEL DRF H13-28


OUT-OF-PHASE LATERAL SSE 12/1/79 1515 TP-524.0015 EWA EA006-27
POST TEST
G
OF PULSES AT 0 DB = 1
DAMPING = 3.0 % 1/6 OCTAVE
10N
2
1
0
-1
5.00
10-2 HZ LOG
CLINTON PS61/2 BOP PANEL DRF H13-28
2281

FROM DRF H13-28



R M Kennedy 12/1/79
D M Clark 12/1/79

ENCLOSURE 5

NUCLEAR ENERGY BUSINESS GROUP

GENERAL ELECTRIC

H13-P603 SH NO.
REV

TEST REPORT

COFRENTES

H13-P603

PREPARED BY: S. Berman
S. Berman
Requisition Design Engineering

PREPARED BY: B. J. Uebelhoer 3/28/79
B. J. Uebelhoer, Engineer
Experimental Mechanics

VERIFIED BY: J. D. Heald
J. D. Heald, Senior Engineer
Experimental Mechanics

APPROVED BY: J N Kass
J. N. Kass, Manager
Experimental Mechanics

APPROVED BY: R A Parker 3/29/79
R. A. Parker, Manager
Requisition Design Engineering

3.0 NUCLEAR SAFETY RELATED DEVICES

a.	Switch (push button)	145C3230P003	(4)
b.	Switch (mode)	163C1487G003	(1)
c.	Switch (type CR2940)	145C3040P024	(8)
d.	Switch (IRM range)	204B6616G001	(4)
e.	Switch (type CR2940)	145C3040P009	(4)
f.	Switch (type CR2940)	145C3040P010	(4)
g.	Switch (type CR2940)	145C3040P001	(2)
h.	Switch (type CR2940)	145C3040P003	(2)

4.0 TEST ARTICLE

The H13-P603 panel was delivered to the Seismic Laboratory in an incomplete condition; the reactor mode switch (163C1487G003) was not available for installation and the reactor display panel with its accessories was not ready for installation by the Panel Production Section at the time scheduled for seismic test. An equivalent structural load of 75 lbs. was inserted at the reactor display panel opening to produce analagous seismic responses of panel structure. The H13-P603 Benchboard measures 173.8 inches at its back edge, 70.74" in depth and 90" in height.

5.0 ATTACHMENT TO SEISMIC TABLE

The H13-P603 panel was bolted to the seismic table as required in Seismic Qualification Procedure 22A4320, paragraph 5.1. Where there were no matching bolt holes between shake table and panel base new holes were drilled and tapped. Thereby, the panel could be bolted to the floor to provide support and rigidity at all designed anchor points.

6.0 INSTRUMENTATION

6.1 Accelerometer Mounting

The accelerometers were located as shown in Figure 1.

	Location
Accelerometer No. 1	Seismic Table
Accelerometer No. 2	High position (Type 2940 switches)
Accelerometer No. 3	High position (pushbutton)
Accelerometer No. 4	High position (mode switch space)
Accelerometer No. 5	High position (IRM range switch)
Accelerometer No. 6	Upper center benchboard
Accelerometer No. 7	Right benchboard (annunciator area)
Accelerometer No. 8	Left benchboard (annunciator area)

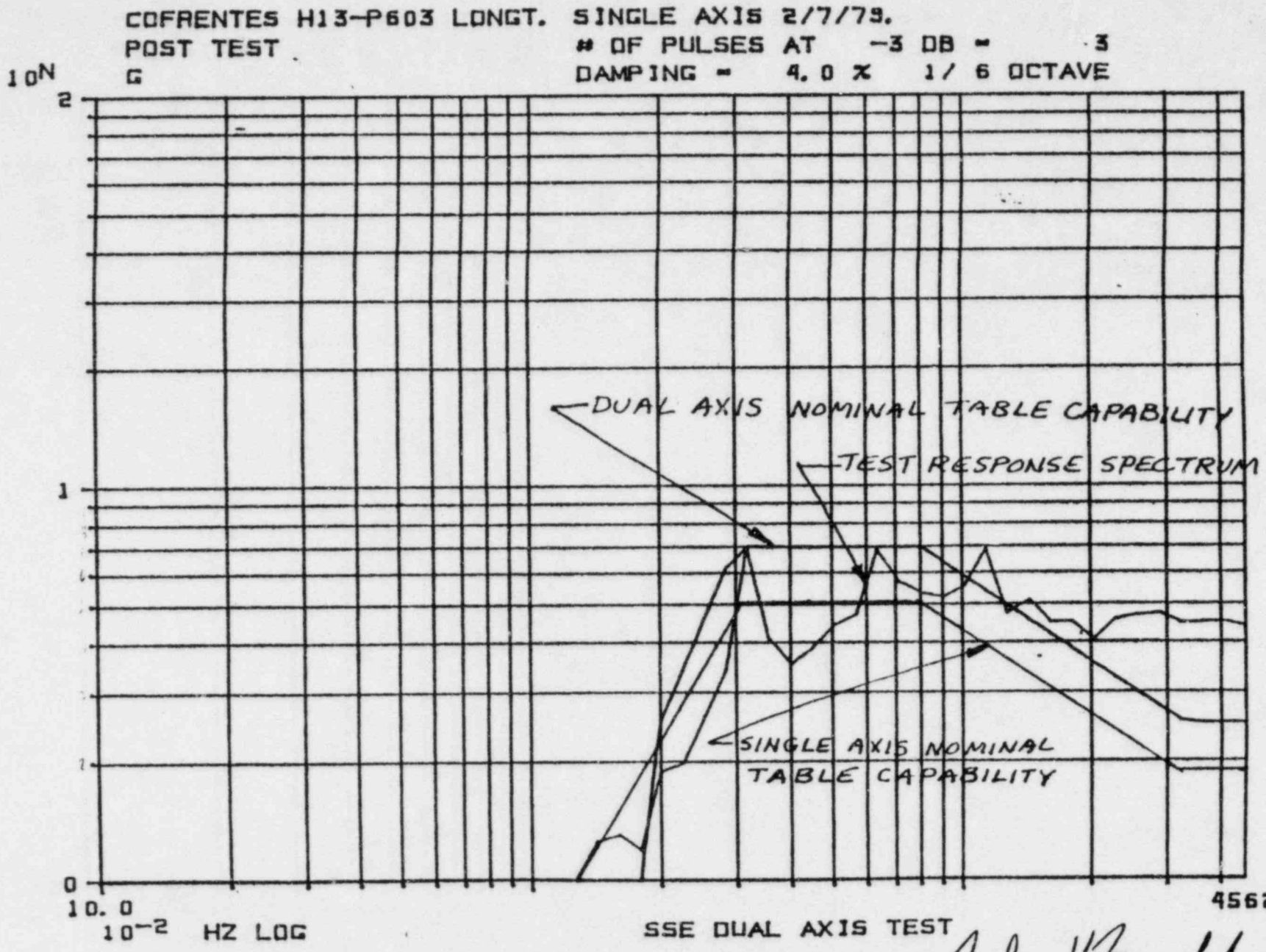
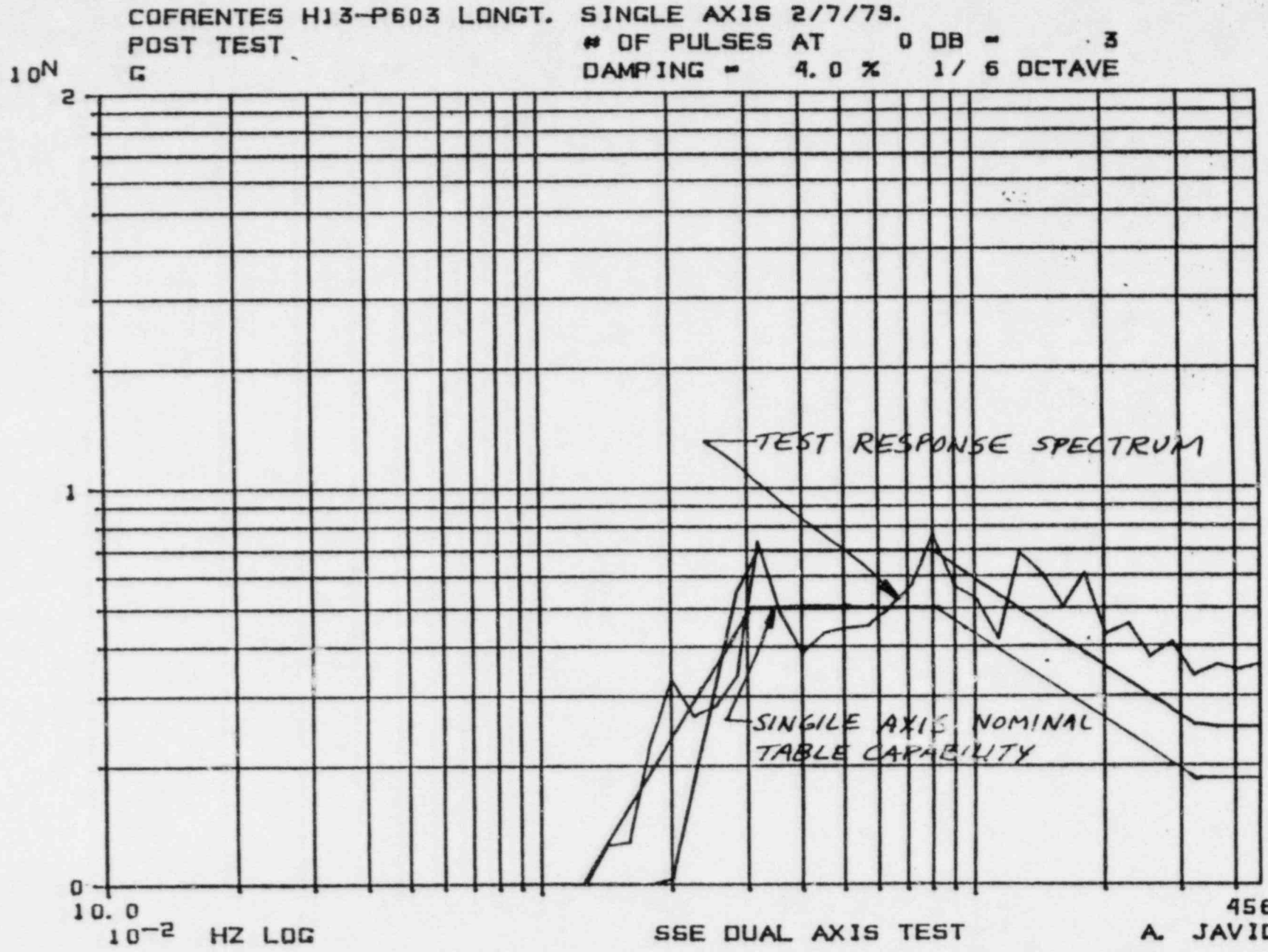


FIGURE 7

Aubrey V French 2/5/79
B. J. Uebelhoer 2/7/79

ORF# A00-579



DRF# A00-579

FIGURE 8

J Strench 2/5/79

B. J. Udelhoven 2/7/79

ENCLOSURE 6

OPTICAL ISOLATOR QUALIFICATION TEST REPORT

A00-794-21L

(REVISION 0)

GE Drawing Numbers:

112D1935G003	169C8742P001	204B6190AAG004
112D1935G007	169C8742P002	204B6192AAG002
112D1935G009	198B6203AAG003	204B6194AAG002
112D1935G010	198B6203AAG004	204B6196AAG002
112D1935G011	198B6241AAG003	204B6198AAG002
112D1936G003	198B6241AAG004	204B6208AAG002
112D1936G004	204B6186AAG004	204B6208AAG003
133D9947G003	204B6188AAG002	204B6220AAG002
133D9947G004	204B6190AAG003	

DRF No. A00-794-21

Prepared by: F. E. Collier — Date: 16 Dec 82
F. E. Collier - Engineer

Reviewed by: M M Sexton — Date: 12/16/82
M. M. Sexton - Senior Engineer

Reviewed by: W. C. Boehm — Date: 12/16/82
W. C. Boehm - Senior Engineer

Approved by: R. L. Fisher for — Date: 12/16/82
N. G. Luria - Manager, Qualification Engineering

General Electric Company - Control & Instrumentation Department

Qualification Engineering

APPENDIX A

PLOTS OF TEST RESPONSE SPECTRA VERSUS REQUIRED RESPONSE SPECTRA

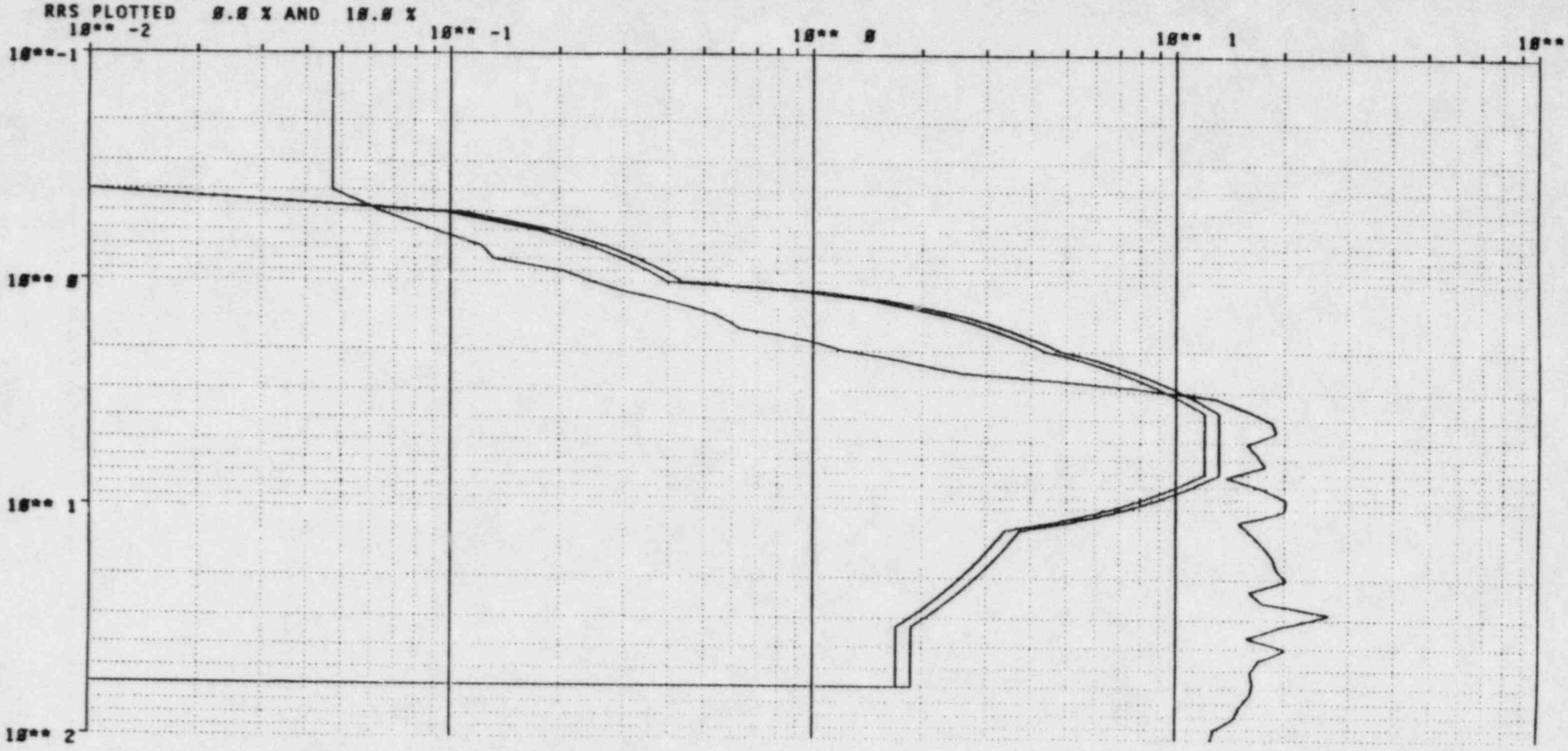
PAGE	RUN	DATE	TIME	DESCRIPTION		
12	71	8/22/81	1355	OBE 1	Out-of-phase Longitudinal	Horizontal
13	"	"	"	"	"	Vertical
14	72	"	1359	OBE 2	"	Horizontal
15	"	"	"	"	"	Vertical
16	73	"	1402	OBE 3	"	Horizontal
17	"	"	"	"	"	Vertical
18	74	"	1404	OBE 4	"	Horizontal
19	"	"	"	"	"	Vertical
20	75	"	1407	OBE 5	"	Horizontal
21	"	"	"	"	"	Vertical
22	76	"	1505	OBE 1	In-phase	Horizontal
23	"	"	"	"	"	Vertical
24	77	"	1508	OBE 2	"	Horizontal
25	"	"	"	"	"	Vertical
26	78	"	1511	OBE 3	"	Horizontal
27	"	"	"	"	"	Vertical
28	79	"	1515	OBE 4	"	Horizontal
29	"	"	"	"	"	Vertical
30	710	"	1519	OBE 5	"	Horizontal
31	"	"	"	"	"	Vertical
32	711	"	1614	SSE	"	Horizontal
33	"	"	"	"	"	Vertical
34	712	"	1618	SSE	Out-of-phase	Horizontal
35	"	"	"	"	"	Vertical
36	713	8/24/81	1440	OBE 1	Lateral	Horizontal
37	"	"	"	"	"	Vertical
38	714	"	1550	OBE 2	"	Horizontal
39	"	"	"	"	"	Vertical
40	715	"	1555	OBE 3	"	Horizontal
41	"	"	"	"	"	Vertical
42	716	"	1557	OBE 4	"	Horizontal
43	"	"	"	"	"	Vertical
44	717	"	1602	OBE 5	"	Horizontal
45	"	"	"	"	"	Vertical
46	718	"	1645	OBE 1	In-phase	Horizontal
47	"	"	"	"	"	Vertical
48	719	"	1653	OBE 2	"	Horizontal
49	"	"	"	"	"	Vertical
50	720	"	1655	OBE 3	"	Horizontal
51	"	"	"	"	"	Vertical
52	721	"	1700	OBE 4	"	Horizontal
53	"	"	"	"	"	Vertical
54	722	"	1705	OBE 5	"	Horizontal
55	"	"	"	"	"	Vertical
56	723	"	1707	SSE	"	Horizontal
57	"	"	"	"	"	Vertical
58	724	"	1720	SSE	Out-of-phase	Horizontal
59	"	"	"	"	"	Vertical

RUN 711 A0079421 OPT ISO SSE IP LON DATE 8/22/81 16:14: 0 CHANNEL 3 HORZ

DECIMATION RATIO 1 9900 POINTS ANALYZED DELTA T .002 1/6 OCTAVE 100.00 HZ LP FILTER 6 POLES

3.00 % DAMPING START TIME 0.000 SEC END TIME 19.800 SEC 0 RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED 0.0 % AND 10.0 %



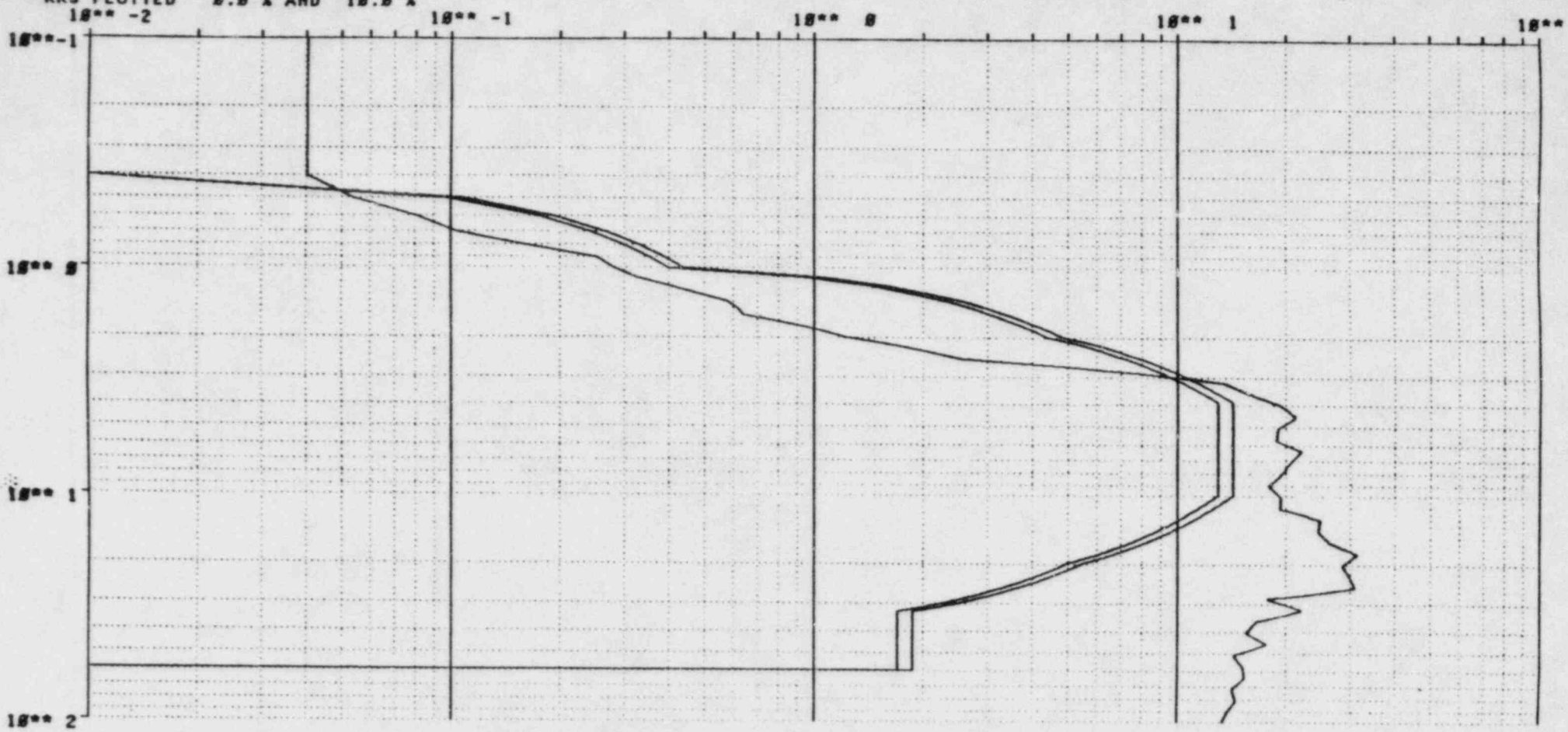
SEMI-CLOSED METHOD APPROXIMATION : 7-22-80 REVISION

RUN 711 A##79421 OPT ISO SSE IP LON DATE 8/22/81 16:14: # CHANNEL 4 VERT

DECIMATION RATIO 1 9988 POINTS ANALYZED DELTA T .882 1/6 OCTAVE 188.88 HZ LP FILTER 6 POLES

3.88 % DAMPING START TIME #.### SEC END TIME 19.888 SEC # RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED #.# % AND 1#.# %



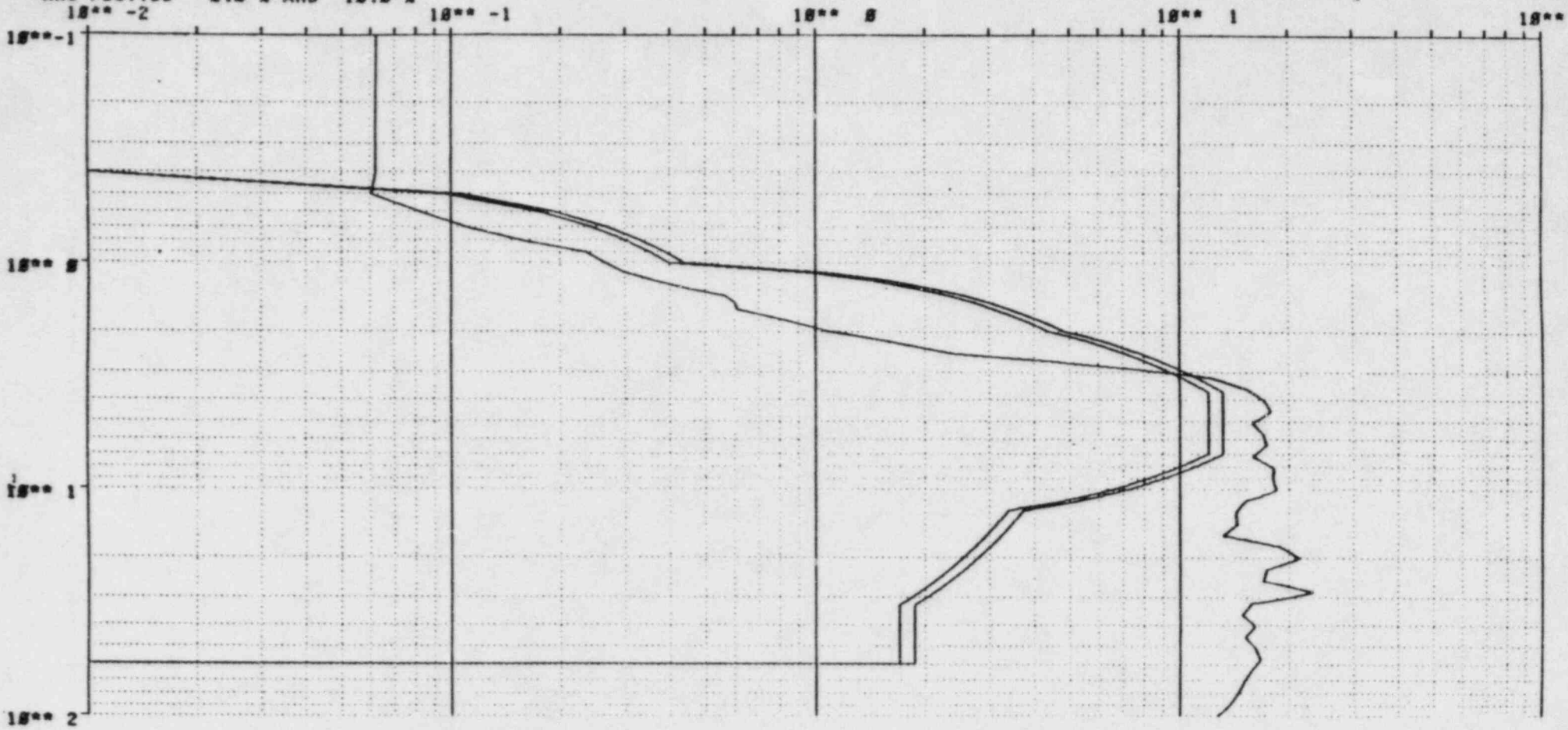
SEMI-CLOSED METHOD APPROXIMATION : 7-22-88 REVISION

RUN 712 A0079421 OPT ISO SSE OP LON DATE 8/22/81 16:18: 0 CHANNEL 3 HORZ

DECIMATION RATIO 1 9900 POINTS ANALYZED DELTA T .002 1/6 OCTAVE 100.00 HZ LP FILTER 6 POLES

3.00 % DAMPING START TIME 0.000 SEC END TIME 19.800 SEC 0 RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED 0.0 % AND 10.0 %



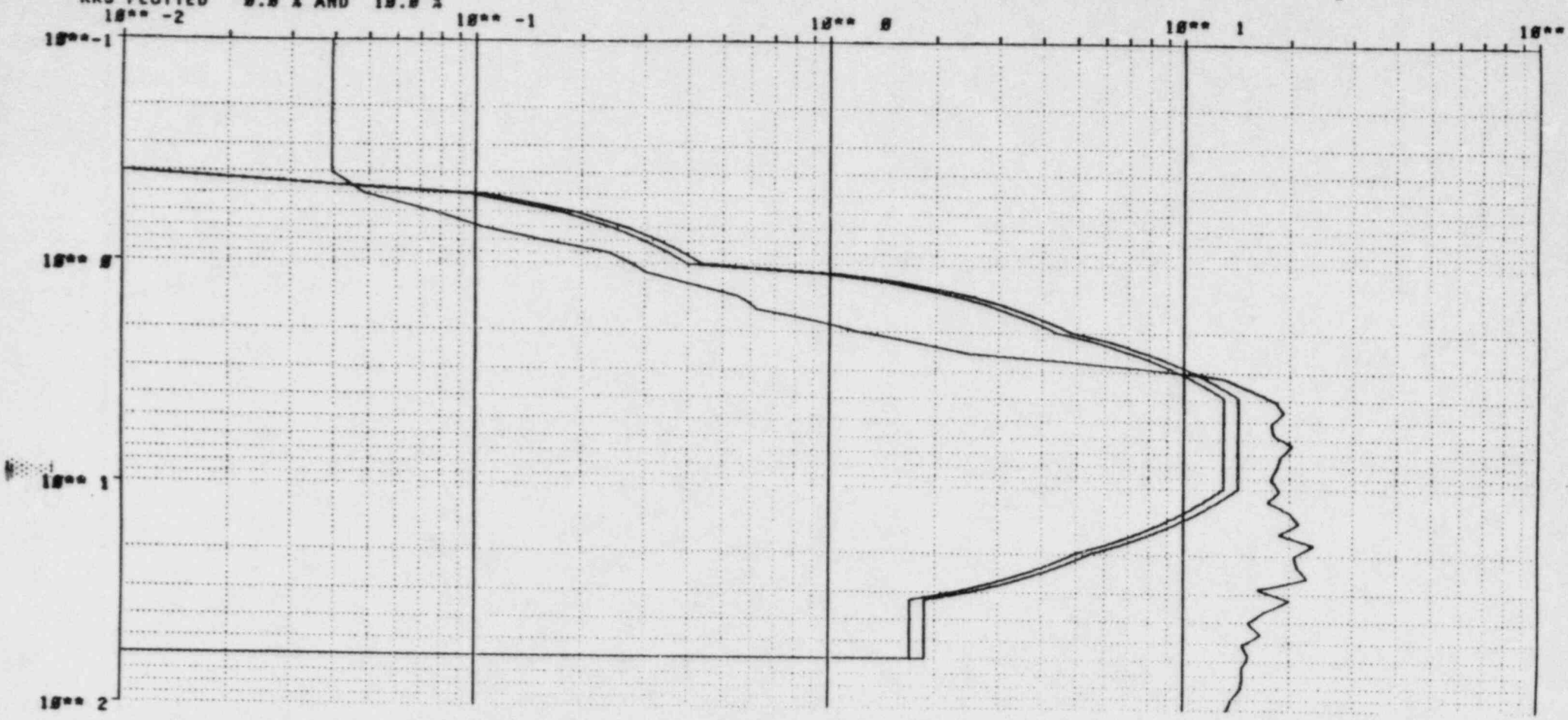
SEMI-CLOSED METHOD APPROXIMATION : 7-22-80 REVISION

RUN 712 A0079421 OPT ISO SSE OP LON DATE 8/22/81 16:18: 0 CHANNEL 4 VERT

DECIMATION RATIO 1 9900 POINTS ANALYZED DELTA T .002 1/6 OCTAVE 100.00 HZ LP FILTER 6 POLES

3.00 % DAMPING START TIME 0.000 SEC END TIME 19.800 SEC 0 RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED 0.0 % AND 10.0 %



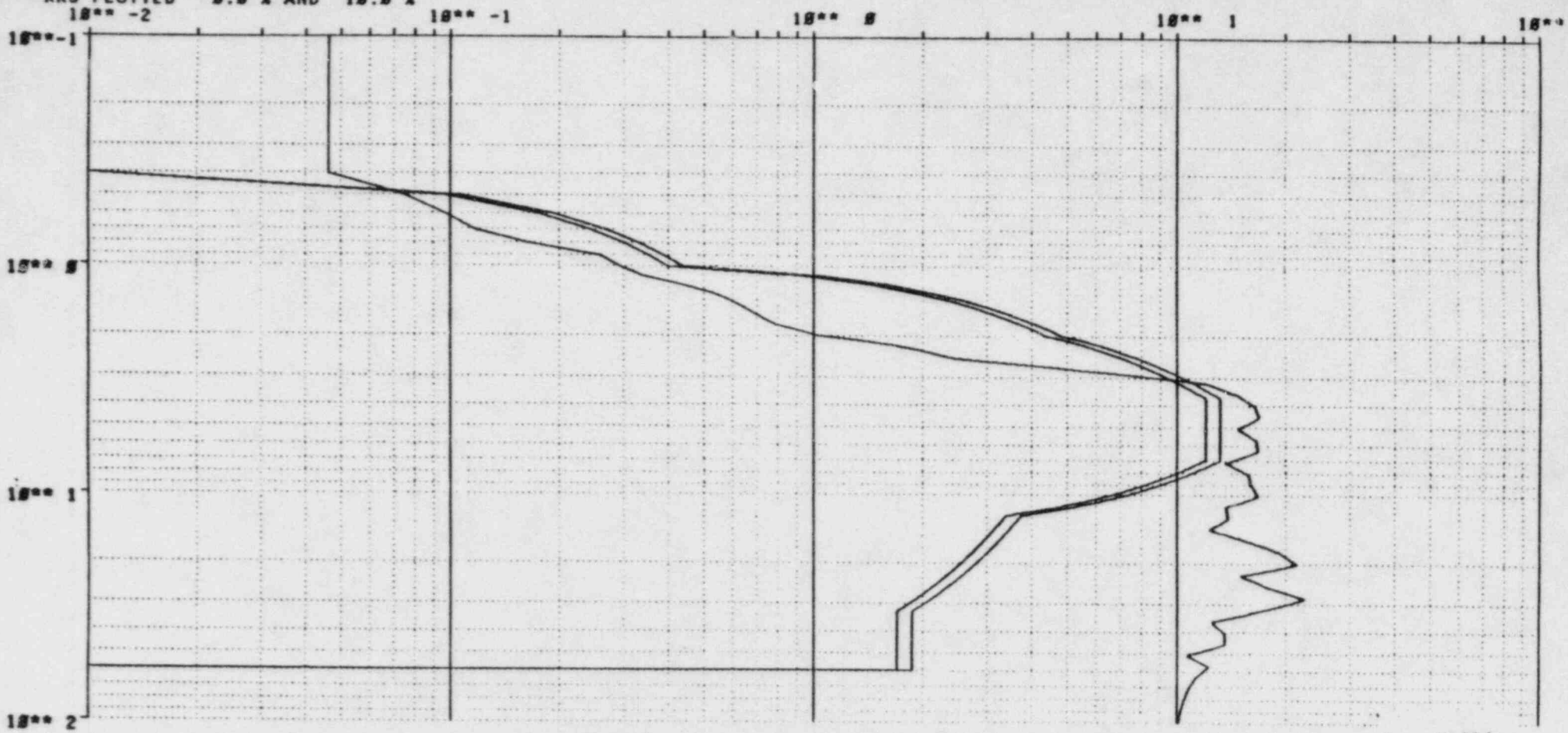
SEMI-CLOSED METHOD APPROXIMATION : 7-22-80 REVISION

RUN 723 A0879421 OPT ISO SSE IP LAT DATE 8/24/81 17: 7: 8 CHANNEL 3 HORZ

DECIMATION RATIO 1 9988 POINTS ANALYZED DELTA T .002 1/6 OCTAVE 188.88 HZ LP FILTER 6 POLES

3.88 % DAMPING START TIME 8.888 SEC END TIME 19.888 SEC 8 RECORDS SKIPPED 76 RECORDS ANALYZED

RRS PLOTTED 8.8 % AND 18.8 %



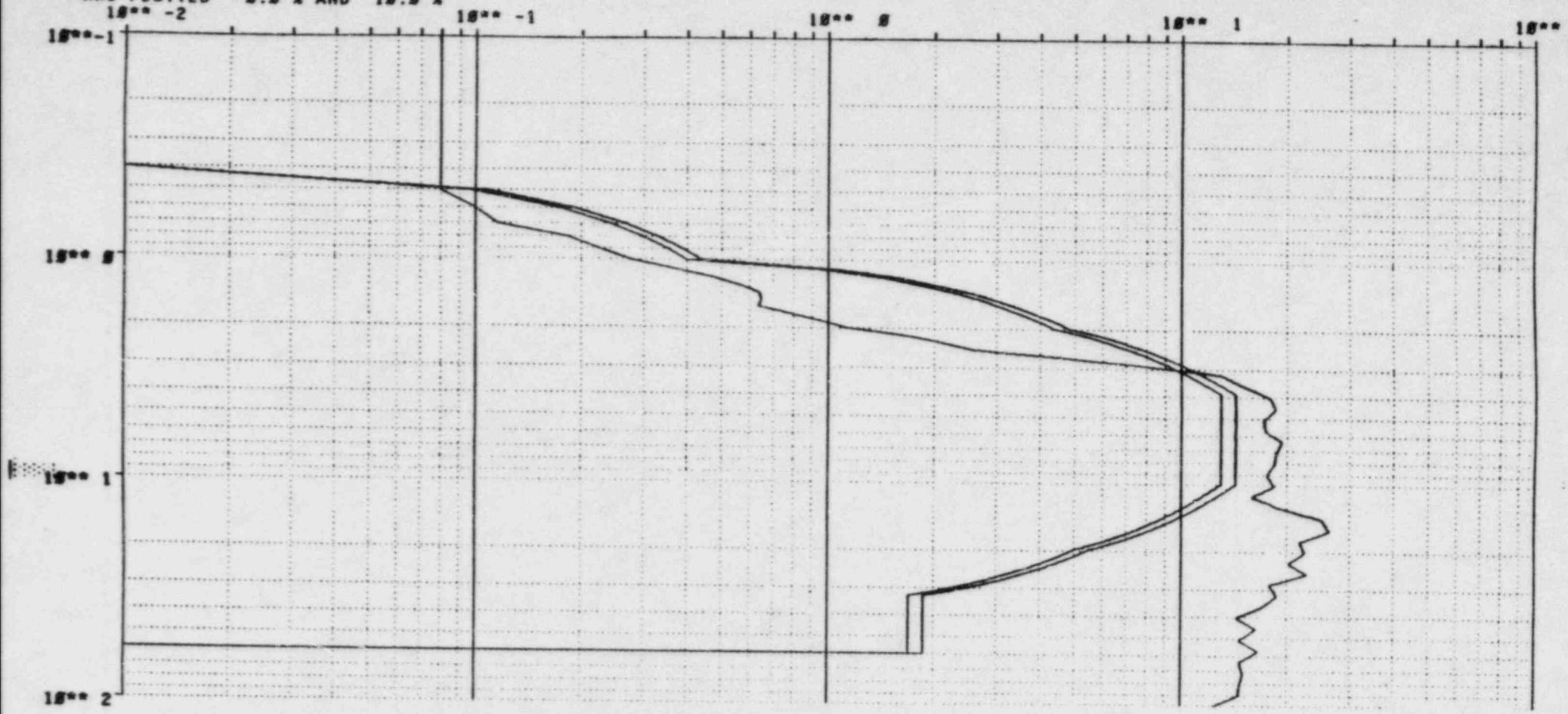
SEMI-CLOSED METHOD APPROXIMATION : 7-22-80 REVISION

RUN 723 A##79421 OPT ISO SSE IP LAT DATE 8/24/81 17: 7: # CHANNEL 4 VERT

DECIMATION RATIO 1 9988 POINTS ANALYZED DELTA T .882 1/6 OCTAVE 188.88 HZ LP FILTER 6 POLES

3.88 % DAMPING START TIME #.888 SEC END TIME 19.888 SEC # RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED #.# % AND 1#.# %



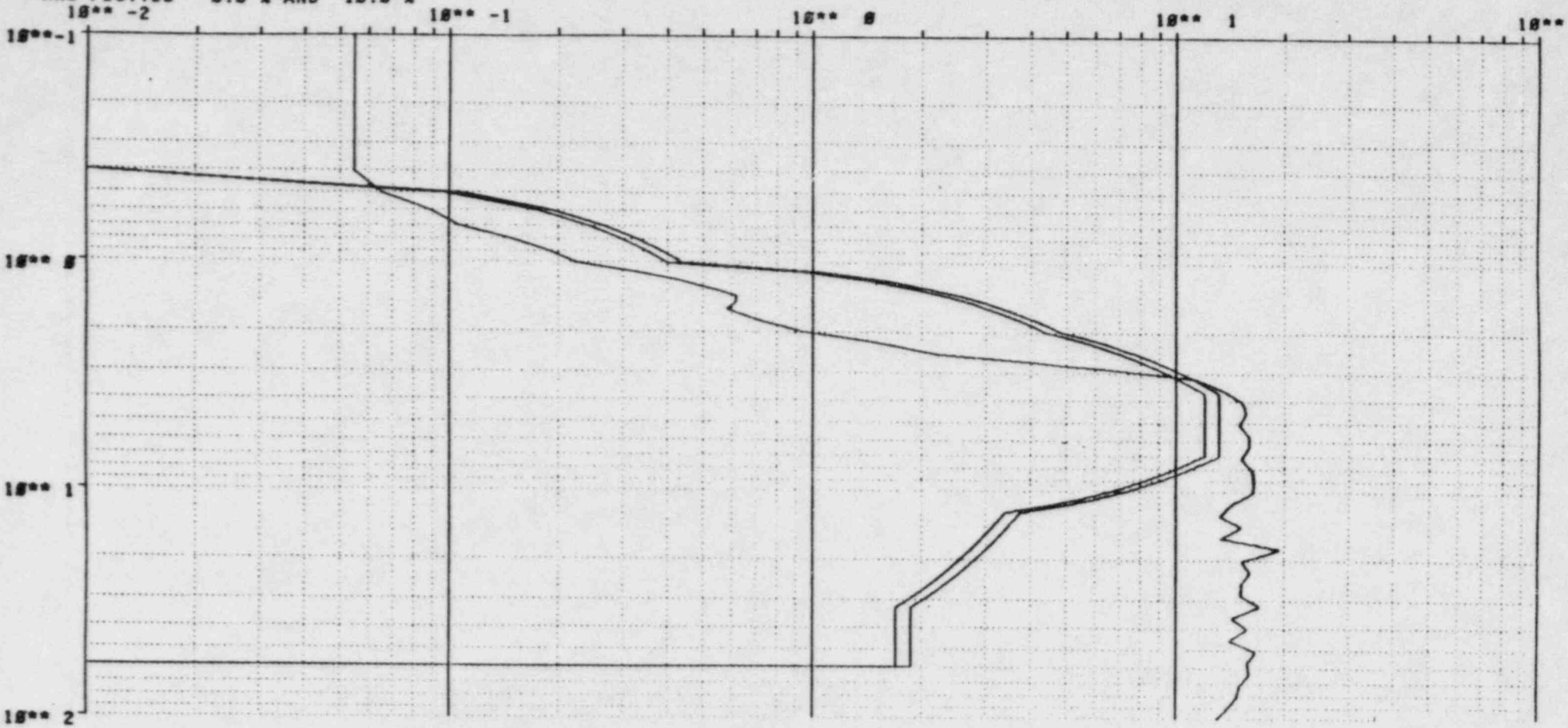
SEMI-CLOSED METHOD APPROXIMATION : 7-22-88 REVISION

RUN 724 A0879421 OPT ISO SSE OP LAT DATE 8/24/81 17:20: 0 CHANNEL 3 HORZ

DECIMATION RATIO 1 9900 POINTS ANALYZED DELTA T .002 1/6 OCTAVE 100.00 HZ LP FILTER 6 POLES

3.00 % DAMPING START TIME 0.000 SEC END TIME 19.800 SEC 0 RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED 0.0 % AND 10.0 %



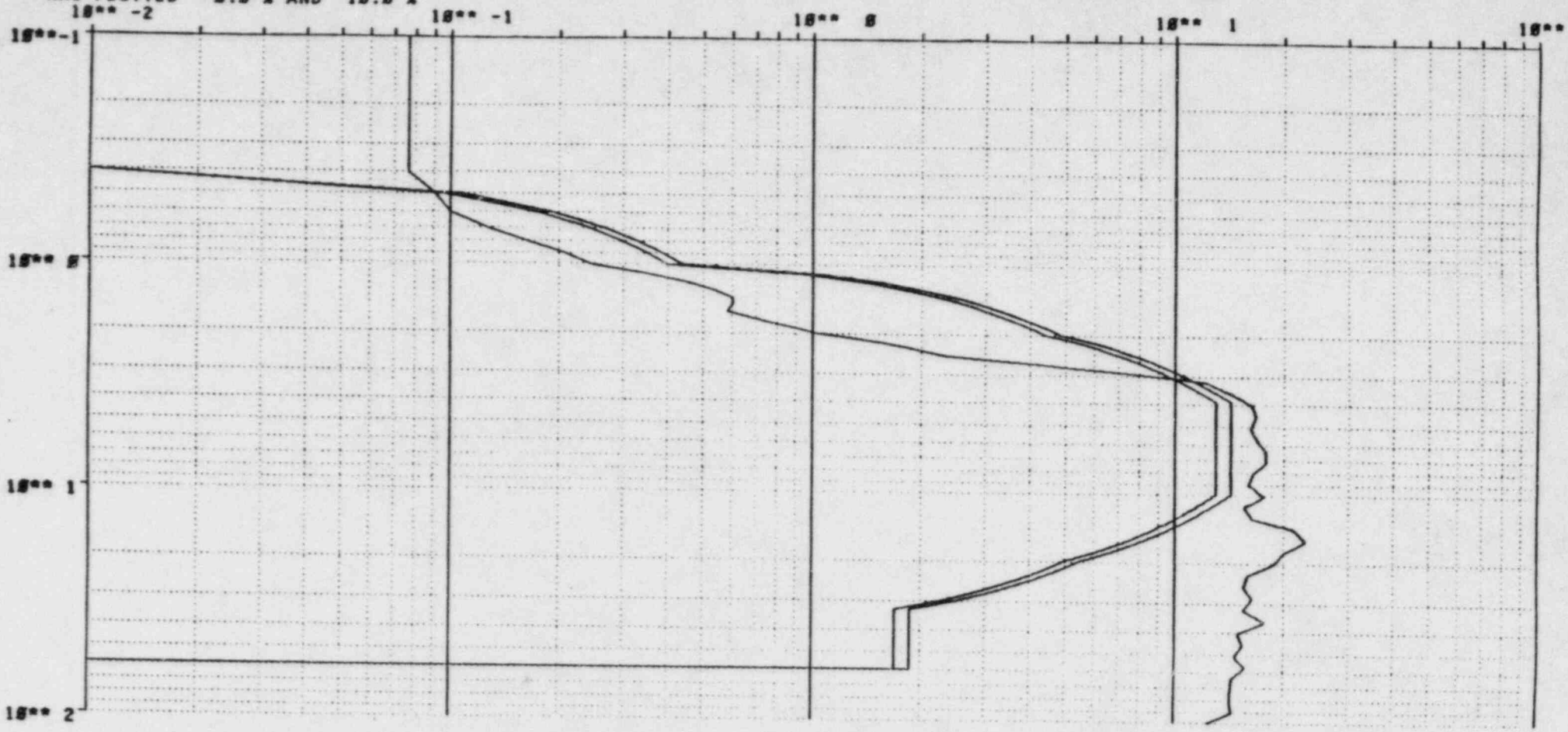
SEMI-CLOSED METHOD APPROXIMATION : 7-22-80 REVISION

RUN 724 A##79421 OPT ISO SSE OP LAT DATE 8/24/81 17:2#: # CHANNEL 4 VERT

DECIMATION RATIO 1 9988 POINTS ANALYZED DELTA T .882 1/6 OCTAVE 188.## HZ LP FILTER 6 POLES

3.## % DAMPING START TIME #.### SEC END TIME 19.8## SEC # RECORDS SKIPPED 75 RECORDS ANALYZED

RRS PLOTTED #.# % AND 1#.# %



SEMI-CLOSED METHOD APPROXIMATION : 7-22-## REVISION

ENCLOSURE 7

POTTER AND BRUMFIELD MDR RELAY (169C9481)

REDRAWN FROM ATWS PROGRAM

DRF A00-1406

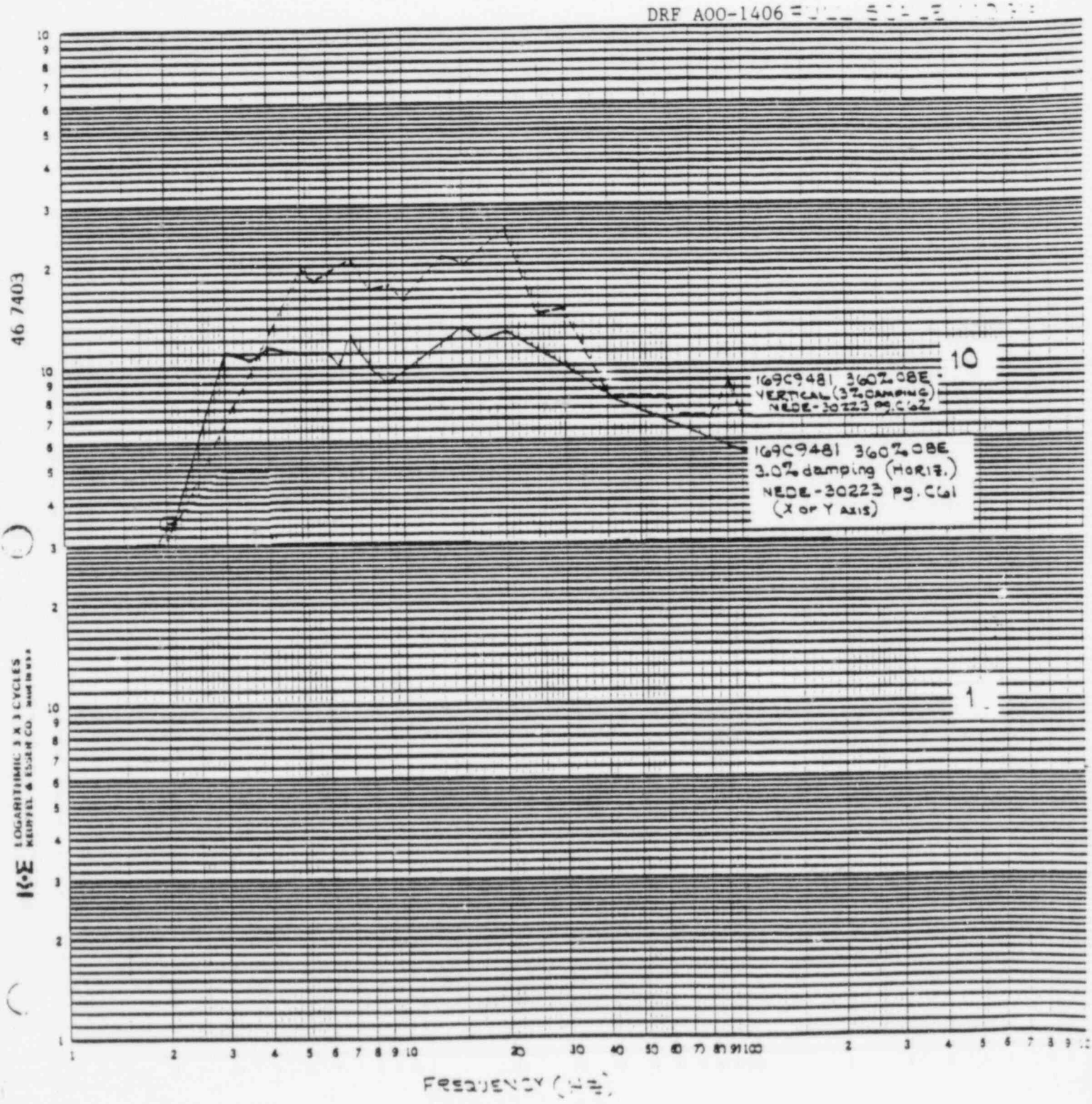


FIGURE 2-9

AGASTAT RELAY (169C9488)
(169C9437)

REDRAWN FROM ATWS PROGRAM

DRF A00-1406

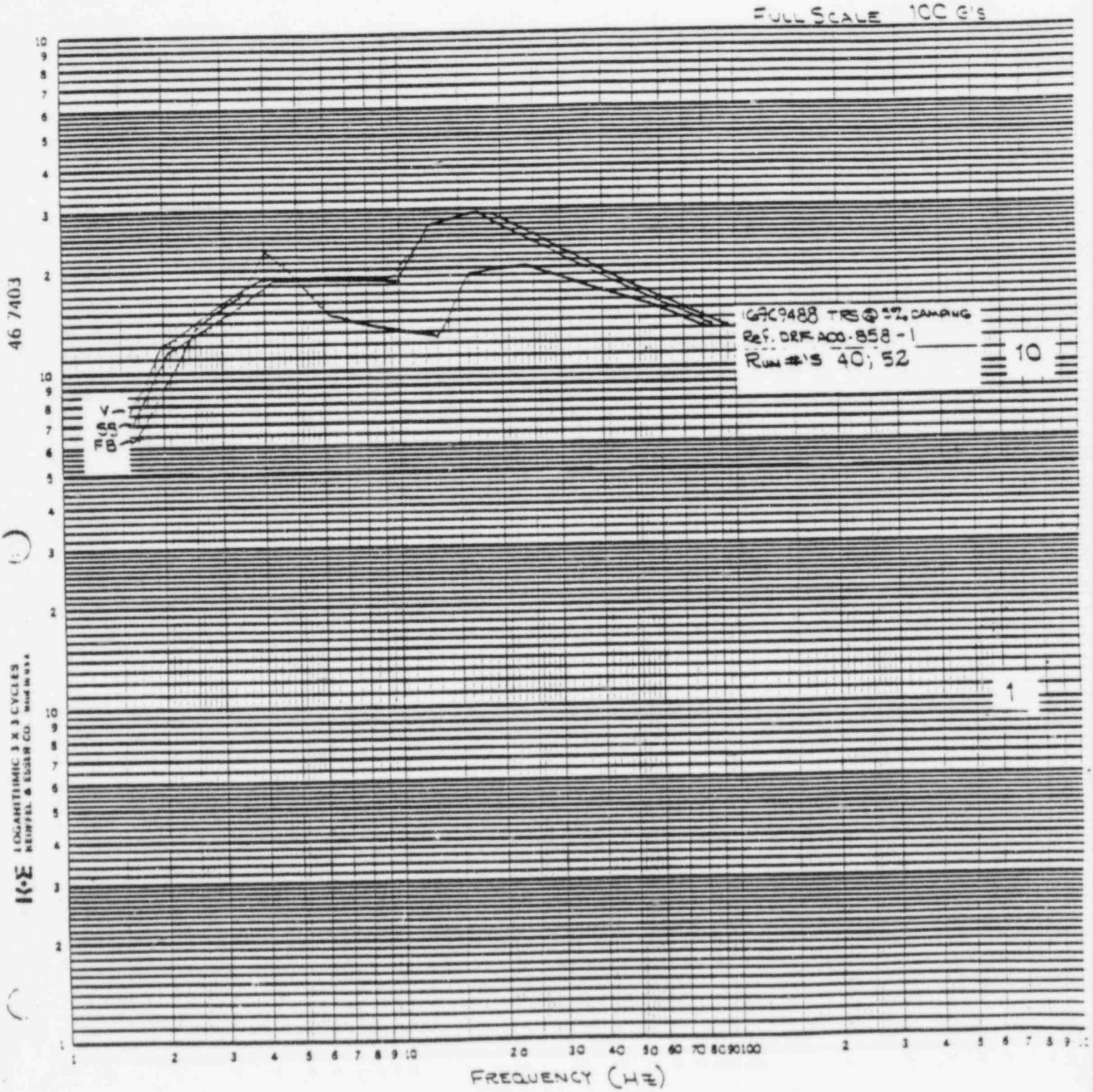


FIGURE 2-6

ELECTROSWITCH SERIES 20K

16?C?53E

SAME AS 184C4689

REDRAWN FROM ATWS PROGRAM

DRF A00-1406

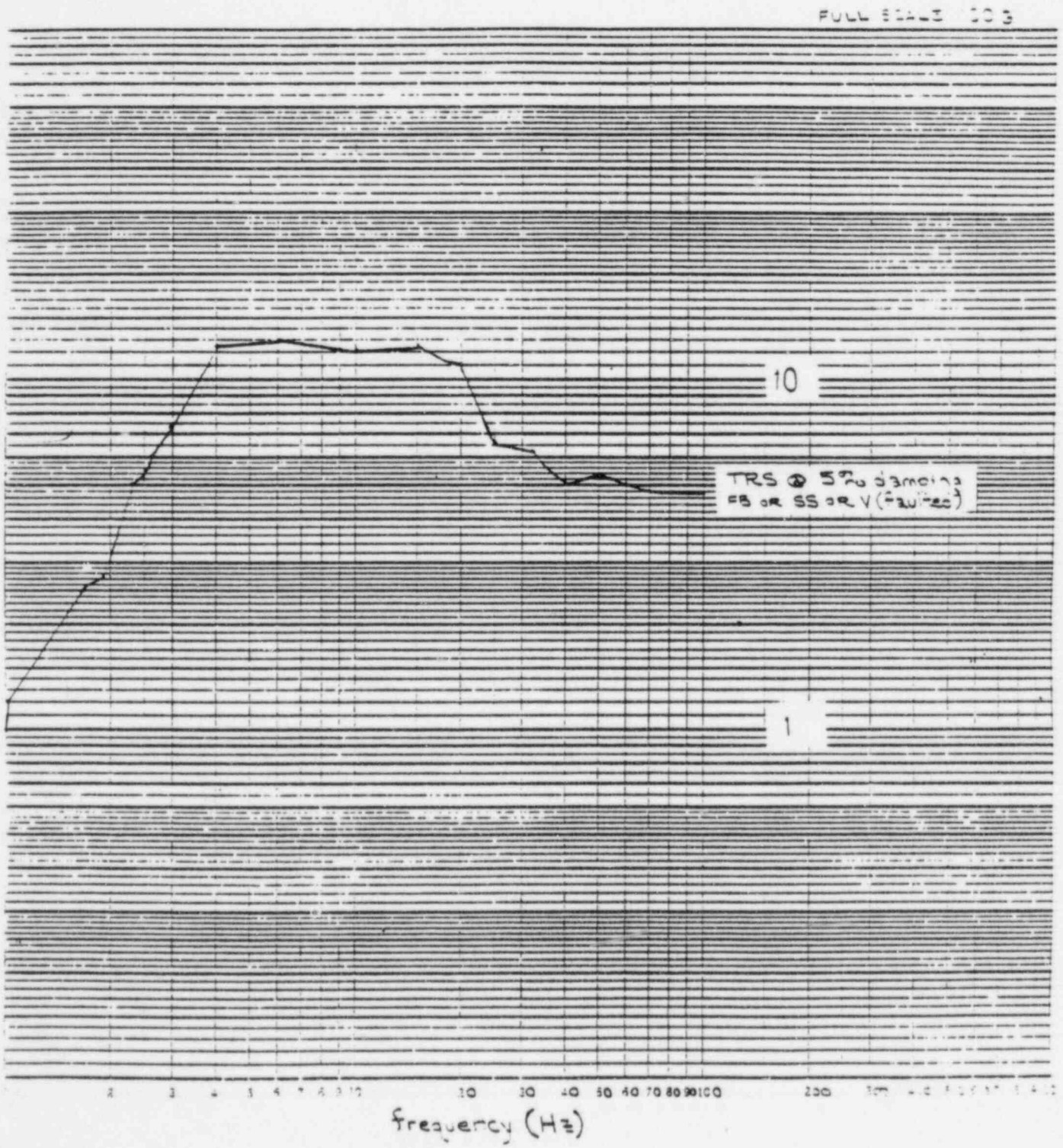


FIGURE 2-7

A5

1845933

GE TRIP UNIT

REDRAWN FROM ATWS PROGRAM

DRF A00-1406

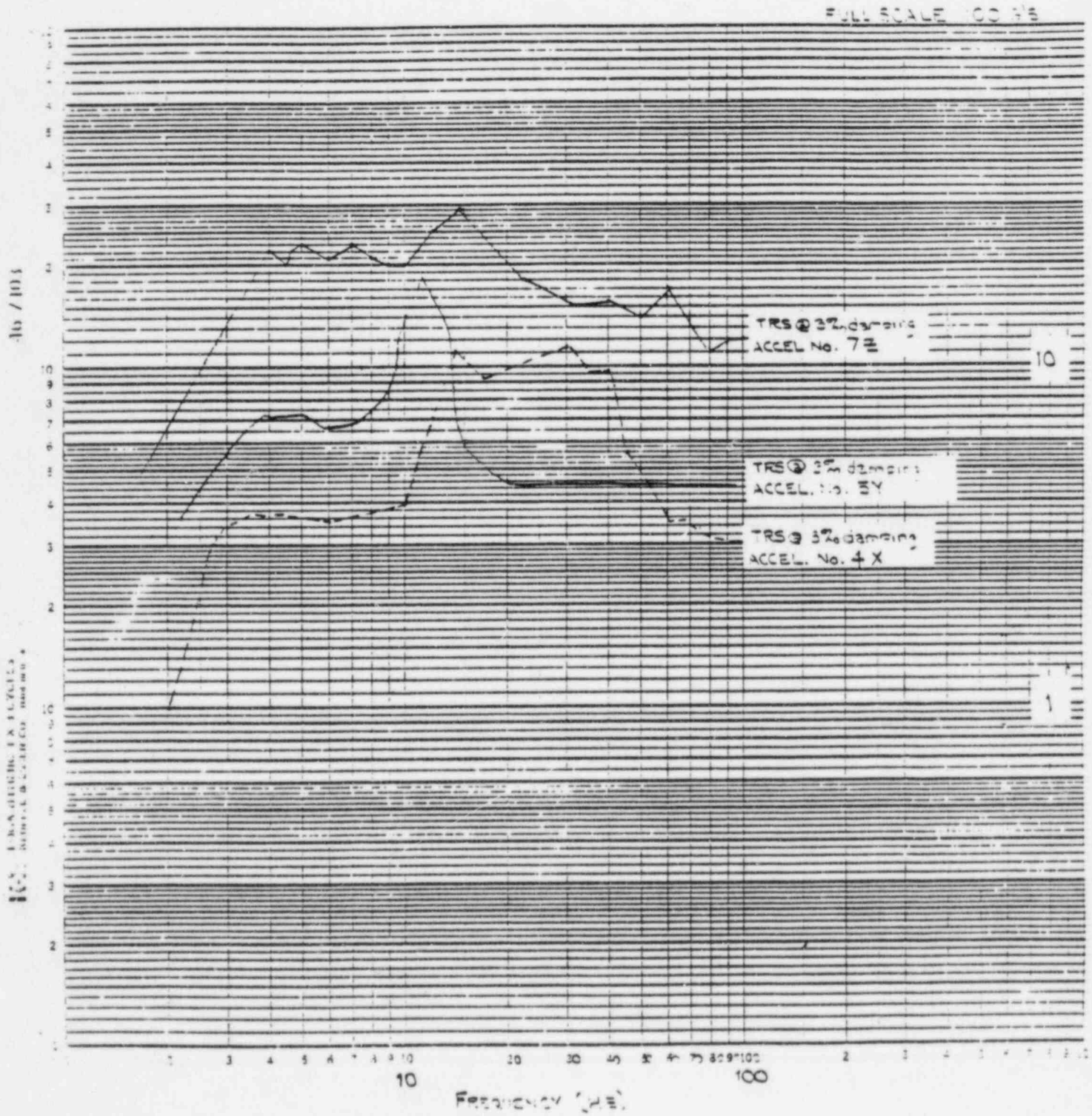


FIGURE 2-4

ENCLOSURE 8

EQUIPMENT EVALUATION REPORT

Panel Auxiliary
HFA Relay

DEVICE & TYPE: (Type HFA151A)

PROJECT: ALL BWR'S

MANUFACTURER: GENERAL ELECTRIC

MPL#: As Identified Per Plant

IDENTIFICATION: GF DWG. #184C5506
(PPD#136B3137 Modified
with PPD#184C4137)

I. INTRODUCTION

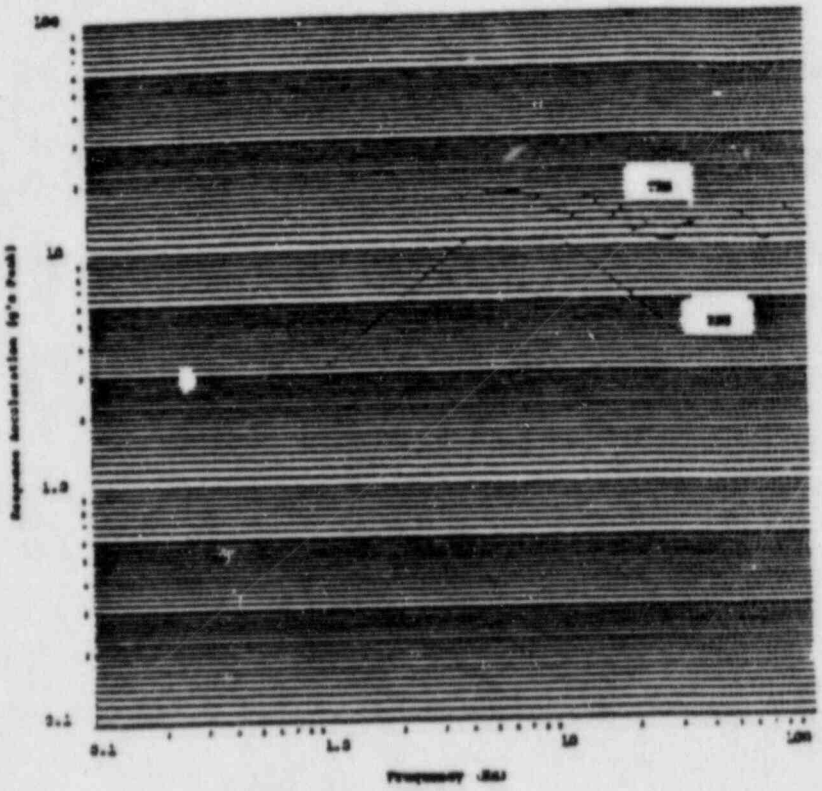
A. PURPOSE

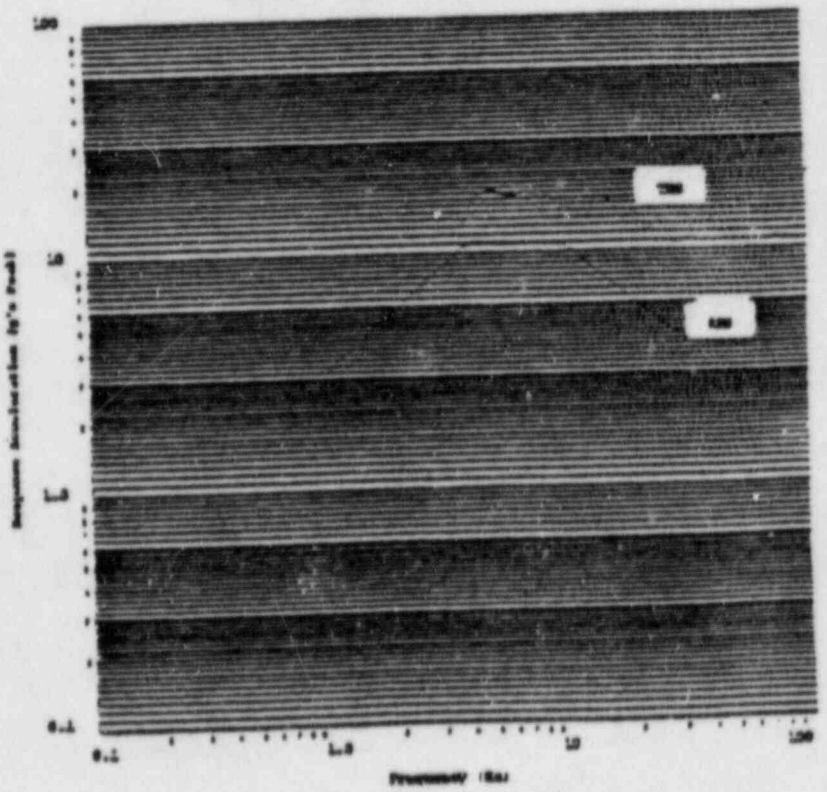
This design re-evaluation is to be performed to verify the adequacy of the qualification of the above specified component(s) to survive the most severe environment in which they may be required to operate. The criteria to which these components are to be evaluated are derived from industry standards IEEE 323-1974 and 344-1975 appropriate to the equipment under review. The Equipment Evaluation Report must be completed in sufficient detail so that it will guide an independent reviewer or review team through the data to a conclusion that the device is qualified for its intended application or to the action plan to achieve this result.

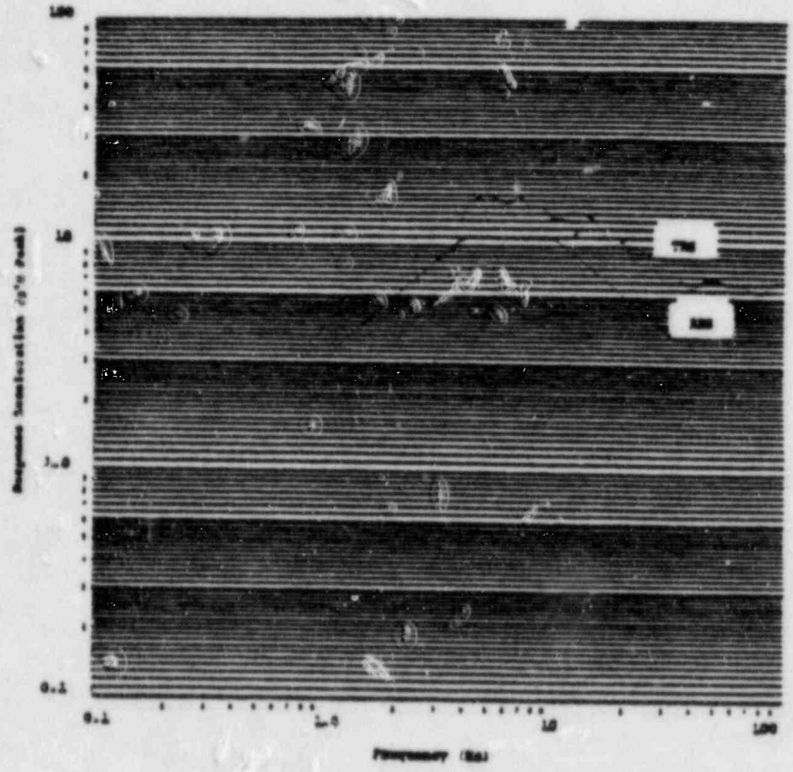
B. DOCUMENTATION COLLECTION

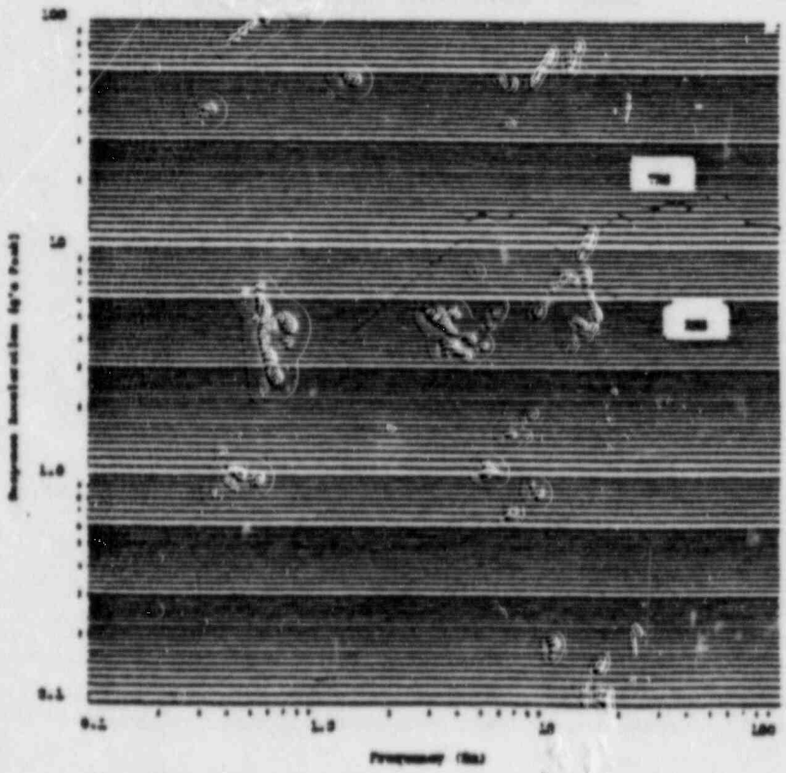
Assemble all known available documentation:

1. Reports, especially the qualification test report(s)
2. Correspondence
3. Procurement documents
4. Any documentation which associates equipment actually installed in the plant with the specific piece of equipment which was tested.









ENCLOSURE 9

159C4660
159C4486
159C4659

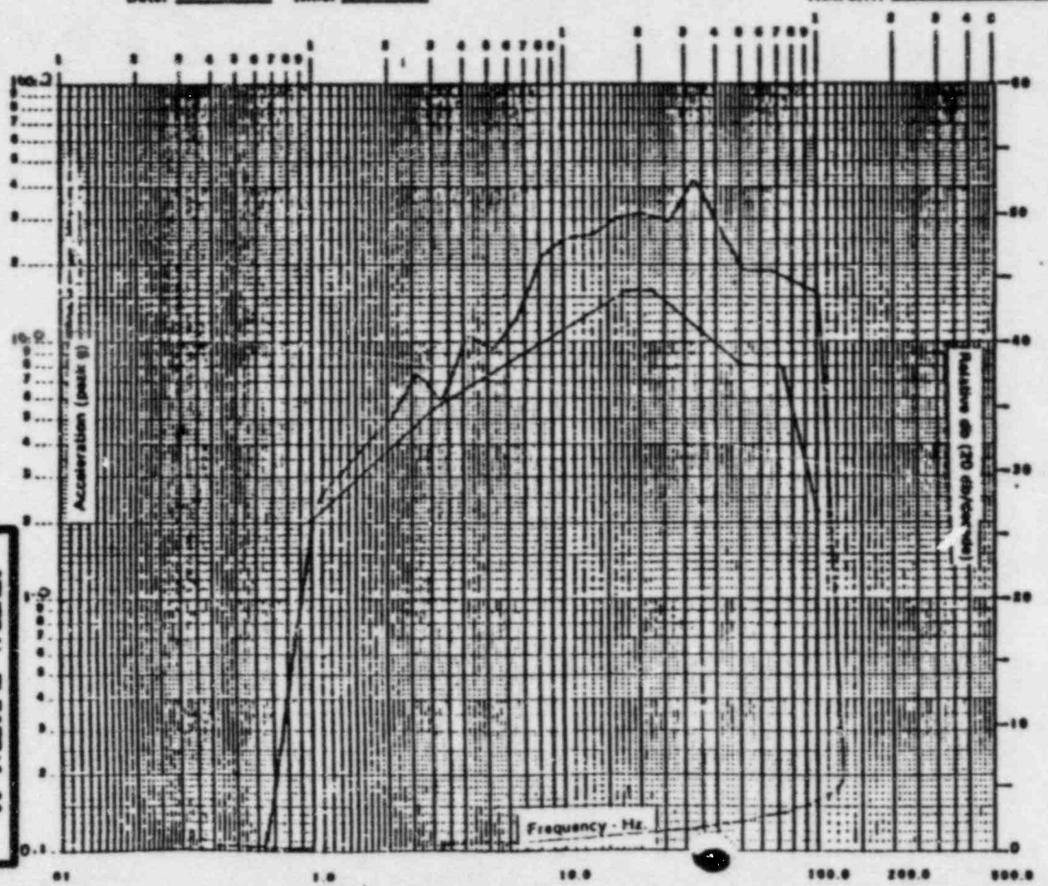
Plotted by: [illegible]

Checked by: R. Christyson 9/7/82

Date: _____ Time: _____

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Test Item: Summer, Square Root Extractor, Alarm Dual
Item P/N: 752410AAAN2, 750110AAAN2, 745210AAAN2
Item S/N: Q369-3,2; Q368-2,3; Q370-2,3
Ref. Spec.: QTP-N137
Unit: Operational ☑ Non-operational ☐
Temp. & Humidity: 72°F, 58% RH
Test Type: SSE
Duration: 30 Seconds
Sweep Speed: _____ oct/minute
Damping: 2%
Pickup Sensing Axis: Z
Pickup Sensitivity: 100 mv peak / g peak
Vibration Axis: +Y2
☐ Live ☐ Tape
Graph Number: 27
Tolerance: +6db -6db



GENERAL ELECTRIC CO.
FILE NO. 39/X234-0022
REV. 0
APPROVED _____

SH. 120 OF 132

Rep

Plotted by: W. Shuff

Checked by: R. Christyson

9/7/82

Date: _____ Time: _____

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Test Item: Summer, Square Root Extractor, Alarm Dual

Item P/N: 752410AAAN2, 750110AAAN2, 745210AAAN2

Item S/N: Q369-3,2; Q368-2,3; Q370-2,3

Ref. Spec.: QTP-N137

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 72°F, 58% RH

Test Type: SSE

Duration: 30 Seconds

Sweep Speed: _____ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

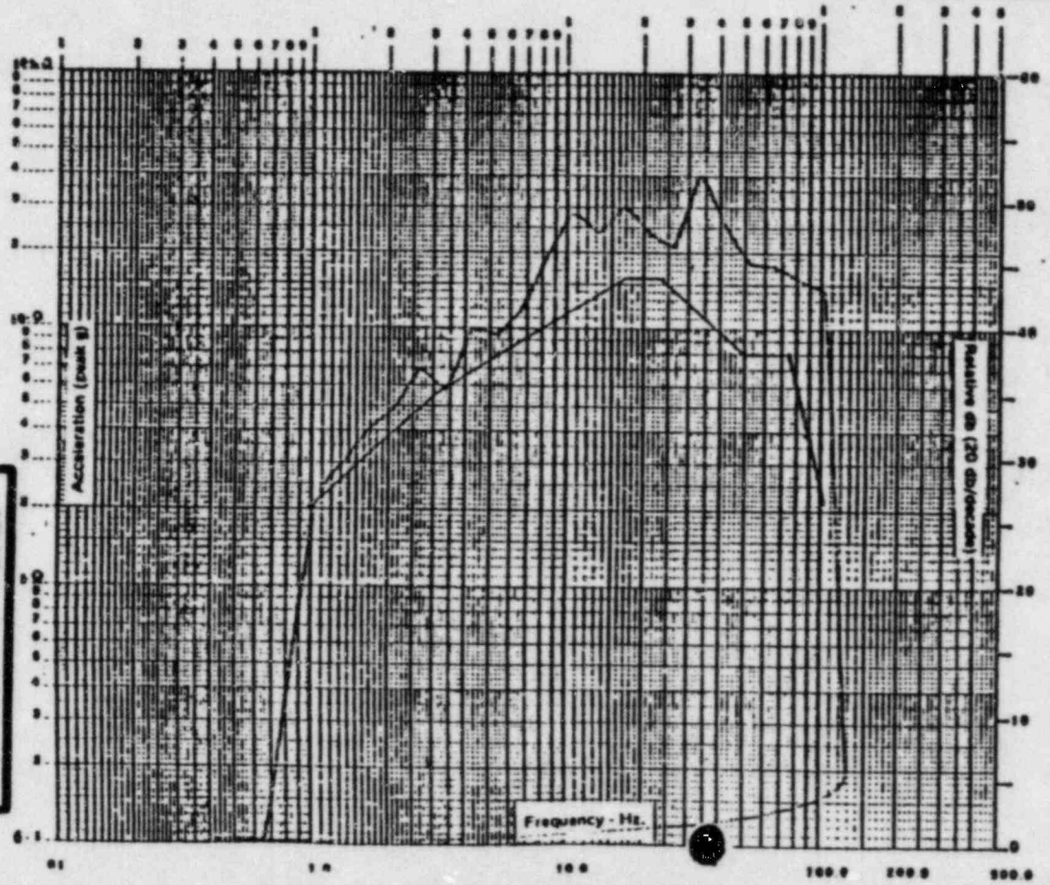
Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -Y

☒ Live ☐ Tape

Graph Number: 25

Tolerance: +6db -0db



GENERAL ELECTRIC CO.
FILE NO.
391X234-002
REV: 0
APPROVED

SH. 118 OF 132

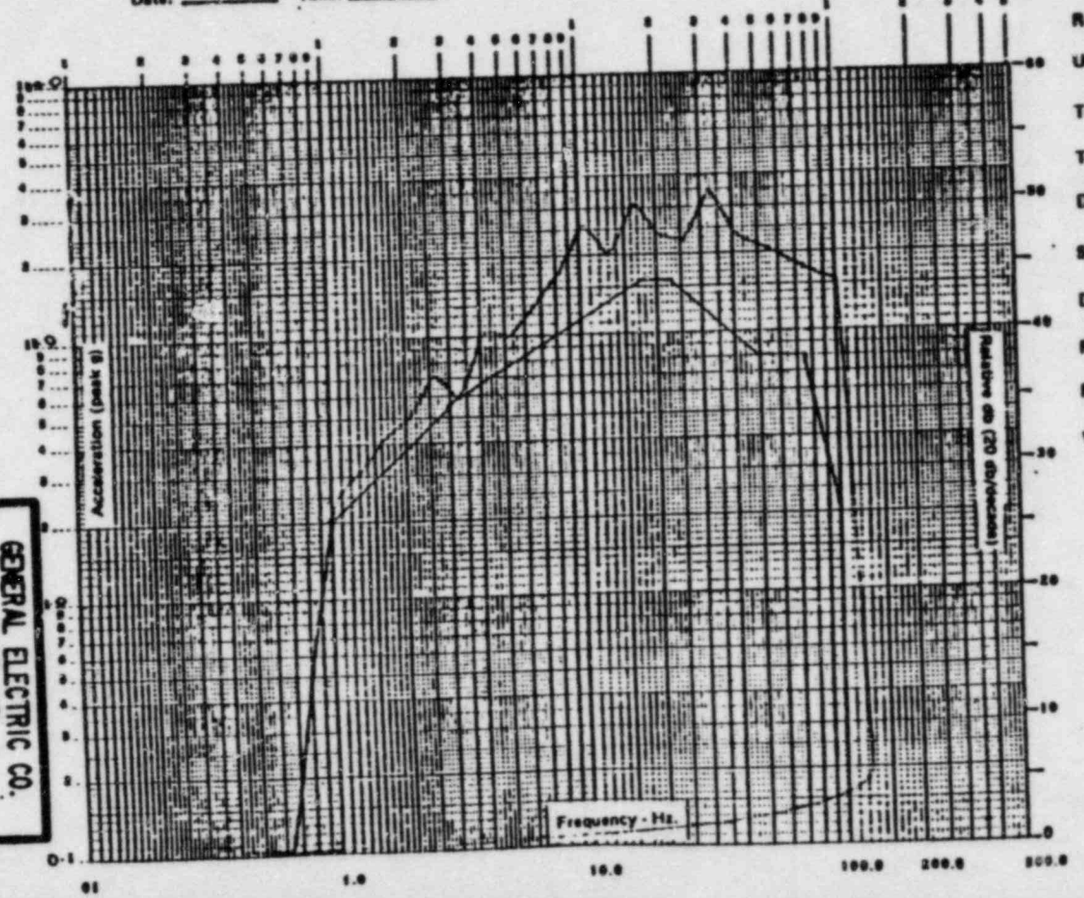
Report No. QR-3203-E92-745

Page No. F-16

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Plotted by: W. Stef
Checked by: R. Christyson
Date: 9/7/82 Time:

Test Item: Summer, Square Root Extractor, Alarm Dual
Item P/N: 752410AAAN2, 750110AAAN2, 745210AAAN2
Item S/N: Q369-3,2; Q368-2,3; Q370-2,3
Ref. Spec.: QTP-N137
Unit: Operational ☒ Non-operational ☐
Temp. & Humidity: 72°F, 58% RH
Test Type: SSE
Duration: 30 Seconds
Sweep Speed: — oct/minute
Damping: 2%
Pickup Sensing Axis: Z
Pickup Sensitivity: 100 mv peak / g peak
Vibration Axis: -X Z
☒ Live ☐ Tape
Graph Number: 28
Tolerance: +6db -0db



GENERAL ELECTRIC CO.
FILE NO. 391X234-002
REV. 0
APPROVED

SH. 121 OF 132

Plotted by: W. Shelton

Checked by: R. Chinatyan 9/7/82

Date: _____ Time: _____

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Test Item: Summer, Square Root Extractor, Alarm Dual

Item P/N: 752410AAAN2, 750110AAAN2, 745210AAAN2

Item S/N: Q369-3,2; Q368-2,3; Q370-2,3

Ref. Spec.: QTP-N137

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 72°F, 58% RH

Test Type: SSE

Duration: 30 Seconds

Sweep Speed: _____ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

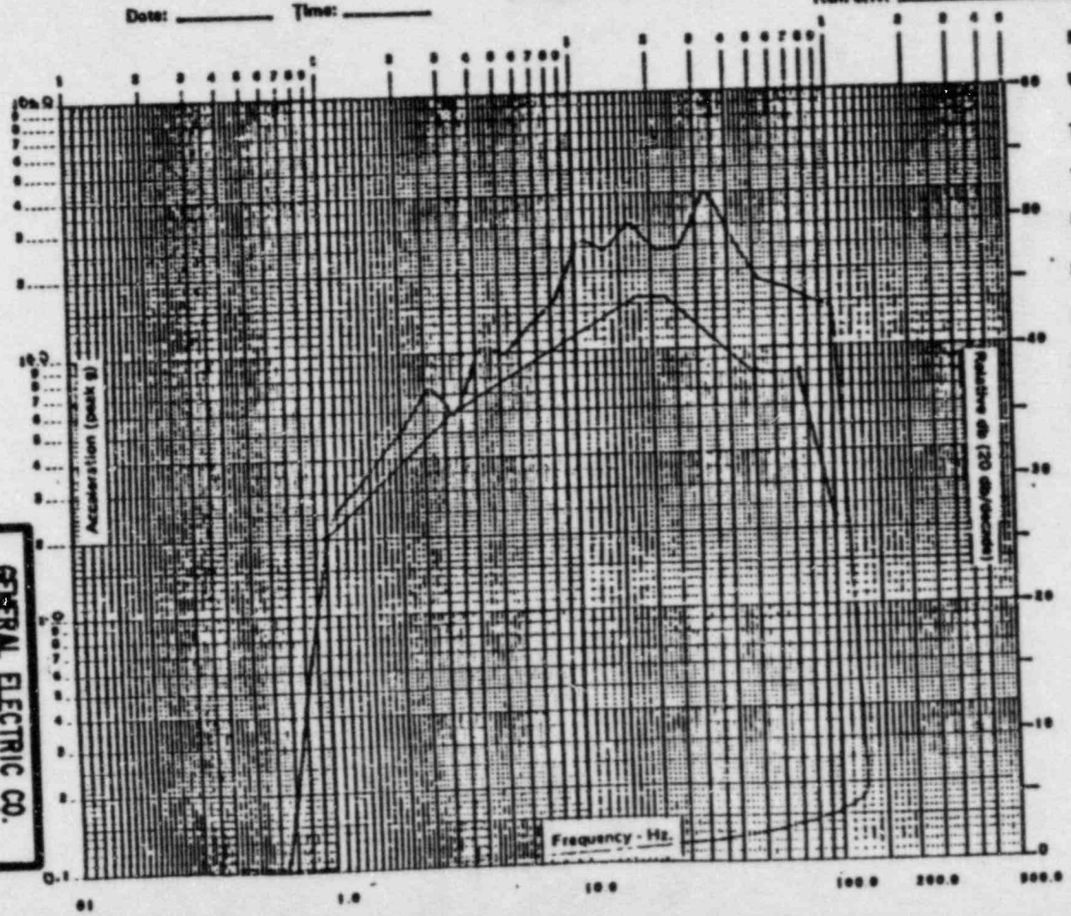
Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +X7

☒ Live ☐ Tape

Graph Number: 26

Tolerance: +6db -0db



GENERAL ELECTRIC CO.
FILE NO. 39/X234-002
REV. 0
APPROVED _____

SH. 119 OF 132

ENCLOSURE 10

DRF A00-696

TEST REPORT

MYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO. 58459
OUR JOB NO. NDS 58459
CONTRACT ---
YOUR P. O. NO. 282-KN495

GENERAL ELECTRIC COMPANY
175 Curtner Avenue
San Jose, California 95125

59 - Page Report

DATE 27 August 1979

SEISMIC TESTING
OF
TWO REACTOR MODE SWITCH ASSEMBLIES
PART NO. 163C1487G001
FOR
GENERAL ELECTRIC COMPANY

SIMILAR TO
188C8035

REGISTERED PROFESSIONAL ENGINEER
A. HEESEMAN
No. 806
CHEMICAL
STATE OF CALIFORNIA

STATE OF CALIFORNIA }
COUNTY OF RIVERSIDE } ss.

R. C. Myrick, being duly sworn, deposes and says: That the information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

R. C. Myrick

SUBSCRIBED and sworn to before me this 28th day of August, 19 79

Notary Public in and for the County of Riverside, State of California

My Commission expires 14 July, 19 83

OFFICIAL SEAL
CATHERINE C KELTY
NOTARY PUBLIC - CALIFORNIA

W-867A

DEPARTMENT DYNAMICS

DEPT. MGR. J. J. Anderson

TEST ENGINEER Phillip Knoll

Registered Professional Engineer A. Heeseman

DCAS-QAR VERIFICATION

QUALITY CONTROL L. Housteau

DRF A00-696

WYLE LABORATORIES

Report No. 58459

CUSTOMER G.E. Job No. 58459 Page No. 27

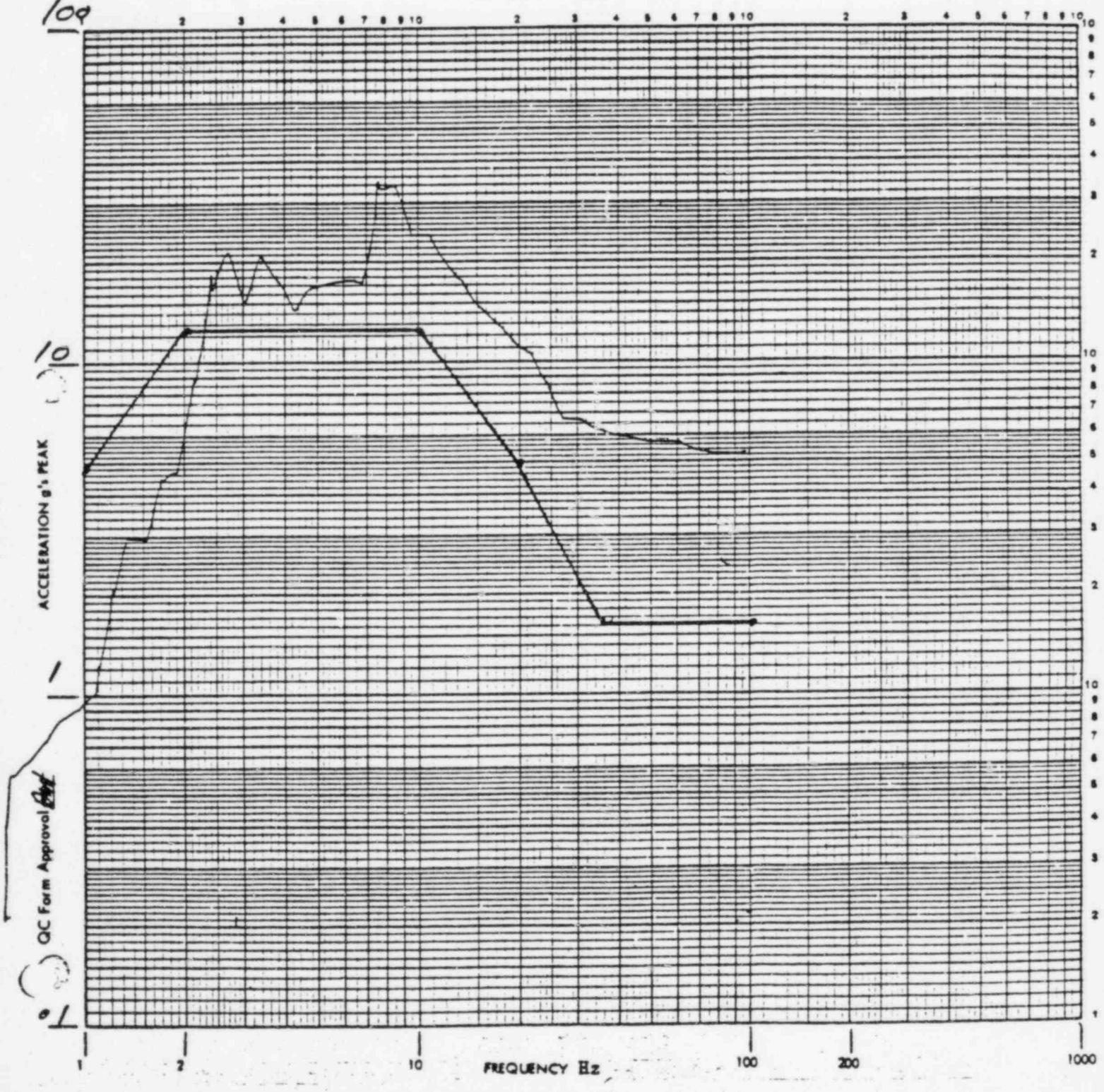
Full Scale 100 g Accel. No. 2 Control (✓) Response ( )

Operator ELLIS Specimen REACTOR MODE SWITCH

Date 8-9-79 Damping 3 % Axis of Test X-Y

VERT SSE 1ST

RESPONSE SPECTRUM



QC Form Approval

DRF A00-696

WYLE LABORATORIES

Report No. 58459

CUSTOMER G.E. Job No. 58459 Page No. 28

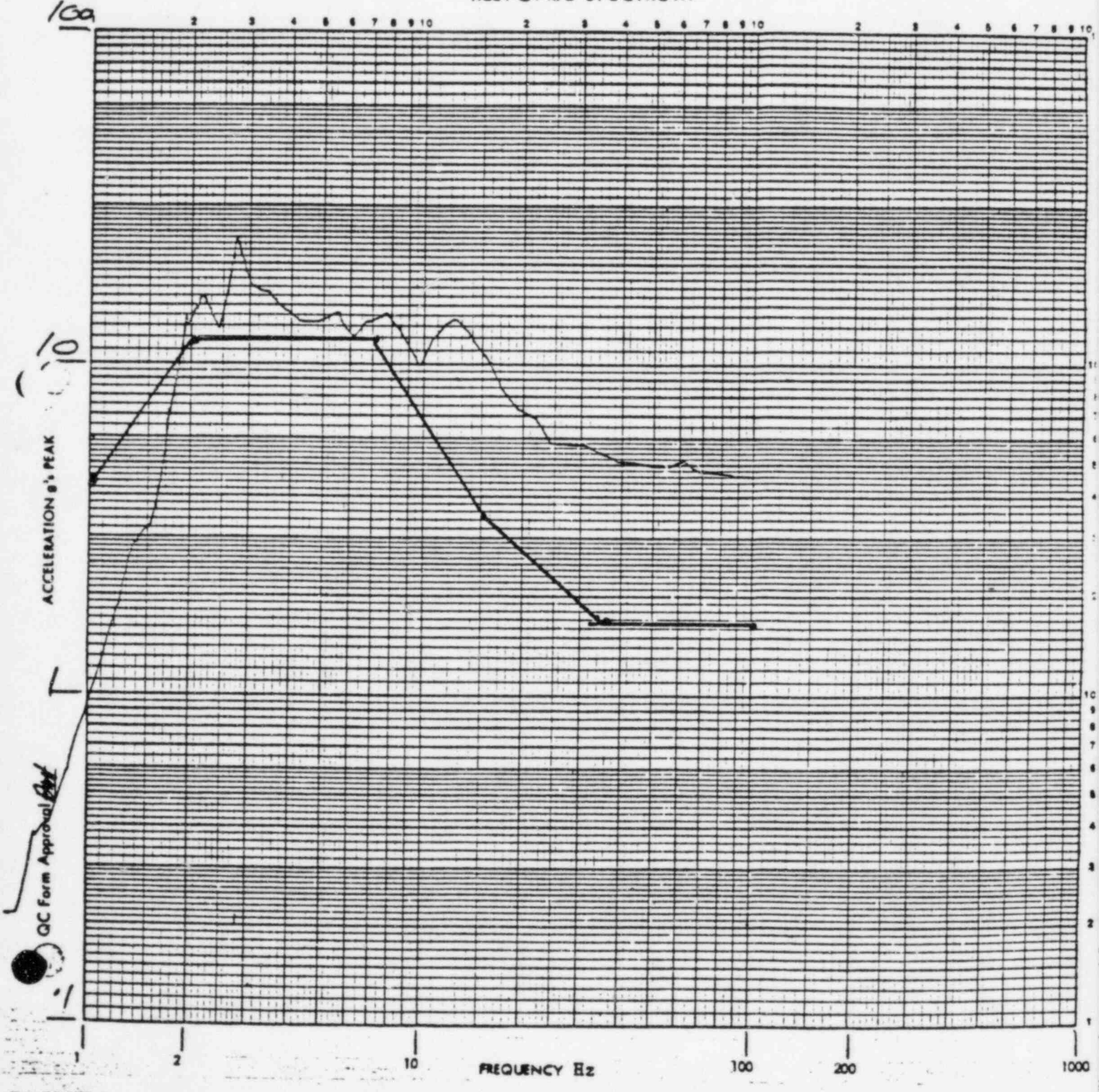
Full Scale 100 g Accel. No. 1 Control (↔) Response ( )

Operator ELLIS Specimen REACTOR MODE SWITCH

Date 8-9-79 Damping 3 % Axis of Test X-Y

HORIZ SSE 1ST

RESPONSE SPECTRUM



DRF A00-696

WYLE LABORATORIES

Report No. 58459

CUSTOMER G.E. Job No. 58459 Page No. 28

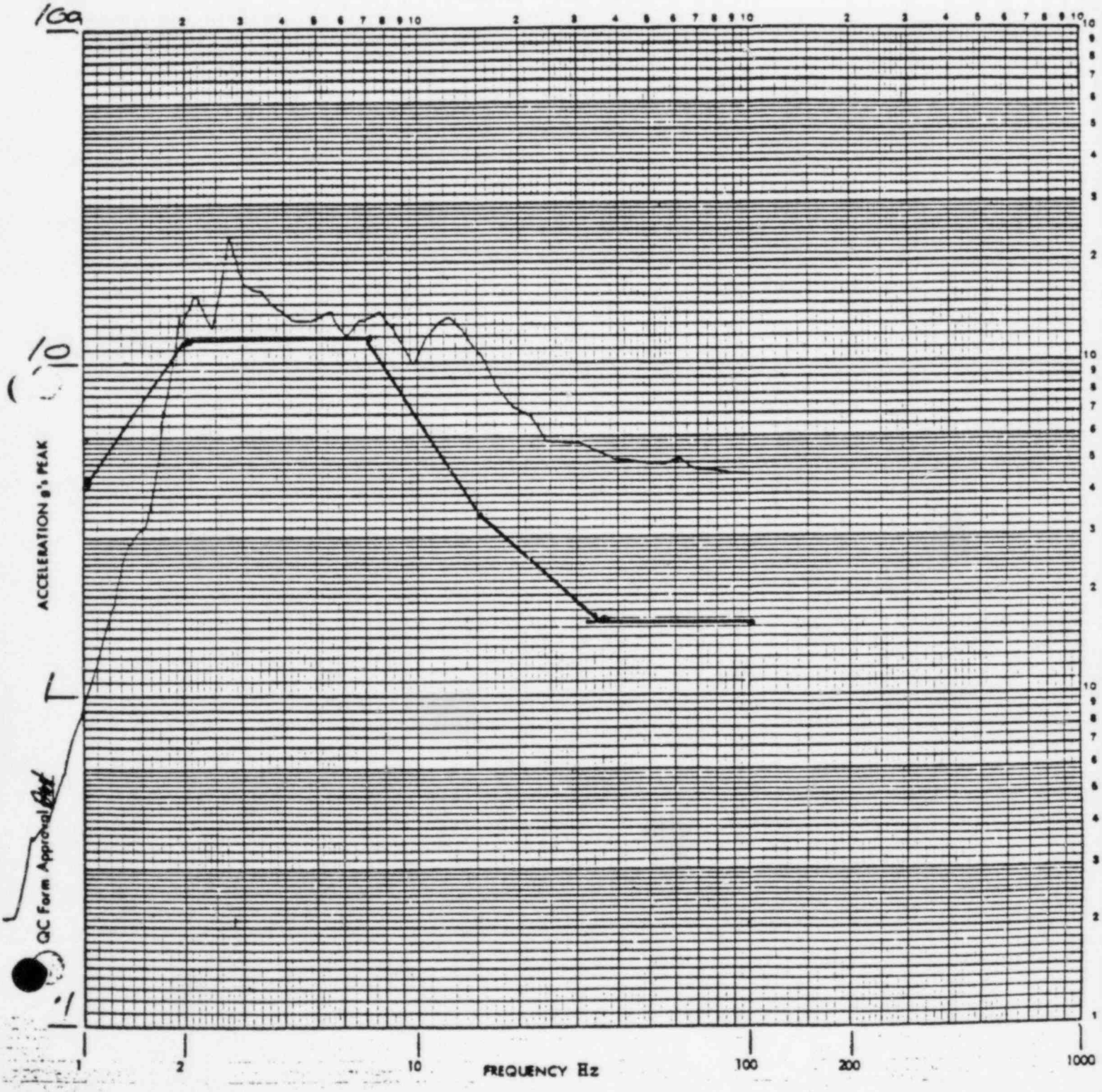
Full Scale 100 g Accel. No. 1 Control (↔) Response ( )

Operator ELLIS Specimen REACTOR MODE SWITCH

Date 8-9-79 Damping 3 % Axis of Test X-Y

HORIZ SSE 1ST

RESPONSE SPECTRUM



QC Form Approved

ENCLOSURE 11

SINGLE FREQUENCY TESTED DEVICES

DRF# A00-1084
INDEX 219
DV 164C5628

C

TEST REPORT # 563

164C 5628

SEISMIC TEST

I ITEM IDENTIFICATION

Test Report #563 Title GE-MAC Dynamic Compensator

Description GE-MAC Type 755 Dynamic Compensator, Rack Mount in a Type 7610 rack-mountable Rack Unit supported in an angle iron frame.

II TEST FACILITY

Location UPAPD, Lynn, Mass. Date 11-30-73

Shaker Type Ling Electronics

SCO-100 sinewave control center, 390 shaker, Vibra-Plane

TP-850 power amplifier, field power supply. Mod. KST-20

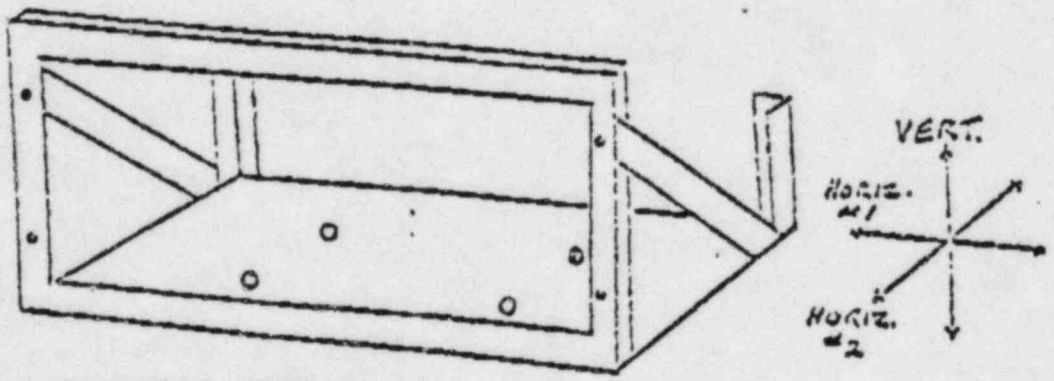
III OPERATIONAL TEST METHOD

Test Method Reference: APED 225A5766 Rev. Rec'd. 4-16-73
Test Specification
Seismic Qualification Procedure

Mounting Mode:

1-1/2" X 1-1/2" X 1/4" ANGLE FRAME ON 1/4" STEEL PLATE

MOUNT FOR TYPE 7610 RACK UNIT



TEST INSTRUMENTATION

CSC Mod. DC-100A Precision D.C. Voltmeter

EDC Mod. MV-100N Precision D.C. M.V. Standard

Power Designs, Inc. Mod. 4005 Power Supply

Dana Automatic Counter Mod. 8114

HP Low Frequency Oscillator Mod. 202B

SEISMIC TEST

Test Report #563

VIBRATION TESTS

4.2.1 Vibration Sweep Test:

		1 - 10 Hz DISPL.	10-60 Hz ACCEL.
15 Sec./Cycle Sweep	(Horizontal - 2 axes)	0.5"	3G
	(Vertical)	0.5"	2G
Observed Resonance	(Horizontal - Axis 1)	Negl	47 Hz
	(Horizontal - Axis 2)	Negl	None
	(Vertical)	Negl	26 Hz

Method of Observation Visual and Electrical Monitor

4.2.2 Malfunction Limit Test:

Resonant Frequency	Max. Applied Accel.	Axis
47 Hz	9G	Horiz #1
None	7.5G @ 30 Hz	Horiz #2
26 Hz	9G	Vertical

Malfunction (If any)

Horiz #1 No Malfunction

Horiz #2 Unit walks out of connector in rack opening circuit @ 7.5G

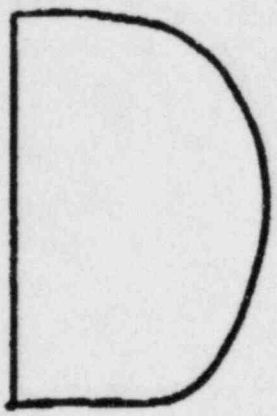
Vertical No Malfunction

RESULTS

Observations Made During Vibration:

In the Horizontal #2 position the unit after walking out of connector was re-inserted and normal readings restored. There was no discernible change in output otherwise.

DRF# A00-1084
INDEX 221
DV 164C5630



TEST REPORT # 566

SEISMIC TEST

I ITEM IDENTIFICATION

Test Report #566 Title GE-MAC MV/I

Description GE-MAC MV/I, Type 740, Rack Unit in a Type 7610 rack-mountable Rack Unit supported in an angle iron frame.

II TEST FACILITY

Location UPAPD, Lynn, Mass. Date 12-5-73

Shaker Type Ling Electronics SCO-100 sinewave control center, 390 shaker, Vibra-Plane TP-850 power amplifier, field power supply. Mod. KSI-20

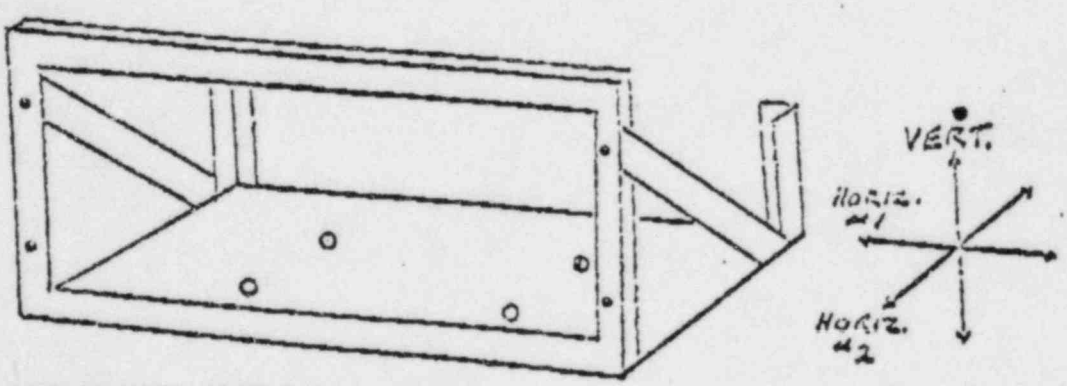
III OPERATIONAL TEST METHOD

Test Method Reference: APED 225A5766 Rev. Rec'd. 4-16-73
Test Specification
Seismic Qualification Procedure

Mounting Mode:

1-1/2" X 1-1/2" X 1/4" ANGLE FRAME ON 1/4" STEEL PLATE

MOUNT FOR TYPE 7610 RACK UNIT



TEST INSTRUMENTATION

CSC Mod. DC-100A Precision D.C. Voltmeter

EDC Mod. MV-100N Precision D.C. M.V. Standard

Power Designs, Inc. Mod. 4005 Power Supply

Dana Automatic Counter Mod. 8114

HP Low Frequency Oscillator Mod. 202B

SEISMIC TEST

Test Report # 566

VIBRATION TESTS

4.2.1 Vibration Sweep Test:

		1 - 10 Hz DISPL.	10-60 Hz ACCEL.
15 Sec./Cycle Sweep	(Horizontal - 2 axes)	0.5"	3 G
	(Vertical)	0.5"	2 G
Observed Resonance	(Horizontal - Axis 1)	Negl	None
	(Horizontal - Axis 2)	Negl	56 Hz
	(Vertical)	Negl	26 Hz

Method of Observation: Visual & Electrical Monitor

4.2.2 Malfunction Limit Test:

Resonant Frequency	Max. Applied Accel.	Axis
None	9G @ 30 Hz	Horiz #1
56 Hz	9G	Horiz #2
26 Hz	9G	Vertical

Malfunction (If any)

Horiz #1 No Malfunction

Horiz #2 Unit walked out of connector in rack @ 9G opening circuit

Vertical No Malfunction

RESULTS

Observations Made During Vibration:

Unit was re-inserted in rack connector and normal readings restored.

There was no discernible change as the result of the vibration in any axis.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1

SQRT ID No.: NSSS-3

Applicant ID No.: C61-P001

Finding

The installation condition of being next to another cabinet and the wall was not addressed in the qualification.

Response

SWEC originally located panel C61-P001 (documented on E&DCR No. P-2772) as directed by the ability to locate anchor bolts within the reinforcing bar pattern of the concrete floor. No specific clearance criteria were provided by GE for the panel in question prior to installation.

Corrective Action

In order to resolve this issue in a timely fashion and to support the NRC audit, GE was contacted and asked to aid SWEC in evaluating the clearances provided for the panel in advance of work completion in the area where the panel is located. E&DCR Nos. C-68,908 and P-2772D have been issued as a result of the evaluation. These change documents will result in rework of the subject panels. E&DCR No. C-68,908 incorporates GE FDDR LDI-3021, Revision 1 and Revision 2. As dictated by GE, the two panels are being bolted together to eliminate the gap between the panels. Work is currently being performed as authorized by Rework Control Form E-7154.

Additionally, specific guidelines for panel to panel clearances will be added to the SWEC Electrical Installation Specification. These clearances will be evaluated after installation is completed via SWEC Construction Site Instruction (CSI) 8.1.1 which requires that a walkdown be conducted for purposes of performing this evaluation. Differences noted during the walkdown are resolved by engineering or rework as appropriate.

Conclusion

The corrective action stated above will ensure that similar conditions are precluded in the future.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 1

Dynamic similarity between the tested specimen and the RBS unit was not established.

Response

The SQRT qualification report that was presented to the NRC reviewer during the audit states the RBS panel as assembly Drawing NO. 914E501. The subtier RBS drawing for the panel is Drawing No. 914E594. The tested panel is comprised of the right two bays of the production unit, Drawing No. 865E118AB (reference to DRF No. A00-1138, Tab I, Section 4.0). The tested panel has the same dimensions and structural characteristics as those installed at RBS with the exception of the width. Since the bays are lined up in a straight line, testing of a smaller number of bays as compared to the plant installation produces representative responses in the front-to-back and vertical directions. The side-to-side responses are reduced in the plant installation since additional bays, bolted together, provide additional stiffness.

The criteria used by GE in establishing dynamic similarity for RBS between tested and installed units have been utilized for other NTOL plants, were discussed with the SQRT reviewer, and were found to be acceptable. The SQRT reports for these plants include a written discussion of these criteria; however, such a writeup was omitted from the RBS package. The writeup will now be added to the RBS SQRT report.

Corrective Action

A writeup outlining the criteria to establish similarity between tested and installed panels will be added to the SQRT report.

Conclusion

Dynamic similarity between the tested and the installed panel was established using criteria that were found acceptable for other NTOL plants.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 2

The test mounting should be completely documented in the test report and compared with the as-built configuration for acceptability.

Response

Photographs of test mounting contained in DRF No. A00-1138, Tab I, and General Electric (GE) base mounting detail Drawing No. 133D9825 indicate that the test specimen was secured to the seismic table using all available mounting holes in the front and rear base plate members. The mounting detail shows these bolts at 1 ft 0 in. on center.

The installed RBS panel is mounted to the PGCC floor via 1/2-in. bolts on 6-in. centers. The installed RBS mounting gives a much stiffer base, yielding a lower seismic/dynamic response characteristic. Therefore, the tested panel accelerations are considered conservative when applied to the RBS case.

The NRC's consultant followed this response with the comment that a complete description of the test mounting shall be included in the test report (bolt: number, diameter, spacing, grade, etc; weld: type, size, length, spacing, grade, etc).

The following reviews were performed to address the followup question. As stated above, the spacing for the hardware for mounting the test specimen to the table is 1 ft 0 in. centers. This is shown on the referenced drawing, which also shows the holes for the hardware to be of 3/4 in. diameter. This is consistent with GE's practice of using 5/8-in. diameter bolts to match the predrilled and tapped holes in their shake table surface.

In the initial evaluation, engineering judgment had been employed to conclude that the RBS installation structural integrity was adequate. In order to support this engineering judgment, the following analysis is provided.

An analysis of tested and installed bolt stresses was made in the response to the NRC's finding for SQRT ID No. NSSS-6. The same analysis

is applicable for this panel, which was mounted during the test using 5/8-in. diameter bolts at 1 ft 0 in. centers, while the inservice installation used 1/2-in. diameter bolts at 6-in. centers. The analysis concluded that the stresses in 1/2-in. bolts would be 80 percent of the 5/8-in. bolts for the same loading on the tested and installed panel.

The TRS/RRS ratio for this panel is approximately 89.5, which means the inservice installation stresses would be (1/89.5) or 1.1 percent of the tested stresses for the same size of mounting bolts. The combined effect of twice the number of 1/2-in. bolts installed to 5/8-in. bolts tested would make the inservice 1/2-in. bolt stresses (0.80)(1/89.5) = 0.9 percent of the stresses in the 5/8-in. bolts tested.

This clearly illustrates that the installed mounting is adequate, since it is very conservative.

Corrective Action

None required.

Conclusion

The documentation describing the test mounting was reviewed, and it was confirmed that the as-built configuration is acceptable with a high degree of conservatism.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 3

For component qualification, the capability g-values were not defined and demonstrated to envelop the RRS over the entire frequency range.

Response

Same as NSSS-2, Finding No. 3

Corrective Action

None required.

Conclusion

The qualification for devices mounted in control room panels was established using the same criteria that were found acceptable for other NTOL plants.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 4

Qualification of some devices below 5 Hz was missing.

Response

All optical isolators, square root extractors, controllers, CR2940 switches, and Cutler Hammer switches have been tested for resonances below 5 Hz and have been found to have none. These devices were the only devices for which qualification below 5 Hz was missing. Meters are of the galvanometer type and are not subject to resonances below 5 Hz, although some needle movement may occur, which has no effect on safety.

The NRC's consultant followed this response with the further request that the response needs to be verified with the qualification documents.

The following qualification documents were reviewed to address this question:

Device	Document
Controller	A00-1084-176, Index D
Square Root Converter	A00-1084-135, Index C
CR2940 GE Switch	A00-1084-58, Index E
Optical Isolators	A00-794-21, App. E
Cutler Hammer Switches	A00-1084-95, App. E

These documents support the original response that no resonances exist below 5 Hz.

Corrective Action

None required.

Conclusion

The absence of resonances below 5 Hz was verified in a review of the qualification documents.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 5

Controller and recorder units were sliding during the test. It could not be verified from documentation presented whether the River Bend panel contains these devices.

Response

Movement of several controllers and recorders was observed during the test of prototype panel H12-P870 (prototype for panel H13-P601). These various components were tested on prototype panel H12-P870 only as a matter of convenience. River Bend control room panel H13-P601 has only one of these components, controller 163C1392. This controller continued to function during the test of prototype panel H12-P870, in spite of the movement observed. The ZPA of the TRS exceeded the RRS by a factor of six. It was concluded that no additional requirements need to be placed on production panels, since normal procedure following a seismic event requires inspection of all safety-related equipment.

Corrective Action

None required.

Conclusion

This item does not affect the qualification of the panel. The operability of the controller was successfully demonstrated, especially in light of the significant margin applied during testing.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-5

Applicant ID No.: H13-P601

Finding No. 6

Site inspection revealed the following:

1. One unistrut was loose.

2. GE ERIS terminals were very flexible.

Response

1. Inspection Report (IR) No. E4300485, dated November 1, 1984, identifies unistrut supports recorder E12-R601 as having a loose mounting. Since this IR was initiated prior to turnover to construction, a CWR was not required, and the unistrut bolts were tightened to the torque values specified in Specification No. 248.000, Revision 8. FQC verifies that the actions were completed in accordance with the required specification.

2. The ERIS system is classified as non-Class 1E. Due to their very small weights, the ERIS terminal blocks would not become missiles during any seismic events and thus would not jeopardize any other Class 1E equipment on this panel.

Corrective Action

None required.

Conclusion

Implementation of Electrical Inspection Plan No. R1248000F05240B02 would have identified this loose unistrut. However, the implementation of the electrical inspection plan was not complete at the time of the NRC audit, and hence, the loose unistrut was not identified as such.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-6

Applicant ID No.: 1H13*P670

Finding

The cabinet was installed with 1/2-in.-diameter bolts, although the specimen was tested with 5/8-in.-diameter bolts.

Response

Cabinet 1H13*P670 is installed on floor module 1H13*U710 in accordance with General Electric (GE) Drawing No. 914E989, sheet 1, Revision 5 (SWEC File No. 0242.426-000-422E). 1H13*U710 assembly floor sections D-D and J-J (reference GE Drawing No. 914E962, sheets 1 and 2, Revision 2, SWEC File No. 0242.426-000-451B/452B) identify the mounting studs arrangement and reference the material as Part No. 3. GE Parts List PL914E962, Revision 2 (SWEC File No. 0242.428-000-507B), calls out Part No. 3 as 1/2 in. - 13 x 1.62 Lg Stud. Therefore, the studs were installed by the manufacturer in accordance with GE-approved drawings.

The tested panel was mounted using 5/8-in.-diameter bolts at 12-in. centers, while the inservice installation used 1/2-in.-diameter bolts at 6-in. centers. In the initial evaluation, engineering judgment had been employed to conclude that the RBS installation structural integrity was adequate. In order to support this engineering judgment, the following is provided.

The bolt stresses are controlled by tensile area and shear (gross) area of the bolts. The tensile areas for 5/8 in. and 1/2 in. are 0.226 sq. in. and 0.142 sq in., respectively. The gross areas of 5/8-in. and 1/2-in. bolts for shear are 0.307 sq in. and 0.196 sq in., respectively. The test and inservice panel mounting critical areas are as follows:

	Tested	Inservice	Ratio of Stress, Inservice vs Tested
Tensile Area (sq in.)	0.226	0.284	0.8

	Tested	Inservice	Ratio of Stress, Inservice vs Tested
Shear Area (sq in.)	0.307	0.392	0.8

From this comparison, the stresses in 1/2-in. bolts would be 80 percent of the 5/8-in. bolts. The TRS/RRS ratio for this cabinet is approximately 37.5, which means that the inservice installation stresses would be (1/37.5) or 2.7 percent of the tested stresses for the same size of mounting bolts. The combined effect of twice the number of 1/2-in. bolts installed to 5/8-in. bolts tested would make the inservice 1/2-in. bolt stresses (0.80) (1/37.5) = 2.1 percent of the stresses in the 5/8-in. bolts tested. This clearly illustates that the installed mounting is adequate since it is very conservative.

Corrective Action

None required.

Conclusion

As outlined above, the 1/2-in.-diameter bolts are adequate to withstand the imposed loads.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-7

Applicant ID No.: H22-P041, 42

Finding No. 1

Transmitters were not environmentally aged prior to seismic testing.

Response

Aging of the transmitter was performed in a separate environmental and qualification test. Rosemount 1152 transmitters were seismically qualified in their aged condition as referenced in DRF No. A00-01312-20. Based on this information, the data presented at the audit is adequate to demonstrate qualification.

Corrective Action

None required

Conclusion

The effects of aging are addressed as documented in DRF No. A00-01312-20.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-7

Applicant ID No.: H22-P041, 42

Finding No. 2

Transmitter output variation was detected during testing, apparently due to incomplete instructions provided by GE to testing engineers regarding calibration.

GSU/GE is to confirm that River Bend installation engineers have received complete instructions and that the transmitters are properly calibrated.

Response

Complete Rosemount adjustment and calibration instructions have been defined to the RBS installation engineers for proper calibration. In addition, GSU calibration procedures, such as Procedure No. MCP-4067, Rev. 0, dated August 6, 1984, Calibration of Rosemount Model 1152 Transmitter, provides detailed calibration instructions which are based on vendor manual GEY 5577, Volume 3, Tab 22 and SWEC Manual No. 3242.414-000-006A.

Tested devices were identical to RBS devices or have been analyzed to be similar (reference DRF No. A00-901-002 and VPF No. 442X711-001, sh. 20).

The NRC's consultant followed this response, with the further request that the documents through which these instructions have been conveyed should be made available to the SQRT for review.

The relevant document, vendor manual GEY 5577, Volume 3, cited above, was conveyed from GE to SWEC and GSU via Transmittal No. 2969 during the 33rd week of 1983, as evidenced in the attached transmittal summaries.

Corrective Action

None required.

Conclusion

It is evident from this response that existing RBS programs are effectively implementing necessary equipment adjustment and calibration procedures.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-8

Applicant ID No.: B21-F022/F028B MSIV

Finding No. 1

Adequacy of the valve body was not demonstrated.

Response

The MSIV body, yoke assembly, and actuator are modeled in the piping analysis, which is performed using 3-dimensional finite element dynamic analysis. GE Specification No. 213A8418 summarizes the data required to model the valve and also its loading capabilities. Piping analysis performed and reported in Stress Reports 23A4062, 4063, and 4064 dated May 1, 1984, documented and compared the dynamic pipe-induced loads at the valve body (locations G1, G2, and F) against the maximum allowables. Since the induced loads are less than the maximum allowed, the adequacy of the valve body is demonstrated.

Corrective Action

None required.

Conclusion

Based on the response provided above, GSU confirms that the adequacy of the valve body was demonstrated prior to the NRC audit.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-8

Applicant ID No.: B21-F022/F028B MSIV

Finding No. 2

GSU should confirm compliance with GE's recommendation regarding the following required for qualification:

1. Bracket modification for limit switch

2. Elimination of junction box

Response

Bracket modification for limit switches and elimination of junction boxes are initiated via GE's FDI No. 76/56800, Revision 0, dated August 23, 1984.

Corrective Action

None required.

Conclusion

Based on the above response, GSU confirms the compliance with GE's recommendations regarding bracket modification for Limit Switches and elimination of junction boxes for MSIVs. The actions needed to confirm the compliance with GE's recommendations were initiated by GSU prior to NRC audit.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.1.1

SQRT ID No.: NSSS-8

Applicant ID No.: B21-F022/F028B MSIV

Finding No. 3

The source of River Bend specific RRS was not presented during the audit.

Response

River Bend Station specific RRS for dynamic testing of the MSIV were calculated by the GE Piping Analysis Group No. II, transmitted to the MSIV responsible engineer by memo - Nguyen to Nieh dated February 15, 1984, and provided to the NRC auditors in response to the question raised during the audit.

Corrective Action

None required.

Conclusion

Based on the above response, GSU believes that the source of River Bend specific RRS was available and presented to the NRC auditors.

B O P

PVORT - SSER

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-6

Applicant ID No.: 1CCP*MOV138

Finding No. 1

Valve has serial number 809 (1980) on "N" stamp tag. Manufacturer's nameplate serial number is 1413-2. PVORT form lists valve serial number as 809 (1980). Inspection and test record form list serial number as 1413. Clarification required.

Response

The PVORT form provided to the NRC at the time of the audit listed the valve S/N 809 (1980). The valve manufacturer includes two serial numbers for the valve, a valve S/N and a body S/N. For the subject valve, S/N 809 is the serial number for the valve and S/N 1413 is the serial number for the valve body. Exclusion of either S/N from the PVORT form would not degrade or impair the effectiveness of the RBS PVORT program. The use of the manufacturer's nameplate serial number is recorded on inspection and test records to distinguish between the valve manufacturer and the supplier of the valve body's forging or casting.

Corrective Action

The PVORT form has been revised to include both serial numbers

Conclusion

The PVORT forms were prepared at the request of the NRC for its use to aid in the review of the specific equipment included within the audit scope.

Retrieval of pertinent qualification documentation to substantiate the equipment's ability to perform its intended safety function is controlled via the unique mark/identification number attached to each piece of equipment, i.e., 1CCP*MOV138. GSU believes that omission of one of the serial numbers from the PVORT form has no impact on the qualification of the equipment in question.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-6

Applicant ID No.: 1CCP*MOV138

Finding No. 2

Stroke time requirements need clarification; they vary from 30 seconds (specification sheet) to 22 seconds (inspection and test record) to 20 seconds (PVORT form).

Response

Stroke time for this valve is 20 seconds. This time is stated on the PVORT form. During the review of the documents, the NRC reviewer looked at the valve data sheet from Revision 1 of the specification showing 30 seconds as the required stroke time for the valve. A SWEC engineer clarified that the data sheet had been revised in Addendum No. 2 to Revision 1 of the specification, and the current data sheet shows the 20-second stroke time, which is consistent with the PVORT form. The discrepancy regarding the stroke time on the inspection and test record was clarified during the audit, and the correct record showing the 20-second stroke time was presented to the NRC reviewer.

Corrective Action

None required.

Conclusion

This concern was resolved with the NRC reviewer during the audit. The applicable documents are attached to further clarify that a consistent stroke time of 20 seconds is stated on all three items in question.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-6

Applicant ID No.: 1CCP*MOV138

Finding No. 3

Have stem leakoff requirements been provided?

Response

The subject valve was provided with a stem leakoff connection in accordance with the valve technical data sheet included in SWEC Specification No. 228.212. A short length of 1/2-in., schedule 80 pipe connected to the valve body is provided, as shown on the Velan Company valve drawing (SWEC File No. 0228.212.047-008L). This connection is not used on River Bend and therefore is not piped up to a permanent drain point. The leakoff is to be plugged in accordance with applicable requirements provided in Piping Erection Specification No. 228.160 and on the installation drawing. A photograph of the stem leakoff connection was provided to the NRC inspector during the audit.

Corrective Action

None required.

Conclusion

Stem leakoff provisions for this valve are consistent with engineering requirements documents. SWEC design procedures require piping up valve stem leakoffs for high-pressure and/or high-temperature applications only, and this valve does not fall into this category.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-6

Applicant ID No.: 1CCP*MOV138

Finding No. 4

Have space heaters been removed?

Response

Space heaters, located inside the limit switch compartment of MOV operators, had failed in some specimens during the River Bend dynamic test program. The nature of the failure did not affect the operability of the actuator. During the discussion of this failure, GSU informed the NRC reviewer that these space heaters do not perform any safety function and that they would either be disconnected electrically or removed altogether after placement of the valves in service. SWEC had already addressed this issue in a letter to GSU, SWEC Letter No. RBS-9515 dated June 13, 1984. GSU has subsequently decided to electrically disconnect the heaters. E&DCR No. C-60,849 dated February 14, 1985 provides direction to disconnect the heaters.

Corrective Action

E&DCR No. C-60,849 has been issued.

Conclusion

GSU believes that this finding highlights the fact that the River Bend QA program is controlling the engineering and design process effectively. This issue had been identified by GSU/SWEC prior to the audit.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-6

Applicant ID No.: 1CCP*MOV138

Finding No.5

Revision 2 to MOV Checkout Procedure 1-G-EE-18 was initiated due to excessive torque values in Revision 1. Comparing Revisions 1 and 2, the torque values appear to be the same.

Response

Revision 2 of 1-G-EE-18 added a note which allowed the use of socket-head or hex-head fasteners to facilitate torquing. The original slotted-head fasteners were stripping during tightening, which precluded the application of the required torque values. The intent of the revision was not to reduce the torque values (and, in fact, it did not reduce torque values), but to change the type of fastener head utilized. It should be noted that Revision 7 of Procedure 1-G-EE-18 was the effective revision at the time of the NRC audit.

Corrective Action

Not applicable to this finding.

Conclusion

No followup or preventive action is required as a result of this item.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 1

Valve installation contradicts Note 18 of FSAR Figure 6.7-1, qualification documentation and manufacturer recommendations.

Response

This discrepancy has been investigated and determined to be caused by a misinterpretation of the required direction of flow which occurred during the design process. This, in turn, resulted in the incorrect valve orientation being shown on the drawings. The key design documents which show the remaining 77 inline SOVs used on the project have been reviewed. One additional SOV was found to be oriented incorrectly.

The design documents which show the incorrect orientation of the two valves have been corrected. The affected valves have been removed and reinstalled correctly in the field.

It has been determined that the discrepancies noted were isolated cases, and no programmatic changes are necessary to preclude recurrence.

Corrective Action

FSAR Change Notice F6.7-1 was signed in December 1984 to indicate the correct installation position of the valve.

Conclusion

The incorrect installation of these valves would have been discovered during preliminary testing. River Bend Preoperational Test Procedure No. PT-208 describes testing for the MS-PLCS. Note that in Section 7.3.6 of PT-208 proper closing of 1E33*SOVF014 is verified. 1E33*SOVF014 is designed to close when the d/p between the steam line and the reactor is 8.5 ± 3.0 psid. Installed incorrectly, 1E33*SOVF014 would not close with the PVLCS air supply (101 psig minimum) under the seat. The pressure in the main steam line would continue to increase, indicating a problem with the system. 1E33*SOVF014 is the inboard bypass solenoid valve. 1E33*SOVF034 is the outboard bypass solenoid valve, which operates and is tested in a similar manner.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 2

If the working fluid (air) provides opening force; what is the minimum air pressure required to open the valves?

Response

The process fluid (air) pressure can drop to zero, and the valve will still operate. The valve operation is described in the vendor instruction manual SWEC File No. 3247.501-240-004C.

Corrective Action

None required.

Conclusion

The valve installed with the flow over the seat will operate, as designed, at any pressure from 0 to 200 psig (system design pressure).

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 3

Are the forces delivered by the spring capable of closing the valve against the loads of the working fluid?

Response

Yes, the valve is designed to close against a maximum ΔP. The maximum ΔP for 1E33*SOVF014 is 200 psig (reference Specification No. 247.501, page 1-48, lines 42.32 to 42.37; Drawing No. 0247.501-240-010F). The design pressure for line 1-MSI-002-60-2-(A-), which contains this solenoid valve, is 200 psig.

Corrective Action

None required.

Conclusion

This valve installed with flow over the seat will operate as designed.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 4

What assurance is there that the delivered air quality is in accordance with the manufacturer's requirements?

Response

The process conditions were provided in Specification No. 247.501. The manufacturer has not identified any special process media quality requirements. The system air supply is free of particulates. Air from the auxiliary building atmosphere is drawn into the water seal ring air compressor through an inlet filter-silencer. Seal water is initially fed to the compressor through a strainer and subsequently recirculated. The compressed gas-water mix is fed to a separator where the water (and any solid particles) drop to the bottom, and the compressed gas rises. The rising compressed gas is fed through an air filter to the LSV air accumulator.

Corrective Action

None required.

Conclusion

This valve will operate as designed with air supplied by the PVLCS compressors.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 5

List tests performed by GSU to date or to be performed in the future.

Response

No tests have been performed to date. System functional requirements will be verified by preoperational test procedure PT-208 including:

1. Pressurization of the MSIV from 0-35 psig within 5 minutes
2. Flow meter N006/N026 alarm and isolation at 12 scfm ±0.5 flow and recorder alarm at 6 scfm ±0.5
3. Functional isolation value test
4. Containment and main steam pressure interlocks set at 35 psig; minimum air supply interlock set at 50 psig
5. Functional drain valve test
6. Functional bypass valve test

Corrective Action

Not applicable to this item.

Conclusion

Not applicable to this item.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-9

Applicant ID No.: 1E33*SOV14

Finding No. 6

How will GSU track manufacturer's recommendations regarding maintainability of components subject to aging.

Response

GSU's response to SSER Section 3.10.1.4, Finding No. 3 addresses how GSU's maintenance and surveillance program will track and identify components subject to aging.

Corrective Action

None required.

Conclusion

GSU has committed to have its maintenance and surveillance program, regarding limited-life components, in effect before fuel load.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-11

Applicant ID No.: 1HVC*MOV1B

Finding

Actuator is serialized (260880). Adapter plate is also serialized (260953). PVORT form picked up the adapter serial number in place of the actuator number. Clarification required.

Response

The PVORT form provided to the NRC at the time of the audit listed the valve S/N 10837-4B (1981) and the actuator gear attachment S/N 260953. The actuator and actuator motor are also serialized. This data was not included on the original PVORT form. The serial numbers are as follows for the valve and appurtenances:

1. Valve S/N 10837-4B
2. Actuator S/N 260880
3. Actuator gear attachment S/N 260953
4. Actuator motor S/N 719390-PF

Corrective Action

The PVORT form has been revised to include the above serial numbers (attached).

Conclusion

The PVORT forms were prepared at the request of the NRC for its use to aid in the review of the specific equipment included within the audit scope. Retrieval of all qualification documents for this equipment is controlled via the equipment mark number, not component serial numbers. GSU believes that the serial numbers which were missing from the PVORT form have no impact on the qualification of the equipment in question.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-12

Applicant ID No.: 1E12*PC003

Finding No. 1

The specification identifies the operating fluid as demineralized water on the data sheet, while the pump actually takes suction from the suppression pool. What effect does this have on operability, performance, and life of wear rings, bearings, seals, impellers, etc?

Response

The suppression pool water quality is maintained to the specification listed below (reference GE Document No. 22A2747, MPL A62-4130). Since there is no significant difference between this and demineralized water, there will be no deviation from the design performance or life of the pump or pump components.

Conductivity	10 umho at 25°C
Chloride (as Cl)	0.5 ppm
Ph	5.3 to 8.6 at 25°C
Total insolubles	5 ppm

Corrective Action

None required.

Conclusion

Since suppression pool water chemistry is essentially the same as demineralized water, there is no degradation in pump operability or maintainability.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-12

Applicant ID No.: 1E12*PC003

Finding No. 2

At reduced voltages, what is the capability of the pump/motor, and does it meet the requirements of the system?

Response

Based on Gould/Westinghouse correspondence (reference letter dated November 28, 1984, and TWX dated January 8, 1985), the RHR fill pump is capable of achieving required system conditions of flow and pressure at a 70-percent voltage.

Corrective Action

None required.

Conclusion

Pump 1E12*PC003 meets the requirements of Purchase Specification No. 237.160.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-13

Application ID No.: 1SWP*P2A

Finding No. 1

Documentation provided for the staff review included factory performance test results, vibration test results from a coupled run, preliminary alignment data, and various test procedures.

The performance data agreed with specification requirements; however, the staff notes that the vibration data presented used peak velocity in inches per second and the General Machinery Vibration Severity (GMVS) Chart for acceptability as opposed to the pump specification requirement that peak to peak vibration amplitudes are not to exceed the limits shown on Figure 66 of the Hydraulic Institute (HI) Standard. The staff's concern is that this inconsistency in the use of vibration parameters can lead to errors when comparisons are made with baseline data; also, the acceptance criteria used by GSU in conjunction with the GMVS Chart appear to be less conservative than the limits found on Figure 66 of the HI Standard.

Response

The vibration acceptance criteria are included in Preoperability Test Procedure No. PT-256 and SWEC Document Nos. G232.920-257-001B, 002C, 003B, and 004C. These documents were presented to the NRC reviewer during the audit.

The NRC's consultant followed this response with the further request that GSU confirm that acceptance criteria developed from the GMVS Chart do not exceed the criteria of Figure 66 in the HI Standard as requested in the purchase specification for the pump.

The following reviews were completed to address this followup request.

The vibration acceptance criterion is identified in Preoperational/Acceptance Test Procedure No. PT-256 as 0.314 in./sec. This criterion is verified by Generic Test Procedure No. 1-G-ME-07, Vibration Testing of Rotating Equipment, Enclosure 11.2, which provides a GMVS Chart extracted from the IRD Mechanalysis Instruction Manual for the vibration monitoring equipment being used. The Generic Test Procedure, in quoting from the vibration monitoring equipment instructions, in Section 7, specifies that when recording vibration amplitude, displacement should be recorded for frequencies equal to or less than 600 cycles-per-minute (CPM), velocity should be recorded for frequencies greater

than 600 CPM but equal to or less than 60,000 CPM and acceleration for frequencies above 60,000 CPM. For the rated operating speed of this pump, which is 1,200 CPM, it is therefore entirely consistent with generally accepted practice to measure the vibration amplitude in terms of inches per second, and the use of this vibration parameter should not lead to errors as stated in one concern noted by the NRC. The reason vibration velocities are the preferred measurement in this frequency range is that the corresponding peak-to-peak displacement amplitudes become quite small and are difficult to measure with the desired degree of precision.

The actual vibration test data, as documented in Enclosure 11.1 of 1-G-ME-07, has a maximum vibration of 0.10 in./sec for the coupled run and 0.045 in./sec for the uncoupled run. Therefore, the actual vibration values are well within acceptable limits, when compared with the criterion of 0.314 in./sec given above.

For harmonic excitation, it is well known that the following simple relationship exists between the vibration velocity and the peak-to-peak displacement amplitude.

$$D = 19{,}100\ V/CPM$$

where D is the peak-to-peak amplitude in mils, V is the velocity in inches per second, and CPM is the frequency of the vibration in cycles per minute.

Applying this relationship to the 0.10-in./sec velocity measured for the coupled run above, at the rated speed of the pump, a displacement of 1.59 mils peak-to-peak is computed. This compares with the acceptance criterion of 4.4 mils peak-to-peak given in Figure 66 of the HI Standard, which demonstrates clearly that based on this criterion the vibration values are also well within acceptable limits.

An additional review was completed to address the NRC's concern that acceptance criteria used by GSU in conjunction with the GMVS Chart appear to be less conservative than the limits found on Figure 66 of the HI Standard. These acceptance criteria are compared in the following table for a range of frequencies of vibration.

Frequency of Vibration CPM	Peak-To-Peak Maximum Allowable Vibration Amplitude, mils	
	Figure 66 - Hydraulic Institute Standard	General Machinery Vibration Severity Chart
800	5.3	7.1
1000	4.8	5.8
1200	4.4	5.0*
1600	3.8	3.7
2000	3.4	2.9
3000	2.5	2.0

*Corresponds to the 0.314-in./sec velocity criterion for this pump.

It can be seen by inspecting this table that in the lower frequency region the HI Standard is more conservative, and for frequencies above 1,600 CPM the GMVS Chart is more conservative. At the rated operating speed of this pump (which is 1,200 CPM), the two are within 13.6-percent agreement of each other, which sould be acceptable for practical engineering applications. For this pump, the HI Standard Figure 66 is more conservative, as the NRC reviewer correctly pointed out. However, it also should be noted that the HI Standard,

13th Edition, p 106, states in connection with Figure 66 that the curve should be used as a general guide, with recommendations that vibrations in excess of the curve may require investigation and correction. Often, more important than the actual vibration itself are the changes of vibration over a period of time. Vibrations in excess of the curves may often be tolerated if they show no increase over considerable periods of time and if there is no other indication of damage, such as increase in bearing clearances.

As part of the RBS preventive maintenance and surveillance program, all large rotating equipment of the type under discussion is routinely inspected. RBS vibrating monitoring program, PEP-0003, defines the measurement methods, computerized data retention and analysis, and frequency of recording data on the equipment. The frequency of monitoring motors is established at every 28 days, and pumps are monitored quartely. For this pump, an alarm level is set at 0.2-in./sec vibration velocity magnitude. This is considerably below the criteria in either Figure 66, which is 0.276 in./sec (derived from the 4.4 mils displacement and the equation given above), or the GMVS Chart which is 0.314 in./sec. An alarm level is a preselected vibration value placed into the vibration data bank for each equipment that causes an alert to be signaled to the operator indicating possible vibration problems.

Corrective Action

None required.

Conclusion

From the discussion, it is concluded that inconsistencies in the vibration parameters, peak-to-peak displacement, or vibration velocity, will not arise since a simple relationship exists to equate the two.

Also, a study relative to the NRC's concern that acceptance criteria used by GSU in conjunction with the GMVS Chart appear to be less conservative than the limits found on Figure 66 of the HI Standard showed the two criteria are within 13.6 percent of agreement with each other which is considered acceptable for practical engineering applications. It should be noted in connection with Figure 66, the HI Standard states that this is a general criteria only, and higher levels of vibration may be acceptable. In addition, since the alarm setting for the level of vibration in this pump is established well below either of the two criteria, it is concluded that the NRC's concern is resolved.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-13

Applicant ID No.: 1SWP*P2A

Finding No. 2

Coupling runout value (driven member) is inconsistent with alignment requirement.

Response

The coupling runout value is the difference between the minimum outside diameter and the maximum outside diameter of the coupling. This value is within manufacturer's tolerances.

The vendor's instructions state that the pump and motor shafts are to be aligned axially within 0.002 in. The shaft alignment record shows that the measurement taken was 0.001 in. at 180° and 270° and 0.000 in. at 0° and 90°. Also, the faces of the motor half coupling and the adjustable spacer must be parallel within 0.002 in. The shaft alignment record shows that the angular alignment value was 0.000 in. Therefore, the alignment requirements of the vendor have been met.

Corrective Action

Not applicable to this finding.

Conclusion

All coupling alignment readings were found to be within manufacturer's tolerances.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-13

Applicant ID No.: 1SWP*P2A

Finding No. 3

Pump weight incorrect on PVORT sheets.

Response

Correct pump weights are as follows:

Pump Assembly (dry):	26,500 lb (Add 2, Rev. 1, Spec)
Pump Assembly (filled with water):	36,670 lb (Add 2, Rev. 1, Spec)
Motor:	5,500 lb (Motor Analysis)

These weights were considered in the seismic analysis of the pump and motor, contained in the following references:

SWEC File No. 6232.920-257-005D - Motor
SWEC File No. 4232.920-257-001B/1C - Pump Assembly

Copies of the weight references are attached.

Corrective Action

The PVORT form has been revised to show the correct values.

Conclusion

This finding was the result of an error made during the preparation of the PVORT sheets, which were prepared only to facilitate NRC review during the audit. Since the correct equipment weights were considered in assessing seismic qualification results, this finding has no significance in terms of the overall adequacy and effectiveness of the program.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-13

Applicant ID No.: 1SWP*P2A

Finding No. 4

Final qualification subject to compliance with endurance testing recommended in I&E Bulletin 83-05.

Response

GSU's position on performance/endurance and hydrostatic pressure testing was provided in a letter from Dr. J. G. Weigand to Mr. J. T. Collings dated August 16, 1984. This letter provided information and commitments which satisfied the concerns of I&E Bulletin 83-05.

Corrective Action

The commitments made in this letter are documented as Commitments 25 through 35 in GSU's Internal Commitment Tracking System and will be tracked to completion by the GSU Licensing Group.

Conclusion

The question concerns an I&E Bulletin and is controlled by GSU's Internal Commitment Tracking Program as mentioned above. Therefore, I&E Bulletin concerns are addressed via a GSU program and are not considered indicative of any programmatic problems with the SQRT/PVORT EQ Program.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-SURPRISE

Applicant ID No.: 1E12*MOVF021

Finding No. 1

Have stem leakoff requirements been met?

Response

The subject valve was provided with a stem leakoff connection in accordance with the valve technical data sheet included in SWEC Specification No. 228.212. A short length of 1/2 in., schedule 80 pipe connected to the valve body is provided, as shown on the Velan Company valve drawing (SWEC File No. 0228.212.047-011E). This connection is not used on River Bend and, therefore, is not piped up to a permanent drain point. The leakoff is to be plugged in accordance with applicable requirements provided in Piping Erection Specification No. 228.160 and on the installation drawing. A photograph of the stem leakoff connection was provided to the NRC inspector during the audit.

Corrective Action

None required.

Conclusion

Stem leakoff provisions for this valve are consistent with the engineering requirements documents. SWEC design procedures require piping up valve stem leakoffs for high-pressure and/or high-temperature applications only and this valve does not fall in this category.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-SURPRISE

Applicant ID No.: 1E12*MOVF021

Finding No. 2

N&D No. 6189 states that motor stator housing was welded to motor flange. Have possible effects of welding on valve flange and valve shaft assembly been considered?

Response

During the walkdown of the equipment, the NRC reviewer, R. Hodor, questioned the fact that the actuator motor was missing and asked the reason for the reject Tag No. Y400361-1, which was attached to the valve actuator. In response to these questions, the Nonconformance and Disposition Report (N&D) No. 6189 was made available to the NRC reviewer which explained the reason for the missing motor and the reject tag. As a result of the questions asked during the audit, SWEC conducted a review of the circumstances which caused the N&D to be initiated. The results of this review indicate that:

1. The motor and housing were properly bolted to the stator housing and then tack welded.

2. The nipple where the electrical conduit enters the housing was properly threaded into position and then tack welded.

3. The motor housing vent was threaded into position then tack welded.

Based upon the above, it appears that a conservative disposition was provided for the N&D (i.e., remove/replace motor).

After consulting with SWEC's Material Engineering, it was concluded that the amount of heat generated from tack welding is negligible and as such will not cause any warping of the flanges or cause any significant residual stresses that would affect the operation or qualification of the motor operator and/or the valve shaft assembly.

Corrective Action

The motor has been replaced, and the valve assembly was successfully tested on January 26, 1985.

Conclusion

The tack welding performed on the motor stator housing had no effect on the valve flange and valve shaft assembly, as demonstrated by the successful completion of the valve assembly testing.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: BOP-SURPRISE

Applicant ID No.: 1E12*MOVF021

Finding No. 3

The dates of issue on qualified documents are very recent (i.e., ST-7003, Operability Test Procedure, is dated November 2, 1984, which was the exit meeting date. Completeness and approval are required.

Response

Operability Test Procedure No. ST-7003 was approved on November 2, 1981. The PVORT form for the subject equipment erroneously lists this date as November 2, 1984. However, the Operability Qualification Test Report (SWEC File No. 6228.212-047-105A) was approved on November 1, 1984. With the approval of this report, all qualification documents have been received by SWEC, reviewed, and approved.

GSU was notified, immediately prior to the audit, that the subject equipment would be included in the audit. The Equipment Qualification Master List, a copy of which was provided to the NRC prior to the audit, indicated that the qualification process for the subject equipment was not complete (status shown was "test complete but test report not approved.") Since the Operability Qualification Test Report had been received by SWEC, and in order to provide complete qualification documentation for the NRC reviewer, SWEC proceeded to complete the review/approval of this report to support the audit. The report was approved on November 1, 1984, 1 day prior to the audit exit meeting.

Corrective Action

The PVORT form for the subject equipment has been revised to correct the approval date of the Operability Test Procedure. Also, the Operability Qualification Report has been added to the list of documents on the PVORT form.

Conclusion

The incorrect date shown on the PVORT form was a data transcription error which occurred when the form was prepared.

N S S S

PVORT - SSER

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-5

Applicant ID No.: E22-F015

Finding

The operability of the valve was established using analysis only. A test program is presently being performed, and a similar analysis with a similar valve which was tested will be submitted as demonstration of operability and qualification.

Response

Static deflection testing has been completed for representative samples of the full family of HPCS valve sizes including the smallest at 4 in. and the largest at 24 in. All valves are dynamically qualified for the RBS application. The results will be documented in the qualification report prior to fuel load.

The NRC's consultants followed this response with the further comment that the response by GSU does not indicate that a similarity analysis considering fluid dynamic and seismic effects under normal, accident, and post-accident conditions is in process or completed. Resolution of the concerns will require documented results of the static deflection testing and similarity analysis.

Static deflection testing was performed on the full family of HPCS valve sizes, as stated above. The operability of the 20-in. valve under discussion can best be demonstrated from the test results of a similar 24-in. valve. This valve is outside the range of valves installed at the River Bend Station, but has parameters which most closely match the current valve. The 24-in. valve tested and the 20-in. valve being qualified have the same pressure ratings. Operability of the 24-in. valve was demonstrated by cycling open and closed under the full design pressure of 100 psig, or 90 psig across the gate for the closed valve, which corresponds to the RBS design pressure. Simultaneously, the motor operator was deflected by the application of a force corresponding to 8 g, which compares with the 3.5-g faulted loading requirement for any direction for RBS. Extension of these results qualifies the E22-F015 candidate valve by similarity, which is in addition to previous analyses documenting the stresses and stem deflections for the RBS loading. The above is documented in DRF No. 126-E22-LDO-1, River Bend High Pressure Core Spray E22-F015 New Loads Evaluation, Rev. 1, March 25, 1985.

In addition, a 12-in. gate valve parent design was dynamically and seismically tested with considerable margins (reference VPF No. 5485-95-1), in accordance with GE Specification No. 23A1361, to demonstrate operability due to dynamic flow-induced vibration, SRV aging, and upset, faulted, and chugging loads. Operability results of the parent valve may be extended to the E22-F015 candidate valve due to design similarity.

Corrective Action

None required.

Conclusion

The application of static deflection testing of a similar valve design cycled open and closed under the same design pressure conditions and with a simultaneous loading with over 100-percent margin adequately demonstrates the operability of the valve under discussion.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-7

Applicant ID No.: E12-C002C

Finding No. 1

How is pump performance (curves, vibration levels, bearing temperature, etc) established without the use of manufacturer's data/acceptance criteria?

Response

Evaluation of the RHR pump and motor performance is directly dependent on vendor data. Some examples of documents/procedures which utilize specification and vendor data are listed below.

1. FSAR, Chapter 14, Initial Test Program - 14.2.12.1.5(4.b.) "Pump head flow characteristics and NPSH are as specified by the GE preoperational test specification for the following modes of operation: LPCI, shutdown cooling, and suppression pool cooling."

2. 22A5296 AG, GE Preoperational Test Specification, Appendix B, GE-5 Residual Heat Removal - Prescribes the minimum testing requirements necessary to verify residual heat removal (RHR) system capabilities to meet design requirements. Under Section B5.1, Supporting Documents, a list of vendor documents is given. Among them are:

   RHR Pump, Vendor's Instruction Manual
   RHR Pump, Certified Performance Curves

3. 1-G-ME-04, Generic Test Procedure, Preliminary Testing of Pumps.

   2.0 References

   2.1 - "Applicable Vendor Technical Manuals"

   3.0 Prerequisites

   3.1 - "Verify that cold alignment data complies with the manufacturer's specification. Allowance for thermal expansion should be made as required by vendor technical manual or system specification."

3.4 - "The test engineer shall review the vendor technical manual and specification data for the panel and motor prior to starting the test. This review should include all specific operating parameter limits, specific acceptance criteria, and instructions relative to startup and initial pump operation."

3.5 - "If required, ensure that a vendor representative is present for the initial run of the pump."

5.0 Limitations and Precautions

5.2 - "Do not exceed the manufacturer's operating limits of number of successive motor starts."

5.5 - "Secure the panel if bearing temperature, lube oil pressure, or seal leakage specified on the pump design data sheet or instruction manual are exceeded."

7.0 Procedure

7.1 Centrifugal Pumps

7.1.15 - "Plot the above data on manufacturer's curve and attach to Enclosure 11.1. Indicate on the curve any head or flow limits given in the specification."

10.0 Acceptance Criteria

10.1 - "Pump performance shall closely approximate the manufacturer's shop curve (7.1.15)."

4. 1-G-ME-07, Generic Test Procedure, Vibration Testing of Rotating Equipment

3.0 Prerequisites

3.7 - "The Test Engineer shall be aware of any specific vibration limits, test points, or test methods that are called out by the equipment specification or vendor manual."

10.0 Acceptance Criteria

10.1 - "Data shown on Enclosure 11.1 shall be compared to limits supplied by the manufacturer, found in either the contract specification or found in the operating manual. Where no information is given, data shall be compared to the General Machinery Vibration Severity Chart (Enclosure 11.2)."

Actual test results are available showing the design limits and the RHR pump, certified performance curves which were extracted from vendor and specification data. Three examples of actual test results are given as

evidence that vendor/specification data are utilized and documented on the following data sheets:

1. 1-G-ME-04, BIP-1-BX-RHS.000, GSU System-204, Date 04/04/84
2. 1-G-ME-07, BIP-1-RHS.000, GSU System-204, Date 05/24/84
3. 1-G-ME-07, BIP-1-RHS.000, GSU System-204, Date 08/27/84

Corrective Action

None

Conclusion

Usage of Vendor/Specification data pervades the GSU preoperational start-up and test program, and no problem is evident in this area.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-7

Applicant ID No.: E12-C002

Finding No. 2

Discharge pressure transmitter has a reject tag and as-built acceptance tag. Clarify the difference and the reason for the reject tag and the action taken.

Response

The reject tag was attached to the transmitter because differential stud projections indicated that studs may not have been fully engaged (dirt also present). Inspection Report (IR) No. M4000946 documents this concern. The concern was resolved by reworking the studs in accordance with Construction Work Request No. 4543.

As-built tags are applied to components to identify that as-built dimensional measurements and orientations have been taken for the component. Reject tags are applied by FQC when any component deviation is identified on an unsatisfactory IR or Nonconformance and Disposition (N&D) report. Both tags may exist simultaneously on a component.

Corrective Action

Not applicable to this item.

Conclusion

Not applicable to this item.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-7

Applicant ID No.: E12-C002

Finding No. 3

Serial number on documentation and long form disagree.

Response

The serial number on the long form was for a motor that was identified for RBS Unit 2. The correct serial numbers for RBS Unit 1 are CNJ 316027, 316028, and 316029. These serial numbers agree with the documentation.

Corrective Action

Not applicable to this item.

Conclusion

Not applicable to this item.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-7

Applicant ID No.: E12-C002

Finding No. 4

Clarify the differences between GE Specification Nos. 21A3504, Rev. 1 and 21A3504BV, Rev. 0 (e.g., removal of IEEE Standards - is this component built to IEEE, if not justified why).

Response

Specification No. 21A3504, Rev. 1 is the base specification which forms a part of the plant-unique data sheet Specification No. 21A3504BV, Rev. 0. Specification No. 21A3504BV, paragraph 2.2.1, states that if there are conflicts between the two specifications, the plant-unique document, Specification No. 21A35041BV, Rev. 0, shall govern. Based on this, IEEE standards were not removed from the order since they were required in Specification No. 21A3504, Rev. 1 and were not retracted or superseded by a statement to that affect in Specification No. 21A3504BV, Rev. 0. In this area, there were no conflicts between the two specifications; therefore, IEEE standards were required. The motors were built to the IEEE standards identified.

Corrective Action

Not applicable to this item.

Conclusion

Not applicable to this item.

RBS-EQUIPMENT QUALIFICATION PROGRAM

SSER RESPONSES

RIVER BEND STATION - UNIT 1
DOCKET NO. 50-458

SSER TABLE 3.10.2.1

PVORT ID No.: NSSS-7

Applicant ID No.: E12-C002

Finding No. 5

Clarify how GSU will or has identified parts sensitive to aging mechanisms and how they will be tracked.

Response

GSU's response to SSER Section 3.10.1.4, Item No. 3 addresses how GSU will identify and track parts sensitive to aging mechanisms and how they will be tracked.

Corrective Action

Not applicable to this item.

Conclusion

Not applicable to this item.