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July 6, 1984

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

Subject: Limerick Generating Station, Units 1 and 2
Post Accident Sampling System (PASS)
Chemical Engineering Branch

Reference: BWR Owners Group (BWROG) and NRC Meeting dated May 2, 1984.

File: GOVT 1-1 (NRC)

Dear Mr. Schwencer:

As discussed and agreed to at the reference BWROG and NRC meeting, attached, are LGS draft FSAR page changes to Section 11.5.5 describing the modified dissolved gas measurement capability of the post accident sampling system. The information contained on the draft FSAR page changes will be incorporated into the FSAR, exactly as it appears on the attachments, in the revision scheduled for July, 1984.

Sincerely,

J. W. Gallagher
for
J. S. Kemper

RJS/gra/06288408

cc: See Attached Service List

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PDR ADOCK 05000352
A PDR

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cc: Judge Lawrence Brenner (w/o enclosure)
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11.5.5 POST-ACCIDENT SAMPLING SYSTEMS

The post-accident sampling systems (PASS) are designed to obtain representative liquid and gas grab samples from the primary coolant system and from within the primary and secondary containments for radiological and chemical analysis under accident conditions. The grab samples are subsequently transported to the radwaste enclosure chemistry laboratory and counting facility for chemical and radiosotopic analyses, or shipped offsite for analysis.

The PASS is designed to satisfy the requirements of NUREG-0737 item II.B.3. The system design minimizes operating complexities and "in-line" instrumentation, is modular for maintenance and contamination control purposes, and is compact in size to reduce the amount of shielding required. The system can be used to provide samples under all plant conditions, ranging from normal shutdown and power operation to post-accident conditions.

The PASS piping and instrument diagram is shown in Figure 11.5-2. The equipment includes isolation and control valves, piping racks, shielded sample stations (gas and liquid), liquid chillers, and control panels. The seismic category, quality group classification, and corresponding codes and standards that apply to the design of the PASS are discussed in Section 3.2. A separate PASS is provided for each unit with common demineralized water, nitrogen and tracer gas support systems.

The PASS will be operational before exceeding 5% power.

11.5.5.1 System Description

11.5.5.1.1 Sample Points

a. Wetwell and Drywell Atmospheres

Sample lines are installed to obtain atmosphere samples from two separate areas in both the drywell and wetwell. Drywell samples are taken at El 291 and 242 ft. Wetwell samples are taken at El 222 ft on opposite sides of the containment. The sample lines tap into the containment atmospheric control system (CACS) sample lines outside the primary containment and outboard of the second containment isolation valve. Containment gas samples will be representative of conditions throughout the primary containment because the containment is not compartmentalized and the atmosphere is fully mixed.

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and a measured volume of diluent (generally 10 milliliters) through the valve and into the sample bottle. This provides an initial dilution of up to 100:1. The sample bottle is contained in a shielded cask and remotely positioned on the sample needles through an opening in the bottom of the sample enclosure.

- Non-Diluted Liquid and Dissolved Gas Samples

→ Insert A ←

Alternatively, the sample can be diverted through a 70 milliliter holdup cylinder to obtain depressurized samples of primary coolant gas and liquid phases. A coolant sample is circulated through a holdup cylinder, the cylinder is then isolated and the contents circulated through a gas loop containing a measured amount of inert krypton. The gases are vented to an evacuated gas collection chamber, and a fraction of the ~~gas is expanded into a sample vial for analysis by gas~~ chromatography. The concentration of krypton in the sample is used to calculate the fraction of the dissolved gases recovered. The krypton also serves as a stripping agent at low gas concentrations. Ten milliliter aliquots of degassed liquid can then be taken for offsite (or onsite depending on activity level) analyses which require a relatively large undiluted sample. This sample is obtained remotely using the large volume cask and cask positioner through needles on the underside of the sample station enclosure.

11.5.5.1.4.3 Sample Station Ventilation

The sample station enclosure will be vented to a Zone V room in the secondary containment. Ventilation is facilitated by differential pressure between the control structure and reactor enclosure. The ventilation rate required for heat removal and proper sweep velocity during operation is about 40 scfm. A pressure gauge is attached to the sample station enclosure to monitor the pressure differential between the enclosure and the general sampling area in the control structure. The pressure differential will assure the operator that airborne activity in the sample enclosure will be swept into secondary containment.

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11.5.5.4.4 ~~Gas Analysis-Gas Chromatography~~

~~A gas chromatograph will be used to measure hydrogen and oxygen~~ concentrations in containment atmosphere and dissolved gas samples.

→ Insert B ←

a. Dissolved hydrogen concentrations - - An accuracy of +10 percent can be expected over the range of concentrations from 50 to 2000 cc/Kg. Below 50 cc/Kg, the accuracy will be +0.05 cc/Kg. Gas chromatography has been ~~successfully demonstrated for the determination of~~ hydrogen in TMI-2 post-accident gas samples.

b. Dissolved oxygen concentrations - - Dissolved oxygen will be measured indirectly using the residual hydrogen method of analysis. Using this method, dissolved oxygen concentration is verified to be less than 0.1 ppm by measurement of positive hydrogen residuals of greater ~~than 10 cc/Kg.~~

11.5.5.4.5 Determination of Extent of Core Damage

A generic procedure to assess the extent of core damage based on radionuclide concentrations and other parameters has been prepared by the BWR Owners Group and transmitted to the NRC by letter from Mr. T. J. Dente to D. Eisenhut dated June 17, 1983. A Philadelphia Electric corporate procedure based on this methodology has been prepared and transmitted to the NRC.

11.5.5.4.6 Storage and Disposal of Sample

Short-term sample storage areas will be provided in the chemistry laboratory and counting room facilities. An area for long-term storage of the samples will be designated at a later date. Low level wastes generated by the chemistry procedures will be flushed to radwaste. Ultimate procedures for disposal of the samples will be determined later; however, after a sufficiently long decay period, the activity levels will be significantly reduced. This will ease exposure problems during disposal.

11.5.5.4.7 System Testing and Operator Training

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The sample station can provide depressurized samples of the primary coolant gas and liquid phases. A coolant sample is circulated through a holdup cylinder and the dissolved gases are vented into a partially evacuated gas collection chamber. Total dissolved gas concentration is determined by measuring the resulting collection chamber pressure rise. A fraction of gas may be removed for analysis by gas chromatography and/or gamma ray spectroscopy. Ten milliliter aliquots of degassed liquid may be taken for offsite (or onsite depending on activity level) analyses which require a relatively large undiluted sample. This sample is obtained remotely using the large volume cask and cask positioner through a needle on the underside of the sample station enclosure.

INSERT B

Gas Analysis

Total dissolved gas concentrations will be determined by measuring gas collection chamber pressure rise, as discussed above. The accuracy of this measurement has been determined by testing and analysis to be at least:

$\pm$ 50% between 25 cc/kg and 50 cc/kg
$\pm$ 30% between 50 cc/kg and 400 cc/kg

A gas chromatograph will be used to measure hydrogen and oxygen concentrations in containment atmosphere and dissolved gas samples. The accuracy of the containment gas analysis will be at least:

$\pm$ 5% between .1 and 30 volume percent of the constituent

The accuracy of the dissolved oxygen analysis will be at least:

$\pm$ 60% between 4 ppm and 8 ppm
$\pm$ 30% between 8 ppm and 20 ppm