

Central file



**Consumers  
Power  
Company**

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Region III  
US Nuclear Regulatory Commission  
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DOCKET 50-255 - LICENSE DPR-20 -  
PALISADES PLANT - IE BULLETIN 79-21 -  
TEMPERATURE EFFECTS ON LEVEL MEASUREMENTS

Consumers Power Company's response to IE Bulletin 79-21 is as follows:

1. Item

Review the liquid level measuring systems within containment to determine if the signals are used to initiate safety actions or are used to provide post-accident monitoring information. Provide a description of systems that are so employed; a description of the type of reference leg shall be included, ie, open column or sealed reference leg.

Response

The liquid level monitoring systems affected by this bulletin are (1) steam generator level indication and (2) pressurizer level indication. Both systems utilize wet reference legs which are at containment ambient temperature under steady state conditions. The steam generator level signals are used in the Palisades 2/4 logic for reactor trip on low level and would also be used for post-accident monitoring. The pressurizer level signals are not used to initiate automatic safety functions but would be used for informational purposes in the post-accident situation.

2. Item

On those systems described in Item 1 above, evaluate the effect of post-accident ambient temperatures on the indicated water level to determine

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any change in indicated level relative to actual water level. This evaluation must include other sources of error including the effects of varying fluid pressure and flashing of reference leg to steam on the water level measurements. The results of this evaluation should be presented in a tabular form similar to Tables 1 and 2 of Enclosure 1.

### Response

Our analyses have shown that the containment ambient temperature has a biasing effect on the level measurement systems. The magnitude of the error is presented in tabular form below and graphically in Attachment 1.

<u>Tamb</u>	<u>S/G Level Error (%)</u>	<u>Pzr Level Error (%)</u>
90	.1%	0
200	4.1%	5.6%
280	8.6%	11.9%
320	11.3%	15.6%
400	17.6%	24.3%

Where error  $\frac{\Delta}{\text{indicated level}}$  (%) - actual level (%).

The foregoing calculations assumed post-accident conditions, ie, feedwater, reactor tripped, etc. Under these conditions, it was found that vessel pressures had an effect on level measurement. These results are presented below in tabular form and graphically in Attachment 2.

### SYSTEM PRESSURE EFFECT

<u>P<sub>S/G</sub> (Psia)</u>	<u>Span Coefficient</u>	<u>Zero Error (%)</u>	<u>P<sub>pzr</sub> (Psia)</u>	<u>Span Coefficient</u>	<u>Zero Error (%)</u>
500	0.96	0.3	500	.68	8.5
700	1.01	-0.6	1000	.76	7.0
900	1.06	-1.7	1500	.86	4.3
1100	1.11	-2.9	2000	1.00	0.0
1300	1.16	-4.4	2500	1.23	-8.6

Where actual level  $\frac{\Delta}{\text{span coefficient}}$  (indicated level) + zero error.

### 3. Item

Review all safety and control set points derived from level signals to verify that the set points will initiate the action required by the plant safety analyses throughout the range of ambient temperatures encountered by the instrumentation, including accident temperatures. Provide a listing of these set points.

If the above reviews and evaluations require a revision of set points to ensure safe operation, provide a description of the corrective action and the date the action was completed. If any corrective action is temporary,

submit a description of the proposed final corrective action and a timetable for implementation.

#### Response

The safety set point affected by the foregoing discussion is the reactor trip on steam generator low level. A possible correction to this set point due to ambient temperature effects of the first table is inadvisable since the analyses assume equilibrium between the containment structure and the instrument reference legs. This would require three reference legs on both steam generators to have achieved the high ambient temperatures within 30 seconds of initiation of a loss of feedwater event. Such a scenario appears extremely improbable and any minimal gain in margin of safety would certainly be far outweighed by ~ 10% loss in operating band which increases the possibility of unnecessary reactor trips. The error in level signal due to steam pressure variations was found to have a conservative effect at power, thus no corrections are to be made with respect to this parameter.

The present set point values are:

#### S/G

- a. Protective Channels:
  - Low-Level Trip: TS Min 24.7%
  - Actual 25.7%
- b. Control Channels: Manually Set at 65%

#### Pzr

Control Channels:  
Auto Mode: 42% to 56.8% (Linear With Power)  
Manual Mode: Manually Selectable

#### 4. Item

Review and revise, as necessary, emergency procedures to include specific information obtained from the review and evaluation of Items 1, 2 and 3 to ensure that the operators are instructed on the potential for and magnitude of erroneous level signals. All tables, curves, or correction factors that would be applied to post-accident monitors should be readily available to the operator. If revisions to procedures are required, provide a completion date for the revisions and a completion date for operator training on the revisions.

Response

Procedure revisions are required and will be completed by November 1, 1979. Operator training will be provided during the next regularly scheduled 5th Shift Training Cycle.

David P Hoffman (Signed)

David P Hoffman  
Assistant Nuclear Licensing Administrator

CC Director, Office of Nuclear Reactor Regulation  
Director, Office of Inspection and Enforcement