



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 116 AND 78 TO FACILITY OPERATING
LICENSE NOS. NPF-39 AND NPF-85
PHILADELPHIA ELECTRIC COMPANY
LIMERICK GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated March 1, 1995, as supplemented by letter dated April 16, 1996, the Philadelphia Electric Company (the licensee) submitted a request for changes to the Limerick Generating Station (LGS), Units 1 and 2, Technical Specifications (TSs). The requested changes are to the concentration of calibration gas required for calibrating the Hydrogen (H₂) and Oxygen (O₂) Analyzers and support the LGS Transient Response Implementation Plan (TRIP), T-102, "Primary Containment Control Bases." The April 16, 1996, letter requested a new effective date and did not change the initial proposed no significant hazards consideration determination nor the Federal Register notice.

2.0 EVALUATION

2.1 Background

The H₂/O₂ Analyzers monitor the concentration of combustible gases in the primary containment (Drywell or Suppression chamber) to provide indication, recording, and annunciation when combustible gas concentrations reach unacceptable levels.

As part of the Containment Atmosphere Control (CAC) system, the primary containment gas analyzer consists of two redundant analyzer packages, each containing a hydrogen analyzer cell and an oxygen analyzer cell. The redundant packages are fully independent and are powered from different divisions of Class 1E power in conformance with Regulatory Guide 1.97, "Post Accident Monitoring Instrumentation."

Each analyzer package consists of a sample cabinet located in the reactor enclosure and a remote control panel located in the control room. The analyzer package can take samples individually from three different locations in the drywell and two different locations in the suppression chamber. Sample gases are drawn through the analyzer cells by one of two redundant diaphragm-type pumps located in the sample cabinet. Selection of the pump to be placed in operation is made at the remote control panel in the control room. Sample gases discharged from the pump are routed back to the primary containment. The sample suction and return lines are each provided with two normally open

solenoid-operated valves for containment isolation. These valves are operated by hand switches in the control room, and are automatically closed when a containment isolation signal is received. The isolation signal to the valves can be overridden by using key-locked bypass switches.

The operation of the hydrogen and oxygen analyzer cells is based on the measurement of thermal conductivity of the gas sample. The hydrogen analyzer cell uses a catalytic combustion feature which removes the hydrogen by using oxygen as a reagent. The thermal conductivity of the sample is measured before and after recombination, and the two samples are compared. The difference in thermal conductivity is proportional to the concentration of hydrogen originally in the sample. The oxygen analyzer operates in a similar manner, except that the reagent gas is hydrogen.

The hydrogen analyzer has a range of 0% to 30% (by volume) and the oxygen analyzer is a dual-range device capable of measuring ranges of 0% to 10% and 0% to 25% (by volume). The analyzers are capable of providing measurement under positive (+60 psig) to negative (-2 psig) ambient pressures. The hydrogen and oxygen concentrations are indicated at the sample cabinet and the remote control panel in the control room and are also recorded in the control room.

2.2 Technical Specification Changes

Table 4.3.7.5-1 ACCIDENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

8. Drywell Oxygen Concentration Analyzer-Channel Calibration Q#

Using calibration gas containing:

Remove: a. Zero volume percent oxygen, balance nitrogen.

Remove: b. Five volume percent oxygen, balance nitrogen.

Add: Seven volume percent oxygen, balance nitrogen

9. Drywell Hydrogen Concentration Analyzer-Channel Calibration Q*

* Using calibration gas containing:

Remove: a. Zero volume percent hydrogen, balance nitrogen.

Remove: b. Five volume percent hydrogen, balance nitrogen.

Add: Seven volume percent hydrogen, balance nitrogen.

2.3 Justification for the Technical Specification Changes

The present method of calibration of both H₂/O₂ analyzers is to assure zero by using 100% nitrogen and zero oxygen for the oxygen analyzer and 100% nitrogen and zero hydrogen for the hydrogen analyzer. The licensee states that the calibration gas for zero is not required for the calibration to provide accurate indication of H₂ and O₂. Zero calibration is achieved by valving out the reagent gas, and comparing the same gas, resulting in a 0% difference in concentration. The zero concentration values are calibrated to the required

accuracy using a comparison of thermal conductivities of two samples of the same span gas without a reagent gas for recombination. Calibrations of the H₂/O₂ analyzers are in accordance with the manufacturer's instructions.

The LGS Transient Response Implementation Plan (TRIP), T-102, "Primary Containment Control Bases," requires the operator to determine if the Drywell or Suppression Pool H₂ concentration is AT OR ABOVE 6%. The concern with H₂ concentration is related to the post-Loss-Of-Coolant-Accident (LOCA) because the H₂ recombiners may be an ignition source if the H₂ is above 6% as stated in the TRIP T-102 procedure bases. The span gas concentration, used to calibrate the H₂/O₂ analyzers, is changed from 5% to 7% to support TRIP T-102. The licensee finds that calibration from 0% to 7% is acceptable since the postulated maximum Post-LOCA containment H₂ and O₂ concentrations are less than 5%. In order to assure that the concentration is below 5%, one of two hydrogen recombiner subsystems is required to be placed in service at 39 hours after the LOCA. Since the recombiner subsystem requires a maximum 2-hour heat-up period before complete recombination, one recombiner subsystem is activated at or prior to 37 hours after a LOCA. Because the analyzer will display an accurate reading within the range of the span gas, the span gas concentration was changed from 5% to 7%. This assures an accurate reading relative to the 6% hydrogen concentration, identified in TRIP T-102, as being the concentration where ignition may occur if the recombiner subsystem is placed in service.

3.0 CONCLUSION

The staff has reviewed the proposed changes to the TS, (1) removing the zero volume percent hydrogen used to calibrate the hydrogen analyzer and, (2) removing the zero volume percent oxygen to calibrate the oxygen analyzer. Based on that review, the staff concludes that removal of the zero volume percent hydrogen and oxygen concentration calibration requirements from the TSs will not adversely affect H₂/O₂ analyzer calibration as they are unnecessary for this purpose, and are in accordance with the manufacturers instruction. The staff also concludes that increasing the span gas concentration from 5% to 7% increases the accuracy over a larger range and supports procedure T-102. The staff, therefore, concludes that the proposed TS changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no

significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (60 FR 20525). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: April 23, 1996