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February 2, 1983

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Post Implementation Review of NUREG-0737, Items
II.F.1.4, II.F.1.5 and II.F.1.6

Gentlemen:

This submittal has been prepared in response to your request for additional information dated December 16, 1982 concerning the instrument accuracy and related data for the containment pressure monitors, containment water level monitors and the containment hydrogen monitors. In order that the staff may perform a post-implementation review of these systems the requested information is contained in the attachment to this letter.

Item 1 in the attachment to your letter states that we have not provided submittals describing our system or stating any exceptions to NUREG-0737. Submittals, however, have been provided which have included a summary of the plant modifications, responses to Generic Letters and other NRC letters and NUREG-0737 related submittals, some of which documented differences to NUREG-0737 design criteria. Our response to item 1 of your attachment will identify those areas where differences to design criteria have been identified.

If you have any questions regarding this submittal, please contact my office.

Sincerely,

J J Carey

J. J. Carey
Vice President, Nuclear

cc: Mr. W. M. Troskoski, Resident Inspector
U. S. Nuclear Regulatory Commission
Beaver Valley Power Station
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U. S. Nuclear Regulatory Commission
c/o Document Management Branch
Washington, DC 20555

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Beaver Valley Power Station
Unit No. 1

Response to NRC Letter
dated December 16, 1982

Attachment

Item 1: Exceptions Being Taken to NUREG-0737 Requirements

To date we have received no submittals which describe your proposed monitoring system or which indicate that you plan to take any exceptions to the NUREG-0737 requirements in our scope of review. Please indicate any exceptions you plan of which we are not aware. For each exception indicate (1) why you find it difficult to comply with this item, (2) how this exception will affect the monitor system accuracy, speed, dependability, availability, and utility, (3) if this exception in any way compromises the safety margin that the monitor is supposed to provide, and (4) any extenuating factors that make this exception less deleterious than it appears at face value.

Response

Our submittal of April 14, 1982 identified two differences in these systems from the NRC design criteria. The pressure transmitters for containment pressure monitoring systems and the level transmitters for the containment water level system are qualified to IEEE 323-1971 rather than the 1974 edition of this standard. Our submittal of May 25, 1983 identified the containment water level system level transmitters being qualifed to IEEE-344-1971 rather than the 1975 edition. Equipment meeting the specific criteria of NUREG-0737, Appendix B, was unavailable at the time the NUREG was issued. Therefore, the best available equipment at that time was purchased to meet the implementation dates which were in effect. There have also been several minor equipment qualification differences identified for each of these systems. All qualification differences have been identified and are being followed as part of our equipment qualification program.

The design criteria of NUREG-0737 indicated the need for a narrow range containment sump level indication spanning from the bottom to the top of the sump. Our level indication system utilizes a float and is unable to read to the bottom of the containment sump. It will read a level of approximately three inches as a minimum and will read beyond the top of the sump. This concern was identified during an IE Inspection of our facility during September of 1982 and was reported in Inspection Report 82-24. It was concluded that this difference did not have any safety significance. We believe our system meets the intent of the design criteria.

Many of the plant modifications completed during our second refueling addressed specific items contained in NUREG-0737. As a result of an earlier plant IE Inspection, we hired a contractor to perform

an independent review of these modifications and to determine the degree of compliance with the regulatory requirements. The results of this review were documented in our submittal of May 25, 1982. In general, this review determined that the final design of each of these three modifications meet the intent of the appropriate regulatory requirements. However, during this review, it was determined that a detailed human-factors analysis was not performed as part of the design to install the displays and controls added to the control room. The completed installations are being reviewed by the plant operations personnel and their evaluations will be factored into the detailed control room design review we will be performing in accordance with the guidance given in Supplement I of NUREG-0737. Some review is still in progress for the unresolved items of our letter of May 25, however, none of the unresolved items were judged by the independent review organization to represent a condition where the plant modification would not accomplish its intended purpose.

Item 2: II.F.1.4 - Pressure Monitoring System (PMS) - Accuracy and Time Response

2a. Provide a block diagram of the configuration of modules that make up your PMS. Provide an explanation of any details in the block diagram that might be necessary for an understanding of your PMS accuracy and time response.

Response

Refer to Figure 1 for a block diagram and equipment location relative to containment.

2b. For each module provide a list of all parameters which describe the overall uncertainty in the transfer function of that module.

Response

Pressure Transmitter

Range:	0-200 psia
Accuracy:	± 0.25% (Full Scale)
Temperature Effect:	± 3.75% per 100° (65°-116°F)
Stability:	± 0.375% in six months

Pressure Indicator

Accuracy: ± 1.5% (Full Scale)

Pressure Recorder

Accuracy: ± 0.5% (Full Scale)

2c. Combine parameters in 2b to get an overall system uncertainty. If you have both strip chart recorder and indicator output, give the overall system uncertainty for both systems. If you have systems spanning different ranges, give the overall system uncertainty for each system.

Response

Reducing each of the error parameters in 2b to one standard deviation and then combining the reduced parameters using the Root-Sum-Square method, results in overall system uncertainties as follows:

PMS Indication:	± 0.897% (Full Scale)
PMS Recording:	± 0.763% (Full Scale)

2d. For each module indicate the time response. For modules with a linear transfer function, state either the time constant, or the Ramp Asymptotic Delay Time, RADT. For module with an output that varies linearly in time, state the full scale response time. (Most likely the only module you have in this category is the strip chart recorder).

Response

Pressure Transmitter

Time Constant: 0.2 Seconds

Pressure Indicator

Full Scale Response Time: 1.0 Second

Pressure Recorder

Full Scale Response Time: 1.0 Second

Item 3: II.F.1.5 - Water Level Monitoring System (WLMS) - Accuracy

3a. Provide a block diagram of the configuration of modules that make up your WLMS. Provide an explanation of any details in the block diagram that might be necessary for an understanding of your WLMS accuracy.

Response

Refer to Figure 2 for a block diagram and for equipment location relative to containment.

3b. For each module provide a list of all parameters which describe the overall uncertainty in the transfer function of that module.

Response

Wide Range Level Transmitter

Range: 3-93 inches
Accuracy: ± 0.56% at any point within range

Wide Range Level Transducer

Accuracy: ± 2.0% at any point within range

Wide Range Level Indicator

Accuracy: ± 1.5% (Full Scale)

Wide Range Level Recorder

Accuracy: ± 0.5% (Full Scale)

Narrow Range Level Transmitter

Range: 3-15 inches
Accuracy: ± 4.2% at any point within range

Narrow Range Level Transducer

Accuracy: ± 2.0% at any point within range

Narrow Range Level Indicator

Accuracy: ± 1.5% at any point within range

3c. Combine parameters in 3b to get an overall system uncertainty. If you have both strip chart recorder and indicator output, give the overall system uncertainty for both systems. If you have systems spanning different ranges, give the overall system uncertainty for each system.

<u>Response</u>

Reducing each of the error parameters in 3b to one standard deviation and then combining the reduced parameters using the Root-Sum-Square method, results in overall system uncertainties as follows:

WLMS Wide Range Indication:	± 0.85% (Full Scale)
WLMS Wide Range Recording:	± 0.71% (Full Scale)
WLMS Narrow Range Indication:	± 1.62% (Full Scale)

Item 4: II.F.1.6 - Hydrogen Monitor System (HMS) - Accuracy and Placement

4a. Provide a block diagram of the configuration of modules that make up your HMS. Provide an explanation of any details in the block diagram that might be necessary for an understanding of your HMS accuracy. If you have different types of HMSs, give this information for each type.

Response

- Refer to Figure 3 for a block diagram and for equipment location relative to containment
- Refer to the Response to 4c

4b. For each module provide a list of all parameters which describe the overall uncertainty in the transfer function of that module.

Response

Hydrogen Analyzer

Range:	0-10% H2 in atmosphere
Accuracy:	± 2.5% (Full Scale)
Drift:	± 2% (Full Scale per Month)

Hydrogen Indicator

Accuracy: ± 1.5% (Full Scale)

Hydrogen Recorder

Accuracy: ± 0.5% (Full Scale)

Hydrogen Analyzer Ambient Temperature Sensor

Accuracy: ± 1°F (65° - 120°F)

Hydrogen Analyzer Ambient Temperature Indicator

Accuracy: ± 3°F (65°-120°F)

Containment Pressure Monitoring System

Standard Deviation: ± 0.634% (Full Scale)

4c. Combine the parameters in 4b to get an overall system uncertainty. If you have both strip chart recorder and indicator output, give the overall system uncertainty for both systems

Response

The hydrogen analyzer determines hydrogen content in a gas sample by passing the sample gas and a reference gas across the two sides of a heated thermal conductivity cell. The difference in thermal conductivity of the two gases generates a signal which is displayed in the control room. Since the gas sample contains water vapor plus hydrogen, the indicated reading will be higher than the actual hydrogen concentration due to the thermal conductivity contribution of the water vapor in the sample. This indication may be corrected by determining the water vapor contribution and subtracting this from the indicated reading. The greatest difference in indicated hydrogen concentration versus actual concentration has been calculated to be 1.9%, thus an indicated reading of 4% hydrogen concentration would correspondend to an actual concentration of 2.1% hydrogen. The PMS uncertainty and the analyzer ambient temperature monitoring system uncertainty have been included in the determination of the overall HMS uncertainty.

Reducing each of the error parameters in 4b to one standard deviation and then combining the reduced parameters using the Root-Sum-Square method, results in overall system uncertainties as follows:

HMS Indication:	± 2.36% (Full Scale)
HMS Recording:	± 2.31% (Full Scale)

4d. Indicate the placement and number of hydrogen monitor intake ports in containment. Indicate any special sampling techniques that are used either to examine one region of containment or to assure that a good cross section of containment is being monitored.

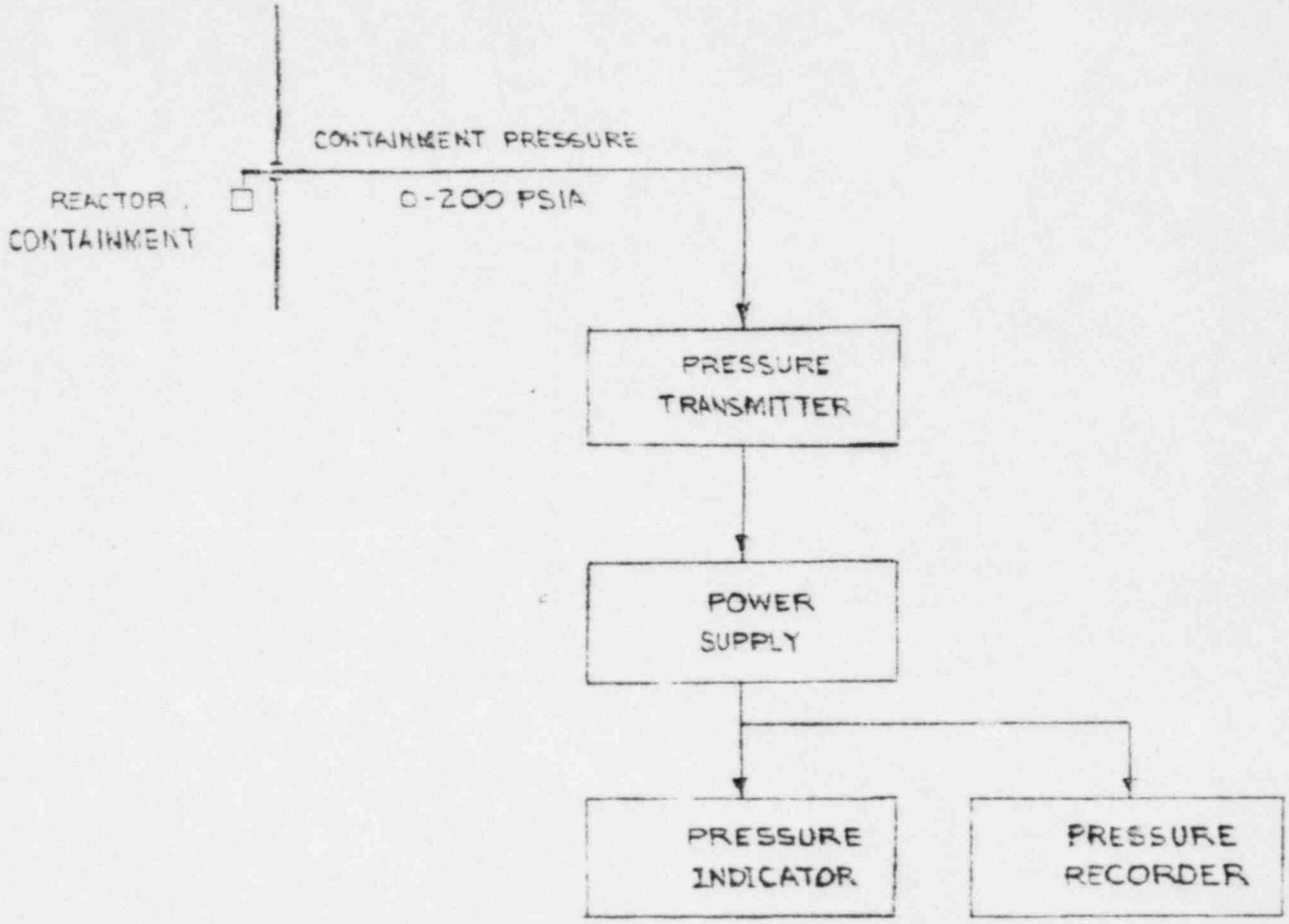
Response

The hydrogen analyzer can sample the containment atmosphere in two locations, the dome region of the containment or the pressurizer cubicle within containment. Each location has two intake ports. Either sample location may be selected from the control room by selectively opening or closing the appropriate containment isolation valves.

4e. Are there any obstructions which would prevent hydrogen escaping from the core from reaching the hydrogen sample ports quickly?

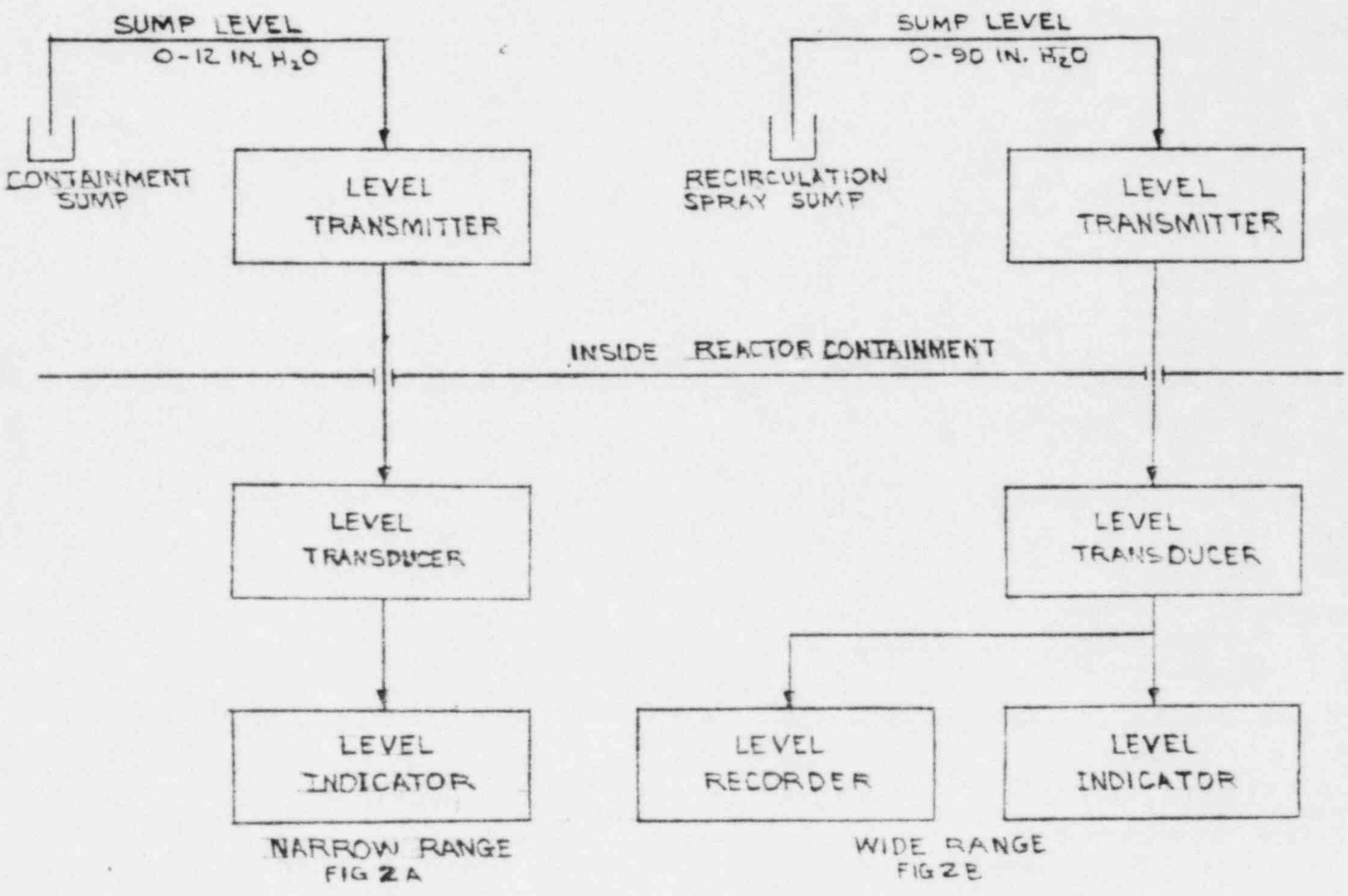
Response

The locations, as referred in response to 4d above, were chosen to facilitate the collection of hydrogen. Figure 14.3-82 of the Updated FSAR identifies free volumes and vent areas for steam generator and pressurizer cubicles. As indicated in this figure, there is sufficient vent area in containment which when coupled with the continued operation of the containment air recirculation fans or the containment sprays will assure uniform mixing of the containment atmosphere.



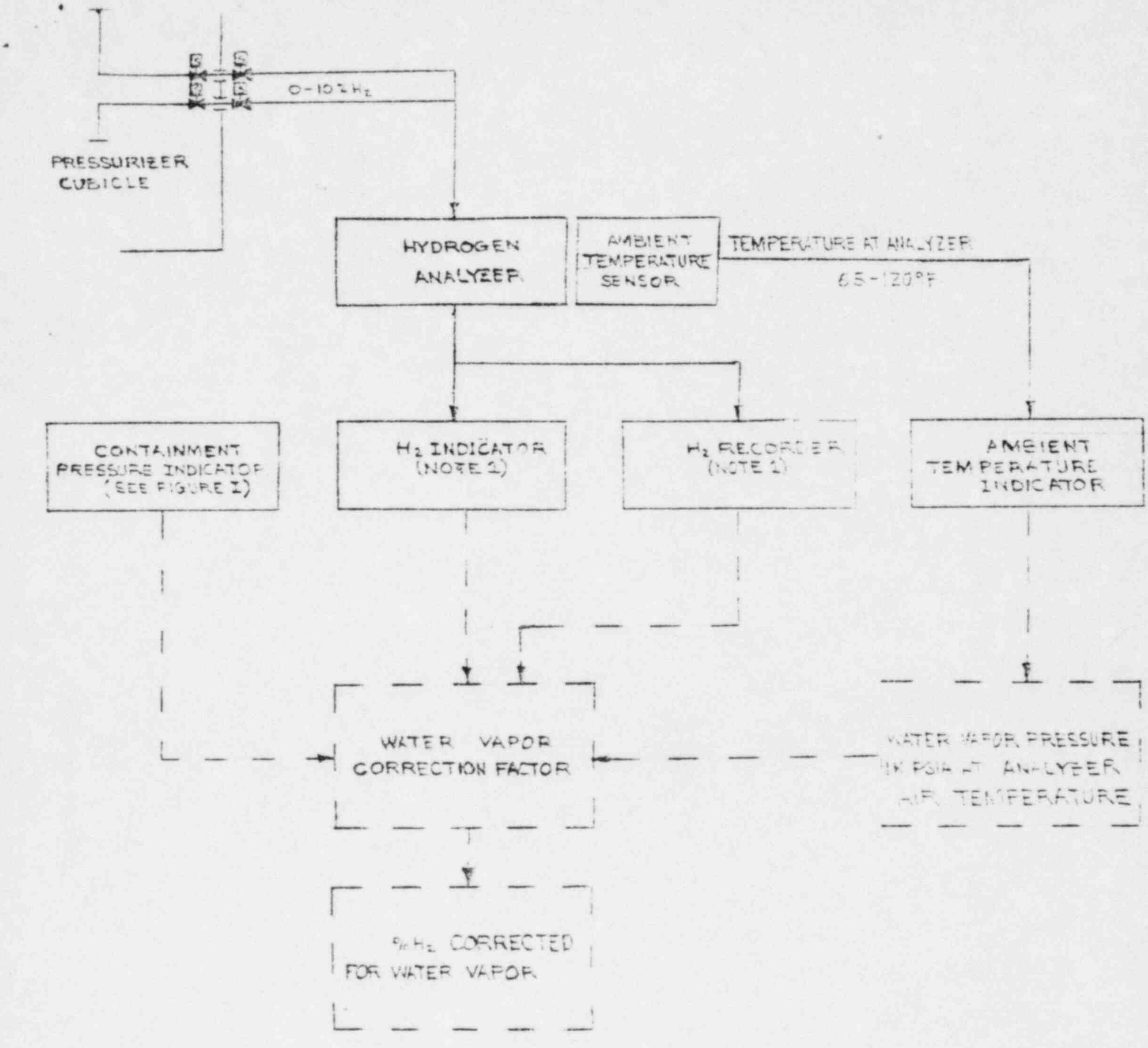
WIDE RANGE CONTAINMENT PRESSURE INDICATION

FIGURE 1



CONTAINMENT SUMP LEVEL INDICATION

FIGURE 2



NOTE: 1. UNCOMPENSATED FOR WATER VAPOR

CONTAINMENT HYDROGEN ANALYZER SYSTEM

FIGURE 3