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AUG 16 1984

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docket Nos.: 50-352
50-353

Subject: Limerick Generating Station, Units 1 and 2
Conformance to Regulatory Guide 1.97

References: (1) Letter from A. Schwencer to E. G. Bauer, Jr. dated April 30, 1984
(2) NUREG-0991

File: GOVT 1-1 (NRC)

Dear Mr. Schwencer:

The reference (1) letter transmitted a request for additional information concerning some of the Limerick exceptions to conformance to Regulatory Guide 1.97, Revision 2. The attachments to this letter provide the information requested by the reference (1) letter and permit the closure of open issue #12 in reference (2).

Sincerely,

Jw Gallagher
for
JS Kemper

DFC/aag/08038402

cc: See Attached Service List

A048
1/1

cc:	Judge Lawrence Brenner	(w/enclosure)
	Judge Richard F. Cole	(w/enclosure)
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	Atomic Safety & Licensing Appeal Board	(w/enclosure)
	Atomic Safety & Licensing Board Panel	(w/enclosure)
	Docket & Service Section	(w/enclosure)
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	Mr. James Wiggins	(w/enclosure)
	Mr. Timothy R. S. Campbell	(w/enclosure)
	Ms. Phyllis Zitzer	(w/enclosure)
	Judge Peter A. Morris	(w/enclosure)

ATTACHMENTS

Philadelphia Electric Company Response to
Requests for Additional Information (RAI)
On Conformance to Regulatory Guide 1.97
For Limerick Generating Station Units 1 and 2

RAI: Conclusion #1

> Neutron Flux - The applicant should address which proposed option for modifications will be followed, which specific deviations will result, if any, and any justifications where deviations are taken.

Response:

The upgrading that is alluded to in FSAR Section 7.5 dealt with the availability of the Neutron Monitoring System power sources. We have increased the availability of the RPS buses; they are no longer shed off the Class 1E sources when an accident condition exists.

The startup range detectors drive mechanisms and controls, along with the Reactor Protection System inverters, meet Category 2 requirements in lieu of Category 1 requirements. Justification for this deviation is based on the use of neutron flux indication by control room operators. The only event that would require the long term monitoring of neutron flux is an anticipated transient without scram (ATWS) event. The ATWS Rule (49FR26036) is consistent with Category 2 design and qualification requirements for neutron flux instrumentation in lieu of Category 1 as specified in Regulatory Guide 1.97. Application of Category 2 requirements is consistent with the requirements applicable to other ATWS mitigation features. Due to the multiple uses of the neutron flux instrumentation, most portions are designed, procured, installed, and tested to standards more stringent than Category 2.

Since there are many neutron monitoring system channels (4 SRM, 8 IRM, and 6 APRM's plus individual LPRM Channels) that have historically demonstrated a high level of reliability and since the ATWS mitigation features have a lower importance to safety than safety systems, a Category 2 classification for neutron flux instrumentation is considered appropriate.

RAI: Conclusion #2

> Reactor Water Level - The applicant should address specifically why the recommendations of Regulatory Guide 1.97 cannot be accomplished for this variable.

Response:

The R.G. 1.97 assessment contained in the Limerick Final Safety Analysis Report (FSAR) indicates an exception to the range given in the Regulatory Guide for RPV water level. The exception is specifically that the range of measurement provided by existing RPV water level instrumentation is sufficient rather than extending the range to the centerline of the main steam line as indicated in R.G. 1.97.

The present Limerick Generating Station (LGS) design provides two (2) wide range and two (2) fuel zone level indicators for post accident level measurement. These overlapping ranges measure water level from the bottom of the fuel to the top of the feedwater control range.

The exception has been made because the need for the range specified in R.G. 1.97 does not exist. A generic test program conducted by the Boiling Water Reactor Owners' Group (BWROG) on safety relief valves (SRV) entitled "BWR Safety/Relief Valve Operability Test" concluded that the probability of unacceptable safety consequences resulting from high level was sufficiently low such that improvements to the existing instruments measuring level in the upper portion of the vessel were unnecessary. Compared to the generic design studied by the BWROG, LGS has an improved level 8 trip capability. This improvement is due to two (2) additional level 8 trips in both the HPCI and RCIC trip logics. These additional trips have a higher reliability than the generic trip system used in the BWROG study.

In addition to the BWROG study mentioned above, none of the actions included in the Limerick emergency operating (TRIP) procedures to assure adequate core cooling require monitoring of RPV water level above the ranges currently provided at LGS. In fact, those portions of the TRIP procedures which may result in water level above the normal range allow utilization of other instrumentation (such as, reactor pressure and drywell/suppression pool pressure, both of which are monitored by Category one instrumentation) to carry out the procedure. These portions of the TRIP procedures include Contingency 5 (alternate shutdown cooling) and Contingency 6 (RPV Flooding) which assumes that water level cannot be determined.

Physical limitations of the existing LGS reactor pressure vessel and containment designs prevent implementation of the regulatory guide range recommendations without major modifications. The modifications required are necessary to provide a reference leg for the differential pressure measurement. In order to install an instrument to measure level up to the centerline of the main steam lines (MSL), a vessel nozzle and a condensing chamber is required at or above the centerline of the main steam line and an associated drywell penetration is required at an elevation that limits the instrument sensing line elevation drop to 12'(± 1'). This elevation drop limit is necessary to provide a reference leg which is parallel to the existing variable legs inside the drywell.

The centerline of the MSL is located at elevation 323.46'. There are no spare reactor nozzles available at or above that elevation. Likewise, there are no spare containment penetrations that meet the elevation drop requirements.

Due to the physical limitations of the plant and the fact that the presently installed system is sufficient to 1) determine the reactor water level over the range required by the operator for normal and emergency operation, 2) determine the adequency of core cooling, and 3) limit reactor level to level 8, it is neither necessary to measure reactor water level to the centerline of the main steam lines, nor reasonable to install such instrumentation.

RAI: Conclusion #3

Drywell Sump Level and Drywell Drain Sumps Level - The applicant should provide justification for the use of Category 3 instrumentation for this variable. The applicant should also provide the information to complete Table 7.5-3 for this variable.

Response:

Limerick has two drywell drain sump tanks. One is the equipment drain sump tank which collects identified leakage, the other is the floor drain sump tank which collect unidentified leakage.

Although the level of the drain sump tanks can be a direct indication of a breach of the reactor coolant system pressure boundary, it is ambigious because there is water in those tanks during normal operation. There is other instrumentation required by Regulatory Guide 1.97 that would indicate a breach of the reactor coolant system pressure boundary in the drywell:

1) Drywell Pressure - Variable B7, Category 1
2) Drywell Temperature - Variable D7, Category 2
3) Primary Containment Area Radiation - Variable C5, Category 3

The drywell sump tank level signal neither automatically initiates safety-related systems nor alerts the operator to the need to take safety-related actions. Both tanks have a level switch that provides a high-high level alarm in the main control room. Although Regulatory Guide 1.97 requires instrumentation to function during and after an accident, the drywell sump tank systems are deliberately isolated at the primary containment penetration upon receipt of an accident signal to establish containment integrity. This fact renders the drywell-sump-level signal irrelevant. Therefore, by design, the drywell-sump-level instrumentation serves no useful accident-monitoring function.

The Limerick TRIP procedures use reactor level and drywell pressure as entry conditions for the level control guideline. A small line break will cause the drywell pressure to increase before a noticeable increase in the sump tank level. Therefore, the drywell sump tanks will provide a "lagging" versus "early" indication of a line break.

Limerick has installed a sump tank level monitoring system that meets the requirements of Regulatory Guide 1.45, Reactor Coolant Pressure Boundary Leakage Detection Systems. The purpose of this system is the detection and monitoring of leakage of reactor coolant into the containment area during normal operation. The system uses a dedicated level transmitter and processing unit for each drywell sump tank and is fully qualified to withstand a safe shutdown earthquake. The system furnishes the following outputs:

- Normalized* sump tank level to Emergency Response Facilities Data Acquisition System
- Average flowrate into each sump tank
- Change in flowrate greater than 1 GPM alarm
- Alarm for exceeding technical specification flowrate for each sump tank.

The system outputs give the operator continuous information concerning drywell sump level and flowrate. FSAR Table 7.5-3 reflects this information.

Based on the above discussion, Category 3 sump tank level instrumentation is adequate for the purpose of accident monitoring.

* Normalized level is a linearized level measurement which compensates for the cylindrical shape of the sump tank.

RAI: Conclusion #4

Radioactivity Concentration or Radiation Level in Circulating Primary Coolant - The applicant has not provided acceptable justification for the use of the Category 3 instrumentation for this variable. The diverse indication presently provided for this variable is acceptable on an interim basis on the condition that the applicant commits to evaluate systems for this variable as they become available.

Response:

The usefulness of the information obtained by monitoring the radioactivity concentration or radiation level in the circulating primary coolant, in terms of helping the operator in his efforts to prevent and mitigate accidents, has not been substantiated. The critical actions that must be taken to prevent and mitigate a gross breach of fuel chadding are (1) shut down the reactor and (2) maintain water level. Monitoring variable C1, as directed in Regulatory Guide 1.97, will have no influence on either of these actions. Hence, design and qualification to Category 1 requirements is not necessary.

Regulatory Guide 1.97 specifies measurement of the radioactivity of the circulating primary coolant as the key variable in monitoring fuel cladding status. The words "circulating primary coolant" are interpreted to mean coolant, or a representative sample of such coolant, that flows past the core. A basic criterion for a valid measurement of the specified variable is that the coolant being monitored is coolant that is in active contact with the fuel, that is,

flowing past the failed fuel. Monitoring the active coolant (or a sample thereof) is the dominant consideration. The post-accident sampling system (PASS) (see variables C2 and E13) provides a representative sample which can be monitored by using Category 3 instrumentation.

The subject of concern in the Regulatory Guide 1.97 requirement is assumed to be an isolated nuclear steam supply system (NSSS) that is shutdown. This assumption is justified because existing monitors in the condenser off-gas and main steam lines provide reliable and accurate information on the status of fuel cladding when the plant is not isolated. Monitoring of the primary containment area radiation (see variables C5 and E1) and containment hydrogen (see variable C11) by Category 1 instrumentation will provide information on the status of the fuel cladding, although not by a measurement of circulating coolant, when the plant is isolated. Monitoring of the primary containment area radiation (see variable C5 and E1) and containment hydrogen (see variable C11) by Category 1 instrumentation will provide information on the status of the fuel cladding, although not by a measurement of circulating coolant, when the plant is isolated.

In conclusion, since no planned operator actions are identified and no operator actions are anticipated based on this variable serving as the key variable, the instrumentation in the above paragraphs, which is a combination of Category 1 and 3 instrumentation, is adequate for monitoring fuel cladding status. There is no need to evaluate future systems when they become available.

RAI: Conclusion #5

Suppression Spray Flow and Drywell Spray Flow - The applicant has not provided acceptable justification for not monitoring these parameters directly. The applicant should provide additional information for these variables.

Response:

Drywell spray and suppression pool spray operation are directly monitored by utilizing the following parameters:

a) A combination of RHR loop flow and valve position indication provides a direct indication of system operation. The RHR loop flow indicator provides drywell spray and suppression pool spray flow indication. The valve position indicators allow the operator to verify that drywell spray and suppression pool spray flows are directed through the proper flowpaths. This combination of parameters is a direct and unambiguous indication of the proper operation of the spray systems. Both the RHR loop flow and valve position indicators meet the Category 2 design and qualification requirements as described in Regulatory Guide 1.97, Rev. 2.

Limerick Operating procedures to instruct the operator how to put the drywell spray and suppression pool spray systems into service and to ensure that the RHR system is is properly lined up to direct flow to the drywell spray and/or suppression pool spray spargers and to prevent flow from being diverted to other RHR discharge flow paths.

b) Suppression pool air space temperature and pressure and drywell temperature and pressure indicators provide direct and unambiguous indication of the effectiveness of drywell spray and suppression pool spray. The Limerick TRIP procedures direct the operator to establish drywell spray, suppression pool spray, or both based on various combinations of drywell pressure and temperature and suppression pool air space temperature and pressure. When the specified values of temperature or pressure are reached, the TRIP procedures direct the operator to establish the appropriate loops of drywell spray and suppression pool spray. The operator is then directed to continue to monitor the temperature and pressure parameters of interest and to monitor the suppression pool level to determine the effectiveness of the spray systems in operation and to maintain those variables within their specified values. The suppression pool air space pressure, suppression pool level, and drywell temperature and pressure are monitored by instrumentation that meets either Category 1 or 2 design and qualification requirements as described in Regulatory Guide 1.97, Rev. 2.

The instrumentation described above meets the requirements of Regulatory Guide 1.97, Rev. 2 and is sufficient to satisfy the operator's information requirements for the drywell and suppression pool sprays as called out by the Limerick TRIP procedures.

RAI: Conclusion #6

Standby Liquid Control System Storage Tank Level - The applicant should confirm conformance to the Category 2 criteria except for equipment qualification and provide a statement that the instrumentation for this variable is located in a mild environment.

Response:

The SLCS storage tank level measurement system at Limerick Generating Station conforms to the criteria for Category 2 instrumentation since it is 1) properly ranged to show the normal operating range of the SLCS storage tank, 2) supplied by highly reliable instrument air and electrical supplies, 3) located in a mild environment 4) constructed of high-quality, commerical grade equipment which meets the quality assurance requirements consistent with the systems' importance to safety.

The SLCS storage tank level instrumentation provides a non-redundant indication of SLCS storage tank level on panel 10C603 which is located in the control room.

Level transmitter LT-48-1N001 provides level detection over the normally used portion of the SLCS storage tank. It is powered by highly reliable electrical power and instrument air supplies. The electrical power supply, while non-safeguard, receives its power from a class 1E safeguard motor control center. This means that after a loss of power event, the electrical power can be restored to the instrument from onsite power.

The instrument's air supply is provided by the instrument air system. This system consists of two, identical, 100%-capacity trains. Each train has its own header that branches off into the instrument air subsystems. The headers can be interconnected through a common connecting line. The instrument air system is switched automatically to the standby AC power supply during a loss of off site power. Upon receipt of a LOCA signal, the compressors will be tripped off the standby AC power source, but may be restarted manually following a LOCA when diesel loadings allow. In addition, the service air compressor serves as backup to the instrument air compressors.

The purpose of the SLCS tank level instrument is to provide an indication of SLCS storage tank level during normal and ATWS conditions. It is not required to mitigate an accident or perform a safety function during a LOCA or HELB event. The environmental conditions for the level transmitters' area does not vary significantly from its normal conditions which are as follows:

	Normal	ATWS[1]
Temperature	65/104°F	120°F
Pressure	-¼ inch W.C.	ATMOS.
Relative Humidity	50/90%	90%
Radiation	9E2 R	8E3 R[2]

1. The environmental condition listed are post-LOCA. ATWS conditions are less severe.
2. 40 yr. + 11 day post-ATWS dose.

These conditions are considered to be a mild environment.

In addition to the level measurement system described above, a limited range level indication is available to display level from the centerline of the SLCS suction line to plus 30 inches (approximately 1/3 height of tanks). These instruments are primarily to trip the SLCS pumps on low level, however, their outputs are displayed on the Emergency Response Facility Data System and the plant process computer.

In the event of failure of the primary system, low level can be determine by use of the computer displays.

RAI: Conclusion #7 & #8

Reactor Building or Secondary Containment Area Radiation - The applicant has not shown how the proposed alternate method for monitoring this variable satisfies the recommendations of Regulatory Guide 1.97 nor has the applicant provided sufficient justification for not implementing this variable. The applicant should provide additional justification for this deviation.

Radiation Exposure Rate - The applicant has not shown how the proposed alternate method for monitoring satisfies the recommendations of Regulatory Guide 1.97 for long term surveillance and release assessment. Nor has the applicant provided sufficient justification for not implementing this variable. The applicant should provide additional justification for this variable.

Response:

The information requested by these items has been provided in the responses to Questions 471.6 and 471.10 and in FSAR Section 12.3.4. This information has been reviewed and approved by the Radiological Assessment Branch and is sufficient to close these items, as agreed upon during a conference call between J. Joyce and M. La Mastra (NRC) and L. Nendza, W. Bowers, A. Marie and G. Rombold (PECO) on May 30, 1984.

RAI: Conclusion #9

Primary Coolant and Sump Grab Sampling - The applicant has not shown how the proposed alternate method for monitoring satisfies the recommendations of Regulatory Guide 1.97. The applicant should commit to installation of a satisfactory system for this variable or provide further justification.

Response:

Sampling of the suppression pool in lieu of the Primary Coolant and Sumps has been reviewed and approved by the NRC's Materials, Chemical & Environmental Technology Division as stated in the letter from W. V. Johnston (NRC) to G. G. Sherwood, (GE), dated July 17, 1984.