ATTACHMENT 2

IRN TREND REPORTS

MARCH-SEPTEMBER 1983 - WATTS BAR

	March	April	May	June	July	August	Sept	Totals
Weld	3/6388	4/8407	8/6039	12/8260	1/9505	9/8305	0/7473	37/54377
HGR	29/2650	17/1997	7/1849	8/1555	6/2904	20/4454	2/3806	89/19215
Civil A	4/8963	2/9609	6/8483	0/7038	1/18,113	2/10,698	4/8180	19/71,084
Civil B	5/4234	0/4824	1/5746	0/7476	0/9698	0/9947	1/9992	7/51,917
							TOTAL	152/196,593
Mech	50/1342	20/767	5/349	43/1278	98/645	63/626	79/744	358/5751
Elec	30/1009	133/2108	108/1611	90/1486	134/1330	208/1373	248/2357	951/11,274
Inst	58/1338	99/1722	95/2027	27/1004	46/835	54/677	91/901	470/8504
Matl Svc	15/348	15/442	9/344	11/392	5/328	13/393	22/584	90/2831
							TOTAL	1869/28,360

(IRNs Written/Inspections Performed)

ATTACHMENT 3

TREND ANALYSIS REPORTS

SEMI-ANNUAL - NCRs - WATTS BAR

	Jan-June 1980	July-Dec 1980	Jan-June 1981	July-Dec 1981	Jan-June 1982	July-Dec 1982	Jan-June 1983
Mech	100	152	221	248	121	110	99
Weld	76	116	33	23	17	14	60
Hgr				44	51	49	55
Elec	24	36	44	40	22	36	25
Civil	15	17	32	75	35	32	47
Inst	11	8	17	36	32	23	14
R&S	39	27	15	NR	NR	0	9
Doc	156	106	153	NR	NR	0	3
Totals	421	462	515	466	278	264	312

NR - Not Reported

ATTACHMENT 4

WATTS BAR TREND ANALYSIS

SIGNIFICANT AND REPORTABLE ITEMS

	1980, Quarters				1980	1981, Quarters				1981	1982, Quarters				1982	1983, Quarters		
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3
I NCR	21	6	8	17	52	17	6	8	14	45	11	15	8	15	49	11	4	5
II 5055E	17	3	5	7	32	8	12	10	3	33	5	6	5	31	47	3	0	2
III NCR	2	3	10	7	22	8	0	0	0	8	0	4	0	0	4	0	0	0
IV Audit	1	1	0	3	5	9	1	1	5	16	1	6	5	2	14	0	0	0
V Pt 21	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0

AUDIT ITEMS

	1980, Quarters				1980	1981, Quarters				1981	1982, Quarters				1982	1983, Quarters		
	1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total	1	2	3
I CQA	20	32	26	28	106	36	15	23	32	106	27	40	58	54	179	18	12	8
II ANI	5	2	0	8	15	5	0	0	2	7	6	3	1	1	11	2	0	1
III ASME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IV OEDC	3	0	0	0	3	0	5	0	0	5	0	0	1	0	1	(OEDC QA Extinct OQA Auditing)		

BELLEFONTE TREND ANALYSIS

SIGNIFICANT AND REPORTABLE ITEMS

	1981, Quarters				1981	1982, Quarters				1982	1983, Quarters		
	1	2	3	4	Total	1	2	3	4	Total	1	2	3
I 5055E	9	13	16	22	60	6	6	12	12	36	11	10	6
II Pt 21	4	10	7	21	42	5	5	4	4	18	6	1	1
III NCRs	16	23	19	25	83	10	8	17	23	58	11	10	0
IV NRC	4	4	5	6	19	5	7	7	5	24	17	6	10
V Audit	0	0	0	1	1	0	0	2	0	2	1	0	-

AUDIT ITEMS

	1981, Quarters				1981	1982, Quarters				1982	1983, Quarters		
	1	2	3	4	Total	1	2	3	4	Total	1	2	3
Deficiencies	33	32	29	35	129	30	25	33	28	116	0	0	11 (OQA Auditing)

TVA 64 (08-8-68)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '840309 050

TO : H. G. Parris, Manager of Power, 500A CST2-C

FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : March 9, 1984

SUBJECT: EXCESSIVE WATER IN RADWASTE SHIPMENT FROM BROWNS FERRY NUCLEAR PLANT - NUCLEAR SAFETY REVIEW STAFF REPORT NO. I-83-28-BFN

In November and December 1983, the Nuclear Safety Review Staff (NSRS) conducted an investigation into a BFN radwaste shipment to Barnwell, South Carolina, containing an excessive quantity of free-standing water.

At the time of the NSRS investigation NUC PR had already conducted a thorough review of the incident and had made several changes in the area of radwaste at BFN. NUC PR was in a mode of continuing review and testing in relationship to the occurrence under investigation.

Even though NUC PR had conducted a good investigation and implemented changes in their radwaste program that would greatly decrease the chances of recurrence of shipping a container of radwaste with excessive water, the NSRS believes that the area of mixing different types of resin was overlooked. From the NSRS analysis of the incident, the following recommendations are being made to further enhance the radwaste program at BFN.

I-83-28-BFN-01 - The water retaining characteristics of a mixture of bead and powder resin should be determined by test for various mixture percentages. Based upon the test results, plant procedures should be changed as applicable to ensure that resin liners are adequately dewatered. These tests could be conducted in the laboratory to determine worse case conditions and then a full scale test could be performed under those conditions.

I-82-28-BFN-02 - A USQD for the change in the actual operations from that which was intended by the system design as described in the FSAR should be made.

Since the mixture of different types of resin only occurs at BFN, the applicability of this report to other TVA plants does not need to be considered.

The detailed report by NSRS is attached. If you have any questions, please contact R. W. Travis at extension 4813 in Knoxville.

H N Culver

H. N. Culver

RWT:LML
Attachment
cc: MEDS, W5B63 C-K (Attachment)

NSRS FILE

GNS 840309 051

TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

NSRS REPORT NO. I-83-28-BFN

SUBJECT: EXCESSIVE WATER IN RADWASTE SHIPMENT FROM BROWNS FERRY NUCLEAR PLANT

DATE OF REVIEW: NOVEMBER 28 - DECEMBER 1, 1983

REVIEWER: Ronald W. Travis — RONALD W. TRAVIS — 3/7/84 DATE

APPROVED BY: Richard D. Smith — RICHARD D. SMITH — 3/7/84 DATE

TABLE OF CONTENTS

I. SCOPE

This report is the result of an investigation by the Nuclear Safety Review Staff (NSRS) into the shipments from Browns Ferry Nuclear Plant (BFN) to Barnwell, South Carolina, of radioactive spent resin which contained excessive amounts of water. The standard investigation techniques were used.

II. SUMMARY

On October 25, 1983, TVA made a shipment of radioactive spent resin from BFN to Barnwell, South Carolina, which was subsequently sampled by Chem Nuclear Systems, Incorporated, at Barnwell and was found to have an excessive amount of water in the resin liner. TVA returned two other shipments before they could be sampled at Barnwell and sampled one of these containers at Browns Ferry. That container also was found to have an amount of water in it which violated South Carolina burial regulations.

TVA Division of Nuclear Power (NUC PR) then began an investigation to find causes of the incident and to find ways of preventing recurrence. The investigation discovered deficiencies in the operating procedure for dewatering the resin shipments, in the labeling of valves and handswitches, and in the labeling of flexible hosing used to fill and dewater resin containers. Also, the standard practice for radwaste was found deficient in management controls in radwaste handling and to implement a process control procedure. Furthermore, a drawing for the radwaste resin system was found deficient by the NUC PR investigation, and the plant was reviewing all drawings for radwaste and revising any which had deficiencies. Special tests were performed by BFN to verify that the revised operating procedure adequately provided for the dewatering of the shipping containers containing powder-type resin.

The NSRS investigated the incident and the efforts made by NUC PR to correct any deficiencies. This investigation indicated that NUC PR had identified a number of pertinent problems and initiated corrective action. The improvements and corrections implemented by NUC PR should produce a radwaste program which is safer and less likely to produce violations provided only powder resin shipments are made. The one area of NSRS concern was that the mixing of different types of resins in radwaste shipments had not been properly analyzed, and, as such, it is unknown whether or not the dewatering procedure at BFN is adequate for these mixtures. The radioactive waste system at BFN was designed to keep the two resin types separated. The mixing of the resins was a change from the FSAR and and an unresolved safety question determination (USQD) was not performed as required by 10CFR50.59.

III. FACTS

Sequence of Events

On October 25, 1983, a shipment of low-level radioactive ion-exchange resins was made from Browns Ferry Nuclear Plant to the Barnwell, South Carolina, burial site. As with all such shipments, the resins were stored inside of a steel container called a liner which was transported within a metal cask on a specially designed truck trailer. Normally the liner is left at Barnwell to be permanently buried and the trailer with the cask returned to BFN to be filled with another liner. In this instance the liner, designated as LL886, arrived at Barnwell on October 26, but was not buried immediately. Chem Nuclear, which has a negotiated lease (contract) with South Carolina for the operation of the burial site on the state-owned Barnwell site, weighed the liner and its weight varied from that recorded on the shipping report. Because of this weight difference the liner was set aside to be inspected later. Before the inspection took place another liner, designated as LL889, was shipped from BFN on November 1. (The cask liner numbers are not necessarily in order.) Liner LL889 arrived at Barnwell on November 2 and it also was not buried immediately. Instead, it was selected as a part of a random sampling program to be set aside and sampled later. TVA continued to ship to Barnwell and on November 3 another liner, designated as LL887, was shipped from BFN. It arrived at Barnwell on November 4 but was never unloaded from the truck.

On November 4, TVA was notified that LL886, the liner with the weight discrepancy, had been sampled by drilling a hole in its bottom with the result that 95 gallons of free-standing water was drained from it. The State of South Carolina and the NRC limits free-standing water to 0.5 percent of the volume for this type liner. Liner LL886 had a volume of 180 cubic feet or 1350 gallons. The 0.5 percent allowable limit translates into 6.75 gallons for this size liner. Thus the liner had 14 times the allowable volume of free-standing water.

After TVA received this information, liner LL887, which was never unloaded from the truck, was returned to BFN immediately and TVA asked Chem Nuclear if liner LL889 could be brought back to BFN before any sample was taken from it. Chem Nuclear agreed and LL889 was returned on November 7. Upon its return, TVA personnel at BFN drained LL887 and collected approximately 100 gallons of free-standing water. NUC PR then began its investigation to determine the cause of the water. Meanwhile, TVA was notified on November 8 that South Carolina had imposed a $1000 fine and denied all burial rights until TVA could show the cause of the excess water and prove that it would not occur again.

NUC PR Investigation

The BFN staff and the NUC PR Central Office (NCO) made an investigation into the cause of the excess water. In its response to South Carolina TVA reported three possible causes for the error.

1. TVA Operating Instruction (OI-77) for radwaste packaging was not specific in the sequencing for valving in dewatering filters which are located at different levels within a liner. Consequently, there was no assurance that the bottom filter element was always used last to ensure complete dewatering.

2. OI-77 did not specify a minimum amount of time to dewater using only the bottom drain.

3. Hoses and valves required for dewatering a liner were not all clearly identified.

Even though these problems could have caused or contributed to the cause of the excess water, TVA could not conclusively identify the cause.

Actions Taken to Correct Deficiencies

To correct the deficiencies disclosed by the NUC PR investigation and to prevent recurrence of excess water in the dewatered resin, several steps were taken:

1. OI-77 was revised to specify the filter sequence to be used for resin liner dewatering.

2. Based on several tests (using the revised procedure) conducted on November 11, a minimum time of from two to six hours, depending on the type liner and its contents, for dewatering was incorporated into the procedure.

3. Hoses and valves required for dewatering were clearly identified.

4. The Standard Practice, BF 7.9, for radwaste was revised to include more management controls and to add a process control program to periodically verify the adequacy of the dewatering procedure.

Actions not yet completed but in progress were:

1. Drawings for the radwaste system were being reviewed and were to be revised as required to reflect the actual "as-constructed" status.

2. A new plant organization was being developed to be dedicated entirely to the operation and control of the radwaste program.

Background Information

Resin

The radwaste liners involved in this investigation were used to transport low-level radwaste in the form of used or spent resins to Barnwell, South Carolina. The liners were then buried with the resins in them. The liners have volumes of either 180 ft^3, 135 ft^3, or 150 ft^3 depending on the type liner used. The type used in the incident being investigated had a volume of 180 ft^3. Two types of resins are used at BFN and shipped in the liners. A powder-type resin was used for most of the water cleanup systems and a bead-type resin was used in the radwaste demineralizer. By far the largest percentage of resin used at BFN was the powder type. A total of approximately 3500 ft^3 of spent resin was shipped each month, of which only approximately 130 ft^3 (975 gallons) was bead resin. The resin involved in the shipments under discussion was a mixture of bead and powder. Six

13,875-gallon tanks labeled A through F, called phase-separators, were used to store the spent resin in and to remove gross amounts of water before the resins are put into the liners.

Phase-separators A through D are generally used for the storage and dewatering of powder resin, therefore, no bead resin in excess of about 5 percent due to the manufacturing process would be expected. The 5 percent bead resin is an integral part of the powder type resin and would not settle out but would remain in solution. Phase-separators E and F are generally used for the storage and dewatering of the bead resins. When the bead resins are stored in phase-separators E and F, these resins are generally mixed with powder resins. When E and F phase-separators are dumped, plant personnel expect to have a mixture of 10 percent bead resin and 90 percent powder resin There was no control, however, to ensure this mixture and this was simply the ratio expected from a full phase-separator containing only 975 gallons of bead resin. The phase-separators, however, are not completely filled so the ratio could vary. From samples taken from liner LL887, which was returned to BFN from Barnwell, the plant personnel estimated by visual inspection that bead resins accounted for about 20 to 25 percent of the sample. An operator's log showed that this cask was loaded from phase-separator D, which should not have had more than five percent bead resin. LL889 had not been sampled at the time of this investigation.

Operations personnel stated that during the timeframe involving this incident (this was from the operator's memory and no exact date could be determined), the content of F phase-separator (quantity and mixture ratio unknown) was transferred to C and D phase-separators due to maintenance requirements on F phase-separator. Also, on October 7, at the time of the last dump of bead resin to the phase-separators, the operator log shows that operational requirements forced the dumping of bead resin into C phase-separator. Liner LL889 was filled from C phase-separator, but no sample was taken after its return to BFN to determine the resin ratio. A standard sample is taken before dewatering for determination of activity levels from a liner.

It was the opinion of one person in Operations that this high percentage of bead resin, 20 to 25 percent, could possibly be accounted for by stratification of the bead resin in the phase-separator.

The liner dewatering process for powder resin is greatly different from that of bead resins. From the special tests conducted at BFN, it could be seen that powder resin-filled liners of the type liner used for those shipments can be dewatered in two hours using a vacuum pump. Tests showed that after two hours of dewatering less than 0.5 percent water remained as confirmed by examination after standing for seven days. From other data, dewatering bead resin is not greatly affected by the vacuum pump. At SQN, where bead resin only is used, the dewatering process takes three days to complete and uses only gravity drain as recommended by the manufacturer. The bead resin's surface appears smooth but contains capillaries or small canals that hold the water which produces the vacuum process ineffective. Initially a large amount of water can be drained from a liner with bead resin but much remains entrapped in the capillaries. It requires a longer time and gravity to separate the water from the bead resin. The powder resin has a stronger electrolytic bond holding the water. This stronger bond produces the gravity method ineffective and necessitates the use of the vacuum pump to pull the water away from the resin.

These characteristics have been verified by manufacturer's tests and by tests at SQN and BFN. The NCO is satisfied that the November 28, 1983 revision of the dewatering procedure at BFN is adequate for powder resins and that the SQN procedure for dewatering is adequate for bead resin, but no one has conducted tests on the water retaining characteristics of the mixture of resins that may occur at BFN. When Operations took resins from phase-separators E and F, which contained bead-type resin, they had historically relied on their experience to determine proper dewatering times using vacuum, since no guidance was given in the procedure.

The description of the handling of wet solid waste, which includes the spent resins, contained in section 9.3.4.1 of the BFN FSAR is for a procedure that handles bead resin and powder resin completely separately. In conversation with EN DES it was their understanding that the radwaste system was designed to operate with bead resin and powder resin shipped in separate liners. Until the November 28, 1983 revision of OI-77, the operating instruction contained steps to keep the two resin types separated, but the section for transferring bead resin from the spent resin storage tank to the liner directly was deleted by BFN because it was never used. The plant staff chose to mix the resins because it seemed to them to be a safer method of operation. It was determined to be safer because in order to fill a 180 ft^3 liner would require more than one 130 ft^3 bead resin discharge, and the liner would set for 4-5 weeks until a second discharge were available. In mixing the resin, operations were conducted in a manner not described in an operating instruction and not described in the FSAR. 10CFR50.59 requires an USQD if either the facility or the procedures described in the FSAR are changed. A USQD has not been performed even though the system is not being used in the manner for which it was designed. The system was designed to store bead resin in the spent resin storage tank which has a capacity of 1800 gallons rather than the phase-separator. Also, only the 180 ft^3 liner and not the 135 ft^3 liner had a bottom-bottom drain so only the 180 ft^3 liner can be used for 100 percent bead resin shipments since the bead resin must be gravity drained.

Procedures

The Operating Instruction, OI-77, "Radwaste," was reviewed by the NSRS. The revision in use at the time of the incident, the revision made on November 18, 1983, and the revision made on November 28, 1983, were compared. The OI in use at the time of the incident was vague and required the operator to make judgment decisions when dewatering a liner. The latest revision incorporates all but some minor details of the NCO recommendations and is more definite in its instructions, including dewatering times and valve sequencing. OI-77 now specifies that a suction be maintained on the bottom-bottom connection for at least 120 minutes for reactor cleanup liners and low-level liners, 180 minutes for General Electric liners, and 120 minutes for high integrity liners after indication is obtained that vacuum is broken. If bead resin is present above that expected for a nominal pure powder resin, these times are doubled. It is assumed that bead resin is present if resin is taken from E or F phase-separators or if the operations log indicate bead resin is in another phase-separator. The latest revision also deletes the use of level instrumentation that had never actually operated correctly. The instrument as designed could not accurately measure levels, and visual indication had therefore been relied upon and will be relied upon in the future. As previously stated, the latest revision deleted the direct processing of bead-type resin from the spent resin storage tank to the liner. Training in the new OI-77 is on-the-job type training.

The Standard Practice BF 7.9, "Radwaste Packaging and Radioactive Materials Shipment Control (Excluding Fuels)" has been revised to include more management involvement and to assign responsibilities directly to individuals. A Process Control Procedure has been incorporated into the standard practice to periodically test liners to verify the adequacy of the dewatering procedure in terms of percentage water remaining in the liner. The program lists time intervals for testing or for testing after a set number of liners are filled, whichever comes first. For high integrity containers the test is required at least once a quarter or every sixth container, whichever is sooner. A high integrity liner is used for higher levels of radioactivity and is constructed of polyurethane. For low-level liners the test is required at least once a month.

A special test was also performed for each type of low-level liner using new powder resin. This test was required, by the coversheet of the test, to be repeated whenever a new liner type was used, a modification was made to liners, or a modification is made to the dewatering equipment. The test procedure requires that radiologically clean resin be used of the same type intended for routine use.

The procedure does not specify that any mixture of bead and powder resin be made. This is a special test and is separate from the process control program. Nothing takes into account the various mixtures of resins.

Labeling and Drawings

At the time of the NUC PR investigation of the incident it was found that while valve numbers for flow control valves were correct, the valve names on the permanent valve nameplates on the remotely mounted control switches did not agree with their function. The actual use was marked with ink on the panels.

This discrepancy was caused by a 1974 change in the type liners used and these changes were not reflected in the valve tagging. Also, the NUC PR investigation found at least one drawing, 47W830-6A, which did not accurately show the radwaste system operation, because the cask liner was shown with three drain lines rather than four. Since this was not a permanent portion of the plant, it was not a part of the "as constructed" plant drawings, but it (47W830-64) was on an "as-constructed" drawing. Furthermore, the flexible hoses used to fill and dewater the liners were labeled only in ink and not with a permanent-type tag. Neither the NSRS nor the plant staff could determine that these discrepancies actually caused the incident under investigation.

By the time of the NSRS review, the permanent valve nameplates had been changed on the control panel to correctly reflect their actual usage, and the flexible hoses had the valve numbers to which they were connected correctly stenciled on both ends. Also, plant personnel were in the process of reviewing all radwaste drawings to either verify that they were correct or to correct them.

IV. ANALYSIS

Resin

The liner sampled at BFN was found to contain 20-25 percent bead resin when only about 10 percent was expected by BFN personnel. That 10 percent concentration (actually 11.6 percent) can be calculated assuming that the 13,875 gallon phase-separator is filled with 975 gallons (130 cubic feet) of bead resin and 12,900 gallons of powder resin containing 5 percent bead resin as an impurity.

From the resin sample taken from liner LL887, it could be seen that the bead resin appeared to settle toward the bottom. If the bead resin were completely settled out and a 180 ft^3 liner were to be filled from this, then, theoretically, 72 percent (130 ft^3/180 ft^3) of the liner contents could be pure bead resin. The remaining 28 percent would contain 5 percent bead resin due to the manufacturing process (assuming that the bead resin impurity did not separate), and this would add 1.4 percent to the total bead resin. Therefore, when a phase-separator containing a mixture of powder and bead resin is loaded into a liner, that liner could contain anywhere from 11.6 to 73.4 percent bead resin.

Of course, the recirculation of the phase-separator before its contents are loaded into a liner, as required in all reviewed revisions of the OI, should convert the resins into a more homogeneous mixture. Also, if the spent resin tank has more or less than the 130 cubic feet of bead resin, the percentages of types of resin would change; and if the phase-separator is less than full, the percentage of bead resin in the mixture could be higher than calculated here.

From the above analysis, it can be seen that several factors influence the amount of bead resin found in a shipping liner. Even though theoretically a liner filled from a phase-separator containing both powder- and bead-type resin should include about 10 percent bead resin, the liner sampled at BFN for some reason contained 20-25 percent bead resin. This unexpected mixture could have resulted from one of the influencing factors described above or from some anomaly caused by the transfer of resins from E and F phase-separators to C and D phase-separators.

Tests have been performed on liners containing powder resin at BFN and on liners containing bead resin at SQN to determine the dewatering characteristics, but tests have not been performed on a liner containing a mixture of powder and bead resin. Several things are known about the circumstances surrounding the resin:

1. It is known that at least one liner with excess water had 20-25 percent bead resin.

2. It is known that vacuum is ineffective on bead resin. At SQN three days of gravity drain are required for bead resin.

3. It is known that BFN only uses vacuum to dewater liners.

4. It is known that there is no test data for a mixture of bead and powder resins.

5. It is reasonable to assume that a mixture of resins will exhibit some of the same properties of each of its constituents.

The FSAR was written to describe a system which kept the types of resin separated. No formal analysis (USQD) for the change in operation from that expected by EN DES has been performed on the radwaste system at BFN. Not writing a USQD violates 10CFR50.59, and writing the USQD should prompt the person writing it to logically think through the change and determine any possible safety concerns associated with the change.

As described by plant personnel, if a liner partially filled with bead resin were to be set aside in the loading area or outside to wait for the next load of bead resin to complete the filling operation, which might be four to five weeks, the radiation hazard posed by this liner could more than offset the disadvantage of mixing the resins. On the other hand, if the spent resin tank were used, it has a volume of 1800 gallons, which is more than sufficient to completely fill a liner which has a volume of 1350 gallons. But the spent resin tank is not capable of holding two complete dumps of the bead resin which would be 1950 gallons. Therefore, it might be difficult to fill the spent resin tank with excess bead resin that would require dumping elsewhere. To avert these difficulties the 180 ft^3 liners could be partially filled and shipped with bead resin only.

Procedures

The plant staff has reviewed the Operating Instruction (OI-77) and revised it to include more detailed instructions for the sequencing of valves during the liner dewatering process and to increase the dewatering times. This is an improvement over the procedure in place at the time of the incident. Also, a revision to Standard Practice BF 7.9 has been issued to include more management controls and includes a process control procedure. To verify the adequacy of the dewatering procedure, changes may be required in the procedure after the dewatering characteristics of a mixture of resin is determined and the USQD is performed on the change from segregated resin to mixed resin. The procedures as now written are applicable for pure powder resins only. The special dewatering tests now required do not specify what type resin will be used and do not make any distinction between resins. The tests require the use of the same type of resin normally used and for BFN could be considered powder resin because of the volume used. Therefore, the test could be representative of normal operations but not the worst case.

Labeling and Drawings

The control switches for valves involved in the liner dewatering process have been properly labeled with permanent tags. Also, the flexible hosing has the valve numbers for the valve to which they are attached stenciled to both ends. This should decrease the possibility for incorrect hose connection.

The NSRS has not seen the revisions which are to be made to the system drawings, but the plant staff is aware of some needed corrections, and a review of all associated drawings is being made. The correction of drawings should also decrease the possibility for error.

Organization

NUC PR is in the process of forming an organization at the plantsite dedicated to the radwaste processing. Neither the group nor its organizational structure had been approved at the time of this review, but it was to be directed by a management-level person and have control of all radwaste. This group should add more stability to the operation and control of radwaste and improve BFN's performance in this area.

V. CONCLUSION

The exact cause of the excess water in the shipments to Barnwell could not be determined but several possibilities were identified:

1. The NUC PR investigation was thorough and was continuing. Their investigation concluded three possible causes or contributing factors of which NSRS agrees. There were:

   a. TVA OI-77 for radwaste packaging was not specific in the sequencing for valving in dewatering filters. Consequently, there was no assurance that the bottom filter element was always used last to ensure complete dewatering.

b. OI-77 did not specify a minimum amount of time to dewater using only the bottom drain.

c. Hoses and valves required for dewatering a liner were not all clearly identified.

2. The water retaining characteristics of a mixture of powder and bead resins is not known and could be a contributing factor to excess water in a resin shipment. As such, the dewatering procedure OI-77 and the special test procedure may not be adequate for resin mixtures.

3. A USQD for mixing bead and powder resins has not been performed, and TVA is in violation of 10 CFR 50.59.

Judgment of Needs

1. The water retaining characteristics of a mixture of bead and powder resins should be determined by test for various mixture percentages. Based upon the test results, plant procedures should be changed as applicable to ensure that resin liners are adequately dewatered. These tests could be conducted in the laboratory to determine worse case conditions and then a full scale test could be performed under those conditions.

2. A USQD for the change in the actual operations from that which was intended by the system design as described in the FSAR should be made.

VI. DOCUMENTS REVIEWED

Browns Ferry Nuclear Plant Final Safety Analysis Review

BFN Operating Instruction, OI-77, "Radwaste"

BFN Standard Practice BF 7.9, "Radwaste Packaging and Radiation Materials Shipment Control (Excluding Spent Fuel)"

BFN Standard Practice BF 4.6, "Specialized Training Program"

Radioactive Material Shipment Manual

Memorandum from L. M. Mills to H. G. Shealy, Chief, Bureau of Radiological Health, South Carolina Department of Health and Environmental Control (L31 831117 867)

Special Test BF ST 83-18

Memorandum from L. M. Mills to H. G. Shealy (second response)

Memorandum from J. W. Hutton to G. T. Jones with attachments A and B (L31 831121 871)

VII. PERSONNEL CONTACTED

	R. N. Armstrong	Radwaste ASE
** *	T. E. Chin	Compliance Section Supervisor
**	Ausie Clement	Chemical Section Supervisor
	N. G. Dyer	Radwaste AUO
	T. P. Hillmer	Reactor Engineering Branch
*	Ray Hunkapellar	Operations Section Supervisor
*	G. T. Jones	Plant Superintendent
**	T. W. Jordan	Operations Section
**	K. M. Morkin	Compliance Section
	W. R. Simonds	Reactor Engineering Branch
** *	J. E. Swindell	Assistant Plant Superintendent
** *	W. C. Thomison	Engineering Section Supervisor

* Attended Entrance Meeting
** Attended Exit Meeting

GNS 840413 051

TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

REVIEW

NSRS REPORT NO. R-84-02-WBN

SUBJECT: WATTS BAR NUCLEAR PLANT OPERATIONAL READINESS REVIEW

DATES OF REVIEW: FEBRUARY 13-17, 1984

ORGANIZATION VISITED: WATTS BAR NUCLEAR PLANT

TEAM LEADER: Ronald W. Travis
RONALD W. TRAVIS — 4/13/84
DATE

REVIEWER: Gerald G. Brantley
GERALD G. BRANTLEY — 4/12/84
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RICHARD D. SMITH — 4/12/84
DATE

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I. BACKGROUND

This was the first of a minimum of four reviews that will be performed by the Nuclear Safety Review Staff (NSRS) of activities at Watts Bar Nuclear Plant (WBN) to evaluate the operational readiness of that facility.

II. SCOPE

The activities to be reviewed are generally controlled by the Division of Nuclear Power (NUC PR). Each review will be conducted in sufficient detail to facilitate the formulation of an NSRS opinion as to the status of the specific area being reviewed. When the series of reviews has been completed, the status of the specific review areas will be evaluated and the operational readiness of the facility determined. This particular review focused on the WBN General Employee Training (GET) program, employee awareness of regulatory and TVA requirements and policies relating to nuclear safety issues and expression of staff views, and preoperational testing. Preoperational testing will be further reviewed during the hot functional retest.

III. MANAGEMENT SUMMARY

A summary of the status and adequacy of each of the areas evaluated in this specific review are presented in the following discussions (each area is discussed in more detail in section V):

A. <u>General Employee Training (GET)</u>

The WBN GET program depicted in Watts Bar Administrative Instruction (AI) 10.1 conceptually meets TVA commitments and NUC PR requirements with the exception identified in section IV.A.1 of this report. The past Field Quality Engineering (FQE) Surveys of the WBN GET program have been effective and instrumental in initiating program improvement; however, improvements in the survey program are recommended. The GET initial training status of the WBN employees was reasonably up-to-date with the exception of one plant section. (The plant had initiated actions to correct this condition.) There was an apparent problem with GET retraining resulting from difficulties with scheduling and recordkeeping associated with the health physics and security bypass examinations. WBN employees interviewed by NSRS demonstrated a very good knowledge of the basic concepts taught during the GET program. Overall, the WBN GET program was acceptable and was receiving management support, but needs some attention applied to the detailr of implementation.

B. <u>WBN Employee Awareness of Regulatory and TVA Requirements and Policies Relating to Nuclear Safety Issues and Expression of Staff Views</u>

NSRS concluded that, in general, WBN employees were aware of the regulatory policies relating to nuclear safety issues concerning employee and worker responsibilities, employee protection, sabotage, protection of NRC inspectors, and the procedure for notifying NRC of concerns about radiological working conditions or other matters regarding compliance with NRC rules and regulations.

The WBN employees were generally unaware of TVA's policy on expression of staff views on matters regarding nuclear safety and the preferred method for reporting nuclear safety concerns.

C. <u>Preoperational Test Program</u>

The Preoperational Test Section had responded in a commendable manner to several recent NRC findings against that program. The preoperational test engineer's checklist and the supervisor's checklist for use on the test procedures were excellent. The test given the test engineers to certify them as test directors is viewed as an enhancement to the program. Engineers observed during testing operations were knowledgeable of and were implementing the requirements of controlling documents. The preoperational test program in the areas reviewed is generally acceptable pending NSRS review of the hot functional retest.

IV. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and NSRS recommendations are offered to correct perceived program weaknesses or to enhance a generally acceptable program.

A. <u>General Employee Training (GET)</u>

1. R-84-02-WBN-01, <u>Noncompliance with TVA Commitments and NUC PR Requirements for GET Training</u>

TVA is committed to Regulatory Guide (RG) 1.8 and ANSI 18.1 through the TVA Topical Report. ANSI 18.1 states that <u>all</u> persons regularly employed in the nuclear power plant shall be GET trained. A note in WBN AI-10 1 exempts plant superintendents and assistant plant superintendents from all initial training and retraining on GET (except GET 2 and 3). See section V.A.2 for details.

Recommendation

The exemption should be removed from AI-10.1 to be in full compliance with TVA commitments and NUC PR requirements or formal exemption should be obtained.

2. R-84-02-WBN-02, Expansion of the FQE Survey No. 3QT(a)

The FQE survey of periodic and specialized training has been effective in the past. However, the survey is performed only once per year, only a sampling of a few WBN employees are surveyed for compliance with initial GET training requirements, compliance with retraining requirements is not verified, and the acceptable timeframe for initial training specified in the survey (6 months) is inconsistent with that specified in AI-10.1 (90 days). See section V.A.3. for details.

Recommendation

NSRS recommends that the survey checklist be expanded to better represent the overall status of compliance with AI-10.1 GET initial and retraining requirements.

3. R-84-02-WBN-03, Problems with Scheduling and Recordkeeping Associated with the Health Physics and Security Bypass Examinations (GET 2.35 and 3.15)

There were indications that all six plant sections reviewed by NSRS were delinquent for the bypass examinations for health physics and security. The root cause appeared to be scheduling and recordkeeping. See section V.A.4 for details.

Recommendation

Sufficient bypass examinations should be scheduled and/or the methodology for updating the "Train Report" should be adjusted to give credit for GET 2.35 and 3.15 when personnel take retraining courses in lieu of the bypass examinations.

B. WBN Employee Awareness of Regulatory and TVA Requirements and Policies Relating to Nuclear Safety Issues and Expression of Staff Views

1. R-84-02-WBN-04, Enhanced Employee Awareness of TVA's Policy on Expression of Staff Views and Preferred Methodology for Reporting Nuclear Safety Concerns

Employees interviewed by NSRS were generally unaware of the TVA policy for expression of staff views and the preferred method for reporting nuclear safety concerns. See section V.B.3 for details.

Recommendation

Training and retraining in the form of GET should be provided to all WBN employees to enhance their awareness of TVA's policy for expression of staff views and to ensure that they are aware of the preferred method for reporting nuclear safety concerns.

V. DETAILS

A. General Employee Training (GET)

1. Regulatory and NUC PR Requirements

TVA has committed through the Topical Report to comply with the requirements of Regulatory Guide (RG) 1.8, "Personnel Selection and Training," September 1975, with no exceptions. RG 1.8 endorses ANSI N18.1, "Selection and Training of Nuclear Plant Personnel," 1971. Section 5.4 of ANSI N18.1 states that all persons regularly employeed in the nuclear power plant shall be trained in the following areas:

- Appropriate plans and procedures
- Radiological health and safety
- Industrial safety
- Plant controlled access areas and security procedures
- Use of protective clothing and equipment

This training is commonly classified as "General Employee Training (GET)."

Part III, section 6.1 of the NUC PR Operational Quality Assurance Manual (OQAM) extends the training requirements beyond the ANSI 18.1 requirements to include the following:

- Plant quality assurance program
- Fire protection program
- Plant cleanliness and housekeeping requirements

The OQAM specifies that the training will be to the extent necessary to assure safe execution of duties.

Section 13.2.1.1.1, "General Employee Training," of the WBN FSAR establishes additional training requirements for the following subjects:

- General description of plant and facilities

- Station emergency plans

The Nuclear Training Branch (NTB) has developed a division program to implement the requirements of RG 1.8, ANSI 18.1, the OQAM, and the WBN FSAR. This program is delineated in the Nuclear Training Program (Area Plan) Procedure No. 202.04 "Nuclear Plant General Employee Training Program," August 23, 1983. Appendix A of that procedure lists the following GET training courses applicable to all personnel regularly employed at the nuclear plants:

- GET 1.1 - Safety, Fire Protection, and Housekeeping Orientation

- GET 2.1 - Level I Health Physics Training

- GET 2.3 - Health Physics Retraining

- GET 2.35 - Health Physics Bypass Examination

- GET 3.1 - Plant Security and Emergency Plans

- GET 3.15 - Plant Security Bypass Examination

- GET 3.2 - Drug Awareness

- GET 4 - Introduction to Quality Assurance/Quality Control

- GET 5 - Plant Description and Organization

- GET 6 - Plant Procedures and Instructions

NOTE: Area Plan Procedure No. 202.04 states that health physics (GET 2.3) and security (GET 3.1) retraining shall be required on a biennial basis with bypass examinations (GET 2.35 and GET 3.15) given on intervening years. Failure of bypass examinations results in manadatory retraining and examintion.

2. <u>WBN GET Training Program</u>

The WBN GET training program is delineated in Administrative Instruction AI-10.1, "Plant Training Program," R3, September 28, 1983. This WBN document and its associated activities were examined during the course of this review to determine compliance with TVA commitments and NUC PR requirements.

Conceptionally, AI-10.1 meets the TVA commitments and NUC PR requirements with the following exception:

The note of section 4.1 of AI-10.1 indicates that plant superintendents and assistant superintendents will be exempted from all initial and retraining on GET (except GET 2 and 3). Justification is provided based upon the proposal that these individuals' knowledge of GET course content far supersedes the minimum requirements of the courses. The point is made in the note that changes in procedures, instructions, and regulations are approved by these individuals which helps them to maintain their level of awareness.

This exemption is contrary to the TVA commitment to comply with the requirements of RG 1.8/ANSI 18.1 with no exceptions and NUC PR requirements (OQAM and FSAR), which require that all persons regularly employed be trained in appropriate plans and procedures and industrial safety as well as the material covered in GET 2 and 3.

WBN should remove this exemption from AI-10.1 and comply fully with TVA commitments and NUC PR requirements or obtain formal exemption.

Not withstanding the exemption allowed by AI-10.1, plant training records examined during this review indicated that personnel occupying these positions had received the GET training required for all employees regularly employed at WBN.

3. WBN Field Quality Engineering (FQE) Survey Program of GET

The WBN GET program is routinely surveyed on an annual basis via survey No. 3QT(a), "Periodic and Specialized Training." Completed surveys performed in July 1982 and May 1983 were reviewed to determine their effectiveness. The survey performed in July 1982 was extensive with numerous significant findings. The discrepancies identified in this survey (12) had all been closed, and the subsequent survey performed in May 1983 documented program improvement. However, six discrepancy reports were issued after the May 1983 survey to plant sections whose employees were delinquent in their training. Five of the six discrepancy reports had been closed at the time of this review. The one discrepancy report remaining open involved a plant section where several of the employees had received the training but had trouble passing the examination because of reading and writing handicaps. This discrepancy report had been granted an extension while some special training in the area of reading and writing is being provided to these employees.

The FQE surveys have been effective and have stimulated program improvement. However, as the FQE survey is performed only once per year, NSRS recommends that the FQE survey be expanded to better represent the overall status of compliance with AI-10.1 GET training requirements. The expansion should include the following:

- Amend item X of 3QT(a) to require FQE to verify that all GET courses required for all permanent and temporary section personnel are completed within 90 days of assignment to the plant as specified in AI-10.1 rather than the current 6 months timeframe specified in the survey. This amendment is considered necessary because only five personnel are sampled from each plant section and the sizes of the sections vary from approximately 5 to 150 employees, and the acceptable timeframes are inconsistent.

- Expand the survey checklist to require FQE to verify that all required GET retraining for all permanent and temporary section personnel is completed within the calander quarter containing the retraining date. Presently, compliance with AI-10.1 GET retraining requirements is not being verified by the FQE survey.

4. GET Training Status of WBN Employees

The GET training status of the WBN employees is summarized monthly in a "Train Report" prepared by Management Services and submitted to each plant section supervisor for review. This report is a useful tool and enables each section supervisor to quickly and easily determine the GET training status of each of his employees. The section supervisor is responsible for scheduling his employees for GET training to comply with the initial and retraining requirements. NSRS reviewed the reports issued February 14, 1984, and March 27, 1984, to determine the status of six plant sections. The results of that review are presented in Table 1.

All six sections were delinquent for the bypass examinations for health physics and security required by GET 2.35 and 3.15, respectively. Health physics and security retraining is required on a biennial basis with bypass examinations given on the intervening years. Failure of the bypass examinations results in mandatory retraining and examination. Plant managment indicated that the security bypass examination was a relatively new requirement (September 1983) which had not yet been

TABLE 1

Examined the 2/14/84 and 3/17/84 "Train Reports" for the following plant sections:

1. Instrument Maintenance
2. Mechanical Maintenance
3. Electrical Maintenance
4. Field Services
5. Health Physics
6. Engineering

The following matrix is a summary of the percentage of employees in those sections who are either past due by 90 days for initial training (90 days specified in AI-10.1) or past due on retraining.

GET No.	Percent Past Due Inst* Maint	Mech** Maint	Elect* Maint	Field* Servs	Health* Phy	Engrng*
1.1	0	2	0	0	0	0
2.1	0	0	0	0	0	0
2.3	0	3	4	0	5	6
2.35	18	10	22	10	14	28
3.1	1	4	4	0	5	2
3.15	26	2	12	8	9	23
3.2	2	4	6	0	0	2
4	7	7	2	1	0	6
5	9	8	2	1	0	0
6	8	7	2	0	0	5
Total No. Employees in Section	88	134	49	144	22	65

*Train Report dated 2/14/84

**Train Report dated 3/27/84

fully implemented, and the health physics bypass examinations were not being administered on a frequent basis and were being supplemented (personnel attended retraining classes rather than take the bypass examination) by the health physics retraining program. Therefore, the root problems associated with GET 2.35 and 3.15 appeared to be primarily scheduling and recordkeeping (the bypass exams are not being scheduled or if an employee attends retraining in lieu of taking the bypass exam, that employee is given credit for the retraining but not necessarily for the bypass exam). This should be evaluated by the plant staff and scheduling and recording practices changed to correct these conditions.

With the exceptions of the problem in one plant section with reading and writing handicaps (discussed in section IV.A.3) and the problems with the health physics and security bypass examinations, the GET initial training and retraining status of the six plant sections reviewed by NSRS was reasonably up-to-date. However, it should be noted that while good effort was being applied at keeping training current, each section had employees past due; and therefore WBN would be subject to citations for violation of procedures.

5. <u>Employee Comprehension of GET Basic Concepts</u>

During the review NSRS administered a questionnaire to six WBN employees to assess the degree of comprehension from GET of the following basic concepts:

- <u>Security</u> - Bomb threats, escorting of visitors, suspicious persons, and key card access control system.
- <u>Fire Protection</u> - Transient fire loads, reporting of fires, and duties during a fire.
- <u>Hold Orders</u> - Recognition of hold order tags and purpose of hold orders.
- <u>Health Physics</u> - Application of time/distance/shielding to radiation protection, ALARA, contamination and radiation, recognition of radiation protection alerting devices, plant evacuation, and personnel contamination control.

These personnel were selected to represent a cross section of personnel who have access and frequent the controlled and regulated areas within the plant. Four of the six personnel completing the questionnaire had been at WBN for a period of more than two years and, therefore, had received initial training and retraining in security and health physics.

Using this process, NSRS determined that those personnel completing the questionnaire had retained a very good understanding of the basic concepts covered. However, the participants were unanimously unfamiliar with the concept of transient fire loads, and this area should be given more emphasis during future GET training sessions.

B. WBN Employee Awareness of Regulatory and TVA Requirements and Policies Relating to Nuclear Safety Issues and Expression of Staff Views

1. Posting of Form NRC-3, "Notice to Employees"

Paragraph 19.11(c) and (d) of 10CFR19, "Posting of Notices to Workers," requires that the licensee post Form NRC-3, "Notice to Employees," in a sufficient number of places to permit individuals engaged in licensed activities to observe them on the way to or from their work activities. The forms are required to be conspicuous. Form NRC-3 contains information concerning employee and worker responsibilities, employee protection, sabotage, protection of NRC inspectors, and procedures for notifying NRC of concerns about radiological working conditions or other matters regarding compliance with NRC rules and regulations. This portion of the review was performed to determine if WBN was in compliance with the 10CFR19.11(c) and (d) requirements to post Form NRC-3 in conspicuous locations and, if indeed, the employees were familiar with the contents of the form.

Standard Practice WB 3.2.7, "Posting of Documents," February 23, 1983, specifies that Form NRC-3 will be posted on one bulletin board located in the NUC PR office building and on one bulletin board in the Temporary Service and Office Building (TSOB). Inspection of these bulletin boards revealed that the forms were posted as specified. There was no form posted on the bulletin board in the new NUC PR office building housing the Preoperational Testing and Field Services organizations. The standard practice should be revised to require posting of the form in this building as access to the plant from this location is via routes that do not pass those locations specified by WB 3.2.7. It should be noted that Form NRC-3 and its contents are illustrated and discussed in a module of GET 2.1, "Health Physics Level I Training." All employees at WBN are required to take this course.

Six employees of the WBN NUC PR organization were interviewed to determine if they had noticed and read Form NRC-3, if the contents of the form had ever been discussed with them, if they were aware of their rights as an employee relating to access to the Nuclear Regulatory Commission, and if they were aware of the protection afforded to NRC inspectors performing their duties.

Two employees of the six interviewed had read the Form NRC-3, one of six thought that the contents of the form had probably been discussed with him but he was not certain, all six were very much aware of their rights as employees relating to access to the NRC, and five of the six were aware of the fact that harassment of an NRC inspector as a result of performance of his inspection duties is a federal offense.

WBN was in compliance with the requirements of 10CFR19.11(c) and (d) with the possible exception of the new office building housing Preoperational Testing and Field Services personnel. The contents of Form NRC-3 are being discussed with all employees regularly employed at WBN; and, in general, those persons interviewed by NSRS were familiar with the contents of the form.

2. Worker Responsibility for Reporting Conditions that may Cause a Violation of NRC Regulations or Unnecessary Exposure to Radiation or Radioactive Material

Paragraph 19.12 of 10CFR19, "Instructions to Workers," states that all individuals working in or frequenting any portion of a restricted area shall be instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of NRC regulations or unnecessary exposure to radiation or radioactive materials.

This portion of the review was performed to determine the process used to instruct workers of their 10CFR19.12 responsibility and if the WBN NUC PR employees were indeed aware of their responsibility.

Initial instruction for nuclear plant workers respective to this requirement is provided through GET 2.1, "Health Physics Level I Training." In addition, Standard Practice WB 2.1.10, "Employee Reporting of Nuclear Safety Concerns," January 19, 1981, states it is the duty of a WBN employee to make known their concerns about nuclear safety. The standard practice identifies and establishes the methodology that the employee should use to report their nuclear safety concerns to plant management.

Six NUC PR employees were interviewed to determine if they were aware of their responsibility to report to plant management any condition that will cause a violation of NRC regulations or unnecessary exposure to radiation. NSRS concluded that the respective instruction required by 10CFR19.12 was being provided and the employees interviewed were aware of their responsibilities.

3. <u>Expression of Staff Views and Preferred Methodology for Reporting Nuclear Safety Concerns</u>

NRC IE Information Notice No. 84-08:10CFR50.7, "Employee Protection," issued February 14, 1984, states that protected activities such as providing information to the NRC often occurs when employers do not have an effective program for soliciting and resolving safety concerns of employees and that safety concerns have been taken to NRC because concerned employees were unaware that an issue raised previously with the employer had been resolved. NRC urged licensees to review their activities to ensure that (1) a mechanism exists for employees to raise safety issues free from discrimination and (2) that employees are notified about the mechanism.

TVA Code II "Expression of Staff Views," February 22, 1983, establishes that it is TVA policy to encourage and protect the differing views of employees on policy and execution of policy without fear of recrimination or retribution. It states that TVA encourages expression of safety views involving all aspects of its operations, particularly those associated with the design, construction, and operation of TVA nuclear plants. The Code states that TVA employees are responsible for voicing views about significant issues and are encouraged to deal directly with line management so that corrective action may be handled promptly and at the working level. Employees may at any time express their views related to nuclear safety issues to the Nuclear Safety Review Staff and if not resolved through these channels, employees can take their views about significant issues to the attention of the General Manager and the Board of Directors.

This portion of the review was conducted to determine if TVA policy on expression of staff views had been delineated at WBN and if the NUC PR employees at that facility understood that policy along with the preferred method for addressing their nuclear safety concerns.

Three WBN standard practices had been issued addressing expression of staff views and the preferred method for employees to use in reporting nuclear safety concerns.

Standard Practice WB 2.1.1.0, "Employee Reporting of Nuclear Safety Concerns," defines methods of handling concerns about items or matters pertaining to nuclear safety. The standard practice states that employees are encouraged to follow the normal management organization, but if an employee has concerns he feels could best be handled at a higher level, TVA management encourages the employee to take the concerns directly to the highest level he feels would be appropriate to achieve the proper action. The normal ascending management organization starting from the section supervisor position to the Board of Directors is given. NSRS is not included in the ascending management organization. The standard practice does state that if the concern cannot be resolved directly within TVA, the employee should then present his concern to the NRC.

A "Notice to Employees" required to be posted in two locations by Standard Practice WB 3.2.7, "Posting of Documents," indicates that the NSRS has been designated as the group responsible for handling questions raised on nuclear safety issues when an employee feels that resolution through line management is unacceptable, or if he/she feels that the matter is of such significance to warrant review by NSRS.

Standard Practice WB 2.1.1.1, "Employee Expression of Differing Views," delineates the TVA policy for expression of staff views at WBN.

Six NUC PR employees were interviewed to determine if they were aware of the proper method of reporting a nuclear safety concern and of TVA's policy on expression of staff views. All six employees indicated that they would report their concerns to the plant management and if not resolved at that level would refer their concerns to NRC. They were generally unaware that anyone outside their plant organization and NRC was available to address their concerns.

NSRS concluded that even though there were existing WBN standard practices addressing TVA policy on expression of staff views and the preferred method for employees to use in reporting nuclear safety concerns, the employees were generally unaware of the policy and the preferred reporting method.

NSRS recommends that training and retraining in the form of GET be provided to employees in the areas of TVA's policy of expression of staff views and the preferred method for employees to use in reporting nuclear safety concerns. If the training is provided via health physics GET, it should be clearly established that nuclear safety includes other area as well as health physics.

C. Preoperational Test Program

The preoperational test program at WBN is based upon the requirements of the following NRC Regulatory Guides (RG):

RG 1.20 Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing (6/75)

RG 1.41 Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Groups Assignments (3/16/73)

RG 1.68 Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors (11/73)

RG 1.79 Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors (6/74)

RG 1.80 Preoperational Testing of Instrument Air Systems (6/74)

TVA's implementation of the requirements is described in Area Plan Procedures No. 1104.01, "Test Staff Program Manual - Preoperational Test Program;" Program 1100 (Preliminary Operations); and N-OQAM, Part II, Section 4.1, "Preoperational Test Program." Plant specific implementation of the upper-tier documents is described in the WBN FSAR, Section 14.2.1, "Conduct of the Preoperational Test Program," and Administrative Instruction AI-6.2, "Preoperational Test Program." AI-6.2 contains N-OQAM, Part II, section 4.1, in its entirity. A more detailed interpretation of AI-6.2 is given in Preoperational Test Section Instruction Letters.

1. General

After NRC violations had identified problems in the WBN preoperational test program, especially in the area of documentation, TVA instituted several changes. First, more training was given to the engineers. After training, the engineers were administered a test to verify that they understood the material presented. Test records showing a passing grade of 70 percent or better were on file for each test engineer. Also, in response to NRC findings, the Preoperational Test Section had instituted a checklist whereby the engineer would review the completed preoperational test or partially completed test to verify it met all requirements. After this checklist was performed, the supervisor used a separate checklist to do an independent check of the test. Several checklists were reviewed and it appeared to be a move toward closer control of the test program.

A field quality engineering survey of a preoperational test was reviewed and it appeared to be a good administrative type review.

2. Testing in Progress

The NSRS evaluator observed portions of three tests being performed. These were TVA-25B, "High Pressure Fire Protection," TVA-9C, "Auxiliary Building Heating, Ventilation, and Cooling System," and W-6.1, "Fuel Handling Tools and Fixtures." Special attention was given to the calibration and documentation of test equipment used in the test; the test record drawings; the handling of test deficiencies, changes, and exceptions; and the test log book. The engineers performing the tests were questioned about the test being conducted and their training.

The NSRS reviewer observed the performing and signing of steps in the test procedure, the gathering and recording of data, and the writing of changes and test deficiency documentation. The four engineers witnessed in the performance of their tests appeared to understand and to implement the actions specified in all controlling documents.

3. Tests Partially Completed

The NSRS evaluator reviewed two test procedures that had been performed during the hot functional tests, but were not completed and would be performed again in whole or in part during the forthcoming hot functional retest. The two tests reviewed were W-9.2, "Incore Thermocouple and RTD Cross Calibration," and TVA-22, "Auxiliary Feedwater System."

W-9.2 had been completed but there were several open deficiencies, and parts of the test would be performed again during the hot functional retest. The data package had been completed and sent to EN DES for review. EN DES was then evaluating the test results to help NUC PR in deciding how much of the test would have to be conducted again. The handling of this test and the completed data package appeared to meet all pertinent requirements.

TVA-22 was incomplete. A major portion was conducted during the hot functional test but some installed equipment failed to operate correctly and other parts of the system were not complete enough to test. A test data package had not been completed, which is normal for a test in this status. The test director was in the process of writing change sheets for the test.

The retest could then be performed on the change sheets. By doing this the test director could better define the initial conditions necessary for restarting the test.

The portions of the test that had been completed were conducted several months earlier. The NSRS evaluator found many errors of a documenting nature in the completed portions of the test, but the test director's supervisor had reviewed the test using the standard checklist developed by a WBN Preoperational Test Section Group supervisor and had already documented the discrepancies. The errors were to be corrected by the test director after the retest change sheets were written.

VI. DOCUMENTS REVIEWED

1. Regulatory Guide 1.8, "Personnel Selection and Training," September 1975

2. ANSI N18.1, "Selection and Training of Nuclear Plant Personnel," 1971

3. Draft Regulatory Guide 1.8, "Personnel Selection and Training," R2, September 1980

4. ANSI/ANS 3.1, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants," 1981

5. 10CFR19.11, "Posting of Notices to Workers," July 14, 1982

6. 10CFR19.12, "Instructions to Workers"

7. TVA-TR75-1, Section 17.2, "Quality Assurance Program Description"

8. OP-QAP-2.6 R0, "Selection and Training of Nuclear Power Plant and Support Personnel," August 30, 1983

9. OQAM Part III, Section 6.1, "Selection and Training of Personnel for Nuclear Power Plants"

10. OP-QAP-2.2 R2, "Quality Assurance Indoctrination and Training," August 30, 1983

11. OQAM Part III, Section 6.1, "Selection and Training of Personnel for Nuclear Power Plants," September 21, 1981

12. Area Plan Program Procedure 202.04, "Nuclear Plant General Employee Training Program," August 23, 1983

13. WBN FSAR, Section 13.2.1.1.1, "General Employee Training"

14. WBN AI-10.1 R3, "Plant Training Program," September 28, 1983

15. DPM N74A6, "Posting of Documents As Required by the Nuclear Regulatory Commission," December 3, 1982

16. WBN Standard Practice WB 3.2.7, "Posting of Documents," February 23, 1983

17. WBN RCI-2 R7, "Radiological Hygiene Training," July 13, 1982

18. Physical Security Instruction PHYSI-1 R1, "Access Control and Identification - Personnel and Vehicles," September 12, 1979

19. Physical Security Instruction PHYSI-5 R0, "Bomb and Sabotage Threat Plan," November 28, 1978

20. Physical Security Instruction PHYSI-6, R0, "Suspicious Person - Illegal Entry," January 24, 1979

21. Physical Security Instruction PHYSI-2 R10, "Fire Protection Plan"

22. WBN Standard Practice WB 2.1.11, "Employee Expression of Differing Views," March 8, 1982

23. WBN Standard Practice WB 2.1.10, "Employee Reporting of Nuclear Safety Concerns," January 19, 1981

24. WBN FQE Survey 3QT(a)-82-1, "Periodic And Specialized Training," September 2, 1982

25. WBN FQE Survey 3QT(a)-83-1, "Perodic and Specialized Training," June 27, 1983

26. Memorandum from J. F. Bledsoe to W. T. Cottle dated June 3, 1983, "Employee Training" (DQA 830614 700)

27. WBNP Organization Chart - January 31, 1984

28. WBN "Train Project" Report No. 340, "Personnel Training Standard Report," February 14, 1984

29. TVA Code II Expression of Staff Views, February 22, 1983

30. WBN FSAR, Section 14.2, "Test Program"

31. Preliminary Operations Program Manual, Program Area 1100, Procedure 1104.01, "Test Staff Program Manual - Preoperational Test Program"

32. OQAM Part II, Section 4.1, "Preoperational Test Program"

33. WBN Administrative Instruction AI-6.1, "Preoperational Test Program"

34. NRC Regulatory Guide 1.68, "Preoperational and Initial Strarup Test Programs for Water-Cooled Power Reactors"

35. Preoperational Test Section Instruction Letters

36. Preoperational Test Instruction TVA-22, "Auxiliary Feedwater"

37. Preoperational Test Instruction TVA-25B, "High Pressure Fire Protection"

38. Preoperational Test Instruction W6.1, "Fuel Handling Tools and Fixtures"

39. Preoperational Test Instruction W-9.1, "Incore Thermocouple and RTD Cross Calibration"

40. Preoperational Test Instruction TVA-9C, "Auxiliary Building Heating, Ventilation, and Cooling System"

VII. LIST OF PERSONNEL CONTACTED

Name/Title	Attended Entrance Meeting	Contacted During Review	Attended Exit Meeting
Bailey, D. L., Mgt Svs Supervisor		X	X
Beck, R. A., Health Physics Section Supervisor		X	
Beldsoe, J. F., OQAB Site Representative		X	
Byrd, W. L., Compliance Section Supervisor		X	X
Casteel, S. O., Chemical Engineer		X	
Collins, J. L., Mechnical Maintenance Section Supervisor		X	X
Cottle, W. T., Plant Superintendent	X		
Englehardt, J. E., Compliance Engineer	X	X	X
Ennis, E. R., Assistant Plant Superintendent (Operations and Engineering)			X
Gray, E. R., Preop Test Group Supervisor		X	
Griffin, R. J., Engineering & Test Unit Supervisor		X	

Name/Title	Attended Entrance Meeting	Contacted During Review	Attended Exit Meeting
Haerr, C. A., Preop Test Engineer		X	
Hannah, R. H., Preop Test Group Supervisor		X	
Heatherly, R. L., Document Control Unit Supervisor		X	
Howard, T. L., FQE Supervisor		X	
Koehler, H. F., Preop Test Engineer		X	
Kuhn, L. B., Preop Test Section Supervisor		X	X
Lester, D. L., Preop Test Group Supervisor		X	
Matthews, D. R., Chemical Engineer		X	
Murray, M. E., Chemical Engineer		X	
Parker, Craig, Preop Test Engineer		X	
Parker, Keith, Preop Test Engineer		X	
Pope, H. L., FQE Quality Control Survey Supervisor		X	
Smith, L. J., FQE Engineer Supervisor		X	
Smith, R. H., Asst. Preoperational Test Section Supervisor		X	X
Sterling, Glenn, Preop Test Engineer		X	
Tippens, G. V., FQE Quality Control Supervisor		X	
Varga, B. D., Plant Training Officer		X	X
Willis, B. S., Engineering Section Supervisor			X

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TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

NSRS REPORT NO. R-84-05-WBN

SUBJECT: OPERATIONAL READINESS REVIEW - PHASE II

DATES OF REVIEW: MARCH 26 - APRIL 6, 1984

TEAM LEADER:	R. W. Travis R. W. TRAVIS	6/4/84 DATE
REVIEWER:	G. G. Brantley G. G. BRANTLEY	6/4/84 DATE
REVIEWER:	J. C. Jones J. C. JONES	6/4/84 DATE
REVIEWER:	C. M. Key C. M. KEY	6/4/84 DATE
REVIEWER:	M. D. Wingo M. D. WINGO	6/5/84 DATE
APPROVED BY:	M. A. Harrison M. A. HARRISON	6/4/84 DATE

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TABLE OF CONTENTS

I. BACKGROUND

This was the second of a minimum of four reviews that will be performed by the Nuclear Safety Review Staff (NSRS) of activities at Watts Bar Nuclear Plant (WBN) to evaluate the operational readiness of that facility. NSRS Report No. R-84-02-WBN was the first of the series and was issued on April 13, 1984. Table I outlines the NSRS Operational Readiness Review Plan.

II. SCOPE

The activities to be reviewed are generally controlled by the Division of Nuclear Power (NUC PR). Each review will be conducted in sufficient detail to facilitate the formulation of an NSRS opinion as to the status of the specific area being reviewed. When the series of reviews has been completed, the status of the specific review areas will be evaluated and the operational readiness of the facility determined. This particular review focused on the plant organization, staff training, plant procedures and instructions, reactor safety and criticality control, modifications and outage control, and unit interface control.

III. MANAGEMENT SUMMARY

A summary of the status and adequacy of each of the areas evaluated in this specific review are presented in the following discussions (each area is discussed in more detail in section V).

A. Organization

The regulatory requirements and TVA commitments for the submittal of information describing the organizational structure and the responsibilities, authorities, and qualifications of its personnel, along with the controls relating to the organization and management of the facility, had been prescribed in the applicable documents. However, these documents were not current due to the recent restructuring of the operations organization. The organizational structure at the time of the review was considered adequate to safely operate the facility. NSRS will continue to monitor the organizational restructuring until it is completed and the applicable documents are updated.

B. Qualifications and Training of Personnel in Key Management Positions

The qualifications and training of all key management personnel selected for review met or exceeded the requirements of the governing codes and standards in their current positions with one exception. The Operations Section supervisor did not have a current Senior Reactor Operator license as required of the position at the time of initial core loading. NSRS will monitor the qualifications of personnel assigned to key management positions as personnel changes are made prior to initial core loading.

C. Shift Technical Advisor (STA) Program

The WBN STA program meets the minimum requirements for that program and a sufficient number of trained STAs will be available to support the startup of unit 1. The NSRS observed a good attitude exhibited by the Reactor Engineering Unit toward the STA program, and the plant had made an effort to ensure that all of their qualified STAs gained actual hot operating experience at SQN. While the operational readiness of the program will be acceptable for the startup of unit 1, there were some observed weaknesses in the program that should be corrected. These weaknesses involve definition of authority and duties relating to administration of the program, station STA training, retraining records, STA certification, plant familiarization walk-throughs, and STA independence of commercial operation concerns.

D. Conduct of Licensed Operations

The program for the conduct of licensed operations had been established and with the exception of minor documentation discrepancies appeared to meet licensing commitments. However, because of revision efforts that were in progress for the current governing documents, including the Final Safety Analysis Report (FSAR), draft technical specifications, and administrative instructions, NSRS will review this program after the document revisions have been finalized and approved.

E. Reactor Safety and Criticality Controls

The special nuclear materials (SNM) program as required by 10CFR Part 70 was implemented by plant procedures. The procedures were based upon source documents at the corporate level and were being utilized in plant activities.

The SNM program met all requirements as defined by 10CFR Part 70. The plant procedures and associated records were current and accurate. The plant personnel responsible for SNM were knowledgeable and trained on the requirements.

The fuel handling operations as required by 10CFR Part 50 and Part 70 were being accomplished by plant procedures. The only fuel handling operations conducted at the time of the review had been the initial fuel receipt, inspection, and storage. The procedures required for initial core loading were reviewed and approved. The procedures were based upon experience and vendor recommendations but had yet to be performed for core loading. Core loading at the time of the review was scheduled for June 14, 1984.

The duties of the Reactor Engineering Unit (REU) and Field Quality Engineering (FQE) were not well defined for the verification of fuel transfers required during core loadings. The verification per N-OQAM, Part II, section 7.1, required "separate and independent parties . . . " to be performed; each group (REU and FQE) had different interpretations.

The review of the high density fuel storage racks (HDFSRs) resulted in several areas of concern to NSRS. The HDFSRs were in the process of being transferred from the Division of Construction (CONST) to NUC PR. Pertinent quality assurance records relating to neutron attenuation tests were not found in the CONST record vault, nor could any TVA organization produce these records from any quality file when asked to do so. The neutron attenuation tests are conducted to verify the presence of the neutron absorber material, which must be present when fuel bundles are stored in the HDFSRs and flooded with water.

The HDFSRs had been fabricated and installed in the spent fuel storage pool. The HDFSRs were required to meet 10CFR Part 50 and Part 70 by design and fabrication for the range of enriched nuclear fuel to be used. The HDFSRs had undergone intensive dimensional inspection and evaluation. Several nonconformance reports (NCRs), ranging from nonsignificant to significant, had been generated. Full utilization of the HDFSRs was not achievable at the time of the review.

Reactor safety as required by 10CFR Part 50 was being accomplished by design features based upon technical expertise. Many safety and operational systems were not yet operationally functional but were in the preoperational testing phase. The required plant procedures for operation were based upon experience and vendor recommendations. The reactor protection system (RPS) was proceeding toward operational status while undergoing required modifications per NRC Information Notice 83-18. The changes and subsequent actions reflected compliance to 10CFR Part 50 to ensure reactor safety. A follow-up is required to verify all actions are complete.

F. <u>Modification and Outage Control</u>

The modification and outage controls review included an examination of workplans, quality control inspections, materials, measuring and test equipment, and records. Each area was reviewed for plant compliance with upper-level requirements.

The workplans reviewed contained all the required documents but there were some deficiencies. There were instances of disagreement about the QA requirements between the ECN coversheet and the workplans. The majority of workplans did not contain sufficiently detailed functional tests where such tests were required. Several examples were discovered of supplemental information being added to workplans but with no indication of who added it or when, making it impossible to determine if the proper review had been made of the new information. Contrary to procedural requirements, modification work was performed by utilizing a maintenance request (MR).

Initial QC inspector training appeared to be adequate but there was no requirement for periodic retraining and there were no inspector certification records onsite.

Field Quality Engineering (FQE) surveys for NUC PR work have been inadequate because they did not include inspection of the installation of materials. The use of measuring and test equipment had generally been adequate. Some deficiencies were noted in the area of storage of workplans, such as difficulty in retrievability of QA records.

FQE was reviewing the program adequacy of outage, modification, and major maintenance. This effort appeared to be adequate, resulting in several deficiency reports to which the plant was responsive.

G. Instructions and Procedures

The NSRS conducted the review of instructions and procedures in two parts. Part I compared each level of requirements with the upper-tier requirements while part II was a review of the procedures themselves and their use.

In the review of controls the NSRS was concerned that the plant level implementing document for control of instructions and procedures allowed a documented successful use of an instruction or procedure to replace the required two-year adequacy review to be performed on all instructions and procedures. It was also noted that an instruction was written by a person in FQE. However, the same individual performed the documented FQE independent review of the instruction.

In the review of instructions and their field use, four Surveillance Instructions (SIs) were reviewed and their implementation witnessed. All requirements appeared to be adequately implemented. One SI was reviewed for a temporary change and all requirements were incorporated into the change. However, it was noted during implant observations that operations personnel failed to respond adequately to a high-water level alarm in the spent fuel pit but waited until the spent fuel pit covers were removed for routine surveillance testing before checking the pit for water. The alarm was discovered to be due to a malfunctioning water-level detector, and no water was observed in the pit. However, as new fuel was stored in the pit in storage racks with as yet unproven neutron attenuation ability, the failure of control room personnel to immediately and appropriately respond to this potentially significant event was considered a serious shortcoming in the training and conditioning of those personnel.

Overall, the control of instructions and procedures appear adequate with the two exceptions noted, and the use appears to be adequate with the one exception noted. The NSRS will include the review of procedures and their use in the remaining phases of the operational readiness review.

H. Unit Interface Controls

The unit interface controls were reviewed for implementation of the program as described by the division and plant-level documents. This review was primarily for the electrical and mechanical system interfaces rather than the security boundary. An FQE survey of interface controls and the plant response to its findings were also reviewed.

The NSRS found the program instructions to be adequate if followed, but there were problems in the actual implementation. The interface program was implemented almost entirely by the Preoperational Test Section. Interface control points were installed as a part of a Preoperational or Noncritical System Test. Several problem areas were noted during the review. Test directors were not fully aware of the controls on the unit interface, and the interface control points were not being fully implemented, documented, or controlled.

IV. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and NSRS recommendations are offered to correct identified program weaknesses or to enhance a generally acceptable program.

A. Organization

Conclusion

Although the organization of the WBN facility was being restructured, the existing organization at the time of the review was considered adequate to safely operate the facility. WBN and NUC PR documents did not accurately depict the organizational structure, responsibilities, activities, and qualifications of its personnel and was not in compliance with regulatory requirements. These documents are currently being revised. NSRS will continue to monitor organizational restructuring until completed and the applicable source documents have been revised. See section V.A for details.

B. Qualification and Training of Personnel in Key Management Positions

Conclusion

This area appeared adequate with one exception in that the Operations Section Supervisor did not hold the required NRC license for that position at the time of initial fuel load. NSRS will monitor the progress of key personnel toward obtaining required licenses for core loading. See section V.B for details.

C. Shift Technical Advisor (STA) Program

The STA program at WBN met the minimum requirements for the program. However, some program weaknesses were observed and the following recommendations to enhance the program are offered.

R-84-05-WBN-01, Definition of Responsibilities and Authorities for Administration of the STA Program

Conclusion

The responsibilities and authorities for administration of the STA program were not defined in any formal plant document other that the MAS goals of the Engineering Section and Reactor Engineering Unit supervisors. Additionally, the STA corps consisted of personnel from several plant sections with different priorities that could conflict with the scheduling of STA activities. See section V.C.3.a and .f for details.

Recommendation

NSRS recommends that the authority and duties for administering the STA program be clearly established in AI-2.16 and a method established for determining priority between STA and section/unit duties, and assuring the independence of STAs while on duty, from other functions.

R-84-05-WBN-02, Station STA Training

Conclusion

None of the STAs had completed the RST 26, "Station Shift Technical Advisor Training." See section V.C.3.b for details.

Recommendation

RST 26 training should be completed prior to assignment of the STAs to shift duties for the first time.

R-84-05-WBN-03, Annual STA Retraining

Conclusion

All STAs were reported to be up-to-date with the annual retraining requirement. However, no formal plant training records were available in the plant files that documented the up-to-date status. See section V.C.3.c for details.

Recommendation

The formal plant training records should be maintained current to indicate the accurate status of the STA's retraining.

R-84-05-WBN-04, Certification of WBN STAs

Conclusion

Certification records for only 6 of the 11 qualified plant STAs were in the plant training records. See section V.C.3.d for details.

Recommendation

Certification records for all qualified plant STAs should be added to the formal plant training records.

R-84-05-WBN-05, STA Plant Familiarization Walk-Throughs

Conclusion

The walk-through portion of the STA training program had been conducted by Assistant Unit Operators (AUOs). This was determined appropriate for certain portions of the walk-through program but not appropriate for other portions. See section V.C.3.e for details.

Recommendation

NSRS recommends that the STA walk-through program be upgraded to require that only SROs or qualified and experienced STAs be designated the authority to sign off the portions of the training program for: design basis, normal and emergency alignment and operation (logic and interlocks), engineered safeguards features relating to the systems and interactions with other systems, architectural and protective features, and technical specification requirements.

R-84-05-WBN-06, Divergence from the Intent of the STA Program to Provide a STA Corps Independent of Commerical Operation

Conclusion

The WBN STA program had apparently diverged from the original NRC intent that a corps of trained and experienced STAs be available to provide independent operational and accident assessments. The original intent was that the STA would be independent from duties associated with commercial concerns for operation of the plant. All STAs at WBN perform the STA functions as a collateral assignment while having assignments associated with commercial operation.

Recommendation

NSRS recommends that the STAs assigned to shift coverage should be removed from any duties other than those associated with that function.

D. Conduct of Licensed Activities

Conclusion

Except for minor documentation discrepancies of which the plant was aware and was committed to revise, this area appeared adequate at the time of the review. NSRS will review program documents such as the FSAR, technical specifications, and instructions when current revision efforts are complete. See section V.C for details.

E. Reactor Safety and Criticality Controls

1. R-84-05-WBN-07, Two-Party Verification for Fuel Loading

Conclusion

The duties and responsibilities of the "separate and independent parties . . . " for verification of fuel transfers were not clearly defined between REU and FQE as required by N-OQAM. See section V.E.1 for details.

Recommendation

Clarification is necessary to adequately define the duties of the Reactor Engineering Unit and Field Quality Engineering regarding "Separate and independent parties . . ." in section 2.0 of TI-28. Special assignments need to be made to ensure compliance with the N-OQAM, Part II, section 7.1, as to two-party verification.

2. R-84-05-WBN-08, High Density Fuel Storage Racks (HDFSR) Attenuation Testing

Conclusion

The HDFSRs were tested for neutron attenuation by testing a 15 percent sampling of the racks. No technical justification had been found to support the 15 percent sample as an adequate verification method versus 100 percent testing. Neutron attenuation data (strip charts) could not be found in TVA quality record files of CONST, EN DES, or NUC PR. Evidence of boron tests by two different vendors were found with the first test apparently invalidated. The second test was the accepted test. See section V.E.4 for details.

Recommendation

An evaluation of the neutron attenuation testing should be made by EN DES and NUC PR for its acceptability for verifying the presence of boron in all the storage cells.

4. High Density Fuel Storage Racks Dimensional Problems

Conclusion

The dimensional problems identified by the NCRs are under current review and evaluation by the NSRS to assure the problems are addressed.

5. R-84-05-WBN-9, Surveillance Requirements for Changing Modes of Operation

Conclusion

The single signature blank for each plant section, signifying performance of SIs required to be completed before changing plant conditions (i.e., modes), did not identify the specific SIs required to be done. This practice could allow inadvertent exclusions of required SIs. See section IV.E.3 for details.

Recommendation

The surveillance requirements to change the modes of operation should be uniquely identified rather than using a blanket signature.

F. Outage, Modification, and Major Maintenance

1. R-84-05-WBN-10, Workplan Quality Assurance Requirements

Conclusion

Some workplans included the ECN coversheet. There were several instances of disagreement between the QA requirements on the ECN coversheet and those specified on attachment B of the workplan. See section V.F.1 for details.

Recommendation

A justification resolving differences between the specified QA levels of the ECN and the workplan should be made.

2. R-84-05-WBN-11, Workplan Functional Tests

Conclusion

In the random review of workplans, it was observed that the majority of workplans requiring functional tests did not appear to have sufficient details as deemed necessary by the procedure for testing. See section V.F.1 for details.

Recommendation

Workplans should be more closely reviewed for adequate functional testing.

3. R-84-05-WBN-12, Supplemental Information Added to Workplans

Conclusion

Supplemental information had been added to several workplans with no indication of when it was added or by whom. From this it was impossible to determine if the information had been through the proper approval cycle. See section V.F.1 for details.

Recommendation

Any supplemental information added to a workplan should be initialed and dated. This should be a requirement in AI-4.1. Workplans already written should be reviewed to determine that added information has been through the appropriate review cycle.

4. R-84-05-WBN-13, Plant Modification Made by Use of a Maintenance Request (MR)

Conclusion

AI-9.2 included a note which stated that modifications could not be implemented using an MR. However, modification work was being performed using MRs. When performing modification work on an MR, the normal review cycle required for a workplan was circumvented. See section V.F.1 for details.

Recommendation

Administrative controls on MRs should be improved so that they are not used for modification work.

5. R-84-05-WBN-14, Inspector Certification Records

Conclusion

No QC inspector certification records were kept at the site. A monthly printout was sent from POTC listing inspector certifications. Sometimes an inspector was only certified to part of an inspection area, but the printout only indicated that an inspector was "partially" certified. It did not indicate for which part they were certified. Also, the printout sometimes contained errors in certification data. See section V.F.2 for details.

Recommendation

Either the certification records should be kept onsite or the printout should be corrected. For "partial" certification the separate parts should be listed on the printout or record.

6. R-84-05-WBN-15, Material Inspection

Conclusion

AI-8.5 required that inspections for modification workplan activities meet QA standards at least equal to those of the original construction. "Material Control and Identification," of the OEDC QA Manual for ASME Section III NCM, required the Quality Manager to perform inspections prior to and during fabrication and installation. FQE surveys had only checked the paper requirements and not the actual installation of material for modification work. See section V.F.3 for details.

Recommendation

FQE surveys should be initiated to inspect not only the paper requirements but also the actual installation of materials when plant modifications are made.

7. R-84-05-WBN-16, Records

Conclusion

Several QA records for workplans were requested from CONST and not all of these could be retrieved. The system of identifications was complicated and the records appeared incomplete. After complete records transfer to NUC PR, NUC PR would probably have more difficulty retrieving CONST records than did CONST. See section V.F.5 for details.

Recommendation

An efficient effective system for CONST record identification and retrieval by NUC PR should be developed. This should be a joint CONST/NUC PR effort.

G. Procedures and Instructions

1. R-84-05-WBN-17, Two-Year Review Cycle for Procedures and Instructions

Conclusion

TVA was committed to Regulatory Guide (RG 1.33 and ANSI N18.7-1976/ANS-3.2 in the area of procedure and instruction review. The N-OQAM restated the ANSI requirement that procedures and instructions be reviewed at least every two years. AI-3.1 allowed a documented successful performance of the instructions to be considered as the two-year review. See section V.G.1.a for details.

Recommendation

AI-3.1 should be revised so that upper-tier document review requirements are satisfied.

2. R-84-05-WBN-18, Field Quality Engineering (FQE) Review of Procedures and Instructions

Conclusion

The N-OQAM required an FQE review of procedures and instructions that implement the quality assurance program. AI-3.1 implemented part of the quality assurance program and was written by FQE. It was also reviewed by the same FQE individual who had written it. The review of this instruction by its author did not constitute an adequate independent review. See section V.G.1.b for details.

Recommendation

Future FQE procedures and instructions that implement quality assurance requirements and that are written by FQE should have the documented review (indicated by a signature on the coversheet) performed by someone other than the original author.

3. R-84-05-WBN-19, Operator Response to Critical Alarms Before Licensing

Conclusion

An alarm was received in the control room indicating water in the supposedly dry spent fuel pit (SFP) in which new fuel was stored in the HDFSRs. Operations waited until the SFP covers were removed for the routine performance of surveillance instructions before the pit was checked for water. No water was observed, and the alarm was determined to be due to a malfunctioning detector. However, the effect of water in the SFP in conjunction with the present inability to verify adequate neutron attenuation in the HDSFR (see item R-84-05-WBN-08) allowed the potential for a major problem in the SFP at this time. See section V.G.2 and V.E.4 for details. The alarm was installed as a response to an NRC concern after water had inadvertantly leaked into the dry SFP.

Recommendation

Operations should be made more aware of the potential problems associated with ignoring alarms initiated during the construction and testing phase of plant life. The alarms that are critical before licensing should be marked for special attention.

H. Unit Interface Controls

1. R-84-05-WBN-20, Interface Study Report

Conclusion

The interface study performed in 1980 had not been kept up-to-date. Many preoperational test directors and engineers were not aware of the controls on the interface program. See section V.H for details.

Recommendations

The 1980 interface study should be updated or a new study conducted. All preoperational test directors and engineers should be trained in the interface program. A more aggressive role should be taken by the interface coordinator in the interface program. The interface log should be reviewed against the preoperational test procedures. This review should include tests that have already been completed. Tests should be reviewed for interface control points omitted in the original version.

2. R-84-05-WBN-21, Interface Hold Orders

Conclusion

Interface hold orders were not being widely used. Many test procedures closed valves but did not apply the proper controls to the closed valves. See section V.H for details.

Recommendation

Preoperational test procedures should be reviewed for instances where hold orders should be applied to control an interface point. Preoperational test engineers should have the proper use of interface hold orders emphasized to them.

3. R-84-05-WBN-22, Marked-up Drawings for Interface Points

Conclusion

AI-6.1 required a marked-up drawing be given to the shift engineer for each interface control point or set of points installed. Only one marked-up drawing for interface points was found in the shift engineer's office. See section V.H for details.

Recommendation

Preoperational test procedures should be reviewed for interface point installation and the results compared with the marked-up interface drawings in the shift engineer's office. Marked-up drawings for each set of interface points should be submitted to the shift engineer if the comparison indicates missing drawings.

4. R-84-05-WBN-23, Interface Points in Unit 2 Reactor Protection Cabinets

Conclusion

Wire lifts and jumpers had been installed in the output cabinet of the unit 2 solid-state protection system (SSPS). Interface points may be installed on the unit 2 side where needed but the original interface study had recommended transferring these cabinets to NUC PR before the startup of unit 1. See section V.H for details.

Recommendation

The SSPS output cabinets should be transferred to NUC PR before fuel loading or the interface control points moved to unit 1 cabinets.

5. R-84-05-WBN-24, Interface Review After Unit 1 Fuel Loading

Conclusion

After fuel loading for unit 1, there was scheduled to be a two-year period before unit 2 fuel load. In view of this long period between fuel loadings, the NSRS is concerned that interface controls might be inadvertently lifted or overlooked. See section V.H for details.

Recommendation

A periodic physical review of interface control points should be made from the time of unit 1 fuel load until unit 2 fuel load. The time interval could be selected by the plant, but it should be done at least once every six months. Interface review control documents should be written for the periodic review and the reviews documented.

V. DETAILS

A. Organization

Paragraphs 50.34 (b) and 50.36 of 10CFR50 require that each nuclear power plant license applicant submit a Final Safety Analysis Report (FSAR) and proposed technical specifications (tech specs). The FSAR submittal is to include information describing the facility's organizational structure and the responsibilities, authority, and qualifications of its personnel. Administrative controls relating to organization and management to assure safe operation of the facility are to be provided in the tech specs.

Criterion I of Appendix B to 10CFR50 states in part "The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems and components shall be clearly established and delineated in writing".

The Watts Bar Nuclear Plant (WBN) operations organization and staffing were delineated in section 13.1.2 of the WBN FSAR, Area Plan No. 9, procedure No. 0901.01, "Organization and Staffing," and the WBN Tech Specs, Section 6.0, "Administrative Controls."

The current WBN operations organizational structure was compared to the plant organization and staffing positions as delineated in the above referenced documents. The WBN organizational structure was not consistent with those plant organization and staffing positions delineated in the latest revision (R49) of the WBN FSAR and the other above listed documents.

While the WBN organizational structure and some staffing positions are in the process of change, the existing organization at the time of the review was considered adequate to safely operate the facility.

It was noted during the review that cognizant WBN personnel were aware of the needed changes in plant documents and were in the process of revising these controlling plant documents to reflect the correct WBN organizational structure.

NSRS will follow-up on this item prior to initial core loading.

B. Qualifications and Training of Personnel in Key Management Positions

Paragraph 50.34(b)(i) of 10CFR50 requires each nuclear power plant applicant to submit information concerning facility operations personnel qualification requirements. Section 13.1.3 of the WBN FSAR endorsed ANSI 18.1-1971, "Standard for Selection and

Training of Personnel for Nuclear Power Plants", and NRC Regulatory Guide 1.8 R1-R-1975, "Personnel Selection and Training" for fulfilling the minimum qualifications and training requirements for nuclear facility personnel.

Revision 7 of the TVA Topical Report and Part III, section 6.1 of the Operational Quality Assurance Manual (OQAM) also commited WBN to ANSI 18.1-1971 and Regulatory Guide 1.8 R1-R-1975.

The NSRS review of qualifications of key management positions at WBN was performed to determine if the minimum requirements of the governing ANSI standard and regulatory guide were being adhered to. This included a check of academic training, power plant experience, nuclear power plant experience, related technical training and on-the-job training for the following positions.

- Plant Manager
- Assistant Plant Manager
- Superintendent (Engineering and Operations)
- Superintendent (Maintenance)
- Superintendent (Outage, Modifications & Major Maint.)
- Operations Section Supervisor
- Reactor Engineering Unit Supervisor
- Health Physics Supervisor

Section 4.2.1 of ANSI 18.11971 requires that the Plant Manager or one or more of the principal alternates must have received Senior Reactor Operator (SRO) training. The Plant Manager was previously an SRO at a similar pressurized water reactor (PWR) nuclear power plant and the Assistant Plant Manager had successfully completed a 480-hour (PWR) SRO license certification course. NSRS concluded the prior SRO training and experience the Plant Manager had received met the requirements of section 4.2.1 of ANSI 18.1 and the SRO license cerification course completed by the Assistant Plant Manager enhanced the Operational Management Team qualifications level.

It was also noted during the review that all managers in the command sucession of licensed operations had sucessfully completed the training for mitigating core damage as outlined in the NUREG-0737, "Clarification of TMI Action Plan Requiements," and satisfied the TVA commitment for that section of NUREG-0737 at WBN.

NSRS concluded that the qualifications and training of personnel in the key management positions noted in this section of the report met or exceeded the requirements of the governing codes and standards with the exception that the Operations Section Supervisor did not hold a (SRO) license as required by ANSI 18.1-1971. NSRS will followup on this item and monitor any key management personnel changes prior to initial core loading.

C. Shift Technical Advisor (STA) Program

After the accident at Three Mile Island (TMI), NRC concluded that additional technical expertise should be readily available to the shift operating staff prior to, during, and immediately after an accident or severe plant transient. NRC recommended in NUREG-0737, "Clarification of TMI Action Plan Requirements," issued November 1980, that an STA be assigned to each operating shift to improve the quality of plant technical management and operation by providing additional onshift expertise in the area of operational safety. This additional technical expertise was considered necessary for reducing the probability of abnormal or emergency conditions and mitigating the consequences of these conditions should they occur. It was intended that the STA would act in the capacity of an advisor to the shift engineer who is the onshift NRC licensed senior reactor operator (SRO) in charge of the facility.

The qualifications for the STA were to include a bachelor's degree or equivalent in a scientific or engineering discipline and a minimum of 18 months of nuclear power plant experience along with specific related technical training and annual retraining. This combination of formal education, experience, and related technical training was considered the minimum required to provide an indepth understanding of nuclear plant equipment, systems, operating practices and procedures, and the analytical skills and ability to make sound judgment under stressful conditions.

This portion of the review was conducted to determine if the STA program met the requirements of the program source documents and to assess the operational readiness of the program to support the initial startup of WBN unit 1 and consisted of review of plant documents and training records and discussions with personnel involved in the program. The following is a discussion of the results of that review.

1. WBN STA Program Compliance with Source Document Requirements

Source documents for the WBN STA program included the following:

- NUC PR Technical Standard 1202-S01, "Shift Technical Advisor (STA) Program Responsibilities"
- NUC PR Technical Standard 0202.07, "Shift Technical Advisor (STA) Training"
- WBN FSAR, Section 13.1.2.3, "Shift Crew Composition"
- WBN "Draft" Technical Specification, Table 6.2-2, "Minimum Shift Crew Composition," and Section 6.2.4, "Shift Technical Advisor"

The WBN STA program was delineated in the following plant documents:

- Administrative Instruction, AI-2.1, "Authorities and Responsibilities for Safe Operation and Shutdown"
- Administrative Instruction, AI-2.16, "Shift Technical Advisor"
- Administrative Instruction, AI-10.1, "Plant Training Program"
- Engineering Section Instruction Letter No. ENSL R4, "Shift Technical Advisor Plant Familiarization Walk Throughs"
- Engineering Section Instruction Letter No. ENSL R1, "Reactor Engineering Unit Personnel Training"

The WBN STA program as delineated was reviewed for compliance with the requirements of the program source documents. The program was in compliance with those requirements as specified in the source documents. WBN had 11 staff members who met the minimum requirements for STA. In addition, six WBN staff members were receiving related technical training for the position. For startup and full power operations, a minimum staff of six STAs is required while none are required for fuel loading.

2. Observed Strengths of the WBN STA Program

a. Reactor Engineering Unit Attitude Toward STA Program

Six of the eleven qualified STAs and the STA coordinator were members of the Reactor Engineering Unit of the Engineering Section. The NSRS reviewer discussed the STA program with these individuals. The attitude of this group toward the success of the program was an asset to the program.

b. STA Hot Operating Experience

NSRS reviewed the hot operating experience of eight qualified WBN STAs. On a similar plant (SQN), among these eight there were over five years of cumulative hot operating experience above 20 percent power. All eight STAs had participated in startup and shutdowns, and the cumulative time onshift as STAs was approximately four years.

3. Observed Weaknesses in the WBN STA Program

The following is a listing of STA program weaknesses determined during the review from observation, interviews, and procedure review:

a. Engineering Section Supervisor's and STA Coordinator's Authority and Duties Relating to Administration of the WBN STA Program

The corps of WBN STAs qualified or in training was made up of engineers and managers from the Compliance Section; Electrical, Mechanical, and Instrument Maintenance Sections; Outage, Modification, and Major Maintenance Sections; and different units of the Engineering Section. In addition, the STAs interfaced directly with the Operations Section. Administration of the STA program had been assigned to the Engineering Section supervisor and the Reactor Unit supervisor (STA coordinator) via the Management Performance Goals and Appraisal System (MAS). Administration of the STA program consisted of the scheduling of required training and retraining; scheduling of shift coverage; routing of pertinent regulatory, industry, plant operational and procedural changes; and assessment of performance of STA duties. Responsibilities and authorities for administration of the program are not addressed in any formal plant documents.

As the STA program involved personnel from several plant sections with different priorities, it was apparent that conflicts with scheduling STA activities, training, operational review, and shift coverage will be encountered. It is therefore imperative that the authority and duties of the STA coordinator and Engineering Section supervisor performing this safety-related function be clearly delineated in writing and understood by all concerned. NSRS recommends that the authority and duties for administering the STA program be clearly established in AI-2.16 and a method established for determining priority between STA and section/unit duties.

b. Station STA Training

AI-10.1 indicated that special training course RST 26, "Station Shift Technical Advisor Training," should be completed prior to assuming shift duties for the first time.

Examination of the plant training records indicated that none of the WBN STAs had completed the RST 26 training. This training should be completed prior to assuming shift duties for the first time.

c. Annual STA Retraining

AI-10.1 stated that STA retraining is required on an annual basis. The reviewer examined the plant training record files for the eight qualified STAs who had received their initial training before March 1983. Four of the eight had training records in their file which documented that they had received retraining in June 1982. However, there were no records in their files for retraining since that date. There were no records in the files of the other four STAs that indicated that they had received any STA retraining. Therefore there were no records available in the plant training record files that indicated that the eight STAs had received the required annual retraining.

The STA coordinator and Engineering Section supervisor stated that the retraining for these eight STAs was up-to-date, but the records had not been prepared and transferred to the plant training file.

d. Certification of WBN STAs

Section V of NUC PR Technical Standard 202.07 stated that each STA must have been certified as competent to serve in the STA position by the following:

- Manager, Nuclear Production
- Manager, Maintenance and Engineering
- Supervisor, Personnel Services Staff

The reviewer examined the plant training records for the 11 qualified plant STAs. Certification forms were only in the records of 6 of the 11 qualified STAs.

e. STA Plant Familiarization Walk-Throughs

Plant system familiarization walk-throughs were a required portion of the STA training program. The walk-throughs included checkoffs on the following:

- Locations of Components and Flowpaths
- Electrical Power Supplies to Major Components
- Design Bases (Purpose)

- Precautions in Standard Operating Instruction (SOI)

- Normal and Emergency Alignment and Operation (Logic and Interlocks)

- Engineered Safeguards Features Relating to the System and Interactions with Other Systems

- Architectural and Protective Features

- Technical Specification Requirements

- Flow Print Discussion

The source documents specified that checkoffs would be conducted by qualified STAs, SROs, Reactor Operators (ROs), or AUOs. SROs and ROs are licensed by NRC, while STAs and AUOs are not. The checkoffs at WBN were being conducted by AUOs. NSRS agreed that certain portions of the checkoffs could effectively be performed by experienced AUOs as they encounter these subjects in their day-to-day activities. Those subjects included the following:

- Locations of Components and Flowpaths

- Electrical Power Supplies to Major Components

- Precautions in Standard Operating Instructions (SOIs)

- Flow Print Discussions

Those subjects are closely aligned with the training and job responsibilities normally assigned to AUOs. They are normally assigned specific duties in the plant related to alignment or operation of a specific system or portion of a system and nor normally required to be familiar with the technical details of that system. They are not normally assigned to the control room or have responsibility of controlling integrated plant operation. The normal workstation for the STA is in the control room and his primary responsibility is to provide technical assistance to the shift engineer who has extensive training and who has successfully completed extensive examinations in integrated plant operation administered both by TVA and NRC.

The remaining subjects on the checkoff list may have been introduced to the AUO during student operator training, but the AUOs do not normally dwell into these subjects indepth during performance of their day-to-day activities. Additionally, the AUO is not normally retested in these subjects.

To be effective in the performance of their duties, the STA must have a thorough knowledge of the subjects on the checkoff list and those best qualified to assess that knowledge are those that are most knowledgeable in those subjects. To enhance the effectiveness of the program, NSRS recommended that the following subjects be checked-off by an SRO or an experienced qualified STA:

- Design Basis (Purpose)
- Normal and Emergency Alignment and Operation (Logic and Interlocks)
- Engineered Safeguards Features Relating to the System and Interactions with Other Systems
- Architectural and Protective Features
- Technical Specification Requirements

f. Divergence From the Intent of the STA Program to Provide a STA Corps Independent of Commercial Operation

The intent of the STA program as defined in NUREG-0737 was to have a corps of trained and experienced individuals available and dedicated to concern for the safety of the plant and to provide independent operational and accident assessments by reviewing and diagnosing plant operation and off-normal events. In order to ensure that the STA would be dedicated to concern for safety, it was intended that the STA must have a clear measure of independence from duties associated with commercial concerns for operation of the plant.

The STA corps at WBN was made up of individuals who worked part time as STAs but answered at times to four supervisors (shift engineer, respective section or unit supervisor, STA coordinator, and Engineering Section supervisor). The STA function at WBN, as well as administration of the program, were collateral assignments while all involved have duties associated with commercial operation of the plant. It is possible that the STA's independence and dedication to safety could conflict with other legitimate priorities of the various supervisors. Additionally, the schedule for STA coverage was still in doubt at the time of the NSRS review. It was reported that assigning STAs to a particular operations shift was being considered. This practice would undoubtedly lead to a better working relationship between the operations shift personnel and the STA, but possibly at the expense of sacrificing some degree of independence from commercial considerations. The relationship between the operations staff and the STA should be one of respect based upon technical competency. In order to more fully comply with the intent of the STA program, NSRS believes that during the startup period, STAs assigned to shift coverage should be removed from any duties other than those associated with that function. The shift schedule for STA coverage should be one that will ensure the proper relationship between the STA and operations shift.

D. Conduct of Licensed Operations

The NRC NUREG 0737-1980, "Clarification of TMI Action Plan Requirements," provided the interim criteria for shift staffing to all licensees and applicants for operating licenses of nuclear power plants. This criteria was adapted and issued as a federal regulation, with revision to 10CFR50.54(m). Section 13.1-2.1.1 of the WBN FSAR outlined the operations section shift staffing, including the number of shift crews and the minimum shift crew members for 1 and 2 unit operations. The shift crew size included the minimum number of SROs, reactor operators (ROs), and assistant unit operators (AUO's). Section 6, "Administrative Controls," of the WBN Technical Specifications (draft), Table 6.2.1 detailed the minimum shift crew composition for the different modes of operation. Section 6 of the WBN Tech Specs also outlined the command functions of shift crews in the different modes of operation. The shift engineer, who is an SRO, and assistant shift engineer, who is also an SRO, responsibilities and authority were delineated in WBN AI-2.1.

During this review NSRS noted a difference in the number of AUOs per shift crew listed in the WBN FSAR (four each) and the draft tech specs (two each). This was discussed with the compliance supervisor who was aware of this discrepancy and others which are intended to be corrected by revisions to the FSAR and draft tech specs prior to initial core loading. Also discussed was the shift staffing with particular emphasis on assignment of an SRO full time in the operations control room. NSRS was informed that the shift engineer would normally work out of the shift engineer's office. An assistant shift engineer licensed as SRO would be assigned full time to the control room with the command function of the nuclear unit. The assistant shift engineer would only leave the control room for a short term when properly relieved by another licensed SRO and would return to the control room immediately if abnormal conditions occured. This appeared to meet the intent of 10CFR50.54(m).

Another NSRS concern was the unspecified management command succession for the conduct of licensed operations. This concern was based on the fact that the preponderance of hot operational expertise (training and experience) of the current key management personnel was concentrated with the plant manager, assistant plant manager, operations and engineering plant superintendent and the operations supervisor. At the time of this review there was no WBN administrative document available which established an organizational chain of command for licensed operations and which would ensure compliance to the requirements of the governing upper-tier documents identified in section V.A. NSRS was told that an administrative instruction was being drafted to delineate the chain of command for licensed operations.

NSRS concluded that the program for the conduct of licensed operations had been established and appeared to meet licensing commitments. However, due to the anticipated revision of the WBN FSAR, technical specifications and administrative instructions NSRS will follow-up on this item prior to initial core loading.

E. Reactor Safety and Criticality Controls

This part of the review was conducted to ensure compliance at WBN with 10CFR Part 50 (Domestic Licensing of Production and Utilization Facilities) and 10CFR Part 70 (Domestic Licensing of Special Nuclear Material) to ensure readiness to load the initial core. The regulations required that TVA demonstrate the ability to operate and maintain the reactor and associated components in a manner that does not affect the health and safety of the public and TVA's workers.

1. Special Nuclear Material (SNM)

(NOTE: In the context of this report, SNM refers to fuel bundles as a complete assembly and flux detectors for use in the reactor core.)

The review was conducted by document review, interviews and discussions onsite and offsite, and research of records. The review was to determine the following:

- That SNM activities were being conducted per 10CFR Part 70 regulations
- That TVA documents (both procedures and records) were in compliance with 10CFR Part 70 regulations.
- That TVA personnel were cognizant of their responsibilities regarding SNM activities.

During the review at the plantsite, cognizant persons were interviewed. This included person-to-person contact and telephone interviews, both onsite and offsite. Plant records, both NUC PR and CONST, were searched for completeness and accuracy. The review was divided into three primary areas: (1) new fuel receipt, inspection storage and associated records; (2) fuel handing operations; and (3) high density fuel storage racks.

The regulations of 10CFR Part 70 required that a program and procedures be established to maintain accountability of SNM by inventories and records. Material status reports, transfer reports, tests, and inspections are required to verify control and accountability. The regulations of 10CFR Part 50 required that a program and procedures be established to operate and maintain the reactor and associated components in a manner that does not affect the health and safety of the public and TVA workers when utilizing SNM.

The Division of Nuclear Power Operational Quality Assurance Manual (N-OQAM) defined the material and quality control requirements to meet 10CFR Part 70 regulations. Part II, section 7.1; Part III, section 4.1; and Part II, section 1.1 of the N-OQAM were the applicable sections for SNM control and had been implemented in several plant procedures.

The FSAR for WBN had been prepared to support the application for the class 103 license for 10CFR Part 50 and Part 70 regulations. The FSAR provided detailed information and analysis on the plant systems and the requirements for system's performance under analyzed conditions.

The technical specifications for WBN were in draft form and were used to generate the Surveillance Instructions (SI) necessary to verify compliance with the technical specifications. The pertinent plant procedures that were reviewed by NSRS were SIs, technical instructions (TI), fuel handling instructions (FHI), general operating instructions (GOI), and specific group or section instructions in the form of section letters (SL).

TI-1, "SNM Control and Accountability System," specifies material, quality control, and accountability requirements for SNM. It is the primary plant document intended to ensure compliance with 10CFR Part 70. TI-2, "Initial Fuel Receipt and Storage," was performed upon the initial fuel receipt and cancelled after all associated fuel handling was completed. TI-28, "Physical Verification of Core Load Prior to Vessel Closure," is intended to be used for the initial core loading.

The verification of fuel transfers per N-OQAM, part II, section 7.1, required "separate and independent parties . . ." to meet the requirements of 10CFR Part 70 regulations. When the Reactor Engineering Unit Supervisor was questioned about this, he responded by saying that two reactor engineers would comprise the "separate and independent parties." The Field Quality Engineering Supervisor said that he understood that only the reactor engineers would verify fuel transfers and that the plant manager would select those engineers. Thus, the verification of fuel transfers would be performed within one group and not two "parties." The REU Supervisor was of the opinion that two different reactor engineers would constitute "separate and independent parties." The N-OQAM specifically outlines that "separate and independent parties" must verify fuel transfers and that defines a second group which does not perform the fuel transfers is required for verification of the first group's work.

The Fuel Handling Instruction Manual (FHIM) contains all the specific instructions pertaining directly to the handling of nuclear fuel. FHI-1, "Receiving, Inspection, and Storing New Fuel," had been performed for the initial fuel receipt. The other 14 FHIs will be utilized as activities progress toward core loading and operation. The GOIs are used to place-in-service and align plant systems. They are or will be routinely used for the plant systems. Section letters are issued by each individual section to delineate specific instructions to ensure the detailed work is consistently performed adequately.

2. <u>New Fuel Receipt, Inspection, Storage, and Associated Records</u>

New fuel was handled onsite using FHI-1, TI-1, and TI-2. FHI-1, TI-1, and TI-2 comply with the N-OQAM, Part II, section 7.1 requirements which in turn complies with 10CFR Part 70 regulations.

The associated records were found to be complete, based on a detailed sampling utilizing the history of a selected fuel assembly and a random review of other fuel assemblies. The applicable forms from FHI-1, TI-1, and TI-2 were properly completed and reviewed. Where a discrepancy was found, proper documentation was made and the required corrective action was performed.

The SNM custodian was cognizant of the required duties, and the fuel assembly history cards were complete. All sampled DOE forms, "DOE/NRC-742, -742C, and -741," were completed and correct. The SNM accountability records were placed in a separate file and were secured in accordance with N-OQAM requirements.

The Reactor Engineering Group at WBN had been trained in SNM requirements. The Operations Group at WBN was given similar training.

3. Fuel Handling Operations

Only FHI-1, TI-1, and TI-2 had been used at WBN at the time of the review for any major fuel handling operations. Review of the records showed that training was given to all of the operations personnel for the initial fuel receipt using FHI-1. Training was given to the SNM custodian and the reactor engineers on TI-1 and TI-2. TI-2 had since been cancelled because its application was not required after completion of intial fuel receipt.

The forms used from TI-2 and FHI-1 document compliance to the 10CFR Part 70 regulations. The forms used at that time differ slightly from those in the procedures at the time of the review. The difference being that more information was required on the current forms.

Review of the FHIM revealed that the procedures contained blanket sign-offs intended to signify that all pertinent surveillance requirements for each change of operational modes had been satisfied. Other plant procedures, such as GOIs, AOIs, EOIs, etc., utilized the same generic blanket signoffs. The specific surveillances required to be performed were not defined, but were left to the signatory's cognizance. The example and explanation below provide additional detail.

Example of a blanket signoff:

WBN
FHI-6 - Unit 1 or 2
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II. SIs PERFORMED BY OTHER SECTIONS

NOTE: Each plant section having Surveillance Requirements that must be met prior to entering Mode 6 from MODE 5 will sign and date below to verify applicable Surveillance Instructions are complete and current (see Tech Spec 4.0.4).

A. Chemical Engineering ____________/______

B. DPSO ____________/______

C. Electrical Maintenance ____________/______

D. Field Services ____________/______

E. Instrument Maintenance ____________/______

F. Mechanical Engineering ________________/____

G. Mechanical Maintenance ________________/____

H. Reactor Engineering ________________/____

An operational mode refers to a combination of core reactivity condition, power level, and average reactor coolant temperature as specified in the Technical Specifications. The above example in changing from MODE 5 to MODE 6 means the plant is brought from the cold shutdown to refueling condition. The example is typical of the blanket signoffs which do not delineate the required SIs to be performed for mode change. For each mode change certain SIs are required by Tech Specs to be performed in order to assure that systems and components which must be capable of operation in the new mode are available and operable.

Interviews with the Operations SRO in charge of procedures confirmed that the Refueling Operations Staff had yet to be formally selected. Training on the FHIM would begin for the staff when the core loading is firmly established. Preoperational testing on some of the equipment necessary for the core loading operations had not been completed. The procedures were written, reviewed, and approved for the core loading operations.

4. High Density Fuel Storage Racks (HDFSR)

The NSRS review of the HDFSRs focused on potential problem areas which were problems at the Browns Ferry Nuclear Plant (BFN). Both BFN and WBN have similar HDFSRs installed in their spent fuel storage pools (SFSP). BFN had been cited, by the NRC, for failing to verify and test for the neutron absorber (Boron) necessary to allow safe densified storage of nuclear fuel.

The HDFSRs were designed to store new or irradiated fuel assemblies to allow a maximum number of fuel assemblies to be stored in the spent fuel pit.

The HDFSRs were being used to store new fuel and the spent fuel pit (SFP) had no water in it. The fuel bundles were wrapped in polyethelene. The configuration of new fuel stored in the HDFSRs with the bundles submerged in water is the most limiting (or reactive) condition for controlling criticality, since water is the normal moderator used to attain criticality.

With no water present the configuration is not as limiting. Core loading and fuel transfers are planned to be performed with the reactor cavity and SFP dry, as a precaution to assure inadvertent criticality is not achieved.

The HDFSRs were addressed in the FSAR for their intended purpose and use. The FSAR analysis had been technically reviewed and approved by the NRC. The HDFSRs were installed and inspected by CONST personnel. The Civil Engineering Branch (CEB) of the Division of Engineering Design (EN DES) took the lead in the engineering effort on the HDFSRs.

The CONST quality records for the HDFSRs were reviewed onsite at the CONST file vault. The records were searched for the neutron attenuation test procedure used and the associated data records. This test data if available would demonstrate that new or spent fuel could be safely stored in the HDFSRs, in either wet or dry conditions, since sufficient boron would have been shown present to preclude accidental criticality in the spent fuel pit. No test procedure or data could be found to show the testing method or the results of testing which was performed onsite at WBN and would be required to be in the quality records.

Wachter Associates, Inc. (WAI), of Pennsylvania was contracted by TVA to build the HDFSRs. Wachter Associates, Inc., in turn subcontracted the neutron attenuation testing to Pennsylvania State University. The testing was performed onsite and witnessed by a construction engineer. A record of this testing was found in the personal files of a nuclear power plant engineer but was not in the CONST files. This record indicated that the testing was performed in November 1979, but apparently the test was invalidated for undetermined reasons. A telephone conversation with the Civil Engineering Branch (CEB) of EN DES in Knoxville produced evidence of a second test.

The CEB cognizant engineer sent to WBN a copy of a letter regarding the test performed by National Nuclear Corporation of California (NNC). The records showed that Wachter Associates, Inc., subcontracted NNC to perform this neutron attenuation testing at WBN. The test was performed in June 1980, and the letter from NNC to WAI explained the test procedure and results. The results verified the presence of the neutron absorber in the cells tested by a random 15 percent sampling performance. Documented justification for the 15 percent sampling was not located during the review nor were the WAI (or NNC) strip chart results located during the review.

Since Wachter Associates, Inc., has declared bankruptcy, personnel at WAI cannot be interviewed. However, a telephone interview was conducted with the president of NNC who agreed to make available to TVA copies of the data records. The contract supervisor of CEB was placed in contact with NNC to obtain access to those records.

The review of the HDFSR inspection records revealed numerous identified discrepancies. The majority of these were dimensional in nature and occurred during the fabrication. The result of these discrepancies, identified by nonconformance reports (NCRs), at one time was a rejection rate of 40 percent of the total HDFSR capactiy. The 40 percent rejection rate was the result of inspecting to the generic verticality and levelness criteria for each HDFSR cell. These dimensional problems were the result of fabrication at WAI. The problems were undersized cells, cell walls, and cell floors not vertical and level according to the drawing specifications. These problems could cause damage to the fuel bundles upon inserting and removing the fuel by mechanical interfaces with the HDFSR cells. This could result in potential releases into the spent fuel pit and environment. The 40 percent rejection rate was reduced to 5 percent by examining and inspecting each HDFSR cell on a case-by-case inspection. The criteria used for these examinations was more detailed and specific over the entire length of the HDFSR cell versus the generic criteria initially used.

The 5 percent rejected HDFSR cells will probably never be used as the only corrective action would be refabrication. As "bowing," distortion due to operational use, of fuel bundles can occur, the dimensional criteria is very important during the life of the plant.

In the course of the review of the HDFSRs, the report, "Raw Cooling Water in the Spent Fuel Pit," was researched. The activities addressed in the report reflected good engineering judgment and practices. The report addressed the water spillage on stored new fuel and how the cleanup and recovery was made. The Engineering Section prepared the report. The report was informative and well prepared. However, a problem was noted in this area in that there was a failure to respond to a high-water level alarm in the SFP until the SFP covers were removed for another reason. See section G.2 for details.

5. Reactor Safety Controls

The regulations of 10CFR Part 50 require that a program and procedures be established to operate and maintain the reactor and associated components in a manner that does not affect the health and safety of the public and TVA workers. The N-OQAM defined the program and procedure requirements to meet 10CFR Part 50 regulations. Part II, sections 1 and 4, were the applicable sections for plant activities related to this review. The FSAR provided detailed information and analysis on the plant systems and the requirements for system performance under analyzed conditions.

The applicable plant procedures that were reviewed are SIs, GOIs, and maintenance instructions (MI), emergency operating instructions (EOI), abnormal operating instructions (AOI), and system operating instructions (SOI).

Evaluation of the reactor safety controls was performed by selecting an important safety system and verifying that an important modification to it was accomplished. The feature chosen was the manual trip function of the reactor protection system (RPS). The manual trip function is the operator's primary means of scramming the reactor should automatic protection functions fail.

GOI-1, "Plant Startup From Cold Shutdown to Hot Standby"; EOI-12, "Emergency Shutdown Procedure"; AOI-1, "Reactor Trip"; and SOI-99.1, "Reactor Protection System," were reviewed, and the operations SRO in charge of procedures was interviewed. All licensed operations staff were trained on the procedures, but actual hands-on experience at WBN is limited since the systems were still in preoperational testing. Several operations staff had applicable experience from the Sequoyah Nuclear Plant (SQN). Most of the procedures were based upon the experience at SQN operations. The operations staff planned to intensify training for all operation personnel as initial startup approaches.

NRC-IE Information Notice 83-18, "Failures of the Undervoltage Reactor Trip System Breakers," required TVA to review and improve reliability of the trip breakers per the industry experience described. The Information Notice 83-18 recommended that the undervoltage coil of the RPS breaker be modified by approved means to ensure required operation when activated. The interview of the Compliance Staff revealed that the Information Notice 83-18 was forwarded to them from the Regulatory Compliance Group of the Reactor Engineering Branch.

The Compliance Staff forwarded the information notice to the reactor engineering supervisor/STA supervisor. It was then routed by a cover letter to each STA and reactor engineer for information and/or action.

The interview of the RPS cognizant engineer of the Instrument Maintenance Group disclosed that he had received the information notice and was knowledgeable of the required actions. A modification to prevent the occurrence of the identified failures experienced at other sites was being prepared by the primary vendor, Westinghouse. The plant staff had input into the proposed modification through the Reactor Engineering Branch via the Westinghouse PWR Owners Group. This modification was intended to be performed once the Westinghouse recommendation is reviewed and initiated by NUC PR.

An interview with the RPS cognizant engineer of the Electrical Maintenance Section disclosed that he was knowledgeable of the intended modification to satisfy the information notice. Also, that Maintenance Instruction, MI-47.2, "Annual 480-Volt Switchgear Inspection," was being performed on the RPS breakers. Use of the MI implements the vendor-recommended maintenance on the breakers.

F. Outage, Modification, and Major Maintenance

Previously known as the Field Services Group (FSG), the FSG became the Outage, Modification, and Major Maintenance (OMMM) Group as part of the organization changes in NUC PR As the FSG, the unit performed its activities onsite but reported offsite. In addition to the organization's name change, its chain-of-command had also changed. At the time of this review, the OMMM supervisor reported directly to the Plant Assistant Manager onsite. However, there was no indication that the duties and responsibilities of the OMMM Group had changed appreciably from the time it was the FSG. The FSG work assignments were delineated in an informal memorandum issued under the Power Plant Superintendent's name dated March 10, 1982. The OMMM's supervisor stated that this was an old document and was in need of updating. One of the nine assignments given to the OMMM Group was to be responsible for work generally classified as "modifications."

Modifications, additions, and replacements to the critical systems, structures, and components (CSSC) after issuance of an operating license was addressed by section 17.2.3 of the Topical Report (TVA-TR75-1A R7). Since WBN had not received an operating license, this implementation of the requirement could not be examined in detail. However, the NSRS evaluator reviewed the Operational Quality Assurance Manual (OQAM) and the plant Administrative Instructions (AIs) to ensure that implementing procedures were in place to control this activity after issuance of an operating license.

The plant was in a "transfer" mode. As CONST completed a system, component, or structure, a tentative transfer of that item was made. The tentative transfer conveyed control to NUC PR at that time. Prior to tentative transfer, a walkdown, or inspection, of the item was performed by CONST and NUC PR personnel. Incomplete items of work were identified and put on the Outstanding Work Item List (OWIL). After tentative transfer, NUC PR had the responsibility for controlling all work performed on transferred items. The actual work may be performed by either CONST or NUC PR. Regardless of which organization performed the work, the activity to be performed was controlled by a workplan. CONST workplans were administratively controlled by WBN-QCI-1.30 R6, "Control of Work in Transferred Systems, Equipment, and Architectural Features," which required that these workplans be routed to NUC PR for review and comment. After completion of work the workplans were routed to NUC PR for storage as plant documents.

NUC PR workplans were administratively controlled and coordinated by a unit of the OMMM Group. The workplan activities were examined closely during this review. The following paragraphs give the details of that examination.

1. <u>Workplans</u>

   OQAM, Part II, Section 3.1, "Plant Modifications Before Issuance of the Operating License," stated that "All CONST completion and modification work on plant structures, systems, and components which have been transferred to NUC PR will be controlled by the use of a workplan." This OQAM requirement had been incorporated in a WBN AI. The plant procedure, AI-8.5, "Control of Modification Work on Transferred Systems Before Unit Licensing," contained the administrative requirements for the control of modification work on transferred systems of WBN. The scope of the procedure cited that the implementation of any change by NUC PR in the "as-constructed" status of a component, system, or structure after tentative transfer to NUC PR and before issuance of an operating license shall be handled in accordance with this procedure. The scope also cited that AI-8.8, "Control of Modification Work After Unit Licensing," was to be the controlling document for modification work after issuance of an operating license. AI-8.5 required that all NUC PR modification work be accomplished by an approved workplan; defined how modification work was to be authorized; and described the workplan preparation, review, performance, and documentation in a detailed manner.

   a. Section 5.1 of AI-8.5 listed the methods by which modification to the plant (under construction) were authorized. These methods included changes issued by EN DES as an engineering change notice (ECN) for TVA drawings and specifications. Section 5.2.1b required that the NUC PR cognizant engineer include all documents authorizing the work to be performed. A portion of attachment B of the workplan specification questioned whether the workplan affected a CSSC or not. The workplan specification was to be filled out entirely by the NUC PR cognizant engineer. During review of randomly selected workplans, the NSRS examiner confirmed that workplans contained the required documents. In addition, some workplans also included the ECN cover sheet. The ECN cover sheet included in workplan 2897 indicated that quality assurance (QA) requirements applied to the ECN. However, upon review of attachment B of the workplan, the reviewer observed that the sheet had been marked to indicate that a CSSC would not be affected (therefore QA requirements did not pertain to the work).

Two other examples of conflicting requirements were identified in CONST-initiated workplans (2294 and 2637). Both these workplans had been reviewed by NUC PR. A solution to this potential problem may exist in the WBN QA list. However, at the time of the review the status of this list appeared uncertain to NUC PR.

b. Section 5.2.1c.3g in AI-8.5 cited details of functional tests that the cognizant engineer should include, as applicable, in the instruction portion of workplans.

> Functional tests shall list any check or tests to be performed during returning the equipment to service, including any provisions needed for operation in the test position, the names of persons (by job title) required to be present or whose permission is needed for such checks or tests, and data sheets needed for such checks or tests. Give tolerances, readings, temperatures, cleanliness checks, pressure, vibrations, leakoffs, NDT, and any other reject ranges for each test or check required. The instruction shall provide for performance testing to ensure a level of confidence that the modified item can perform its intended function. Major modifications to the electrical distribution system shall be followed by testing and inspection to ensure divisional separation of ac and dc power and logic system.

In the random review of workplans, it was observed that the majority of workplans requiring functional tests did not appear to have sufficient details as deemed necessary by the procedure for testing. Examples were workplans 3915, 2683, 3126, and 2897.

Also included in this section of the procedure was a note that close coordination should be maintained with the Preoperational Test Section (PTS) since much of the required testing would be performed by this unit. Close coordination would ensure that the workplan did not duplicate a part of a preoperational test. In addition, this would ensure that any retest required by modification work would be identified and performed. In March 1984 WBN Operations Quality Assurance Branch (OQAB) monitored this activity (report No. XWB-S-84-0013) to ascertain if any deviations had occurred in identifying retests. Approximately 300 (of approximately 1000) workplans written since hot functional testing (HFT) were screened for possible test impact. OQAB did not identify any deviations concerning onsite activities. However, the OQAB report pointed out that most of the retest identification was accomplished informally by ECN routing, word-of-mouth, and workplan review. Also identified was the common practice of on-the-spot review of workplans by the preop supervisor or group leader instead of the test director. This practice could lead to the omission of required retest, since the supervisor would not be as knowledgeable of test or retest requirements as the test director. NUC PR had already taken some corrective action by requiring the test director and the PTS scheduler to review every workplan. Future corrective action was planned by revising AI-8.5 to require the PTS to identify affected preop tests and to indicate the status (complete, worked, or scheduled) of the test. Coordination between PTS and the responsible unit should be improved by this procedure revision.

c. Section 5.3 of AI-8.5 indicated that the flowpath for workplan review was detailed on attachment A of that procedure. This attachment mandated that the PTS, the Safety Engineer, Operations Supervisor, Field Quality Engineering (FQE) Section Supervisor (CSSC workplans only), PORC Chairman (CSSC workplans only), and Power Plant Superintendent (Manager) should review and/or approve workplans. It was the responsibility of the originating section supervisor to ensure that other sections that might be affected by the workplan were included in the review process. Attachment 1 to AI-4.1, "Quality Assurance Records," listed completed workplans as lifetime quality assurance records. Section 5.1.4 of that procedure addressed updating of QA records.

> 5.1.4B. In the preparation of a QA record, a correction should be made by marking a single line through the old entry, making the correction, and entering the dated initials of the person making the correction, or the initials of the Section Supervisor responsible for the record. However, new entries which correct any essential element of the record (i.e., data recorded, acceptance criteria, signature, date, the records missing, etc.) or provides supplemental information shall be made using this method.
>
> NOTE: Section Supervisors shall maintain a permanent record of their personnel names (typed) versus written signatures and initials.

5.1.4C. When errors are identified after the completion of the initial review and approval, corrections shall be made per (B) above, and the document shall go through the same review and approval cycle as the original document.

NOTE 1: Non-intent changes do not need to go through the original review cycle; Supervisor approval is sufficient.

NOTE 2: The addition of data to a filed form or data sheet does not need to go through the original review cycle when it does NOT affect subsequent design documents. (Note Paragraph 5.1.2 above.)

During the NSRS examination of workplans, it appeared that supplemental information had been added on workplans 2748, 3578, 2683, 4124, 3126, and 3906. There was no identification of the person who added the supplemental information nor was it dated to indicate when the information had been recorded. Because these additions to workplans were not dated, the NSRS reviewer could not determine if they were added during the initial review cycle or later. If added later, then the workplan should have been sent through the same review and approval cycle as the original.

d. Section 5.0 of AI-8.5 stated that "After transfer of a permanent plant feature to NUC PR, all NUC PR modification work will be accomplished by a plant superintendent approved workplan." A note to section 5.1 (Modification Authorization) read "All modifications must be implemented by way of a workplan . . . ." AI-8.5 defines a modification as "A planned change in plant design accomplished in accordance with the requirements and limitations of applicable codes, standards, specifications, licenses, and predetermined safety restrictions." AI-9.2, "Maintenance Program," had a note in section 5.0 which stated that modifications cannot be implemented using a maintenance request (MR). However, it appeared that modification work was being performed on MRs (example MR 224689). Site management was aware of this activity. When performing modification work on a maintenance request, the normal review cycle for a workplan was circumvented (see attachments A and B for details of review cycles).

2. Inspections

AI-8.5, section 5.2.1c.3e of the instruction preparation paragraph(s) indicated that modification work which could affect the functioning of safety-related equipment shall contain holdpoints for inspection as necessary in the work sequence to ensure quality and conformance with work instructions.

These holdpoints were established by the supervisor or person preparing the workplan instruction. AI-7.1, "Quality Control (QC) Inspection Program," defined guidelines for QC holdpoints. All safety-related modification activities (workplans) were to be reviewed by Field Quality Engineering (FQE) for the adequacy and implementation of QC holdpoints prior to the workplan being issued. Inadequacies should be brought to the attention of the workplan originator for correction(s). QC inspections should be performed by qualified individuals other than those who performed or supervised the activity being inspected. From the NSRS review, it appeared that a certified QC inspector had in fact performed the required inspections.

An interview with the Assistant FQE Supervisor revealed that all inspector training was governed by OQAM, Part II, section 5.3A. Classroom training was performed by Power Operations Training Center (POTC). Education, experience, and physical capabilities were determined from the employees' personal history record (PHR). After the inspectors had received the classroom training they returned to the unit to receive on-the-job training (OJT). (The exception to this was welding inspectors; they receive OJT prior to being tested.) OJT for inspectors was provided for by having a certified inspector train a new inspector. After successful completion of OJT, and an oral exam by the supervisor, then attachment 3 of OQAM-5.3A was filled out and forwarded to the POTC. At the time of the review there was no requirement to document the inspector(s) OJT, nor were inspectors required to receive any retraining. The inspector was required to perform only one inspection per year to maintain certification. No inspector certification records were kept at the site. The document used to provide inspector certification was a monthly printout received from POTC. The assistant FQE supervisor stated that problems existed with the printout. The following were examples of the problems:

(1) There was no indication of what portion(s) of an area to which an inspector was certified if printout denoted only partial certification.

(2) The printout may indicate the inspector was certified to an activity when actually the inspector was not certified to that activity.

On March 19, 1984, OQAB Audit Report No. SQ-8400-03 was issued. This audit was of plant performance training and qualification. This report noted that staff performance training and qualification program activities were adequate and effective. Deviation No. 1 of this audit stated that SQN was not being provided a current list of certified inspection personnel. As stated previously, it appeared a similar problem existed at WBN.

The FQE Unit was notified (usually by phone call) when an inspection was required. The inspector performed the inspection activity and then completed the inspection log. The following information was recorded on the log:

(1) Time, date of inspection
(2) Job (inspection) authorization (MR, workplan, etc.)
(3) Type inspection
(4) Location
(5) Responsible section
(6) Quality Control Inspector
(7) Accepted/Rejected
(8) NDE
(9) Other
(10) Time completed
(11) Comments

If the work were rejected, then the inspector could record a description of the deviation on the work instruction and initial and date it. The normal procedure utilized was for the inspector to complete an Inspection Rejection Form (QA-SIL-4.2) to provide details of the deviation to the FQE Supervisor and the affected unit supervisor. After completion of corrective action, the FQE would reinspect the activity. The FQE supervisor reviewed the rejection report for reportability and trending. A monthly report was issued to the Plant Manager to provide a summary of all inspection activities.

In instances where the Authorized Nuclear Inspector (ANI) had indicated a holdpoint on the work instructions, then FQE could delete its holdpoint inspection (except welding inspections) Review of the inspection log indicated that FQE had performed approximately 600 inspections since January 1, 1984. Of these 600 inspections, nearly 21 percent (123 of 576) were inspections authorized by workplans. Three-fourths (94) of these workplan inspections were for NDE, welder certification checks, and transfer of heat numbers.

3. <u>Materials</u>

AI-8.5 stated that "The originator of the workplan shall ensure that the design, construction, installation, inspection, and testing of modifications meet Quality Assurance standards at least equal to those of the original CONST installation requirements." The following were excerpts of Section 3.7, "Material Control and Identification," of the OEDC Quality Assurance Manual for ASME Section III Nuclear Power Plant Components (NCM).

"1.0 OBJECTIVE

This section defines the requirements necessary for establishing and maintaining control and identification of all material, components, parts, and appurtenances (items) during manufacture and installation.

2.0 APPLICATION

2.1 Scope

This section applies to material control and identification for Watts Bar and future nuclear plants.

2.2.2 NA and NPT Certificate Holder

a. The Quality Manager (WBN and BLN) or Construction Engineer (HTN, PBN, and YCN)

(1) Checks incoming items in the warehouse, manufacturing shops, and installation area for marking or identification as specified in this procedure.

(2) Witnesses remarking of all Code items to be sectioned or to be remarked.

(3) Treats inadequately identified items as nonconforming and processes them in accordance with this manual.

(4) Performs routine and required inspection of items prior to and during fabrication and installation.

2.3 Procedure

2.3.1 All items shall be received, stored, and issued in accordance with this manual.

2.3.2 All items shall be properly identified.

a. All items shall be identified during manufacture and/or installation to facilitate control and maintenance of records. During installation, use of markings such as stamps, tags, labels, or other means as established shall indicate status of manufacture, including examinations and tests performed to assure conformance to material requirements.

b. All items except material shall be identified by mark numbers or by nomenclature and serial number.

c. Material shall be identified to its specification; type, grade, and/or class; heat treated conditions; and to its Certified Material Test Report by a heat code marking where required by the Code. Traceability to a Certificate of Compliance is not required.

2.3.3 Routine and required inspections shall be made on all items during fabrication and installation.

Section 6.3.2 of AI-5.4, "Material Issue, Transfer, and Traceability," stated:

"It is the responsibility of the user of the materials, components, or spare parts to verify correct identity before installation."

The user of the material was determined to be the responsible craft. As noted earlier, the NCM required the Quality Manager to verify identification of materials, components, and spare parts during installation. Criterion X of 10CFR50 Appendix B stated ". . . Such inspection shall be performed by individuals other than those who performed the activity being inspected . . . ." Site management was aware of this potential problem but did not think they were in violation of requirements. FQE surveys of this activity had only checked the paper requirements and not the actual installation of material.

4. Measuring and Test Equipment (M&TE)

The OMMM Group's M&TE program was only programmatically examined during this review. The site M&TE program guidelines were delineated in TI-10, "Calibration Program for Measuring and Test Equipment." FSGL-A16 had been issued to detail how the OMMM Group would implement the requirements of TI-10. Records indicated that FQE had performed two surveys in this area. The first survey, 13MT(f)-82-1, was performed in March 1982. No discrepancies were noted during the course of the survey. The second survey, 13MT(f)-83-1, was performed in June 1983. Discrepancies found included incomplete individual history records, inaccurate calibration due dates, and failure to investigate the use of out-of-tolerance M&TE.

Discrepancy report (DR) No. WB-DR-83-52-R was issued to document these deviations. The OMMM Group's reply indicated that: (1) equipment was sent to Central Lab for new calibration stickers and reports, (2) out-of-tolerance reports were issued for affected equipment, and (3) the group procedure was revised. On June 18, 1983, the corrective action was verified complete and the DR closed.

5. Records

As stated before, workplan activity may be performed by CONST or NUC PR at the present time. NUC PR considered all completed workplans to be QA records. Documentation of required inspections done on NUC PR workplans were stored with the workplan. However, while NUC PR filed CONST workplans as QA records, CONST stored all the inspection documentation in its records vault. In an effort to determine if the records would be identifiable and retrievable by NUC PR upon transfer of records, the NSRS examiner randomly selected nine completed workplans for review. The workplans had been performed by CONST and dealt with safety-related equipment. From the documentation sheet contained in the workplan, 16 unique identifiers were recorded. So that the NSRS could determine if the records were identifiable and retrieveable, the unique identifiers were given to the WBN CONST records clerk to locate the documents. (Unique identifiers were used by CONST and were the only documentation identifiers available to NUC PR; therefore, this system must be workable by NUC PR so that CONST records can be retrieved after they are transferred.) The following points describe the results of this records search.

a. Three of sixteen records requested could not be located. Two records were for unit 2. The records printout did not show these as being QA records; however, the exact records for unit 1 were listed as QA and were located in the vault. The other record was indicated to be revision G by the workplan but only revision F was in the vault.

b. It appeared that the unique identifer may not be sufficient information to locate the record. At the time of the review, CONST had five records programs (ECM&D-Electrical Instrumentation, Universal-Mechanical, Subassembly-Instrumentation, Welding, and Hanger). So in addition to the unique identifier, the record requester must also know what program contained the record. Complicating the problem of record retrieveability further was the fact that several of the five records programs were further subdivided into subparts (i.e., Universal-Mechanical may include pipe, duct, equipment, etc.)

b. On workplan 2443 unique identifier 1-067-S-28-59 was listed. This identifier was for a pipe subassembly. WBN CONST did not file records by this identifier. The current practice was to file records by weld numbers. The welding program did contain an entry that identified the subassembly number and thus the program might be able to sort by the subassembly number in order to alleviate this potential problem.

6. <u>Program Adequacy</u>

FQE was reviewing the OMMM program against upper-tier documents (i.e., ASME, ANSI, OQAM, etc.) to ensure that the OMMM's procedures were adequately implementing upper-tier documents. This review also included a check of CONST upper-tier documents and implementing procedures and a check of the interfaces to determine if problems exist. The responsible FQE engineer indicated that this review would take a month to six weeks to complete if FQE was able to work full time on this project. However, the timeframe was dependent upon the number of higher priority tasks assigned to the individual. The FQE engineer also lacked specific guidelines and/or criteria for the program review.

When a potential OMMM program problem was identified, the FQE engineer initiated a "preliminary" discrepancy report (DR) and forward it to the applicable unit with the following questions:

(1) Is this your responsibility?
(2) Do you have plant instructions implementing this?
(3) Do the instructions need FQE review?

If the response was positive for responsibility, then a DR (examples: WB-DR-84-12-4, WB-DR-84-37-R, WB-DR-84-83-R, WB-DR-84-39-R, and WB-DR-84-40-R) was issued to the applicable unit.

The FQE engineer explained that the response from the plant was very good and the plant was taking the DRs seriously. When asked about this program review, the Assistant OMMM Supervisor stated that some of the DRs are just identifying numbering problems; however, he felt the comparison of procedures with upper-tier documents was a worthwhile effort.

G. Procedures and Instructions

The review of procedures and instructions was two part in nature. Part I was a review of the plant controlling documents and a comparison of these documents with higher-tier documents. Part II consisted of review of instructions and observation of the use of these instructions in the field. During this NSRS review, part I was completed and part II was begun. Part II will continue as an integral part of the NSRS review of WBN and the determination of its ability to safely load fuel. As other areas are reviewed, the procedures and instructions that apply to those areas will also be reviewed.

For part I of this review the requirements of NRC Regulatory Guide (RG) 1.33, "Quality Assurance Program Requirements," were used as a basis. RG 1.33 endorsed ANSI N18.7-1976/ANS 3.2, "Administrative Control and Quality Assurance for the Operational Phase of Nuclear Power Plants." TVA implemented these requirements in N-OQAM, Part II, Section 1.1 (dated 6/2/83), "Document Control," parts 4.4, "Plant Instructions," and 5.0, "Periodic Review of Procedures and Instructions," and Section 8.1 (9/29/82), "Preparation, Maintenance, and Implementation of the Manual." At the plant level, AI-3.1, "Plant Instructions - Control and Use," provided the details for implementing upper-level requirements.

1. Plant Controlling Documents

A review was conducted of AI-3.1, "Plant Instructions - Control and Use." Generally, the instruction implemented the requirements of the upper-tier documents, with two exceptions. One point of NSRS concern was in the matter of what constituted a required periodic review of a procedure or instruction. and the second concerned the FQE review of instructions written by FQE.

a. Two-Year Review

In the area of review, RG 1.33 states:

> The overall quality assurance program requirements for the operation phase that are included in ANSI N18.7-1976/ ANS 3.2 are acceptable to the NRC staff and provide an adequate basis for complying with the quality assurance program requirements of Appendix B to 10 CFR Part 50, subject to the following:

No exceptions were listed for the review of procedures or instructions. ANSI N18.7-1976/ANS-3.2 stated:

> Plant procedures shall be reviewed by an individual knowledgeable in the area

> affected by the procedure no less frequently than every two years to determine if changes are necessary or desirable. A revision of a procedure constitutes a procedure review.

N-OQAM, part III, section 1.1, paragraph 5.0, states:

> Procedures and instructions shall be reviewed by an individual knowledgeable in the area affected by the procedure/instruction no less frequently than every two years to determine if changes are necessary or desirable. A revision of a procedure/instruction constitutes a review. (Note: Some procedures/instructions may require more frequent reviews depending on the type and complexity of the activity covered.)

The N-OQAM restated the ANSI requirement that a review of procedures and instructions be made at least every two years. AI-3.1 states:

> Responsible section supervisors shall ensure that CSSC-related plant instructions (other than rarely used maintenance and modification instructions) are reviewed by an individual knowledgeable in the area affected by the instruction no less frequently than every two years to determine if changes are necessary or desirable. The reviewer shall have adequate understanding of the requirements and intent of the original document. Successful documented performance of the instruction or a "General" or "All" revision made to the instruction satisfies this requirement.

Substitution of "successful documented procedural performance" for the required review was not identified by upper-tier documents as an acceptable alternative.

Plant management stated, as an example of use of the successful document performance, that when the section supervisor reviewed the completed data package of a SI that any errors in the SI would be discovered. According to Planning and Scheduling personnel, only 30 to 40 SIs are performed monthly at WBN. SQN routinely performs approximately 1000 SIs monthly. In February 1984, SQN reported 992 performances of 220 periodic SIs and 433 performances of 45 conditional SIs. A conditional SI is not performed on any set time basis but is performed when plant parameters require it. When WBN becomes a licensed plant, the large numbers of SIs performed daily will make it difficult to adequately review the SI at each performance. The proof of adequacy and currency of a procedure or instruction is more appropriately demonstrated by the actual performance and not from an after-the-fact review.

The SI was only one example of instructions and procedures used at the plant. Administrative Instructions, System Operating Instruction, General Operating Instructions, Standard Practices, and so forth, were all included in the guidance given by RG 1.33. At SQN, AI-4 R41, Section 4.3.2, "Periodic Review," a biennial review was required for each instruction, but there was no provision to allow a successful documented use of the instruction to replace an actual review. At BFN, Standard Practice BF 2.3, "Review, Approval, and Use of Instructions," contained no requirement for a biennial review of instructions, but it referred to N-OQAM, part III, section 1.1, which did require a biennial review. BF 2.3 does state that "Each use of an instruction serves as a review" but does not directly stated that this replaces a biennial review. The NSRS does not believe that a documented performance of a procedure or instruction meets either the intent or the letter of the guidance given by any upper-tier document. NSRS recognized that site procedures may impose more stringent controls than upper-tier documents but should not be more lenient.

b. Field Quality Engineering Review

N-OQAM, part III, section 1.1, paragraph 4.4.4 contained the following statements:

4.4.4.1 New and revised plant standard practices and Administrative Instructions (AIs) which implement the quality assurance program shall be reviewed and concurred with by the Field QE Section prior to use. The purpose of this review shall be to implement the division quality assurance program as documented in the OQAM, DPM, and interdivisional quality assurance procedures. This review shall be documented and maintained to show concurrence.

4.4.4.2 Each plant superintendent shall prepare a list of instructions requiring the above mentioned review. This list shall be submitted for the concurrence of the Field QE Section.

4.4.4.3 The Field QE Section supervisor shall assure that site quality assurance instructions that detail his assigned OQAM functions are prepared and implemented.

AI-3.1, paragraph 4.5.3.16 contained the following statements:

> Any revision to existing instructions listed in Appendix H or new instructions which implement the division's quality assurance program (as documented in the OQAM, DPM, and interdivisional quality assurance procedures) shall be reviewed by the Quality Engineering Section (QE) prior to formal PORC review.
>
> For those instructions which receive informal PORC review, the QE review shall take place after all informal PORC review comments have been resolved, but prior to formal PORC review.
>
> The QE review shall ensure that the plant instructions correctly implement the divisional quality assurance programs as documented in the OQAM, DPM, and interdivisional quality assurance procedures.
>
> QE shall document this review by signing and dating the Appendix B coversheet in the QE review space.
>
> <u>NOTE:</u> This Quality Engineering review shall be performed in addition to the normal review performed by QE of all CSSC instructions.

The cause of the NSRS concern in the area of FQE review was the fact that AI-3.1, "Plant Instructions - Control and Use," was written by an engineer in FQE, it was then revised by the same engineer, and the QE review was made by the same engineer documented by his signature in the FQE signoff space. Thus, the documented FQE review was made by its author. Although there was no requirement in the N-OQAM or AI-3.1 for an independent review, it does appear that the basic concept behind an FQE review is to get a different person to review the document. In this case, the review was for a very specific reason: to ensure the plant instructions implement the divisional quality assurance programs. The FQE reviewer might not be able to identify errors in his own procedure simply because he was required to review it again. AI-3.1, Appendix H, "Plant Instructions Reviewed by the Field QE Section," included AI-3.1 as one of the instructions that was required to be reviewed by FQE.

NSRS understood that in practice the FQE supervisor also reviewed the instruction, but the documented review was not performed by the supervisor. This concern only applied to instructions and revisions originated by the FQE Section.

2. Observation of Work Activities

For the second part of the procedures and instructions review, the NSRS reviewer observed work activities in the field. This review was conducted to determine if the personnel performing the activities had the correct instructions with them to direct their work, if the instructions were adequate to perform the work, if the instructions were followed, and if the proper level personnel were assigned to the task.

The performances of four SIs were witnessed on two radiation monitors. Those were SI 3.3.3-I and SI-3.3.3-II, "Radiation Monitoring Instrumentation Fuel Pool Radiation Monitors Channel Calibration," and SI-3.3.4-I and SI-3.3.4-II, "Radiation Monitoring Instrumentation Fuel Pool Radiation Monitors Channel Functional Test." Three instrument mechanics performed the SIs. One was a senior instrument mechanic, one was a journeyman instrument mechanic, and one was an apprentice. The journeyman instrument mechanic and the senior instrument mechanic switched roles between the tests on the two radiation monitors to avoid the possiblity of making a common-mode type error in the tests. The SIs were available at the location where they were being used in the red folders indicating they were official SIs. The instructions were followed step-by-step. The instrument mechanic checked out the required instruments, verified their calibration dates, used two separate voltmeters for the two radiation monitors, verified that they had not been used on the previous performances of the SIs, and switched instruments between the two radiation monitor SIs, again to avoid common-mode type errors. The SI itself appeared to meet the format requirements for procedures and was technically correct.

In conclusion, the personnel who performed these four SIs knew their job and performed it. They were of the grade level required to perform their functions, and the test instruments they used were within their calibration period. Also, the SIs they were using were technically correct, formatted correctly, and met all administrative requirements.

While monitoring the SIs being performed on the radiation monitors, it was noted by NSRS that an Instrument Maintenance Instruction (IMI) was to be conducted on a water level switch in the spent fuel pit. This switch was installed in response to a past event in which water was found in what should have been a dry spent fuel pit. An Operations Section employee noted that the annunciator in the control room, indicating water in the pit, was on. His check of the pit revealed that there was no water in the pit but that the level switch (a float-type switch) was lying on top of the fuel racks. Apparently during previous construction activities in the pit the switch had been placed there. Operations personnel should have responded to the annunciation immediately by removing the spent fuel pit covers and checking for water rather than waiting for the spent fuel pit covers to be removed for the performance of an SI. Failure to respond to this alarm was a failure to follow an instruction.

NSRS also reviewed the use of a temporary change to an SI. SI-4.0.5.3.C3, "Check Valve Testing During Refueling Outage - Feedwater System," was reviewed in detail. A change was being made to the SI to allow it to be used as a vehicle for generating a pump curve for the motor-driven auxiliary feedwater pumps. A temporary change, form Appendix G from AI-3.1, was included in the SI package and was approved by a plant superintendent. Everything was handled in accordance with AI-3.1 for a temporary intent change to an SI on a piece of CSSC equipment. The SI itself met all the requirements of AI-3.1.

3. System Walk-Through

A walk-through was conducted of portions of the residual heat removal system (RHRS). The inplant equipment and piping was compared to the "as-constructed" physical drawings and flow diagrams. Also, several hangers were randomly selected and compared to the drawings. No major discrepancies were found during the comparisons. Minor problems were brought to the attention of the plant staff.

H. Unit Interface Controls

TVA interface control requirements were defined in ID-QAP-2.3, "Physical Interfaces Between Licensed and Unlicensed Units."

NUC PR implemented the requirements for which it has responsibilities, in Area Plan 1103.01, "Physical and Functional Interfaces." WBN implemented the Area Plan requirements in AI-1.6, "Interface Establishment and Control." Also, the Preoperational Test Section had issued section instruction letter IL-9, "Preoperational Test Program - Unit Interface Program," and the Operations Section had issued section instruction letter OSLA-36 for interface controls.

Each level of definition or implementation generally incorporated the requirements of the higher-tier document. However, the Division of Nuclear Power Test Staff Program Manual, N82A10, TPMP-c.7, March 17, 1983, was made an attachment to IL-9 and was the main body of the section instruction letter. In the Area Plan, this document, N82A10, TPMP-c.7, was no longer in effect, but the division procedures listing indicated N82A10, Division of Nuclear Power Preoperational Test Program Manual, had been superseded by 1102.02, 1104.01, and 1105.01, but Area Plan Procedure No. 1103.01 best described the interface plan.

In reviewing IL-9 with attachment, there did not appear to be any contradiction between it and 1103.01. If it was the intent of the Preoperational Test Section to use the superseded document as its program basis because of the lack of contradiction and the greater detail that was included in the superseded document, there is no problem. Otherwise, IL-9 should be revised to include the latest document as an attachment.

In the review of the implementation of the interface control points, emphasis was placed on the electrical and mechanical interface points that had been established, that were to be established later, or that should have been established, rather than on physical security boundaries. In 1980 an interface study was conducted by the Preoperational Test Section at WBN. In September 1980, a report was issued for the study. In that report electrical and mechanical interface points were identified with justification for their use. All formal interface points were to be established within a preoperational or non-critical system test. That report (with a few changes since) identified 159 interface points in 13 plant systems that were to be controlled by the interface program. Also, in the report were recommendations that certain valves not included in the formal interface control be administratively controlled and that the output cabinets of the solid state protection system (SSPS) for unit 2 ' ~ transferred to NUC PR before unit 1 operation because several wire lifts and jumpers were to be installed in these cabinets to prevent unit 2 testing from interfering with unit 1 operation.

Previous to the NSRS review, the plant FQE had conducted a survey of the unit interface. The survey was conducted by comparing the plant procedures, AIs and SIs, to the Area Plan Procedure 1103.01 and by sampling the established interface control points. The findings of this review were issued in NSI-84-50 which was signed on February 20, 1984. Several deficiencies were found by FQE during its review resulting in WBN CAR 84-08, DR-84-23-R, and DR-84-24-R being written. WBN CAR 84-08 stated that (1) interface points were not accurately addressed on "as-constructed" drawings, (2) marked-up drawings were not being submitted to CONST, (3) test director name, for the test installing the interface point, was not listed on the interface control point log sheet as required by AI-1.6, and (4) AI-1.6 did not adequately implement the area plan in that there was no requirement for unique numbering of interface holdpoints.

The DRs involved an OSLA-36 requirement that drains that were sealed as interface points be painted yellow but had not been, and the identification of some interface temporary alterations which were numbered incorrectly--the year of installation was used instead of the system number. The two DRs had been closed but the CAR was still open with the Preoperational Test Section working on resolving it.

NSRS reviewed the survey, the method used in the survey, its findings, and the correction actions. DR-84-23-R was closed when OSLA-36 was rewritten deleting the requirement that drains capped for interface control were to be painted yellow. Not painting the drain caps had been the philosophy for one and one-half years, but the OSLA was not changed until the FQE survey. DR-84-24-R was closed when the Operations Section said they would reinstruct their Shift Engineer on the numbering system for interface points. The interface points that were already installed were not changed to show the system number rather than the year of installation and this was agreeable to FQE because the control was still intact. NSRS found the survey and its methods to be adequate, the findings valid, and the corrective action acceptable.

NSRS took a different approach to the interface control. NSRS reviewed the interface study report and the preoperational tests that would install the control points plus sampling some areas already surveyed by FQE. It was found that 57 control points had been installed in 5 systems with the use of 5 preoperational tests. From the interface study report there were 36 points still to be installed in the 5 systems and 66 more to be installed in 8 other systems using 8 preoperational or NCS tests. Table II shows the results of this review.

Interface points are installed using two control methods, the Temporary Alteration and Control Form (TACF) and the Hold Order (HO). Standard forms and tags are used for the TACFs and HOs, but a stamp is used on each one that installs an interface point. This stamp indicates that the TACF or HO is being used for an interface control point and that a workplan is required to remove the TACF or HO.