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SUBJECT: Forwards addl info re possible accumulation of hydrogen in containment bldg reactor drain tank room, in response to open item in NUREG-0857, "SER re Operation of Palo Verde Units 1,2 & 3."

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ARIZONA PUBLIC SERVICE COMPANY

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P.O. BOX 21666 - PHOENIX, ARIZONA 85036

July 15, 1982
ANPP-21405 - ACR/WFQ

Mr. R. L. Tedesco
Assistant Director for Licensing
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Palo Verde Nuclear Generating Station
(PVNGS) Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 82-056-026; 6.1.10

Reference: NUREG-0857, "Safety Evaluation Report related to the operation of the Palo Verde Nuclear Generating Station Units 1, 2, and 3"

Dear Mr. Tedesco:

The referenced document (section 6.2.1.5 page 6-19) requested additional information regarding the possible accumulation of hydrogen in the PVNGS containment building reactor drain tank room. The attached information provides a response to this SER open item and is based on additional discussions with the NRC staff.

We believe this information adequately addresses your requests. Please contact me if you have any further questions.

Very truly yours,

E. E. Van Brunt, Jr.

E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/WFQ/sp
Attachment

cc: E. Licitra
L. Bernabei
P. Hourihan
A. Gehr

B001

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt

Edwin E. Van Brunt, Jr.

Sworn to before me this 15 day of July, 1982.

James D. Looney

Notary Public

My Commission expires:

May 21, 1983

Request for Additional Information

Containment Systems Branch

Palo Verde Nuclear Station, Units 1, 2 & 3

Docket Nos. 50-528, -529 and -530

Under postulated loss-of-coolant accident (LOCA) conditions, the reactor coolant drain tank (RCDT) room would become an essentially closed room, with only an annular pipe opening in the RDCT room ceiling available for the venting of any hydrogen evolved to the bulk containment volume. Furthermore, your present analysis of hydrogen production and accumulation following a LOCA indicates that the hydrogen concentration in the RCDT room would reach combustible levels relatively quickly. It is acknowledged that your hydrogen production analysis is conservatively based on staff licensing models for calculating hydrogen evolution for radiolysis of water, and assumptions of hydrogen transport from the RCDT room. Nevertheless, we have the following concerns which should be addressed:

(a) As a result of your Independent Design Review, you have identified the presence of the lights in the RCDT room as a potential ignition source if combustible levels of hydrogen are present. Therefore, describe the design features and/or administrative controls (normal and emergency operating procedures) that will assure the unavailability of electrical power to these lights under LOCA conditions.

RESPONSE:

In order to eliminate potential ignition sources within the RCDT room, permanent lighting will be removed from the room thereby assuring that there are no ignition sources within the RCDT room. (The change is shown in DCN No. 6 to Bechtel drawing 13-E-ZCL-002, Rev. 5)

(b) Provide an analysis of hydrogen transport from the RCDT room through the annular pipe opening into the adjacent containment region. For the postulated accident condition, the open containment volume, as opposed to the RCDT room, would contain a non-combustible hydrogen-air mixture. Therefore, the purpose of the calculation should be to determine if a combustible mixture exiting the RCDT room is adequately mixed to become non-flammable before it reaches a potential ignition source. Identify any potential ignition sources in the vicinity of the annular opening that could come in contact with a plume of a combustible hydrogen mixture.

RESPONSE:

Analysis of hydrogen transport from the RCDT room through the annular pipe opening for 30 days post-LOCA was conducted with the following results:

1) Molecular diffusion as the sole transport mechanism is insufficient to maintain the RCDT room hydrogen concentration at a level which will not support combustion.

2) Convective transfer is sufficient to maintain the RCDT room hydrogen concentration below the combustible limit. Convective transfer is brought about by a density differential between the gas mixture in the RCDT room and the remainder of the containment. The density differential results from differences in the average molecular weights of the gas mixtures in the two regions (i.e., the RCDT room versus the containment), or the temperature difference between the two regions, or both.

3) The temperature differential between the RCDT room and the containment ambient atmospheres is expected to be positive (i.e., the RCDT temperature being greater than the containment ambient), and therefore aids the establishment of convective flow. However, even under assumptions which cause the temperature differential to be reduced to zero, the peak hydrogen concentration within the RCDT room is 3.7% by volume. A sensitivity study using an extremely conservative -3°F differential resulted in only a 4.03% by volume hydrogen concentration within the RCDT room.

(c) If the potential exists for a combustible plume of hydrogen emerging with the annular opening to come in contact with a potential ignition source, provide an analysis of the pressure response of the RCDT room assuming combustion under the most adverse conditions. Compare the calculated results to the structural capability of the RCDT room and discuss the response of any safety-related equipment located either inside or in the vicinity of the RCDT room.

RESPONSE:

As noted in part (b), there is no potential for a combustible plume of hydrogen emerging from the annular opening to come in contact with a potential ignition source.