SNUPPS

Standardized Nuclear Unit Power Plant System

5 Choke Cherry Road
Rockville, Maryland 20850
(301) 869-8010

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Nicholas A. Petrick
Executive Director

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SUBJ: Justifications for Interim Operation - Seismic Qualification

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

Dockets Nos: STN 50-482 and STN 50-483

References: 1. SLNRC 84-0009, dated January 27, 1984: Environmental Qualification Justifications for Interim Operation
2. SLNRC 84-0040, dated March 6, 1984: Same Subject
3. SLNRC 84-0052, dated March 27, 1984: Same Subject

Dear Mr. Denton:

Enclosed is a Justification for Interim Operation (JIO) for the seismic qualification of the Model 581A differential pressure indicating switch which is included in NSSS qualification program ESE-40 for the SNUPPS plants - Callaway Plant Unit No. 1 and Wolf Creek Generating Station Unit No. 1. This JIO is based on technical information contained in a previously submitted JIO for ESE-40 provided in Reference 1. Final resolution of the issues for which the subject JIO is required is expected by June, 1984; however, should resolution be delayed, the enclosed JIO provides an acceptable basis for safe plant operation consistent with the schedule identified in Reference 2, i. e., until March 31, 1985.

Also enclosed is a revised page 2 for previously submitted JIO M-627A. This page was inadvertently omitted from Reference 3.

Very truly yours,

Nicholas A. Petrick

MHF/nld9a3
Attachments

cc: D. F. Schnell — UE — W. Schum/A. Smith — USNRC/WC
G. L. Koester — KGE — J. Neisler/B. Little — USNRC/CAL
D. T. McPhee — KCPL — J. Konklin — USNRC/RIII

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Interim Justification Position for the

Seismic Qualification of the

Differential Pressure Indicating Switch

Barton 581A

(Group B)

(ESE-40)

Control of flow in centrifugal charging pump "mini-flow" lines and resulting protection of CCP (charging) pumps is dependent on switch contact action in a differential pressure indicating switch.* The Barton model 581A switch in this function is intended to be qualified for service during and after a design basis safe shutdown earthquake. Because of questions raised about switch operation, results from a complete seismic test program in 1977 were considered inadequate to demonstrate successful seismic performance. A description of the original tests and subsequent tests performed to establish seismic qualification and the basis for interim operation with existing DP switches is provided below.

In the original Model 288A DP switch seismic test completed in 1977, switch contacts were monitored. A review of analog recordings of switch contact status revealed no intermittent contact status changes in either the normally open or normally closed contacts. No attempt was made to vary measured differential pressure and actuate switch contacts during actual seismic test runs. Acceptance criterion at that time was no contact bounce in the deactivated switches and no affect on performance following seismic testing. Subsequent testing revealed that susceptibility to contact bounce was greater at or near the switch setpoints. In December 1982 two model 288A switches were included in a test, then being conducted. During this test, provisions were made to mechanically change the differential pressure and to control the switching of contacts. This test was not comprehensive enough to establish design limits for all switch ranges, however, confidence was provided that, except at differential pressures near the switch setpoints, no intermittent contact action might be expected as the result of seismic testing. The switches tested had ranges of 30 psid and 60 inches of water. The 60 inch unit was one of those originally tested in 1977. During each seismic simulation using generic WRD seismic envelope inputs, the switches were either operated through their ranges or held near setpoints. The 30 psid unit showed negligible tendencies for switch bounce, even at positions less than two percent full scale from a switch setpoint. The 60 inch unit from the original test was susceptible to switch (contact) bounce. showing decreasing sensitivity as the distance from the setpoint was increased. At two percent from the setpoint, contact bounce was extensive. However, less tendency for contact bounce was exhibited at 5% of full scale from the setpoint and during

* SNUPPS component number EM-FS-917 C & D

one run in which the switch was held approximately 8% from its setpoint, only two instances of intermittent switch action were observed, each lasting less than two milliseconds.

The two switch models are of the same basic design. The sensing bellows in the 581A displaces a larger volume, and the assembly contains a pulsation dampener which has the effect, even when adjusted "full open", of restricting fluid displacement and consequently increasing device time response. The effect of this difference would tend to make the 581A less susceptible than the 288A to intermittent contact actuation caused by seismic induced perturbation originating in impulse lines or the bellows unit assembly. Between the bellows unit and the snap acting switches, the same actuating mechanism is used in both switch models. In the 581A a snap acting switch with a stiffer spring is used than that used in the 288A. Seismic effects originating at the snap acting switch would tend to be less in the 581A because greater force is required to change contact status from the normal deactivated position. The consideration of switch model differences leads to the conclusion that performance of the 581A should be as good or better than that of the 288A demonstrated in previous tests.

A minimum flow rate is maintained to prevent pump failure from cavitation or pumping against a dead head. If contact bounce of a high switch occurred for long enough to initiate valve closure, flow through the pump would decrease until the internal flow control valve limit switch indicated full closure. Provided the DP switch contacts are in the correct state, the valves would then begin to reopen. A partial or full restriction of flow to the pumps could thus occur for the duration of the seismic event but the valve would fully reopen within 10 seconds following the event.

Performance specifications and type test results of the Charging pump demonstrates that the pumps can tolerate fully restricted flow at operating speed without failure for 30 seconds. If contact bounce initiates valve closure at the beginning of a seismic event, flow restriction would occur only until limit switch actuation and subsequent valve reopening following such an event. Normal system performance would be insured provided no drift of the DP switch setpoints had occurred. The original tests in 1977 demonstrated post seismic adequacy of switch performance.

WCAP 8587 Appendix C addresses gamma radiation doses of less than 10^4 rads and provides all necessary details as to why common mode failures will not occur. This equipment does not include any solid state electronic devices and is classified as NUREG-0588 Category C equipment.

In summary, pump protection is the only issue of concern. Evaluation of pump performance demonstrates that in the event intermittent switch actuation does occur, flow will be restored before the pump is adversely affected. Following an SSE earthquake, normal switch and valve functions would be restored to assure adequate flow through the charging pump. All testing, including preparation of test reports, will be complete in June 1984.

JIO: All dampers that were retested satisfactorily demonstrated the adequacy of the attachment method. The tests were witnessed by a representative from the SNUPPS Architect/Engineer. Written confirmation has been received from the testing lab that the dampers had the ability to withstand the specified SNUPPS requirements.

The dampers are considered qualified based on the satisfactory completion of the seismic test program. The documentation is being developed by the testing laboratory and vendor.