LOUISIANA POWER & LIGHT / 142 DELARONDE STREET
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MIDDLE SOUTH UTILITIES SYSTEM

July 17, 1981

W3V81-0033
Q-3-A29

Mr. R.L. Tedesco
Assistant Director
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford 3 SES
Docket No. 50-382
Chemical Engineering Branch
Condition of License Concern

Dear Mr. Tedesco:

Please find enclosed material which addresses a License Condition concern contained in SER Section 1.9 (item 8) regarding the description of the Waterford 3 Post Accident Sampling capability.

If you have any additional questions on this information, please do not hesitate to call. We would welcome the opportunity to discuss this topic with the Staff at the earliest opportunity, possibly during the week of July 20, 1981.

Yours very truly,

L.V. Maurin
Assistant Vice President
Nuclear Operations

LVM:ys

Enclosure

cc: E.L. Blake, W.M. Stevenson, S. Black, P. Matthews, F. Miraglia, F. Witt

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DESIGN BASES

1) The system is based on the criteria from Section 2.18a of NUREG-0578 which deals with implementation of capabilities for sampling reactor coolant during post-accident condition.

2) Provisions for obtaining representative Reactor Coolant samples from hot leg and safety injection sump (recirculation) sample from the high pressure safety injection pump discharge.

3) The capability to cool sample from lines with high temperatures to temperatures for safe handling.

4) Continuously accept reactor coolant sample and separate the dissolved gases from the liquid.

5) Indicate and record the dissolved oxygen concentration, and pH and boron concentration of the liquid phase.

6) Provision for taking 1:1000 diluted liquid grab sample to chloride, boron and radioisotopic analysis.

7) Provision to measure and record continuously degased liquid flow.

8) Provision to measure and record continuously the gas flow separated from the liquid.

9) Indicate and record continuously hydrogen content in the gas phase.

10) Provision for taking variable dilution of gas grab sample. The dilution is up to 1:1000.

SYSTEM DESCRIPTION AND OPERATION

The Sampling System is illustrated schematically in Figure 1 (Drawing SK-CO-01).

The Post-Accident Sampling System samples are taken from the hot leg piping of the reactor coolant loop and from the HPSI discharge. Sample is passed through a cooler where it is cooled to about 90^{o}F. The sample is depressurized to 70 psig by passing through a pressure reducing valve. Due to the high amounts of dissolved gases in the sample there is two-phase flow upon sample depressurization. For this reason the gases must be separated from the liquid, analyzed and then corrolated to quantify the desired parameters in the original sample.

The cooled and depressurized sample passes through a gas-liquid separation system consisting of a line separator, a gas separator and a gas release valve. The line separator is a first stage in the separation system. Liquid enters the top and is spun, causing the liquid to be forced to the side and the gas to the center of the line separator. The resulting streams pass to the gas separator. The gas separator is a packed column with a mist eliminator to ensure complete gas-liquid separation and avoid liquid carryover. An external gas release valve controls the release of the gas and also maintains the desired liquid level in the separator. The liquid is continuously withdrawn at the bottom of the gas separator, while the gas exits the top of the separator through the gas release valve.

Liquid passes through a magnetic flow meter where the flow rate is measured and recorded, a 5-way valve, dissolved oxygen and pH probes, and finally to the reactor containment. To obtain a diluted grab sample the liquid is passed through a 4-way valve. By changing the valve position an exact amount of liquid is captured in the straight bore. The captured sample is flushed out with a required amount of D.I. water, depending on the dilution desired (i.e., 1:500, 1:1000, etc.), to a shielded diluted grab sample container. The diluted grab sample is then carried to the on-site laboratory. The diluted grab sample is analyzed for boron, chlorides and radioisotopes. Provisions are made for flushing all lines, and also for pH, O_2 and boron calibration.

The gas passes through a pulsation dampener to smooth out fluctuations in flow. The gas flow rate is measured and recorded by a linear mass flow meter. The gas is diluted with nitrogen in a gas blender and passes through an in-line hydrogen analyzer. A diluted grab sample is collected in a container and transported to the laboratory for noble gases analysis. All excess gases are vented (or blown) to the containment. Provision for complete purging of the system are provided.

The system is in compliance with the requirements of NUREG 0660 and NUREG 0737 item II. B.3 dealing with the subject system.

Capability is provided to obtain reactor coolant samples and analyze them within 3 hours or less from the time a decision is made to take a sample.

There is an on-site radiological and chemical analysis facility with the capability to provide, within the 3-hour time frame, quantification of the following:

a) radionuclides (noble gases, iodines and cesiums, and nonvolatile isotopes)

b) chloride and boron concentration

c) in-line monitoring capabilities are provided to measure pH, dissolved hydrogen, oxygen and boron.

For analysis of items a) and b) above, diluted liquid (1:1000) and dissolved gas (up to 1:1000) samples are acquired from the post-accident sampling system. Analysis capabilities provided will include:

1) A computer based multichannel analyzer with an intrinsic germanium detector maintained in a calibrated condition and used to analyze (gamma spectroscopy) isotopically for Noble Gases, Iodines, Cesium and other gamma emitting non-volatiles. Appropriate shielding will be provided for the detector to assure an acceptably low background for the Gamma Analyzer.

2) A boron test stand having sufficient sensitivity and accuracy to analyze the diluted liquid samples for Boron with no further sample processing.

3) A chloride test stand with the capability to analyze a reasonable range of chloride levels that could be expected under post-accident conditions.

4) A system for handling containment gaseous grab samples to allow these samples to be analyzed for:

   - Noble Gas Activity
   - Iodines and Cesium
   - Other particulate activity

   The analyses will be performed on the multi channel analyzer described above.

5) The multi channel analyzer will also be calibrated for analyses of iodines and other airborne isotopes to allow Health Physics evaluations and controls for necessary personnel entries into contaminated areas post-loca. A low background to meet these counting requirements will be achieved by location of the facility and additional shielding as required.

The preceding analyses can be performed within the allowable exposure limits since all handling requiring close access by plant personnel will be done after the dilutions are made to the samples.

The post-accident sampling system will be capable to meet the following:

1) Provisions are made for purging the sample lines and for reducing plateout in sample lines. A flow restriction orifice is provided inside the containment to limit reactor coolant losses from a rupture of the sample line. The post-accident reactor coolant will be representative of the reactor coolant in the core area since the system is capable of

receiving the sample continuously. The residues of liquid and gas sample will be returned to the Reactor Containment.

2) Since the system is connected to the hot leg sample line downstream of the second isolation valve, it is designed as a quality Group D and will not meet Seismic Category I requirements.

3) During post-accident condition, the reactor coolant sampling system will not require an isolated auxiliary system to be placed in operation because the samples will be taken from the hot leg or HPSI.

4) Since the dissolved gases (H_2, O_2) will be analyzed continuously during sampling, a pressurized reactor coolant sample will not be obtained under Post Accident Conditions.

5) Chloride analysis will be performed by LP&L within four (4) days of the sample being taken.

6) The grab sample and the in-line calibration stations are located by Skid #2. Skid #2 and the diluted liquid grab sample receiver will be shielded. The shielding requirements are based on the radioactivity levels in the reactor coolant one hour after the accident, and allowing a radiation dose rate of 100 mr/hr as contact with the shielding wall.

   The diluted gas grab sample receiver does not require shielding.

7) The sampling cabinet (Skid #2) will be located in an enclosure of a NEMA 12 classification with a top vent. The vent is connected to the plant HVAC system.

All materials used in the system are corrosion-resistant stainless steel lines. All the equipment is located so as to be protected from accidental damage. Each portion of the system is designed for source pressure and temperature and overpressure protection is provided by means of a pressure relief valve which discharges to the Reactor Containment.

The system is remotely operated from a control panel, which will be located in the vicinity of the sampling cabinet (Skid #2).

The sample selection and strainer station (Skid #1), the sample coolers, and the gas separator (Skid #3) are located in a high radiation area. These items will not be shielded since operation access is not required.

The system is designed to mirimize pipe runs and size of grab sample so as to minimize radiation exposure and also minimize the effects of equipment failures.

Automatic purging and flushing of the system will be provided.

TESTING AND INSPECTION

Each component will be inspected and cleaned prior to installation. The system will be operated and tested initially with regard to flow paths, flow and thermal capacity, and mechanical operability. Instruments will be calibrated during testing.

Data will be taken periodically during normal plant operation to confirm that the sample heat exchangers and pressure reducing valve in the system are properly set to give the desired conditions for sampling.

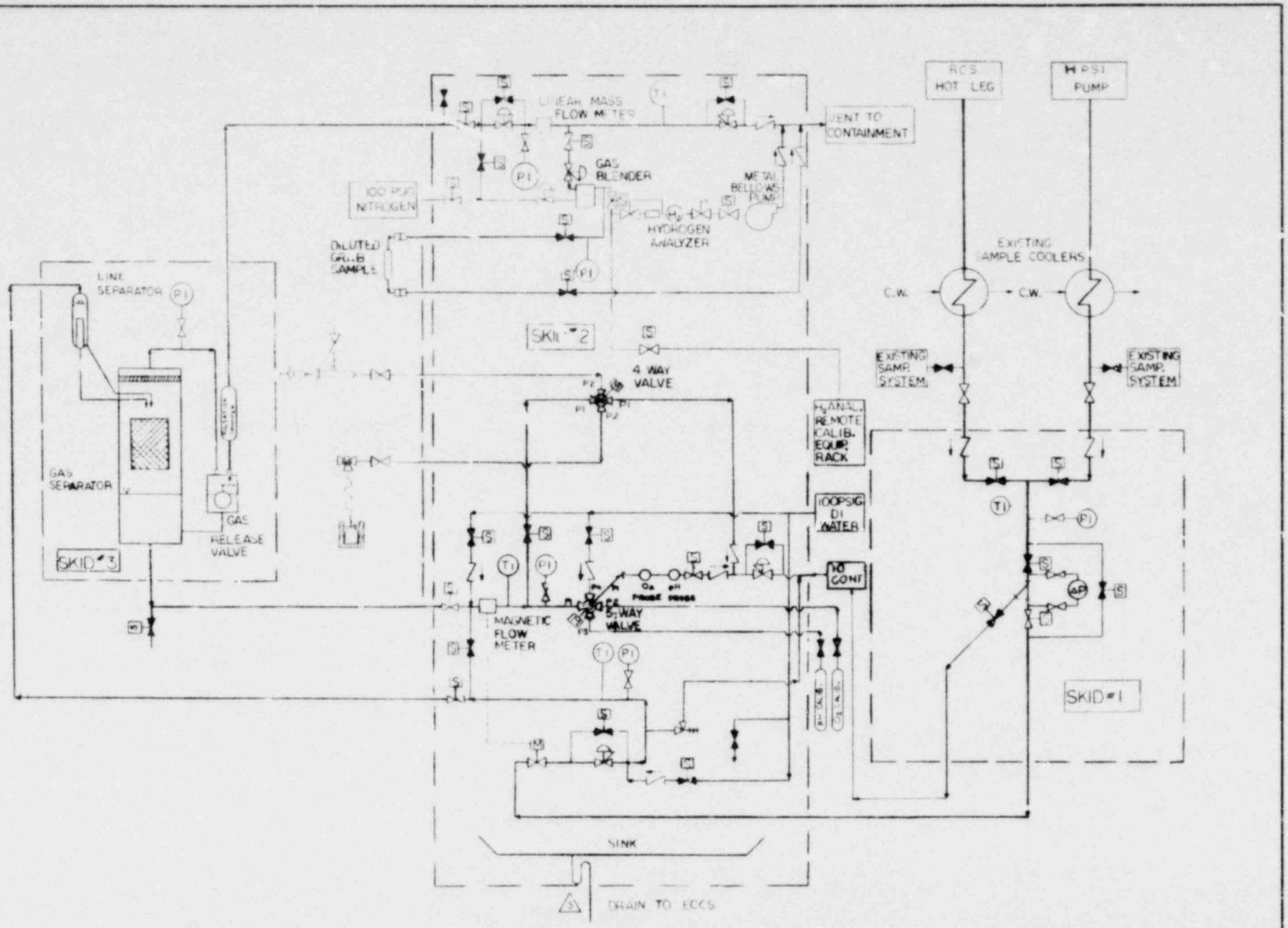
INSTRUMENT AND CONTROL APPLICATION

All necessary instrumentation and control for satisfactory operation of the Reactor Coolant Post-Accident Sampling System will be provided and located in the control panel.

All equipment will be arranged in a manner conducive to safety as well as ease of inspection, maintenance, operation and calibration.

I&C Readout on the Control Panel.

Liquid flow	Indicator-Recorder
Gas Flow (H_2)	Indicator-Recorder
Dyna-Blender	Indicator-Controller
pH	Indicator-Recorder
Dissolved O_2	Indicator-Recorder
H_2 Analyzer	Indicator-Recorder
Temperature	Indicator
Pressure	Indicator
Boron	Indicator-Recorder



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APPROVED

POST ACCIDENT SAMPLING SYSTEM REACTOR COOLANT

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SHEET