PHILADELPHIA ELECTRIC COMPANY
2301 MARKET STREET
P.O. BOX 8699
PHILADELPHIA, PA 19101
(215) 841-5001

SHIELDS L. DALTROFF
VICE PRESIDENT
ELECTRIC PRODUCTION

March 4, 1983

Docket Nos. 50-277
50-278

Mr. V. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: NUREG-0737 Item II.F.1.4 Containment Pressure Monitor
Item II.F.1.5 Containment Water Level Monitor
Item II.F.1.6 Containment Hydrogen Monitor

RE: Peach Bottom Atomic Power Station

Dear Mr. Stolz:

The attachment to this letter provides the information on the NUREG-0737 requirements referenced above, as requested in your letter of January 5, 1983 (V. F. Stolz to E. G. Bauer, Jr., PECo.). The information presented in the attachment is designated with a numbering format that corresponds to your requests.

Should you have any questions regarding this matter, please do not hesitate to contact us.

Sincerely,

Attachment

cc: Site Inspector

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Docket Nos. 50-277
50-278

Attachment

SUBJECT: Request for Additional Information
NUREG-0737, Items II.F.1.4, 5 and 6
Peach Bottom Atomic Power Station Units 2 and 3

(1) Exceptions Being Taken To NUREG-0737 Requirements

Request:

(1a) Please indicate any exceptions that you plan to take to the NUREG-0737 items in our scope of review. 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

(1a) In addition to the exceptions described in items (1b) and (1c) of the enclosure to your January 5, 1983 letter, we have taken the following exceptions to the NUREG-0737 requirements for containment pressure monitors, containment water level monitors, and containment hydrogen monitors. These exemption requests were previously identified in correspondence dated December 22, 1980 (S. L. Daltroff, PECo. to D. G. Eisenhut).

1.) The design and qualification criteria for accident monitoring instrumentation (Appendix B of NUREG 0737) recommends physical separation in accordance with Regulatory Guide 1.75, rev. 2. Peach Bottom was not designed and built to meet the separation criteria of Regulatory Guide 1.75, and back fitting the facility to this criteria is not practical. We have designed the accident monitoring instrumentation to the separation criteria applicable to the plant as described in the Peach Bottom Final Safety Analysis Report. This exception does not affect the system's accuracy, speed, dependability, availability, or utility and does not compromise the safety margin that the instrumentaion is suppo ed to provide.

2.) The design and qualification criteria for accident monitoring instrumentation (Appendix B of NUREG-0737) recommends environmental qualification in accordance with Regulatory Guide 1.89 (NUREG-0588). This requirement specifies qualification of new equipment to IEEE Std. 323-1974. The containment pressure transmitters are qualified to IEEE Std. 323-1971 since they were the best available equipment on the market at the time of their purchase. This exception will not affect the accuracy, speed, dependability, availability, or utility of the pressure monitoring system since these transmitters are essentially the same as transmitters from the same vendor that have since been qualified to IEEE 323-1974 requirements. In addition, the worst-case adverse environment at Peach Bottom is much less severe than the environment for which these transmitters have been qualified. Therefore, this exception does not compromise the safety margin provided by this instrumentation.

3.) Many of the regulatory guides listed in Appendix B of NUREG-0737 pertaining to quality assurance were not in existence at the time the Peach Bottom hydrogen analyzers were installed. However, the analyzer system was specified, procurred, designed, fabricated, and installed in accordance with quality assurance programs which complied with the applicable portions of 10CFR50, Appendix B. Therefore, this exception does not affect the system's accuracy, speed, dependability, availability, or utility and will not compromise the safety margin that the monitor is supposed to provide.

Request:

(1b) In your letter of 22 Dec. 80 from Shields L. Daltroff (PECo) to Darrell G. Eisenhut (NRC), you state that your water level transducer range will extend to one foot above the bottom of the suppression pool, rather than to the bottom as is required by NUREG-0737. You further state that you wish to take this exception so that you can use the existing water level transmitter rather than installing a new one. We find this exception to be acceptable, and will not require that you provide any further justification on this point.

Response:

1b) No response required.

Request

(1c) In your letter of 23 Dec 81 from Shields L. Daltroff (PECo) to Darrell G. Eisenhut (NRC), you state that your hydrogen monitor has a 2 hours warmup period, whereas NUREG-0737 requires that the hydrogen monitor be operation within one half hour after an accident. Please state what measures have been tried or are going to be tried to decrease the 2 hour warmup period and state what progress, if any, has been made on this problem. You state that the long warmup time can be justified by the fact that you have an inerted containment. Are there any other extenuating factors that justify the long warmup time?

Response:

1c) As stated in correspondence dated December 23, 1981 (S. L. Daltroff, PECo to D. G. Eisenhut), the two hour warmup time of the hydrogen analyzers is sufficient for their intended use. Since the Peach Bottom containment is inerted and post-accident combustible gas control is maintained by oxygen deficiency, the control of combustible gas concentrations in containment is relatively insensitive to the rate or extent of hydrogen generation due to metal-water reaction. Maintenance of containment gas concentrations below combustible limits is accomplished by the addition of nitrogen to limit oxygen concentration to less than 5%. Indication of hydrogen concentration is used only to determine if a level of hydrogen exists within containment such that control of oxygen concentration is needed. Based on Safety Guide No. 7 (now regulatory guide 1.7) assumptions, approximately one day will elapse after a loss of coolant accident before nitrogen addition is required. Recent evaluations submitted by the BWR Owners' Groups and reviewed by the NRC staff have demonstrated that the Regulatory Guide 1.7 radiolytic oxygen generation is extremely conservative. (Refer to letter number BWROG-8224 from T. J. Dente of the BWROG to D. G. Eisenhut of the NRC dated June 21, 1982, and the letter from W. G. Counsil of NUSCo to W. J. Dircks of the NRC dated August 6, 1982.) Therefore, this exception to the NUREG-0737 requirements will not affect the hydrogen monitoring system's accuracy, speed, dependability, availability, or utility in performing its intended function. Furthermore, this exception does not compromise the safety margin that the monitor is supposed to provide.

(2) II.F.1.4 - Containment Pressure Monitoring System Accuracy and Time Response

Request

(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:

(2a) See figure 1 for a block diagram of the configuration of modules that make up the containment pressure monitoring system. There are four instrument loops, two with a range of 0 to 225 psig and two with a range of 5 to 25 psia. The power for the instrument loops and the power to run the recorders is provided from the power supply through the power distribution module.

Request:

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

Response:

(2b) The following parameters describe the overall uncertainty of the containment pressure monitoring system:

Pressure transmitter (5 to 25 psia range)

Accuracy:	± 8.3% (Includes combined effect of linearity, hysteresis, and repeatability)
Seismic effect:	± 0.83%

Temperature effect:	± 0.89% (for temperature change from 85 degrees F to 148 degrees F)
Power supply effect:	negligable
Deadband:	none
Stability:	± 0.42%

Pressure transmitter (0 to 225 psig range)

Accuracy:	± 7.4% (Includes combined effect of linearity, hysteresis, and repeatability)
Seismic effect:	± 0.74%
Temperature effect:	± 1.0% (for temperature change from 85 degrees F to 148 degrees F)
Power supply effect:	negligable
Deadband:	none
Stability:	± 0.37%

Current to Voltage Converter

Accuracy:	± 0.17%
Power Supply Effect:	± 0.016%
Ambient Temp. Effect:	± 0.17% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect:	± 0.17%
Seismic Effect:	< 0.17%

Recorder (recording function)

Accuracy:	± 0.25%
Repeatability:	0.1%
Ambient Temp. Effect:	< 0.25% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect:	+0.25%, -0.5%
Power Supply Effect:	< 0.008%

Recorder (indicating function)

Accuracy:	± 0.17%
Repeatability:	0.1%
Ambient Temp. Effect:	0.25% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect:	± 0.17%
Power Supply Effect:	0.008%

NOTE: The above values are expressed as a percentage of full calibrated range.

Request:

(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:

(2c) The following is the overall system uncertainty:

$\pm$7.55% for 0 to 225 psig recorder
$\pm$7.53% for 0 to 225 psig indicator
$\pm$8.43% for 5 to 25 psia recorder
$\pm$8.41% for 5 to 25 psia indicator

Request:

(2d) For each module indicate the time response. For modules with a linear transfer function, state either the time constant, τ , or the Ramp Asymptotic Delay Time, RADT. For modules 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:

(2d) The following is the response time for each module:

Transmitter - time constant is 0.2 seconds.

Current to Voltage Converter - when excited by an 80% input step from 10 to 90%, the maximum time required for the output of steady state value is 37 milliseconds nominal and 50 milliseconds maximum.

Recorder - 3.5 seconds to travel from 10 to 90% of the scale.

(3) II.F.1.5 - Containment Water Level Monitoring System Accuracy

Request

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

Response:

(3a) See figure 2 for a block diagram of the configuration of modules that make up the suppression pool water level monitoring system. There are two suppression pool water level instrument loops, each with a range of 1 foot to 21 feet from the bottom of the suppression pool. The power for the instrument loops and the power to run the recorders is provided from the power supply through the power distribution module.

Request:

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

Response:

(3b) The following parameters describe the overall uncertainty of the suppression pool water level monitoring system:

Response:

Level Transmitter

Safety Function Performance:	± 3.3% (includes combined effect of non-linearity, deadband, hysteresis, and repeatability and the accumulative effects of temp., radiation, seismic, and LOCA)
Power Supply Effect:	± 0.003%

Current to Voltage Converter

Accuracy:	± 0.17%
Power Supply Effect:	∓ 0.016%
Ambient Temp. Effect:	∓ 0.17% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect:	± 0.17%
Seismic Effect:	≤ 0.17%

Recorder (recording function)

Accuracy:	± 0.25%

Repeatability: 0.1%
Ambient Temp. Effect: < 0.25% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect: +0.25%, -0.5%
Power Supply Effect: < 0.008%

Recorder (indicating function)
Accuracy: ± 0.17%
Repeatability: 0.1%
Ambient Temp. Effect: 0.25% (for temperature change from 70 degrees F to 120 degrees F)
Relative Humidity Effect: ± 0.17%
Power Supply Effect: 0.008%

Indicator
Accuracy: ± 0.5%
Hysteresis: ± 0.67%

NOTE: The above values are expressed as a percentage of full calibrated range.

Request:

(3c) Combine parameters in 3b to get an overall system uncertainty. If you have both stripchart 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:

(3c) The following is the overall system uncertainty:

±3.40% for the recorder
±3.37% for the indicator on the recorder
±3.45% for the separate indicator

(4) II.F.1.6 - Containment Hydrogen Monitoring System Accuracy and Placement

Request:

(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:

(4a) See figure 3, for a block diagram of the configuration of modules that make up the containment hydrogen monitoring system. There are four instrument loops, each with a range of 0 to 20%. Two loops monitor hydrogen in the suppression pool airspace and two loops monitor hydrogen in the drywell atmosphere.

Request:

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

Response:

(4b) The following parameters describe the overall uncertainty of the containment hydrogen monitoring system:

Hydrogen Analyzer	
Accuracy of Analyzer:	$\pm$ 1.0% (unadjusted for moisture or steam dilution within the containment)
Temperature Effect:	none
Flow Measurement Effect:	none
Power Supply Effect:	none
Deadband:	none
Hysteresis:	none
Recorder	
Accuracy:	$\pm$ 0.17%
Deadband:	0.083%
Indicator	
Accuracy:	$\pm$ 0.5%
Hysteresis:	$\pm$ 0.67%

Request

(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:

(4c) The following is the overall system uncertainty:

± 1.0% for the recorder
± 1.3% for the indicator

Request:

(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:

(4d) Redundant analyzers are provided to monitor hydrogen concentration in each drywell and torus. Samples are withdrawn through primary containment penetrations at the following elevations:

drywell:	El. 127'-2"
drywell:	El. 199'-9"
torus:	El. 125'-0"
torus:	El. 114'-0"

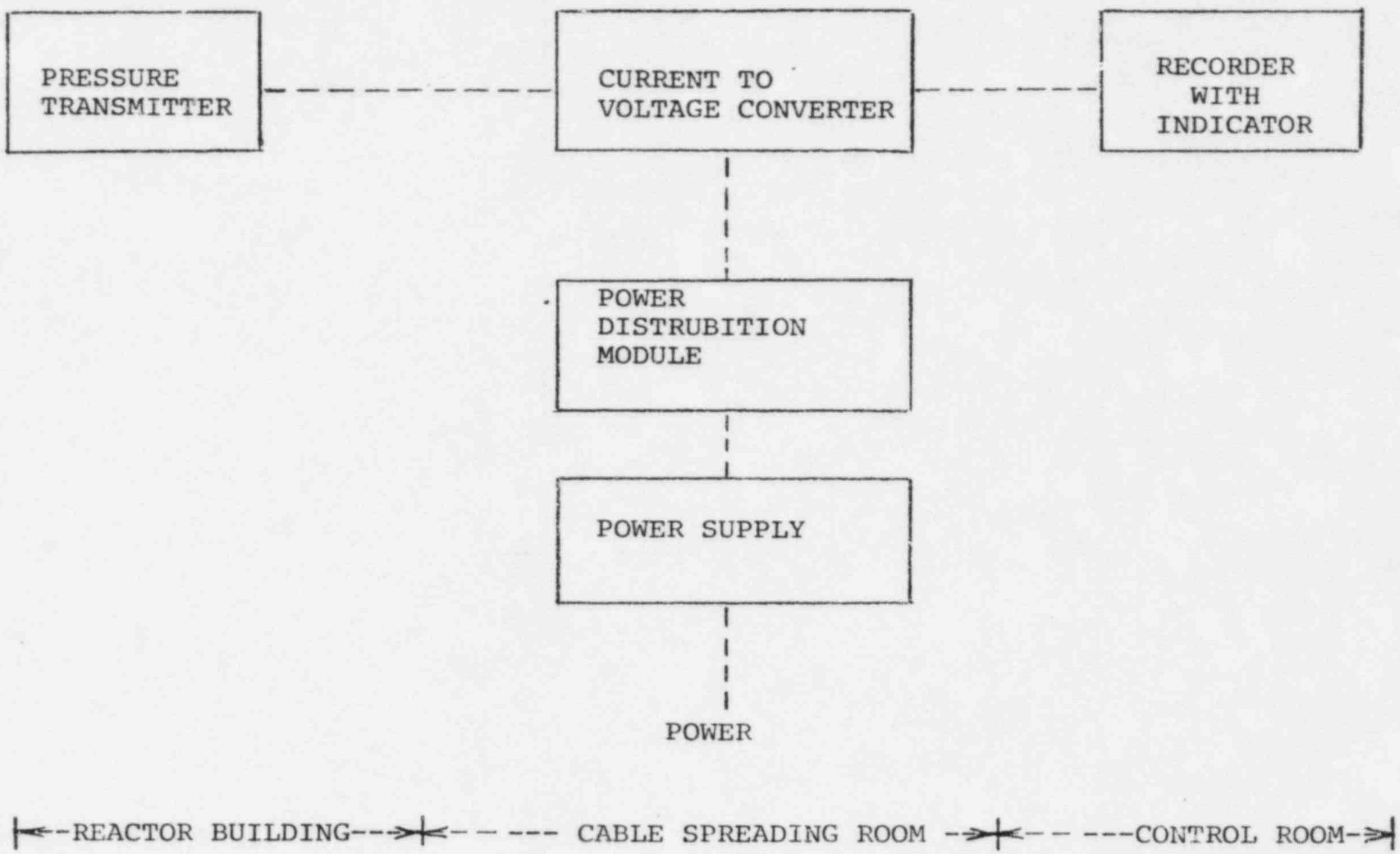
Since the primary containment is not compartmentalized, except into drywell and torus, multiple sample points within the containment compartments for each analyzer are not considered necessary. An analysis of the effectiveness of combustible gas mixing within the PBAPS primary containment is included in FSAR Supplement 1, Response to Question 14.6.

Request:

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

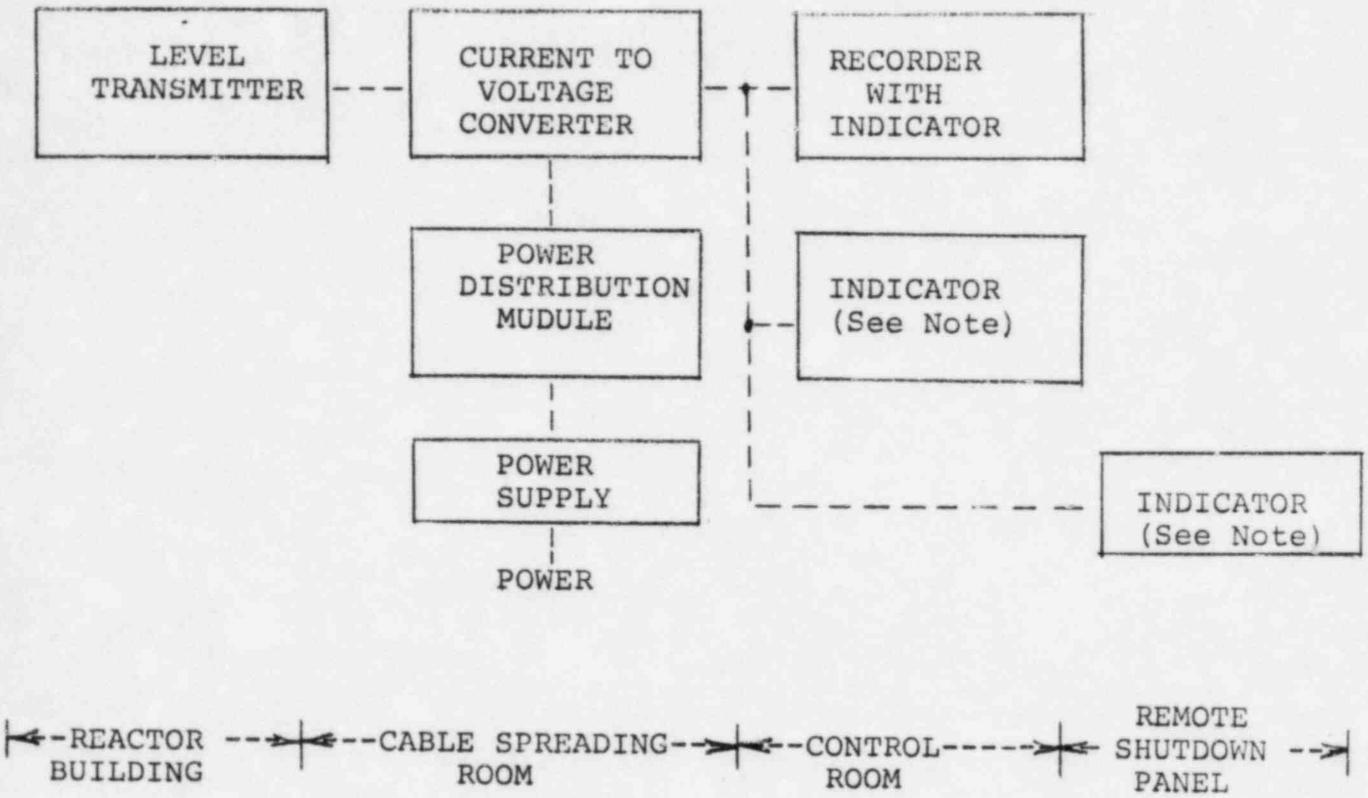
Response:

(4e) There are no single obstructions which can prevent hydrogen escaping from the core from reaching the hydrogen sample ports quickly. Redundant sample lines are provided to ensure that blockage of a single line will not prevent the analysis of containment gas from either the drywell or the suppression pool airspace.



CONTAINMENT PRESSURE MONITORING

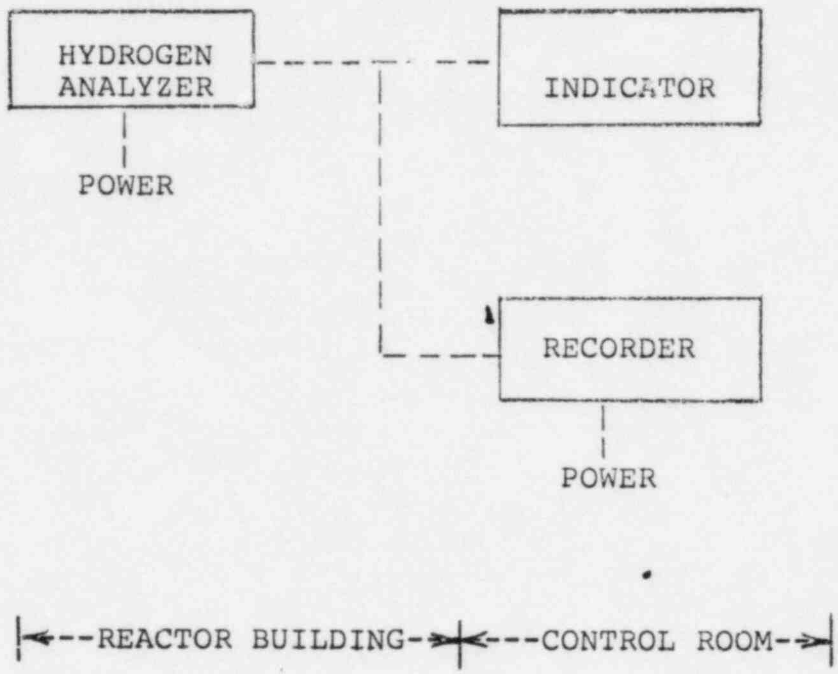
FIGURE 1



Note: Only one of the two instrument loops have these additional indicators

SUPPRESSION POOL WATER LEVEL MONITORING SYSTEM

FIGURE 2



CONTAINMENT HYDROGEN MONITORING SYSTEM

FIGURE 3