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SUBJECT: Provides evaluation supporting util 870731 application to amend Tech Specs re containment high-range area radiation monitors. Proposed monitor locations meet requirements of NUREG-0737 & Generic Ltr 83-37. Sketches encl.

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Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
CONTAINMENT HIGH-RANGE AREA RADIATION MONITORS
(NUREG-0737 ITEM II.F.1.3)

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Attn: T. E. Murley

October 26, 1987

Dear Dr. Murley:

In a letter dated July 31, 1987, (AEP:NRC:0856G) we submitted proposed amendments to our Technical Specifications (T/Ss) dealing with radiation monitoring instrumentation required by NUREG-0737 and Generic Letter 83-37. In that letter we stated that, in response to a request by NRC Region III, we would provide your staff, for review and approval, the evaluations in which we concluded that the containment high-range area radiation monitors as presently installed at the D. C. Cook Plant meet the redundancy requirements of NUREG-0737 with regard to monitor location (i.e., one monitor is in the lower containment volume and the other is in the upper containment volume in each unit. See Figures 1 through 4 for specific locations.). This submittal provides, for review and approval by your staff, the requested information.

The redundancy requirements for containment high-range area radiation monitors established in NUREG-0737 call for a minimum of two physically separated instruments to monitor widely separated spaces within containment. We believe, as shown in Figures 1 through 4, that our presently installed high-range area radiation monitors fulfill this requirement. NUREG-0737 further requires independent measurements in order to provide a "...reasonable assessment of area radiation conditions inside containment." Our understanding of the independence requirement is that each area radiation monitor should "see" the same post-accident conditions inside containment, and therefore the loss of one of the two monitors would not compromise the ability to assess containment radiation conditions. The following is a discussion of the evaluation we have performed to address the independence requirement.

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In performing our evaluation we first assessed the location of the monitors in order to establish the field of view of each monitor, the volume monitored, and to confirm that as presently installed the monitors are sufficiently unshielded so as to independently provide a representative assessment of the containment radiation conditions we would expect following an accident involving the release of radioactivity to containment. On the basis of this assessment we believe that the current monitor locations provide for monitoring a sufficiently large amount of containment volume at each monitor location to reasonably assess post-accident containment area radiation conditions, and that shielding in the vicinity of the monitors does not significantly affect the monitor's ability to perform this function.

The next part of our evaluation involved an analysis of the relative post-accident dose rates to which each monitor (upper and lower containment) would be exposed. This analysis was performed in order to establish if each monitor, independent of the other, can provide a reasonable assessment of containment area radiation conditions following an accident, and hence fulfill the NUREG-0737 redundancy requirements outlined above with regard to monitor location. In performing this analysis the following considerations, which could potentially lead to differences in dose rate readings between the upper and lower containment monitor, were addressed:

- Monitor location (discussed above, not considered to be a concern).
- Mixing between the upper and lower containment volumes to achieve equal concentrations of airborne radioactivity in the upper and lower containment volumes.
- Shielding effects (also discussed above and not considered to be a concern).
- Contribution to dose rate seen by each monitor due to shine from radioactivity in the containment sump.
- Contribution to dose rate seen by each monitor due to steam generator (S/G) primary side activity.
- Volume difference between upper and lower containment.

Through consideration of the above factors, we have addressed what we believe to be the most significant potential contributors to discrepancies in dose rate readings in the upper and lower containment volumes. The following is a discussion of the results of our analysis and resolution of the considerations listed above.

Assuming that one of the two trains of the containment air recirculation/hydrogen skimmer system is operating at its design basis flow of 41,800 cfm, the air recirculation from the upper to lower containment volume provides radionuclide concentration equilibrium between the two volumes in approximately one hour after activation of the air recirculation/hydrogen skimmer system fans. This one hour time frame is consistent with our core damage assessment procedure since, if initiated, this procedure does not rely on the availability of containment area dose rates until one hour after the start of an accident. Activation of the fans occurs approximately 10 minutes after receipt of a phase B containment isolation signal. We believe that an accident of a magnitude sufficient to require our high range area monitors for core damage assessment would also result in the containment high-high pressure setpoint being reached with subsequent phase B isolation. Once equilibrium is achieved between the upper and lower volumes (ie., in approximately one hour after activation of air recirculation fans) both radiation monitors are exposed to the same radionuclide concentration. In evaluating the actual dose rate seen by each monitor (and indicated in the control room) however, it was recognized that the field of view of the lower containment monitor (i.e., the volume monitored) is slightly larger than that of the upper containment monitor. As a result, after concentration equilibrium is achieved, the lower containment monitor will indicate a higher dose rate than the upper containment monitor. Further evaluation showed that this difference is essentially constant once equilibrium is reached, and the difference in dose rate indications is not significant in relation to the level of resolution required for implementation of our core damage assessment procedure or to providing a reasonable assessment of containment area radiation conditions. Therefore, the dose rate indication from either of the two high-range area monitors is sufficient to permit these assessments to be made.

As far as the other potential contributors to discrepancies in dose rate readings between the monitor identified above, our evaluation showed that these effects would be insignificant and hence would not compromise our ability to implement our core damage assessment procedure or to provide a reasonable assessment of containment radiation conditions even in the event that one of the two high-range monitors fails.

In summary, based on the evaluation discussed above, we believe the containment high-range area radiation monitors as presently installed at the Cook Plant meet the redundancy requirements of NUREG-0737 with regard to monitor location. Both high-range area monitors will provide containment area dose rate indication in the control room that will allow initiation of core damage assessment and provide a reasonable assessment of containment area radiation conditions in approximately one hour after activation of the air recirculation fans, which is a time frame that is consistent with our emergency procedures'. We believe that the loss of one monitor will not compromise our ability to perform these activities.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

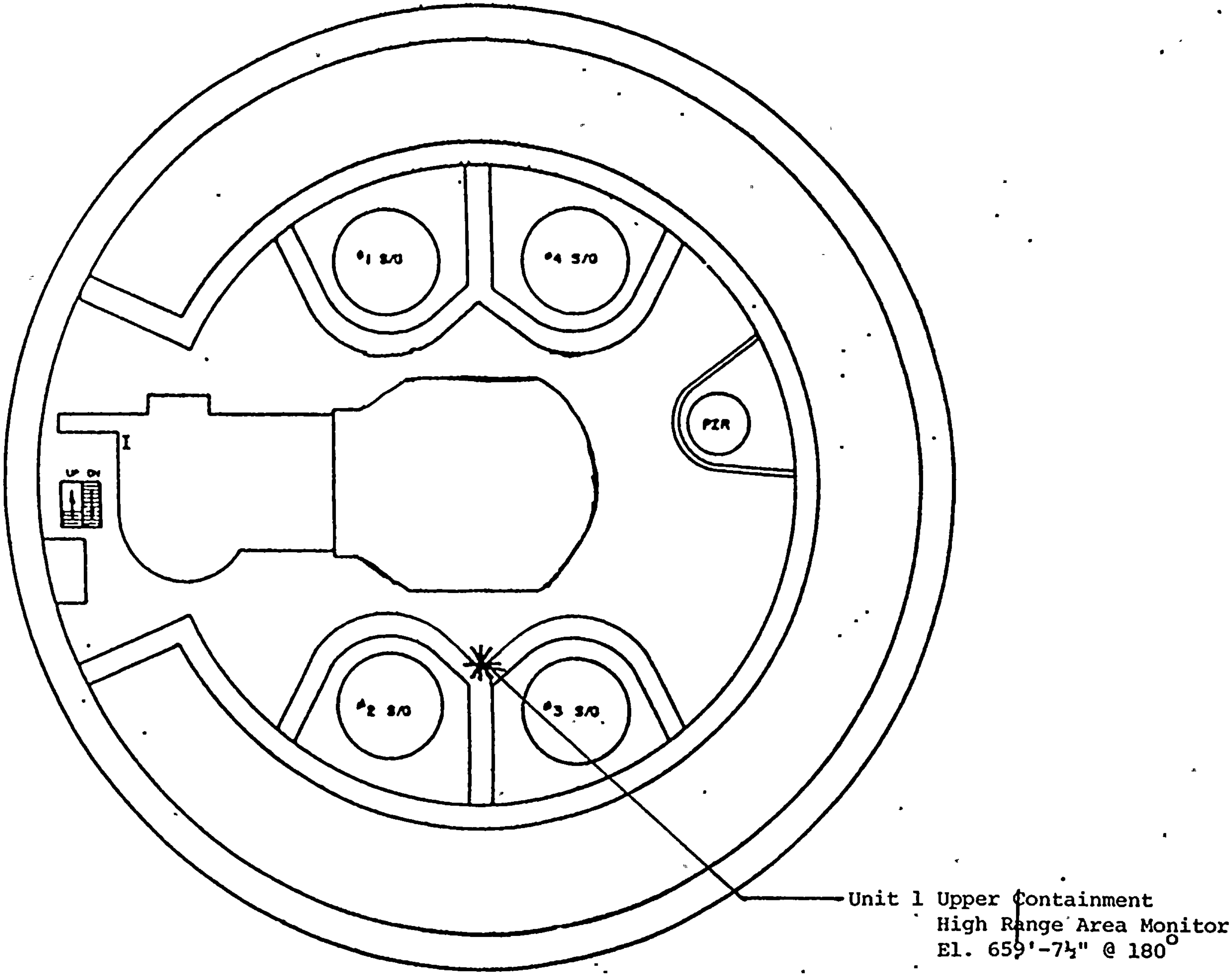
M. P. Alexich
Vice President

cm

Attachments

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman
A. B. Davis - Region III

Figure 1
Unit 1 Upper Containment
Monitor Location



Unit 1 Lower Containment
High Range Area Monitor
El. 618'@0°

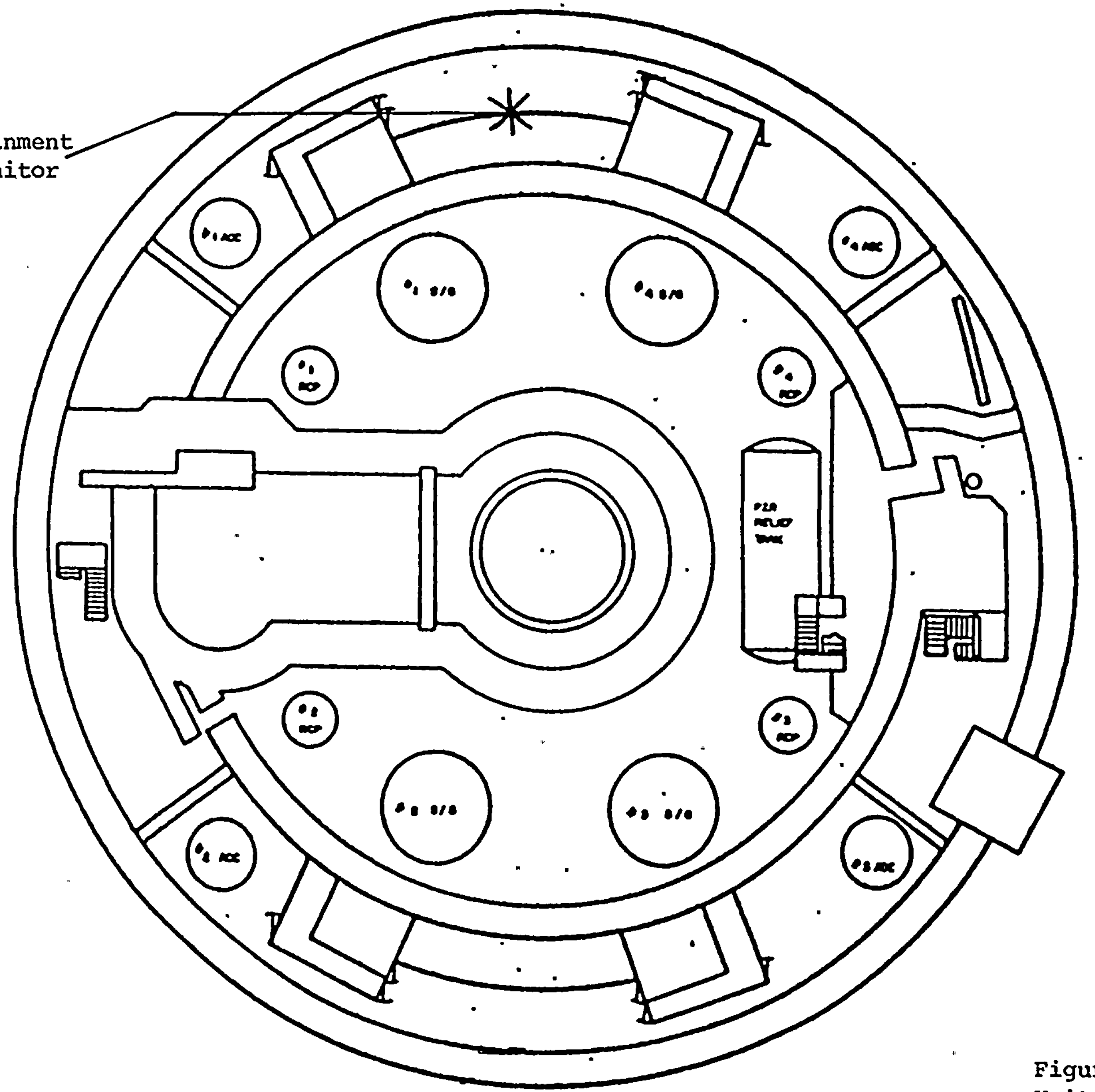
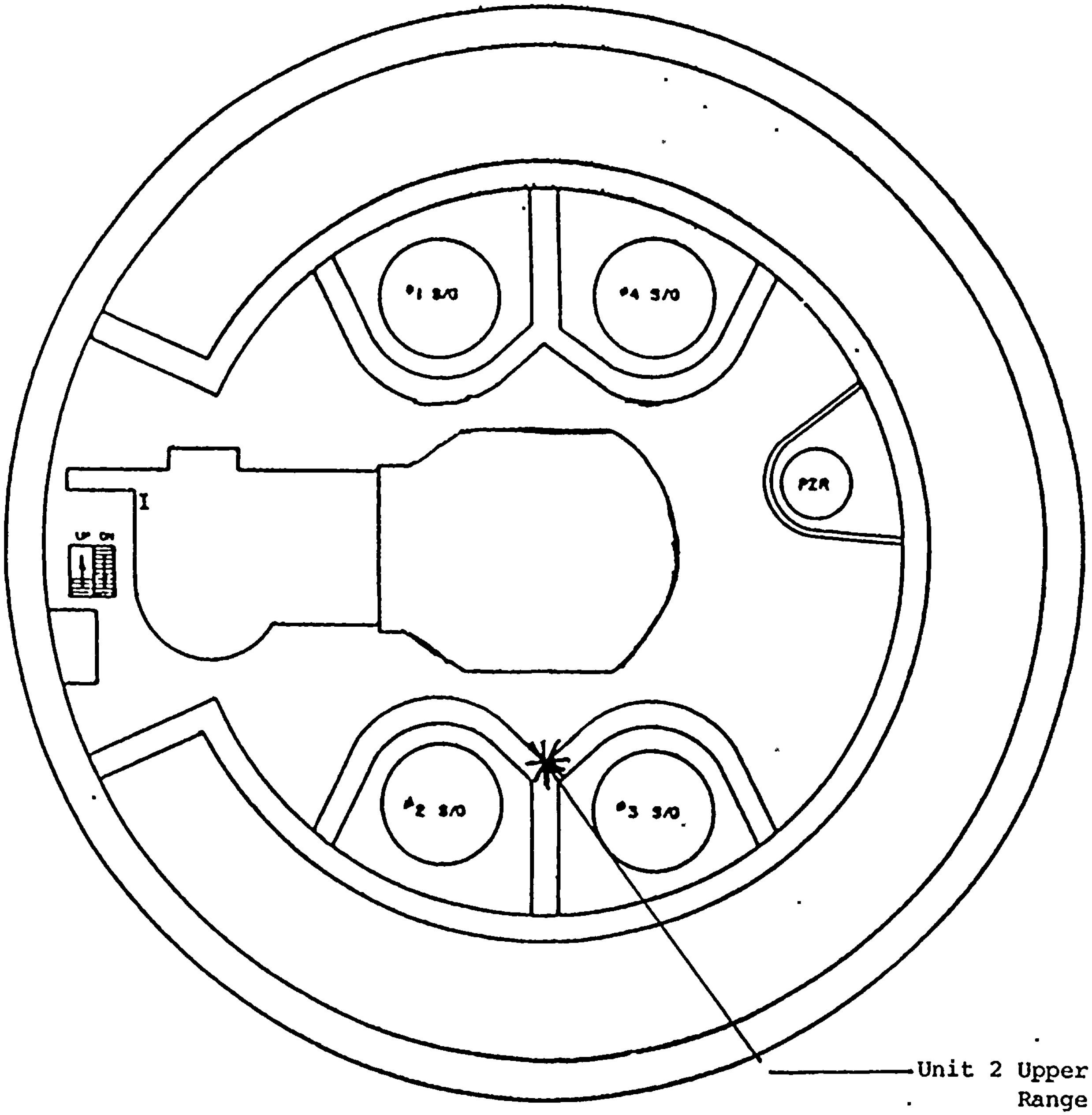


Figure 2
Unit I Lower Containment
Monitor Location

Figure 3
Unit 2 Upper Containment
Monitor Location



Unit 2 Upper Containment High
Range Area Monitor
El. 659'-7½" @ 180°

Unit 2 Lower Containment
High Range Area Monitor
El. 618'@0°

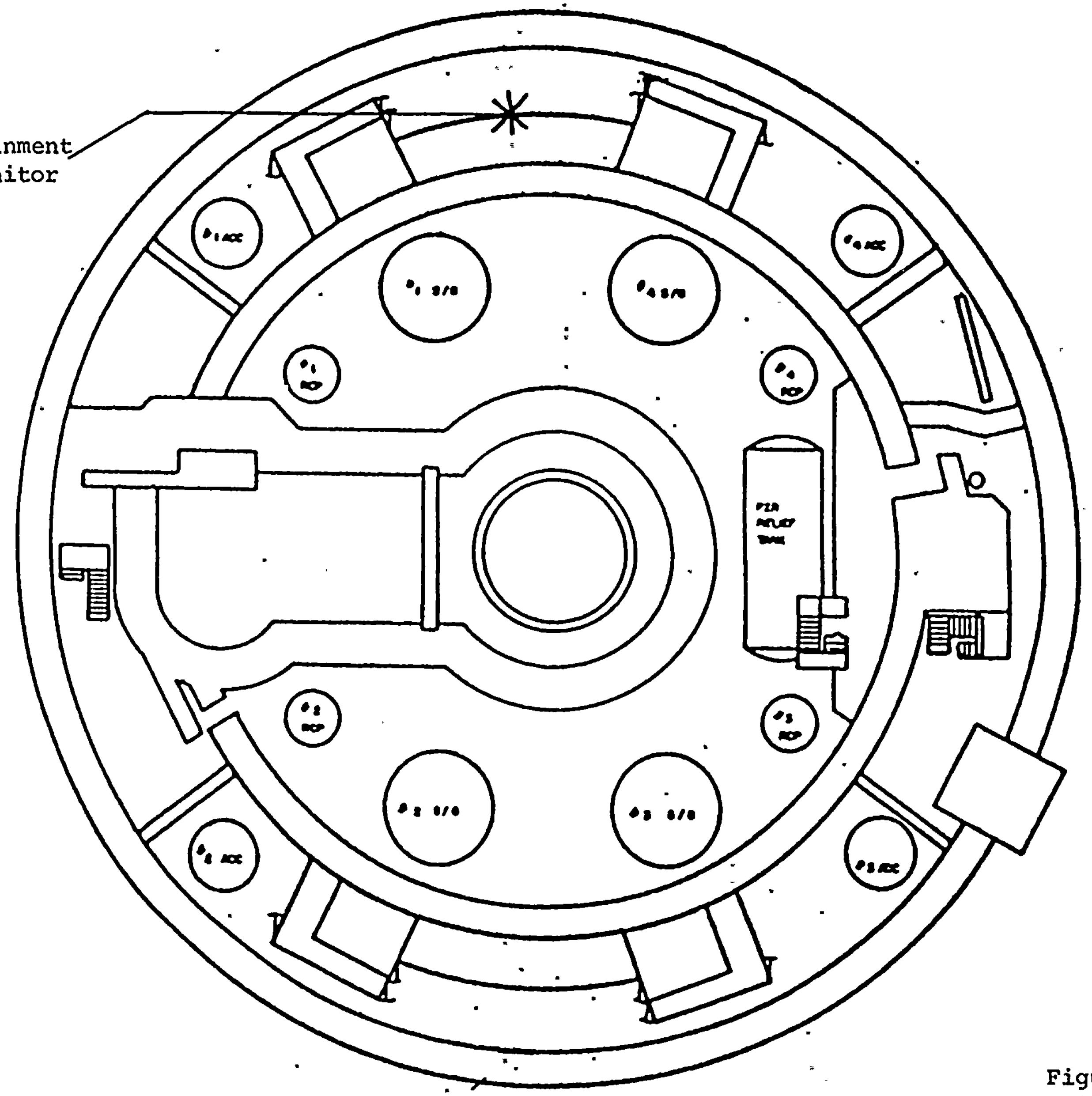


Figure 4
Unit 2 Lower Containment
Monitor Location