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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation

SUBJECT: Forwards preliminary description of conceptual plant mods requiredc for post-accident sampling,per NUREG-0578,Item 2.1.8a.

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January 31, 1980
AEP:NRC:00334A

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

The attachment to this letter provides a description of the conceptual plant modifications required for post-accident sampling in compliance with the requirements of Item 2.1.8a of NUREG-0578. I wish to emphasize that the modification described in the attachment is preliminary and subject to further evaluation. This letter fulfills the commitment we made in our letter of January 18,1980 (AEP:NRC:00334) to provide you with this information.

Very truly yours,

John E. Dolan

JED:em

John E. Dolan
Vice President

cc: R. C. Callen
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ATTACHMENT TO
AEP:NRC:00334A

2.1.8.a Post-Accident Sampling:

This report submits information and the status of the program to evaluate and design a sampling system and the associated analytical methods and procedures to meet the requirements of NUREG 0578 Section 2.1.8.a.

The sampling and analytical requirements of NUREG 0578 for the D. C. Cook Plant, the basis for this report, are summarized below:

Analysis	Sample Source	Time
Isotopic Noble Gases	Reactor Coolant & Containment Air	$<$2 hrs.
Isotopic I, Cs, and non-volatile fission products	Reactor Coolant, Containment Sump & Containment Air	$<$2 hrs.
Chemical boron	Reactor Coolant	$<$1 hr.
Dissolved gases H_2 and O_2	Reactor Coolant & Containment Sump	

Our contractor has evaluated utilization of the existing sample points, auxiliary building sampling room, laboratory, and counting facilities, at the D. C. Cook Plant, under post- accident conditions. Based on postulated dose rates the existing auxiliary building sampling room would not be satisfactory for post-accident sampling, therefore major modifications to the existing sampling system are needed to obtain post-accident samples in accordance with NUREG-0578.

Primarily this requires a new sampling room. Our contractor has concluded that this "emergency" sampling area can be set up in the spray additive tank room. The assessment of post-accident radiation levels indicates this room would be accessible and usable for locating the post accident sampling panel if increased shielding is installed.

The assessments of radiation levels in the counting and laboratory areas indicate that the counting room and laboratory will be accessible and usable for post-accident operations provided the contribution to background radiation from airborne activity is not excessive. This evaluation indicated that the existing containment air sampling panel is accessible and usable for post-accident sampling. The gaseous activity levels within containment will be extremely high and sampling and dilution methods will be developed including localized shielding to minimize personnel exposure.

Presently we are studying two alternate methods of sampling the lower containment sump area; (1) pumping the sample from the lower containment sump, (2) sampling the lower containment by gravity.

Our contractor is designing a sample panel which will provide for on-line analysis for dissolved oxygen, hydrogen and pH on samples from the RCS, lower containment sump and RHR system. The sample panel will also provide for dilution of both liquid and gaseous samples to a volume which will permit withdrawing grab samples for isotopic analyses of the required fission products and analysis of chemical boron concentration. This approach will allow sample collection and analysis within the guidelines of GDC 19.

Post-Accident Sampling Analytical Methods

The post-accident sampling and analysis system shown on the attached Figure 1 provides for:

(1) Collecting a 10 ml reactor coolant water sample.

(2) A diluted sample (1000 to 1) for boron and fission products.

(3) Degassed sample for hydrogen and isotopic gas analysis.

(4) Remote control analysis for O_2 and pH of undiluted sample.

This system will allow sample analysis within guidelines of NUREG-0578,that is:

(1) Isotopic analyses of the diluted sample will be performed on a multichannel analyzer with a Ge-Li detector.

(2) The boron analysis will be done by the fluoroborate specific ion electrode method.

(3) pH and dissolved oxygen will be determined utilizing on-line instrumentation in the sample panel with remote readout. The pH and oxygen probes will be contained in one module designed to minimize sample volumes and permit flushing after calibration and analyses to minimize contamination and radiation levels. The range of analysis is 0.2 mg/l - 20 mg/l for dissolved oxygen and 1 - 13 for pH.

(4) Hydrogen will be determined utilizing an on-line thermal conductivity cell with remote readout. The analysis will be done after the gases have been stripped from solution with nitrogen. Range of the instrument will be 20-400 cc/Kg.

The sampling system modifications and the remote analyses will be operational January 1, 1981, contingent upon equipment availability, delivery and installation time.

Generalized operating procedures as developed by our contractor are attached.

OPERATING PROCEDURE FOR
POST-ACCIDENT SAMPLING AND ANALYSIS SYSTEM

(Refer to Figure 1)

The operating procedures indicated below are generalized in nature since design details have not been finalized for all systems. Information provided will serve to indicate the general nature of the operations.

A. GAS ANALYSIS SYSTEM

The gas analysis system must be calibrated and then purged with nitrogen prior to use. This is accomplished as follows:

1. The hydrogen analyzer will be calibrated with two standards, one containing 400 and the other 1000 ppm hydrogen concentrations in nitrogen gas. Valve line ups will be indicated when the design details concerning the method of gas analyses are finalized.

2. After the hydrogen analyzer is standardized, the system will be purged with nitrogen gas leaving the gas system under a nitrogen blanket at atmospheric pressure. Purge flow will be directed back to the reactor containment through throttle valve 10. This valve will be closed when purge operations are complete.

B. WATER SYSTEM

The entire system will be filled solid with water using the following flow path:

1. The dilution system and primary sample container will be filled with water through line L-18, continuing through line L-15, L-9, L-5, upward through the sample container through L-6. When flow indication is seen on the flow meter, valve 24 should be switched to

route flow through L-14, back through the recirculation pump into the bottom of the dilution tank. The recirculation pump will not be in operation during this period.

2. When the dilution tank is full as determined by flow indication from the remote indicating meter in line L-6, inlet flow to the system should be switched to line L-19. At this time, the recirculation pump should be operated for 3-4 minutes to purge lines L-21 and L-22. Inlet flow through line L-19 should continue.

3. Secure the recirculation pump after 3-4 minutes and close valves 36 and 35 in that order.

4. Lines L-38, L-37, L-4, L-10, L-12, and L-13 will be purged to a solid condition by flow from lines L-3 and L-39. Continue purge flow until the flow meter in line L-6 has stabilized for 1-2 minutes indicating that there are no more air bubbles in the line.

5. All lines and sample containers in the system should now be water solid and the system is ready for sampling.

C. PRIMARY COOLANT SAMPLING

1. Cooling flow to the heat exchanger should be initiated prior to sampling any water from the reactor container.

2. Primary coolant will be sampled through line L-4, then L-5 into the sample container and through L-6 to the letdown system or waste disposal system. Back pressure will be maintained on the system to prevent degassing by throttling back on valve 34 during sampling operations.

3. A representative sample will be obtained after purging 3 or 4 system volumes through the piping. Flow rate can be determined by the flow indicator in line L-6.

D. GAS ANALYSES

1. Once a sample of primary coolant is available in the 10 ml primary sample container, the sample will be degassed with nitrogen gas. Approximately 200 cc of nitrogen at STP will be bled through the primary sample container. Flow path is through line L-27, L-28, the primary sample container and L-29 into the gas collection chamber. Since system volumes are known and gas pressure can be measured, the end volume of gas in the system can be calculated to relate back to hydrogen concentration in the primary coolant.

2. The gas will be recirculated with the gas pump through lines L-30, L-31, L-32, and L-33 and back to the gas collection chamber prior to analyzing the gas for hydrogen concentration.

3. After determining the hydrogen concentration in the gas, the gas will be further diluted by recirculation through the gas dilution tank. Flow path is through line L-31, L-34, the gas dilution tank, and L-35 to the gas circulation pump.

E. OXYGEN AND pH ANALYSES

These analyses will be performed with in-line instrumentation on undiluted primary coolant obtained through line L-10. The lines involved will be flushed with water as soon as analyses operations are complete. Analyses operations for oxygen and pH should be complete in about 5-10 minutes.

F. OTHER ANALYSES

1. Other analyses involving boron and isotopic determinations will be performed on coolant which is diluted by approximately a factor of 1000 with high purity water.

2. The coolant will be diluted by circulation from the dilution tank through line L-17, the recirculation pump, L-14, the primary sample container, L-5, L-9, L-15, and L-16 back to the dilution tank.

3. Prior to sampling the diluted coolant at valve 26, about 3-4 system volumes will be purged through line L-21 and 22.

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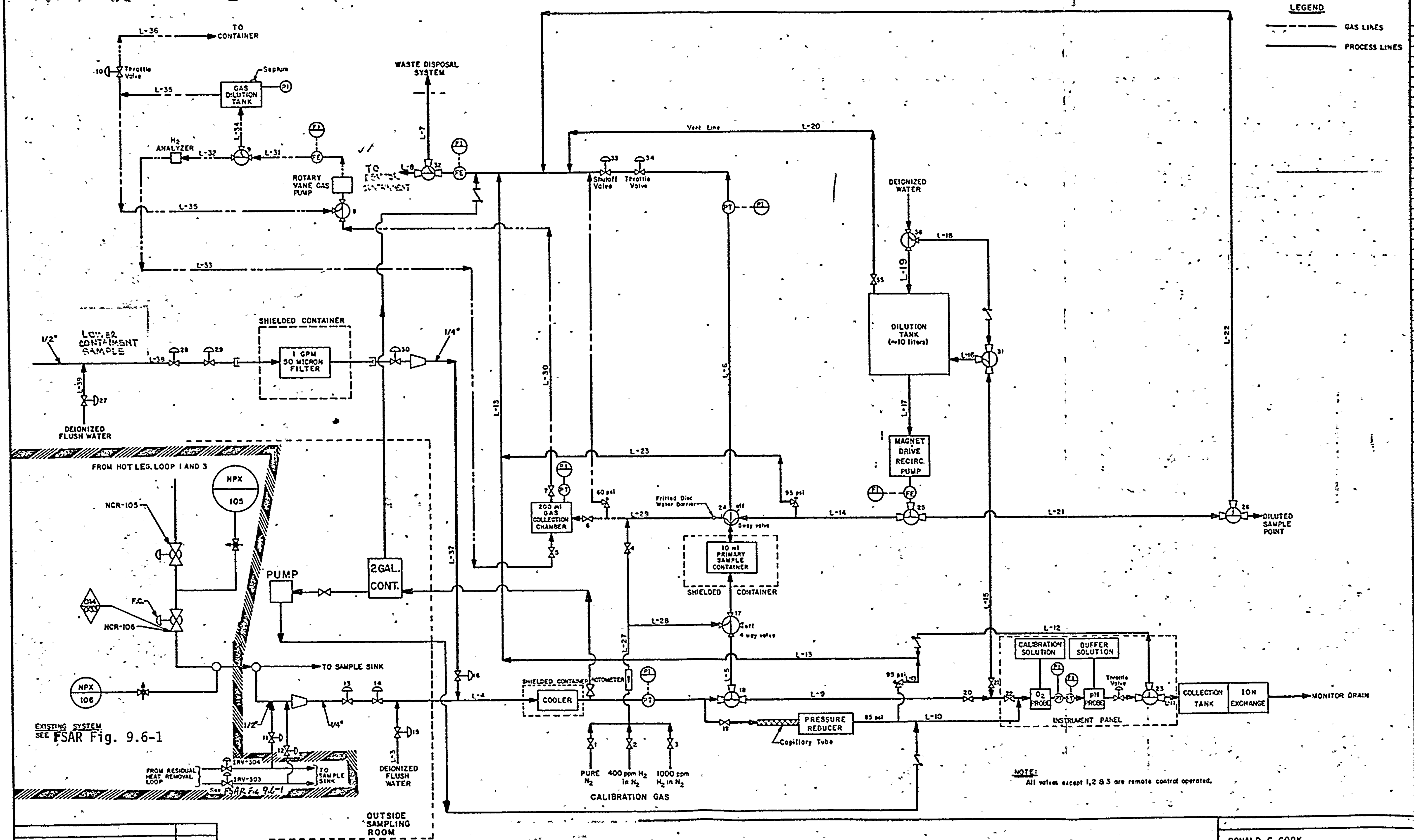

REFERENCE	DWG. NO.

DONALD C. COOK
POST ACCIDENT SAMPLING
AND ANALYSIS SYSTEM

FIGURE 1