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U. S. Nuclear Regulatory Commission
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SUBMITTAL OF
STRATEGIC TEAMING AND RESOURCE SHARING (STARS)
ADDITIONAL INFORMATION ON CONTROL ROOM HABITABILITY
Docket Numbers: 50-483, 50-482, 50-498, 50-499, 50-275, 50-323, 50-445, 50-446

Reference: "Submittal of the Strategic Teaming and Resource Sharing (STARS) Engineering Report on Control Room In-leakage", AmerenUE letter to the NRC Document Control Desk, dated March 5, 2001 (ULNRC-04402)

Gentlemen:

This letter reflects additional information developed by the Strategic Teaming and Resource Sharing (STARS[1]) plants since docketing the referenced letter and is submitted for the Nuclear Regulatory Staff's consideration during the development of regulatory guides to address control room habitability issues. By the referenced letter, STARS docketed a report describing a method, for plants with designs similar to the STARS plants, that provides an adequate means of demonstrating the unfiltered in-leakage assumptions of the control room habitability calculations. This method is the Component Test Method and is endorsed in the Nuclear Energy Institute guidance document NEI 99-03, "Control Room Habitability Assessment Guidance", dated June 2001.

Testing Uncertainty

A number of plants in the industry have performed tests to measure unfiltered in-leakage into their control rooms using a tracer gas methodology described in ASTM E741, "Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution." The testing results led the STARS plants to pursue alternate methods based on the uncertainty regarding the capability of tracer gas testing to verify control room in-leakage in an economic, non-intrusive and accurate manner. One concern is the capability

[1] The STARS group consists of five plants operated by TXU Electric, AmerenUE, Wolf Creek Nuclear Operating Corporation, Pacific Gas and Electric Company and STP Nuclear Operating Company.

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of tracer gas testing to measure the unfiltered in-leakage with sufficient accuracy to be meaningful for the low-leakage control rooms that are characteristic of the STARS plants' designs. The uncertainty of the results of the tracer gas test could exceed the actual unfiltered in-leakage of the low-leakage, positive-pressure STARS plants' control rooms.

STARS commissioned a study to predict the uncertainties that could be expected in the test results by performing tracer gas testing and component testing at the STARS plants. Information from individual control room habitability self-assessments performed at each plant and the STARS engineering report on control room habitability were used as inputs to the study. The study provided an assessment of the random errors expected from the measurement process using the tracer gas method and the random errors expected from using the proposed component test methods for each of the STARS plants. A summary of the expected results is provided in the following table.

Expected Random Testing Errors

Plant	Tracer Gas Method	Component Method
Callaway	+/- 28 cfm	No components require testing
Comanche Peak	+/- 57 cfm	+/- 1.5 cfm
Diablo Canyon	+/- 148 cfm	+/- 0.5 cfm to +/- 1.4 cfm
STPNOC	+/- 141 cfm	+/- 0.13 cfm
Wolf Creek	+/- 28 cfm	No components require testing

The tracer gas method infers in-leakage by measuring the air exchange rate in the control room volume. Both the unfiltered in-leakage and the filtered outside make-up air, used to develop a positive pressure within the control room envelope with respect to adjacent spaces, contributes to the total in-leakage. Therefore, the filtered outside make-up air must be measured and subtracted from the total in-leakage measurement to determine the unfiltered in-leakage. The filtered outside make-up air typically varies from several hundred scfm to a few thousand scfm and can be measured accurately in the range of 5 to 10-percent. Hence, an accuracy of +/- 100 scfm is not unexpected for the make-up air measurement results. This accuracy is the primary contributor to the relatively large uncertainties associated with tracer gas test results performed on low-leakage, positive-pressure control rooms.

Self-assessments concluded that the STARS plants' control rooms are expected to have minimal or no unfiltered in-leakage. The expected random testing errors associated with the tracer gas method are expected to exceed the actual unfiltered in-leakage of the STARS

plants. Therefore, a test method with less uncertainty is necessary to address any result that may be inconsistent with assumptions in the accident analysis calculation. As demonstrated by the preceding table, the Component Test Method should provide the testing results with acceptable uncertainty.

Testing Results

STARS teamed-up with the Palo Verde Nuclear Generating Station in April 2001 to conduct in-leakage testing to measure unfiltered in-leakage using the Component Test Method. This was in conjunction with Palo Verde's scheduled tracer gas test performed on their Unit 2 control room. A self-assessment of control room habitability was previously performed at the Palo Verde plant using the same assessment method performed at the STARS plants. The Palo Verde self-assessment included individuals that had participated in the STARS assessments. The assessment concluded that minimal to no control room unfiltered in-leakage should be expected and that only one component (a non-control room ventilation duct penetrating the control room envelope boundary) was potentially vulnerable to contributing to unfiltered in-leakage. The testing results at Palo Verde are in the following table.

Palo Verde Test Results

Test	Results
Train "A" control room unfiltered in-leakage tracer gas test (note 1)	0 +/- 52 scfm
Train "B" control room unfiltered in-leakage tracer gas test (note 1)	0 +/- 30 scfm
Duct leak component test (note 2)	2.13 +/- 8.8 cfm "out-leakage"
Control room envelope – adjacent spaces pressure (i.e., positive pressure component test) (note 2)	~ 0.8 in. w.g.

Note 1: Each train tracer gas test is independent of the other.
Note 2: Both tests required to complete the Component Test Method

Both the component test method and the tracer gas test method (if the uncertainty of the results can be neglected) indicate that the Palo Verde control room does not have any unfiltered in-leakage. However, the results from the tracer gas method have a considerably larger uncertainty that requires further evaluation of the impact that the uncertainty has on the overall dose assessment to the control room operator.

Long Term Actions

STARS plans to test the Comanche Peak plant control room for measurement of unfiltered in-leakage in late 2001 or early 2002 using both the tracer gas and component test methods. Comanche Peak was selected because their self-assessment identified a larger number of diverse components as vulnerable to unfiltered in-leakage than that tested at the Palo Verde plant. It is expected that the Component Test Method performed at Comanche Peak will demonstrate that their control room has minimal to no in-leakage. It is also expected that the tracer gas test results will validate the component test results if the uncertainty associated with the tracer gas test can be neglected.

It is expected that the Palo Verde and Comanche Peak test results will demonstrate that the Component Test Method is a valid method for performing control room in-leakage baseline testing. The remaining STARS plants plan to perform control room in-leakage measurements using the Component Test Method to provide the basis for the unfiltered in-leakage assumptions of the control room habitability calculations. The STARS plants also plan to establish a long-term control room habitability maintenance program based on the guidelines of NEI 99-03. These actions should provide an acceptable approach for maintaining control room integrity.

Sincerely,

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