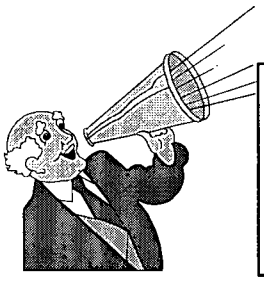

Byron Bulletin

Wednesday, February 4, 2004

Feedwater Tracer Test Planned with Safety as Top Priority

Feedwater Tracer Testing is scheduled to be performed on both Unit 1 and Unit 2 on Friday, February 6, to assist in validating the new AMAG flow meters installed on the Main Feedwater Header in each plant. This document provides some background on the AMAG system and specific information about Friday's test and the actions the site has taken to ensure that all safety aspects and radiological concerns have been properly addressed.

Why is an accurate measurement of Feedwater Mass Flow important to Byron Station?

Measurement of Main Feedwater Flow is critical to plant power operation. Unit heat rate depends directly on the Feedwater mass flow rate to the Steam Generators. PWRs were designed to measure Feedwater mass flow rate with venturi flow meters. The flow coefficient of venturi flow meters can alter with time. As a result, periodical recalibrations are advisable in order to operate the plant at its economic optimum. Both Byron and Braidwood have used an AMAG flow meter to calibrate their venturi flow meters in the past.

Why should a Feedwater Tracer Test be performed?

Originally AMAG flow meters were installed on the individual Feedwater lines to each Steam Generator. To validate the original AMAG instruments, AMAG instruments were installed on the common upstream header in each unit. Investigation into an overpower root cause concluded that signal contamination at the original location of the AMAG instrument was a source of errors.

A comparison of Feedwater flow indication from the venturi flow meters to AMAG header flow reveals that AMAG readings are low by 0.8 to 1.4%. Signal checks on the header installation concluded noise that could affect the AMAG common header accuracy does not exist.

To better understand Feedwater flow, and to assist validation of AMAG flow indication a high precision tracer test is to be performed. A tracer test can measure mass flow with accuracy between 0.1% and 0.3%.

How is the Feedwater Tracer Test performed?

Feedwater Tracer Test is performed with a station at or near full power. During the test, a known concentration of a radioactive tracer (sodium-24) is injected into the Feedwater System at a constant rate. Upon entering the Feedwater System, the concentrated tracer is diluted by the Feedwater flowing to the Steam Generators. After a certain mixing distance, the tracer concentration is constant across the entire pipe cross-section (dilution is complete). Feedwater samples are collected after this distance. Feedwater flow is determined by calculating the required mass flow needed to dilute the injected radioactive tracer to the concentration counted in the diluted downstream samples.

B-54

How does the Feedwater Tracer Test impact Byron Station?

Many tests and evolutions occur weekly at a power plant, but few can affect a plant as much as a handling and injecting a radioactive tracer. This test is not technically difficult, but it does require coordination among several onsite departments. ALARA is the principal concern for the conduct of this test.

The tracer is highly radioactive with dose rates that can exceed 30 R/hr. Great care will be taken during the handling of this material. The exposure to handlers will be kept to a minimum by following the principals of ALARA: minimize time, increase distance and increase shielding. In addition, the sodium-24 will be quickly diluted at the injection equipment and further diluted upon entering main Feedwater flow path. After entering and diluting with Feedwater flow the high radiation hazard no longer exists. After the solution enters the Steam Generators, only the small amount, which is carried over in the moisture droplets, will be seen in the Turbine Building.

What additional Radiation Controls are to be implemented?

The test has been deliberately scheduled for Friday afternoon, February 6 to minimize the number of Station personnel present during test execution, and to allow Saturday and Sunday for activity decay.

The tracer is shipped in a cask that provides shielding. Upon arriving at the site, at approximately 11:00 am Feb. 6, the cask and tracer will be moved into the Unit 2 Turbine Building to a location near High Press Feedwater Heaters 27A and 27B (Elev. 426'). During test execution, this location will be posted as a high radiation area and will be fenced-off. Three additional areas in the Turbine Building will be posted as radiation areas. One is the Secondary Sample Room, the second is the Unit 2 Aux Boiler room for sample processing and the third is temporary sample area located in the Unit 2 Turbine Building (Elev. 401'), near the Mechanical Vacuum Pumps (hoggers). Only designated test and Radiation Protection personnel will be permitted to enter these areas.

Radiation levels drop off rapidly with increasing distance from the injection area. After injection, general area radiation levels in the Turbine Building are not expected to increase because of dilution and the low carryover from the steam generators. Since the remaining areas of the Turbine Building will not experience significant radiation, personnel will be permitted to enter. However, in the interest of ALARA, all personnel are asked not to enter the Turbine Building unless you have specific and necessary work. Leakage from systems must be treated as potentially contaminated and promptly reported to Radiation Protection. Radiation Protection will perform surveys during the test.

In addition, if either unit were to trip during the test, the Turbine Building may become contaminated. Therefore, all personnel would need to evacuate the Turbine Building and not re-enter until approval is given.

After the test, it is expected that the secondary systems (Feedwater, Condensate, Heater Drains, Main Steam, Extraction Steam, etc.) will contain low levels of radiation for several days. Sodium-24 has a half-life of 15 hours. Notify Radiation Protection prior to any work that will breach any of these systems on Saturday through Wednesday following the test.

In addition, a practice run or dry run is going to be performed on Wednesday afternoon, February 4. The purpose of the dry run is to verify and to finalize ALARA techniques. During the dry run demineralized water is used to simulate the radioactive tracer.

As the rules at Byron Station dictate, all personnel are required to obey any posted radiation warnings and the instructions of Radiation Protection Technicians. ALARA is not only a required principal; it is a worthwhile principal.

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