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John A. Scalice
Site Vice President, Watts Bar Nuclear Plant

JAN 22 1996

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555
Attention: Mr. S. D. Ebneter

Dear Mr. Ebneter:

In the Matter of the) Docket Nos. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - RADIATION MONITORING SYSTEM ASSESSMENT

By letter dated January 12, 1996, NRC requested additional information concerning the operational readiness for operation of WBN's Radiation Monitoring System (RMS). As a result of that request TVA conducted an additional review which integrated RMS corrective actions related to construction findings, preoperational test results, and issues associated with current operational experience (i.e., since system turnover to Operations).

The conclusion from this review is that the RMS, in its entirety, meets regulatory requirements and TVA commitments. Further, it was concluded that the plant staff has the knowledge, training, and experience to operate and maintain the RMS at a high level of reliability. Considering these factors, TVA has concluded that the RMS is ready to support full power operation of Unit 1.

Enclosure 1 to this letter is an executive summary which provides the bases for the conclusions stated above. Enclosures 2 through 10 contain detailed discussions of the areas reviewed and the results obtained which support our conclusions.

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If you have any questions, please contact me at (423) 365-8767.

Sincerely,

John A. Scalice

Enclosures
cc (Enclosures):
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Enclosure 1
Watts Bar Nuclear Plant (WBN) Unit 1
Radiation Monitoring System Assessment

Executive Summary

This report responds to NRC's letter dated January 12, 1996, which requested that TVA document an assessment of the WBN Radiation Monitoring System (RMS). Specifically, NRC's letter requested TVA to integrate all of the corrective actions related to construction findings, preoperational test results, and issues with current operational experience into a final assessment which addresses readiness of the RMS, in its entirety, to meet regulatory requirements and TVA commitments, and to support full power operation of Unit 1.

The enclosures to this letter provide a description of TVA's reviews to respond to NRC's request. A summary of the findings of each enclosure is provided below:

Radiation Monitoring Special Program (RMSP) (Enclosure 2)

The RMSP was a specific activity described in WBN's Nuclear Performance Plan. The Special Program reviewed the system to ensure the design and construction were in accordance with TVA's commitments and regulatory requirements, and that identified deficiencies and work activities were correctly completed.

The RMSP and other reviews concluded that the RMS sample line bend radii are designed and installed in accordance with defined requirements, and have been analyzed to ensure the adequacy of the design and installation.

Appropriate materials were used in the sample lines. Copper was not utilized.

Since closure of the RMSP, no deficiencies similar to those which gave rise to the RMSP have been discovered. Post closure deficiencies identified can clearly be considered routine maintenance or system enhancements. Considering these results and the scope of the work associated with the RMSP, TVA has a high degree of confidence that the system is ready to support WBN Unit 1 operation.

Commitments and Regulatory Requirements (Enclosure 3)

The actions implemented under the RMSP discussed above, the Design Baseline and Verification program (DBVP) Corrective Action Plan (CAP) for configuration control, and the current change control processes, provide confidence that the RMS drawings (including outstanding change paper) are current, conform to the design basis requirements, and represent the installed configuration of the system.

The licensing commitments which impacted the RMS are well defined, have been appropriately implemented, and documentation of the implementation has been made available to NRC. Key programs such as the DBVP CAP, the Program for Assurance of Completion and Assurance of Quality (PAC/AQ), and the engineering assessment addressed in Enclosure 5, further assessed commitments and design requirements from the Final Safety Analysis Report (FSAR) and Safety Evaluation Report (SER). The engineering assessment also reviewed and documented conformance to key regulatory and industry guidance documents. Programs such as the Nuclear Experience Review program and the TVA Corrective Action Program have also been adequately implemented to ensure that reviews of issues identified both inside and outside of TVA which may impact the WBN RMS, are performed as necessary. In view of these considerations, there is ample basis for determining that the RMS is consistent with TVA commitments and regulatory requirements.

Quality Assurance Assessment (Enclosure 4)

Based upon numerous verification activities, Nuclear Assurance concluded that the RMSP was adequately implemented prior to fuel load. Subsequently, Nuclear Assurance performed an additional assessment that evaluated the adequacy of the trending of radiation monitoring equipment problems, the additional training provided to operations, and the knowledge level of Instrument and Control (I&C) Maintenance technicians. This assessment concluded that I&C Maintenance technicians possess adequate knowledge to maintain radiation monitors, adequate training has been provided to operations, and that evaluations of recent radiation monitor problems were adequate.

RMS Engineering Assessment (Enclosure 5)

Between November 1994 and March 1995, an experienced engineering team (TVA and contractor) conducted an engineering assessment of the RMS to determine the ability of the system to perform its intended function, to meet regulatory requirements, and to correct identified inconsistencies or problems. The engineering assessment team report concluded that the RMS is adequate, is consistent with typical installations in the nuclear power industry, and will perform the required functions. The RMS installation is adequate to perform the radiation monitoring and control functions for effluents, processes and areas required by GDC 19, 30, and 60 of 10 CFR Part 50 Appendix A, and to meet the radioactivity release and exposure limits of 10 CFR Part 20.

On an individual monitor basis, the engineering assessment concluded that the system installed at Watts Bar provides similar monitoring performance when compared to systems at other nuclear plants. Based upon a field inspection, the assessment concluded that the RMS configuration is consistent with the vendor's requirements, and incorporates standard industry practices in the construction of the sample flow paths.

Isokinetic sampling of effluent paths is adequately provided.

Monitor calibration and setpoint bases are also consistent with design basis documents. The required ranges, accuracies, response times, and safety limits are determined by calculation and are based on regulatory requirements as reflected in the FSAR, Technical Specifications, and system design criteria.

Because the equipment used for the system is similar to that found in many nuclear plants, the system is expected to have a reliability that is similar to that of other operating plants.

No issues have arisen since the closeout of the corrective action documents associated with the assessment report that call into question the validity of the report or its conclusions. Accordingly, no issues have been identified that would prevent the RMS from fully supporting operation of Unit 1.

Preoperational Test Results and Deficiencies (Enclosure 6)

The Preoperational Test program successfully demonstrated the capability of the RMS to perform its intended function and meet design and regulatory requirements. Deficiencies identified during testing have been resolved.

System Preoperability Acceptance Evaluation (SPAE) (Enclosure 7)

Based on reviews of the final SPAE II package, current outstanding design changes, and other tracking items identified subsequent to SPAE II, the conclusions in the SPAE II package regarding completion of engineering activities remain valid. New items identified subsequent to SPAE II were minor documentation changes which do not affect system turnover and operation, or were problems identified as part of the normal process of bringing the equipment to full operational status. Based on the results of these reviews, it is TVA's conclusion that the RMS will support operation of Unit 1.

System Preoperability Checklist (SPOC) (Enclosure 8)

Design and construction work were completed as required and tracking items for the system were reviewed to ensure the system was in good material condition for turnover to the operating staff. As discussed in Enclosure 6, preoperational testing was completed and testing deficiencies were resolved. Therefore, no special operating conditions required by Plant Administrative Instruction (PAI) 5.01, "System Preoperability Checklist," were established at the completion of the SPOC turnover of the system.

Enhanced Training on the RMS (Enclosure 9)

TVA agreed prior to fuel load that enhancement training on system operation could help plant personnel better operate and maintain the system. Qualification Cards were developed or updated as necessary to focus on operation and maintenance of the RMS and the computer systems.

System Operating History (Enclosure 10)

Site management has been closely monitoring RMS availability. The monitoring and trending data indicates that the system is performing well. The cumulative average availability of the individual monitors since fuel load is over 95 percent. Availability of spare parts has not been a problem.

Overall Conclusion Based on Areas Reviewed

The conclusion from this review is that the RMS, in its entirety, meets regulatory requirements and TVA commitments. Further, it was concluded that the plant staff has the knowledge, training, and experience to operate and maintain the RMS at a high level of reliability. Considering these factors, it is TVA's conclusion that the RMS is ready to support full power operation of Unit 1.

Enclosure 2

Radiation Monitoring Special Program Closure

Documented in Nuclear Performance Plan (NPP) Volume 4, was a commitment to implement a Radiation Monitoring Special Program (RMSP). The primary objective of this program was to establish the design basis for the system and implement required modifications to correct design or documentation deficiencies. The primary recurrence control for the deficiencies was issuance of an updated design criteria document. The scope of the RMSP and the actions taken were documented in a TVA closure report for the program dated September 22, 1995. TVA compiled detailed documentation of RMSP activities in a series of "closure books" for the program. The documentation in the closure books outlined key documents discussing the system and addressing each deficiency identified by either TVA or NRC. Through this method, a historical overview of the system was compiled. Each of these documents was made available onsite to NRC resident inspectors and to the Region II staff inspectors.

In preparation for establishing the current status of the system, Nuclear Engineering personnel reviewed the RMSP Closure Report to confirm that the conclusions of the report remained valid. Based on this review, it was confirmed that no issues have arisen since the approval of the report that would call into question the validity of the report or the acceptability of the system. At the time the closure report was issued, the RMSP was approximately 90 percent complete. In accordance with the established process, a specific punchlist of remaining items was included. TVA's letter to NRC dated November 1, 1995, attested to the overall completion of the project, including punchlisted activities, and defined the basis for closure of the issues open at the time the closure report was approved.

Since closure of the RMSP, ten Design Change Notices (DCNs) have been initiated. The open DCNs pertain to monitors which are required to meet Technical Specification, Offsite Dose Calculation Manual (ODCM), or Regulatory Guide (R.G.) 1.97 commitments. However, none of the ten design changes affect compliance of the system with regulatory requirements, commitments, or the design basis documents. These ten DCNs are for correction of minor engineering documentation discrepancies and also involve correction of electronic or circuit noise problems discovered during integrated system testing. Resolution of the noise problems is considered a routine action because noise problems could not be identified and corrected until the radiation monitors were operated in conjunction with other nearby plant equipment. Accordingly, the need for these types of corrections was anticipated.

Six items have been entered into the Tracking and Reporting of Open Items (TROI) system since closure of the RMSP. Currently five items of this group are open. They are minor equipment use deficiencies or maintenance items. A Problem Evaluation Report (PER) was written to document difficulties encountered in taking a grab sample through the normal grab sample path. However, this PER does not affect the operation of the permanently installed equipment because there are alternate connections which can be used to obtain the grab sample.

NRC's final review of the RMSP was documented in Inspection Report 390/95-65. One key element of that report involved the resolution of Construction Deficiency Report (CDR) 390/86-49, "Discrepancies Affecting Radiation Monitoring System." TVA's letter to NRC dated June 29, 1994, submitted the revised final report for CDR 390/86-49. TVA compiled the documentation necessary to resolve the CDR and made it available to NRC inspectors during Inspection 390/95-65. The CDR was closed by NRC in Inspection Report 390/95-65. Since closure of the CDR, no problems similar in nature have occurred.

Another key item that was dispositioned through the RMSP was NRC open item 390/94-56-01. This item contained two examples where the system did not meet design criteria requirements. The first example involved the installation of a high particle loss fitting (a tee) in a particulate/iodine sampling line. The second example identified that the main steam line monitor low range channels were credited for part of the required Regulatory Guide 1.97 range without meeting normal operating environmental conditions.

TVA's letter to NRC dated November 9, 1994, responded to the open item. In resolving the sample line example, action was taken to ensure that RMS lines are installed in accordance with the requirements of WB-DC-40-24, "Design Criteria for Radiation Monitoring System." One requirement of the Design Criteria is that long radius bends, five times the diameter or greater, be used. When such bends are not installed the DC requires that the effects on the sample be evaluated. This is consistent with both NRC guidance and industry practice. The sample lines were walked down and the configuration documented in walkdown reports. These walkdown reports were used in development of calculation WBNTSR-060 that determined particle deposition and iodine plate-out in the sample lines. Calculation WBNTSR-060 accounts for the limited number of short radius fittings used and that the use of those fittings does not compromise the acceptability of the sample.

As a part of the engineering assessment discussed in Enclosure 5, calculation WBNTSR-060 was revised to provide a more rigorous treatment of particle deposition and iodine plate-out in the sample lines. Experimental work provides the basis for the methodology used in the preparation of this analysis. The equations and methodology reflect

the latest theoretical methods. The computer code is based on, but is an upgrade to, the methodology found in the NRC sponsored DEPOSITION code (NUREG/GR-006) and the TRAP-MELT2 code (NUREG/CR-4677). Additionally, the development of the methodology relied heavily on NUREG/CR-5252, "Aerosol Sampling and Transport Efficiency Calculation (ASTEC) and Application to SURTESEY/DCH Aerosol Sampling System." The basic methodology was used in licensing efforts for six nuclear plants including several newer facilities. The plate-out analysis for WBN is empirically based, uses NRC developed methodologies, and represents the state-of-the-art in the nuclear industry. These efforts also established that appropriate materials were used in the sample lines and materials such as copper were not utilized in any manner. Thus it is concluded that the RMS sample line bend radii are designed and installed in accordance with defined requirements, and have been rigorously analyzed to ensure the adequacy of the design and installation.

As with CDR 390/86-49, TVA made available a documentation package for the actions implemented in response to the open item to NRC during Inspection 390/95-65. NRC's review during the inspection concluded that appropriate action had been taken and the issue was closed. Since closure of the item, no problems similar in nature have occurred.

Inspection Report 390/95-65 also included reviews of responses by TVA to weaknesses identified as part of Inspection Report 390/94-56. These included evaluation/correction of area and particulate monitor location, response to area monitor setpoint concerns, and revision of the particle transmission factor calculation to provide adequate loss factors. All issues were considered resolved.

Two actions have also been completed. First, TVA initiated a thorough review of the RMS to verify its compliance with requirements and commitments and to confirm its ability to perform its intended function based on the system configuration. The results of that review are discussed in Enclosure 5. Secondly, TVA has implemented a new procedure to strengthen the control and operation of the RMS, PAI-5.04, "Installed Radiation Monitoring Program."

TVA's letter to NRC dated November 1, 1995, provided notification that the RMSP was complete and that the objectives of the program had been met. Since closure of the RMSP, no deficiencies similar to those which gave rise to the RMSP have been discovered. Considering these results and the scope of the work associated with the RMSP, TVA has a high degree of confidence that the system is ready to support WBN Unit 1 operation.

Enclosure 3
Commitments and Regulatory Requirements
Associated with the RMS

REGULATORY COMMITMENT COMPLIANCE

The Engineering Assessment Review Team (discussed in Enclosure 5) reviewed requirements for the RMS contained in the FSAR and the SER. The following criteria were used during the assessment of the RMS:

- The capability of the system to perform the functions required by its design basis.
- The consistency of the design criteria requirements with the regulatory commitments (primarily requirements from the FSAR and SER) for the system.
- The consistency of design criteria requirements with industry recommendations and practice (i.e., Regulatory Guides, ANSI Standards).
- The completeness of design documentation that shows conformance with the design criteria and regulatory requirements.
- The consistency of the installed system with the design basis and industry practice (i.e., Regulatory Guides, ANSI Standards).

The Engineering Assessment Review Team was also tasked with revising the design criteria, FSAR, or design documents as necessary to correct inconsistencies and bring the descriptions of the system into conformance with NRC regulations and industry practice. The initial phase of this evaluation was to develop a matrix that listed important attributes for the system on a monitor by monitor basis as defined in the WBN Design Criteria WB-DC-40-24, Revision 3, "Radiation Monitoring," and the requirements provided in the WBN FSAR, SERs, and other licensing documents. The Appendices of the assessment provide detailed information on individual monitors and the conformance to requirements from the FSAR and SER. The engineering assessment report was made available to NRC during Inspection 390/95-65.

The engineering assessment examined conformance with the following industry standards and Regulatory Guides:

Regulatory Document	Basis for Conformance
RG 1.45, Rev. 0	FSAR Section 5.2.7 - RCPB Leakage Detection Systems
RG 1.21, Rev. 1 (1974)	FSAR Section 2.3.3.2 - Operational Meteorological Program FSAR Section 11.4 - Process & Effluent Radiation Monitoring Sampling Systems Watts Bar ODCM
RG 1.97, Rev. 2	FSAR Chapter 7, Instrumentation and Controls FSAR Section 11.4.2.2.7, Main Steam Line Radiation Monitors FSAR Section 12.3.4.1.2.1 - Area Monitor Detector
RG 4.15, Rev. 1	Not discussed in FSAR or other regulatory documents
ANSI N13.1 - 1969	Refer to RG 1.21, Rev 1 (Above)
ANSI N13.10 - 1974	Not discussed in FSAR or other regulatory documents

OTHER ISSUES

The RMS-related compliance commitments are found, for the most part, in the NPP, Volume 4, the corrective actions related to resolution of CDR 390/86-49 and Violation 390/94-56-01, and actions defined regarding NUREG 0737 items. A summary of TVA commitments was made available to NRC inspectors as part of the "Closure Books" for the RMSP. The development of the Closure Books as part of the RMSP is discussed in Enclosure 2. Each of these commitments has been reviewed in detail by both TVA and NRC; documentation packages were developed by TVA and made available to NRC inspectors for closure of the issues.

The DBVP CAP upgraded drawing configuration control and site change control processes. Additionally, sample line and equipment walkdowns for the RMS resolved discrepancies between drawings and the installed configuration of the system.

TVA Nuclear Experience Review (NER) program and Corrective Action Program provide added assurance that relevant issues which may impact the RMS are adequately assessed. An example of an issue which resulted in changes in the design of the RMS was Sequoyah Licensee

Event Report (LER) 327/92-019. This deficiency concerned certain technical specification radiation monitors which could have had their setpoints calculated in a nonconservative manner. Watts Bar's review of the corrective action document for this LER was initiated under the NER program. During this review process, it was identified that the LER identified a problem similar to that defined in IE Notice 82-49, "Correction for Sample Conditions for Air and Gas Monitoring." The actions initiated to address the issues of IE Notice 82-49 included a revision of WBN Design Criteria to consider pressure and temperature effects on sample flow rates which will be included in establishing setpoints and scaling requirements; installation of radiation monitoring equipment with pressure/temperature correction capability; issuance of setpoint and scaling documents with appropriate pressure/temperature corrections; and inclusion of pressure corrections in calibration procedures.

CONCLUSION

In summary, the licensing commitments which impacted the RMS are well defined, and have been appropriately implemented. Key programs such as the engineering assessment addressed in Enclosure 5, the DBVP CAP, and PAC/AQ, further assessed commitments and design requirements from the FSAR and SER. The engineering assessment also reviewed and documented conformance to key regulatory and industry guidance documents. Programs have been adequately implemented to ensure that reviews of issues identified both inside and outside of TVA which may impact the WBN RMS are performed as necessary. For these reasons, compliance of the RMS with commitments and regulatory requirements has been adequately demonstrated.

Enclosure 4
Quality Assurance Assessment of the RMSP

The closure verification activities associated with the RMSP performed by TVA's Nuclear Assurance organization included an extensive 75 percent milestone assessment, an interim 100 percent milestone assessment that evaluated two completed radiation monitors, and a final assessment that addressed the deficiencies and follow-up items from the 75 percent assessment plus additional attributes associated with assurance of program completion.

The 75 percent assessment verified that corrective action implementation was consistent and technically acceptable to achieve the objectives detailed in the NPP, Volume 4. This assessment examined completed records, design activities, modification activities, and the completeness of commitments and corrective action documents. The scope covered subsystems 90B, ODCM liquid monitors, 90I, Main Steam monitor and Steam Generator Blowdown monitor, and addressed eight of the 16 radiation monitors required by technical specifications. Several design and modification actions remained open with subsystem 90B and 90I monitors that required further follow-up. The eight technical specification monitors were found to meet RMSP requirements. The subsequent interim assessment and final assessment concluded that the design and modification activities were satisfactorily completed and the follow-up items from the 75 percent assessment were addressed. Also, during the final assessment, several calibrations and functional performance activities were evaluated by Nuclear Assurance and were determined to be adequate.

Based upon these verification activities, Nuclear Assurance concluded that the RMSP was adequately implemented. Subsequent to this determination, Nuclear Assurance performed an additional assessment that evaluated the adequacy of the trending of radiation monitoring equipment problems, the additional training provided to operations, and the knowledge level of I&C Maintenance technicians. Assessment NA-WB-96-0001 concluded that I&C Maintenance technicians possess adequate knowledge to maintain radiation monitors, adequate training has been provided to operations, and that evaluations of recent radiation monitor problems were adequate.

Enclosure 5

RMS Engineering Assessment

As the design and modifications of the RMS were being finalized, TVA initiated an engineering assessment of the system. This effort was performed between November 1994 and March 1995 by a team of individuals with nuclear engineering and instrumentation controls experience from Stone and Webster Engineering Corporation, Bechtel Power Corporation, Raytheon Engineers and Constructors, Spectrum Technologies Services Incorporated, and TVA. The purpose of the activity was to assess the RMS's ability to:

- Perform its intended functions,
- Meet regulatory requirements, and
- Correct identified inconsistencies or problems.

The team reviewed design criteria requirements, licensing commitments, design information from drawings, calculations, vendor manuals, EMS, and other similar sources of information in performing the assessment of the system. Field inspections were conducted to assess the overall condition of the equipment, identify configuration problems as compared to the documents reviewed and to make comparisons with similar installations found at other utilities.

The assessment report was issued in April 1995 and identified 20 open items, 58 team items, and number of observations. The open items were added as specific corrective actions in a PER to document and track resolution of the conditions. Each of the 20 open items and the 58 team items have been corrected and are closed. The 58 team items were issues for which it was determined that the Radiation Monitoring System Design Criteria, FSAR sections on radiation monitoring, or calculations needed to be revised to correct inconsistencies, errors, or provide clarification. The 58 team items were addressed by revisions to the design criteria, FSAR, or calculations. These actions were completed prior to NRC Inspection 390/95-65. The observations did not require action by TVA.

A field inspection of the equipment was conducted while substantial work on the monitors was ongoing. The field inspection items identified were subject to open DCNs or were items that were in the scope of the start-up program. Subsequent completion of the system, start-up and preoperational testing, and completion of the SPAE/SPOC process showed that the system was operational and the observations had been resolved.

The assessment concluded that the RMS at WBN Unit 1 is adequate, is consistent with typical installations in the nuclear power industry, and will perform the required functions. It was concluded that the RMS installation is adequate to perform the radiation monitoring and control functions for effluents, processes and areas required by GDC 19, 30, and 60 of 10 CFR Part 50 Appendix A, and to meet the radioactivity release and exposure limits of 10 CFR Part 20. In accordance with the requirements of GDC 63, the fuel pool area is monitored and appropriate safety actions can be initiated. The system is capable of performing the post accident monitoring function required by GDC 64.

On an individual monitor basis, the assessment concluded that the system installed at Watts Bar provides similar monitoring performance and additional redundancy when compared to systems at other nuclear plants. Based upon a field inspection, the assessment concluded that the RMS configuration is consistent with the vendor's requirements, and incorporates standard industry practices in the construction of the sample flow paths.

Because the equipment used in the WBN RMS is similar to that found in many nuclear plants, the system is expected to have a reliability that is similar to that of other operating plants. Portions of the system were upgraded to provide improved performance. The Shield Building vent, which is the post-accident gaseous effluent path, and containment purge vent path during normal operation, is monitored by a state-of-the-art digital monitor and flow control system. The flow control systems on the Auxiliary Building vent and the Service Building vent were upgraded to digital systems. The monitors for the main steam line are also state-of-the-art digital equipment.

No issues have arisen since the close-out of the corrective action documents associated with the assessment report that call into question the validity of the report or its conclusions, or would prevent the RMS from supporting operation of Unit 1.

OTHER ENGINEERING ISSUES

Isokinetic

Four effluent paths are provided with isokinetic sampling capability. These are the Auxiliary Building vent, the Service Building vent, the Shield Building vent and the condenser vacuum exhaust. The three building exhaust vent paths are provided with multi-nozzle probes and automatic flow control on the sample flow rate to provide an isokinetic sample. The condenser vacuum exhaust has a two-nozzle probe and the sample flow is set manually. The probe assemblies were procured specifically to provide isokinetic sampling capability over the expected range of flows for each effluent path in accordance with the recommendations of ANSI N13.1-1969. TVA reviewed the documentation provided by the vendors and confirmed that the nozzle sizes provided do provide isokinetic velocities for the sample flow rate ranges. The probe assemblies meet or exceed ANSI N13.1-1969

recommendations on the number of nozzles required for a given size duct or pipe. The large duct assemblies for the Shield Building, Service Building, and Auxiliary Building vents were checked and the flow regime is well into the turbulent range. As discussed in section A.3.3.2 of the ANSI Standard, turbulent flow provides a reasonably uniform velocity profile across the duct. Thus, isokinetic sampling of these effluent paths is adequately provided. As stated previously, TVA replaced the sample flow controls on the three plant vent stacks with digital equipment to assure that the samples would be isokinetic.

Monitor Calibration and Setpoints

In addition to the above, another area of design activity included the confirmation that monitor calibration and setpoint bases were consistent with design basis documents. The required ranges, accuracies, response times, and safety limits for the WBN radiation monitors are determined in the Required Range and Accuracy calculations. These requirements are based primarily on 10 CFR 20, 10 CFR 50, 10 CFR 100, RG 1.97, and RG 1.45. The requirements are reflected in the FSAR, Technical Specifications (TSs), and system design criteria, to assure that conformance is maintained.

Setpoints for radiation monitors are established in the following manner: For TS, RG 1.97, and compliance monitoring loops, required range, and accuracy calculations are prepared to capture the regulatory requirements. Range, accuracy, response time, and setpoints are established by demonstrated accuracy calculations or calculations issued as part of the setpoint and scaling documents (SSD's). Some setpoints are based on expected normal background or excursion levels. Most setpoints for effluent releases are based on grab samples and 10 CFR 20 release limits.

For non-compliance monitors, engineering produces at least one SSD for each type of monitor loop. TVA determines some area and particulate monitor setpoints based on ALARA considerations and background surveys.

The Technical Support organization issues site SSDs based on NE SSDs. For those monitors which did not require an NE SSD, Technical Support based site SSDs on equivalent loops for which an NE SSD had been issued. Technical Support and/or Maintenance issue calibration instructions in the form of Instrument Maintenance Instructions (IMIs), Surveillance Instructions (SIs), and Offsite Dose Instructions (ODIs). These calibration instructions invoke the site SSDs for calibration of the monitor loops and loop components. Recent reviews of Maintenance-related procedures have determined the procedures to be in compliance with the NE SSD or the procedure utilizes a more conservative site SSD. Calibration methodology is based on manufacturer recommended procedures, TVA standard practices, and specific equipment configuration.

From the above review, TVA concludes that the monitors will provide indication and alarm, and perform automatic actuation functions in accordance with design basis requirements.

Enclosure 6
Preoperational Test Results and Deficiencies

The preoperational tests of the RMS were performed between April 12, 1994, and October 22, 1995. This testing was comprised of three specific tests which covered the RMS. The testing was performed utilizing plant equipment under normal and simulated conditions as follows:

1. Preoperational Test Instruction (PTI) 90-01 tested area, liquid process and gaseous process radiation monitors. This test performed an operational verification after the component testing and calibrations had been completed for each applicable monitor. This test began on June 19, 1995, and was completed on October 18, 1995. Test Deficiency Notices (TDNs) written during performance of the PTI were minor in nature and were closed prior to completion of the test. The results of the test were approved on October 30, 1995.

2. PTI-90-02 tested the particulate, iodine and gas monitors, the continuous air monitors, and the vent gaseous monitors. This test utilized approved plant instructions to perform calibration and operational testing of each applicable monitor. Testing for this PTI was performed between October 3, 1995, and October 22, 1995. TDNs written during performance of the test were minor in nature and were closed prior to completion of the test with the exception of post-calibration verification of Maintenance and Test Equipment (M&TE) which was transferred to the Test Review Group and was subsequently closed. The results of the test were approved on November 3, 1995.

3. PTI-90-09 tested the process radiation monitoring system during hot functional testing. This test performed an operational verification after the component testing and calibrations had been completed for each applicable monitor. Testing for this PTI was started on May 12, 1994, and was completed on December 5, 1994. TDNs written during performance of the test were minor in nature and were closed prior to completion of the test with the exception of loop 1-RE-90-120, which was successfully closed during the second hot functional test. The results of the test were approved on January 11, 1995.

Modifications to the main steam line radiation monitors were performed to delete the low range detectors. These modifications were verified and the monitors calibrated utilizing approved plant instructions and Work Orders. An additional test was requested by NRC and was successfully performed on one of the main steam line monitors. This test was to verify the lowest scale of the monitor using a radiological source

In summary, the Preoperational Test program successfully demonstrated the capability of the RMS to perform its intended function and meet design and regulatory requirements.

Enclosure 7
System Preoperability Acceptance Evaluation

The final System Preoperability Acceptance Evaluation (SPAE) II package for System 90 was issued on October 24, 1995, and certified that engineering activities had been completed and documentation closed or partially closed as indicated in the Master Tracking System (MTS) Report attached to the SPAE package. Punchlist items for previous System 90 SPAE I packages were tracked by the MTS. Consequently, the final SPAE II package addressed previous punchlisted items. The final SPAE II package and additional DCNs and TROI items (SCARS, PERs, etc.) issued subsequent to the SPAE II package were reviewed by Nuclear Engineering personnel. This effort established that the conclusions in the SPAE II package regarding completion of engineering activities remain valid.

The SPAE II MTS report has been reviewed and items have been confirmed closed except for Nuclear Experience Review item SQN II-S-92-025. This item involves an issue identified at TVA's Sequoyah Nuclear Plant regarding the initiation of a containment ventilation isolation during post-maintenance testing. Final closure of this item is dependent on evaluation of WBN experience following initial power operation.

Subsequent to issue of the System 90 SPAE II package, ten Design Change Notices (DCNs) have been initiated. The open DCNs pertain to monitors which are required to meet Technical Specification, Offsite Dose Calculation Manual (ODCM), or Regulatory Guide (R.G.) 1.97 commitments. However, none of the ten design changes affect compliance of the system with regulatory requirements, commitments, or the design basis documents. These ten DCNs are for correction of minor engineering documentation discrepancies and also involve correction of electronic or circuit noise problems discovered during integrated system testing. Resolution of the noise problems is considered a routine action because noise problems could not be identified and corrected until the radiation monitors were operated in conjunction with other nearby plant equipment. Accordingly, the need for these types of corrections was anticipated.

Based on review of the final SPAE II package, current outstanding DCNs, and TROI items identified subsequent to SPAE II, the conclusions in the SPAE II package relative to completion of engineering activities remain valid. New items identified subsequent to SPAE II involve minor documentation changes which do not affect system turnover and operation, or were problems identified as part of the normal process of bringing the equipment to full operational status. Therefore, based on the results of these reviews, TVA concludes that the RMS will adequately support operation of Unit 1.

Enclosure 8
System Preoperability Checklist

Plant Administrative Instruction (PAI) 5.01, "System Preoperability Checklist (SPOC)," was the process used by TVA to ensure construction and testing were completed successfully and that the system was ready to be accepted by the plant staff for operations. Included in the turnover process was a system walkdown to ensure the system was in good material condition. The process did allow for a limited number of exceptions for open items not complete at turnover.

Seven hardware issues affecting equipment operability were accepted with approved exceptions at the time of system turnover. These items included:

1. Potential leaks in sample lines or monitor tubing for Service and Auxiliary Building ventilation monitors.

2. Faulty ratemeter on the waste disposal monitor.

3. Failed flow alarm relay on the Turbine Building Sump monitor.

4. Low flow condition on hot sample room air particulate monitor.

5. Filter fail alarm on waste packaging room air particulate monitor, possibly caused by filter feed failure.

6. Pump or sample control solenoid failure on Unit 2 Shield Building Ventilation monitor.

7. Failed checksource mechanism on condenser vacuum exhaust mid/high range monitor.

Corrective maintenance for these items has been completed since SPOC turnover.

One work request was accepted which tracked ten SPOC walkdown discrepancies, none of which were determined to be operability restraints or fuel load requirements. The discrepancies were minor items such as missing screws, tags, clamps, damaged face plates, a jammed recorder paper drive, and missing conduit ground straps. These discrepancies were corrected in the field as of January 9, 1996.

As discussed in Enclosure 6, preoperational testing was completed with all testing deficiencies resolved. Therefore, no special operating conditions required by PAI 5.01 were established at the completion of the SPOC turnover of the system.

Enclosure 9
Enhanced Training on the RMS

Inspection Report 390/95-74 included an Inspector Follow-up Item (IFI) 390/95-74-01, regarding additional training planned for Operations, Radcon, Chemistry, and Maintenance staffs. This IFI had five parts:

1. Train Operations personnel on the Radiation Monitoring System.

2. Train Radcon personnel on the Radiation Monitoring System.

3. Train Chemistry personnel on the Radiation Monitoring System.

4. Train Maintenance personnel on the Radiation Monitoring System.

5. Provide training on the Emergency Response Facility Data System (ERFDS) and plant computer systems.

Qualification Cards were developed or updated as necessary to focus on operation and maintenance of the RMS and the computer systems. The required training for each of the above items has been completed for sufficient personnel on shift or in the plant departments to support system operation. Specific issues raised by the NRC Site Resident Inspectors during their review of the implementation of the training have been addressed. TVA has been notified by NRC that closure of the IFI will be documented in Inspection Report 390/95-80.

Another activity initiated by TVA is a Radiation Monitor response review. This effort involves key personnel from Operations, Chemistry, Radiation Control, Maintenance, and Technical Support. The principal purpose for this review is to provide additional confidence that the Alarm Response Instructions contain sufficient guidance in response to alarming monitors.

Enclosure 10
System Operating History
Since Turnover to Operations

WBN management has been closely monitoring the performance and availability of the RMS. For example, the individual Work Orders for the system have been separately listed in the daily "Plan of the Day" report and reviewed at the morning management meeting.

Data has been collected which reflects maintenance activities initiated from November 9, 1995, to January 17, 1996. This data is based on the time period in which a work order was identified for a radiation monitor. Each work order was evaluated to determine the functional impact on the Radiation Monitor and to determine the cumulative average availability of the monitor. Throughout the period the data has been collected for the system, the general indication has been that the system was experiencing a routine number of work items and monitors being placed out-of-service for repairs. A series of tables and charts have been developed to illustrate the maintenance activities for the RMS. These tables and charts have been made available to NRC Inspectors.

The cumulative availability of the individual monitors in the RMS is as follows:

Total - RMS	95.44%
Technical Specification Monitors	96.87%
Offsite Dose Calculation Manual Monitors	93.40%

The above data indicates that cumulative functional availability of the individual monitors is high. There is no indication, based on available data, that an abnormal number of monitor failures would be expected. In addition, availability of spare parts has not been a problem.