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ELECTRIC ENGINEERING
DEPARTMENT

June 29, 1982

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Subject: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2, Docket Nos. 50-317 & 50-318
NUREG-0737, Item II.B.1
Reactor Coolant System Vents

References: (a) NRC letter dated 3/9/82 from R. A. Clark to A. E. Lundvall, Jr., same subject;
(b) BG&E letter dated 1/4/80 from A. E. Lundvall, Jr., to D. G. Eisenhut, TMI Lessons Learned;
(c) BG&E letter dated 8/11/81 from A. E. Lundvall, Jr., to D. G. Eisenhut, Response to NUREG-0737, Item II.B.1.

Gentlemen:

Reference (a) requested additional information concerning the design and operation of the reactor coolant vent system being installed at Calvert Cliffs as a result of the NRC's TMI Action Plan. The proposed design was described in Reference (b), and the operating procedure guidelines were forwarded by Reference (c). Our responses to items of your request for additional information are enclosed. We will forward the remaining responses by July 5, 1982.

Very truly yours,

R. C. L. Olson
Principal Engineer
Nuclear Licensing & Analysis Unit

RCLO:gvg
Enclosure

cc: Messrs. J. A. Biddison, Jr., Esq.
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RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON THE REACTOR COOLANT VENT SYSTEM (NUREG-0737 ITEM II.B.1)

Response 1.

A calculation to verify the adequacy of the charging system was performed for the case of a rupture from the largest reactor coolant vent break. The break was assumed to occur at the Class I/Class II specification change, which is upstream of the point where the vent system taps into the existing piping. Additionally, it was assumed for the purpose of the calculation that the fluid would be at operating temperature and pressure flowing adiabatically to its flash point and that only single phase liquid flow would occur. The latter assumption is conservative because as sonic velocity is approached, actual flow would become less than the calculated value. The calculated flow is 10 gpm, well within the 44 gpm capacity of a single charging pump.

Response 2.a

We have determined that there is a high likelihood that at least one vent path will remain operable following a postulated rupture of other system piping in the general vicinity of the vent system, including the effects of possible missiles generated by such a rupture. This determination is based principally on the physical separation of the reactor vessel head vent system and the pressurizer vent system. The valves for the former are located at approximately Elevation 48', and for the latter at approximately Elevation 20'. The only high energy effects, including missiles, which could have an adverse impact on the ability of the vent systems to perform their design function would be effects that disable the valves so that they do not open. The physical separation of the valves for each portion of the system ensures that a single high energy rupture would not disable both systems. Effects which result in a rupture of the vent system piping or a vent system valve sticking open are within the design envelope of the system since the resultant leakage would be less than the make-up system capacity and the rupture of the vent system piping would still accomplish the venting function.

Response 2.b

Valves 1-SV-101, 1-SV-102, 1-SV-103, and 1-SV-104 shown in the original venting system diagram are actually designated for Calvert Cliffs Unit 1(2) as 1(2)-SV-103, 1(2)-SV-104, 1(2)-SV-105, and 1(2)-SV-106, respectively. The piping and valves were installed to the following criteria:

(i) valves 1(2)-SV-103, 1(2)-SV-104, 1(2)-SV-105, and 1(2)-SV-106 are ASME Section III, 1974 Class I; while

(ii) all piping is per ASME Section III, 1974 Class II.

A revised figure is attached.

Response 3.a

The only new component in the reactor coolant vent system installed downstream of the quench tank is a seismic Class I valve designated SV-402.

Response 3.b (Later)

Response 3.c

The components of the newly installed reactor and pressurizer coolant venting systems analyzed for possible failure consist of the piping which connects the two pairs of solenoid valves in each system. The other sections were not considered since they have a temperature detector and are normally unpressurized portions of seismic Category I and safety Class 2 piping. In the case of the reactor vessel venting system, a cable tray and a pressure transmitter are located near the piping in question. The pressurizer vent line piping between the two solenoid valves has one cable tray in its immediate vicinity. The design and specifications of these safety-related components are such that they can withstand possible fluid spray impingements and still operate.

Response 4.

The only reactor coolant vent system design paths to the containment atmosphere are through the quench tank rupture disc and valve SV-402. Due to procurement problems at the time of installation, the original design calling for a 3-way valve was changed, and a 2-way valve, SV-402, was placed in the system. This arrangement is within the design basis of the system.

Response 4.a

Hydrogen gas entering the containment atmosphere by way of a rupture of the quench tank rupture disc would do so very energetically and would not accumulate in any appreciable quantity in any confined space in the vicinity of the system. Rather, the bulk of the gas would rise rapidly to the upper region of the containment in dilute concentrations. Hydrogen leaving the piping downstream of valve SV-402 would be released in a volume bordered on one side by a concrete wall. The likelihood of hydrogen gas collecting in this area is deemed to be negligible due to the geometry of the area and the proximity of the containment air coolers.

Response 4.b (Later)

Response 5.

The Calvert Cliffs reactor coolant vent system valves were preservice tested in accordance with subsection IWV of Section XI of the ASME Code for Category B valves. Testing was performed according to Technical Support Procedure #45. When the reactor coolant vent system is found acceptable for use, operability testing of the system valves will also be performed in accordance with subsection IWV of Section XI of the ASME Code for Category B valves.

Response 6. (Later)

Response 7.a

The information contained in the generic guidelines concerning venting duration, pressurizer level response, indication of voiding, and charging pump operation has been reviewed and is applicable to the Calvert Cliffs design. If the single vent from the reactor vessel head was to become inoperable, coolant flow could sweep non-condensable gases out of the vessel and into the pressurizer where they would be vented. In the case of an inoperable pressurizer vent, several options are available for the venting of non-condensable gases (e.g., venting through a power-operated relief valve). If no venting path was available from the pressurizer, a gas bubble in the pressurizer would still provide adequate pressure and surge control until a suitable venting mechanism could be developed.

Response 7.b

A copy of Calvert Cliffs Operating Instruction 1G (OI-1G), "Reactor Coolant Vent System", was submitted informally to our NRC Project Manager for information. Section II.A. describes the indications used to detect the presence of a non-condensable gas in the reactor coolant system (RCS). Section II.C. lists the methods for estimating the volume of gas in the RCS. Should non-condensable gases be trapped in the RCS loops, the same indications described in Section II.A. would be present, and the operator would be instructed in step II.E.9 (for reactor vessel venting) and II.F.9 (for pressurizer venting) to resume vent operation.

Response 7.c

Steps II.E.2 through II.E.4 and II.F.2 through II.F.4 of OI-1G describe measures required prior to and during the vent process.

Response 7.d

Steps II.E.6 and II.F.6 of OI-1G provide clear and specific guidelines for operator termination of reactor vessel head and pressurizer venting. A revision to OI-1G will be made to include 2.0% hydrogen concentration as an additional requirement to terminate venting.

Response 7.e

Step II.F.2 of OI-1G specifies that one charging pump should be operable prior to venting to obtain better pressurizer control during the vent process. The caption on Figure 3 should read "CCP on".

Response 7.f

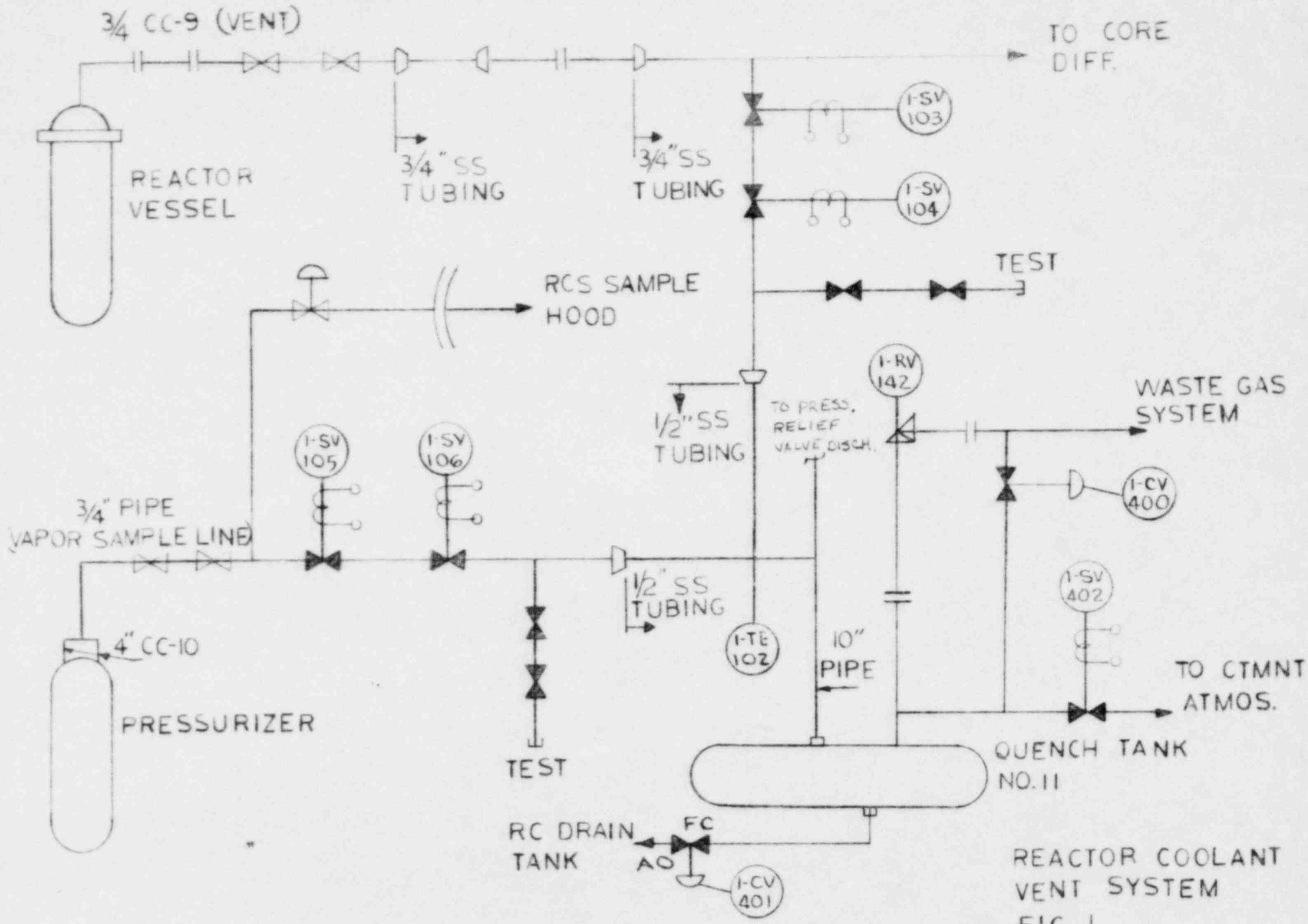
A note will be added to instruction OI-IG which will inform the operator that 2.0% hydrogen concentration in the containment can be achieved after only 25 minutes of venting. This minimum time to reach a 2.0% hydrogen concentration is based on information found in the Combustion Engineering Guidelines. The inclusion of this note will alert the operator that as vent duration approaches 25 minutes, he should again re-examine all critical plant conditions, including hydrogen concentration, to determine if venting is still warranted.

Response 7.g

Should non-condensable gases accumulate in the reactor coolant system in unacceptable quantities and the entire reactor coolant vent system be unavailable, cooldown would be initiated using charging pumps and PORV's in a "feed and bleed" mode.

Response 8.

Not all alarms and controls added to the control room as a result of the TMI Action Plan requirement for reactor coolant system vents have been considered in the human factors analysis required by NUREG-0737 Item I.D.I, but these components will be included in future analyses as needed. A checklist for each alarm and control was formulated to ensure that all these components comply with the guidelines set forth by NUREG-0700. Not all components were specifically evaluated in the analysis. The components not included were the indicators since they were not in place at the time of the analysis, the alarms because they were being modified, and one of the five hand switches per unit which was not installed in time for the analysis.



REACTOR COOLANT VENT SYSTEM
FIG. 1