UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

CONCERNING FSAR, SECTION 11.6, "OFFSITE RADIOLOGICAL MONITORING PROGRAM"

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-390 AND 50-391

1.0 INTRODUCTION

By letter dated January 6, 1989 (Reference 1), TVA proposed a reduced meteorological and environmental monitoring program because of the extensive preoperational data previously collected and the target schedule at that time of approximately two years for the completion of the Watts Bar Nuclear Plants (WBN). Thus, in January 1989, the WBN monitoring program was reduced. The reduced program basically discontinued the collection of atmospheric samples, reduced the frequency of milk sampling from semimonthly to monthly, and reduced the frequency of all monthly sampling to quarterly. In its June 6, 1989 response (Reference 3), the staff indicated that the duration proposed by TVA for the reduction or discontinuation of the monitoring program was unacceptable. In its July 20, 1989 letter (Reference 4), TVA reevaluated the program and is in agreement with the staff's position as stated in the Branch Technical Position (Reference 2) regarding preoperational radiological environmental monitoring programs (REMP).

In 1990, TVA resumed the full preoperational REMP (Reference 5). The collection of all atmospheric samples was resumed, the frequency for collecting milk samples was increased from monthly to semimonthly, and the frequency of all sampling which had been reduced from monthly to quarterly was increased back to monthly. All quarterly, semiannual, and annual sampling continued as before.

The staff reviewed the TVA submittals mentioned above, and Section 11.6 of the FSAR as amended up to Amendment No. 67 (Section 11.6 was in reality substantively updated by Amendment No. 56).

2.0 EVALUATION

TVA is conducting the preoperational REMP to provide for measurement of background radiation levels and radioactivity in the plant environs. The REMP, which provides a necessary comparative basis for the operational radiological monitoring program, will also permit TVA to train personnel, evaluate procedures, equipment and techniques, as indicated in Regulatory Guide 4.1. The preoperational program for WBN was implemented in December 1976, and subsequently revised in 1986, to comply with WBN's draft technical specifications. The program follows the staff's guidelines described in the Branch Technical Position (BTP) on Environmental Monitoring. Table 1 summarizes the critical

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exposure pathways, the number of samples, the parameters measured, and the sampling frequency in the preoperational REMP. Highlights of TVA's REMP include monitoring of air at the offsite locations where the highest concentrations of radionuclides are expected, placement of dosimeters in two concentric rings around the plant, water samples (i.e., surface, ground, and drinking), upstream and downstream milk samples at locations where the highest doses are expected, and various food samples. Lower limits of detection (LLDs) for the various types of samples and nuclides are specified. The LLDs are consistent with those specified in NUREG-0472, "Standard Radiological Effluent Technical Specifications for PWRs" (Reference 6).

During the sampling period, a small number of samples were not collected and several analyses were not completed on some collected samples. The missed samples and analyses were the result of equipment malfunction, sample unavailability, the scarcity of sample media, and the lack of sufficient quantities of sample for complete analyses. In addition, one dairy farm went out of business and was deleted from the monitoring program. The clam population was diminishing, which led to reduction of sampling at several locations. A list of missed samples, analyses, causes, and remedies to prevent recurrence was provided in a related table in TVA's June 14, 1991 letter. The missed samples and analyses are not unexpected for preoperational REMP. TVA has taken corrective action which the staff finds acceptable.

A quality assurance program has been implemented by TVA to ensure that the environmental monitoring data are reliable. This program includes the use of written, approved procedures in performing the work, a nonconformance and corrective action tracking system, systematic internal audits, a complete training and retraining system, audits by various external organizations, and a laboratory quality control program. The staff finds the above program to be acceptable.

TVA's Western Area Radiological Laboratory participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by the Environmental Protection Agency (EPA). The program provides periodic cross check samples of the type and radionuclide composition normally analyzed in an environmental monitoring program. The result obtained in the monitoring program and the EPA's program are reported annually to NRC.

3.0 CONCLUSION

The staff concludes that the Watts Bar preoperational REMP proposed by TVA is adequate to provide baseline data which will assist in verifying radioactivity concentrations and related public exposures during plant operation, and is therefore acceptable.

Dated: September 10, 1991

Principal Contributor: J. Minns

Attachments:
Table 1 - REMP
Table 2 - Sampling Locations

REFERENCES

(1) January 6, 1989, letter from R. Gridley (TVA) to NRC Document Control Desk.

(2) November 1979, Branch Technical Position, Revision 1 Radiological Assessment Branch.

(3) June 6, 1989, letter from S. Black to O. D. Kingsley (TVA) on Environmental and Meteorological Monitoring Program for Watts Bar Nuclear Plant.

(4) July 20, 1989, letter from M.J. Ray, TVA to NRC Document Control Desk.

(5) June 14, 1991, letter from E.G. Wallace, TVA to NRC Document Control Desk transmitting the 1990 Watts Bar Radiological Environmental Monitoring Report.

(6) NUREG-0472, "Standard Radiological Effluent Technical Specifications for PWRs," Revision 3, 1988.

TABLE 1

WATTS BAR NUCLEAR PLANT

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type and Frequency and Analysis
RADIOIODINES AND PARTICULATES IN AIR	Samples from 10 locations:	Continuous sampler operation with sample collection weekly or as required by dust loading, whichever is more frequent	Radioiodine Canister: analyze weekly for I-131
	4 samples from offsite locations (in different sectors) at or near the site boundary (SSW, 0.9 mile, N, 0.5 mile, NNE, 1.9 miles, and SE, 0.9 miles)		
	4 samples from the communities approximately, 6-10 miles from plant (NW, 7.0 miles, NNE, 10.4 miles, NE/ENE 7.6 miles, and S, 6.2 miles)		Particulate Sampler: Gross beta radioactivity following filter change,
	2 samples from a control location, 10-20 miles upwind (SW, 15 miles and NNW, 15 miles)		composite (by location) for gamma isotopic quarterly
DIRECT RADIATION	16 sectors with two or more dosimeters or one instrument for measuring and recording dose rate continuously to be placed as follows: (1) an inner ring of stations near the site boundary; (2) and outer ring 4 to 5 miles from the site; (3) 10 stations (2 or more dosimeters) in special interest areas such as population centers, nearby residences, schools	Quarterly	Gamma dose quarterly

Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type and Frequency and Analysis
SURFACE WATER	1 sample at a control location upstream from plant discharge (1.5 miles) 2 samples downstream from plant discharge (9.9 miles and 4.7 miles)	Composite sample over one-month period	Gamma isotopic analysis monthly. Composite for, Sr-89, Sr-90 tritium analysis quarterly
GROUND WATER	Samples from 1 well and 1 farm (S, 19.5 miles and SE, 1.9 miles)	Quarterly	Gamma isotopic and tritium analysis quarterly
DRINKING WATER	1 sample at the first two potable surface water supplies downstream from the plant (0.4 mile) 1 sample at a control location (1.5 miles) 2 samples of drinking water from public supplies near WBN (Spring City and Watts Bar Reservation)	Composite sample over two-week period if I-131 analysis is performed, monthly composite otherwise	I-131 analysis on each composite when the dose calculated for the consumption of water is greater than 1 mrem per year. Composite for Gross B and gamma isotopic analyses monthly. Composite for tritium analysis quarterly
SEDIMENT FROM SHORELINE	1 sample from upstream area with existing or potential recreational value (14.8 miles) 1 sample downstream from plant discharge (0.4 mile)	Semiannually	Gamma isotopic analyses semiannually
MILK	3 milk samples from farms and/or dairy's in the immediate vicinity of the plant (SSW, 16.0 miles, NW, 4.6 miles and ESE, 3.7 miles) 1 sample for a control; 10-20 miles upwind (E, 15.0 miles, SSW, 16.0 miles and SW 19.5 miles)	Every 2 weeks	Gamma isotopic, Sr-89 and Sr-90 once per month I-131 analysis on each sample

Exposure Pathway and/or Sample	Number of Samples and Locations	Sampling and Collection Frequency	Type and Frequency and Analysis
FISH AND INVERTEBRATES	1 sample of each commercially and recreationally important species; from Nickajack, Chichamauga, Watts Bar Reservoirs and 4 samples near plant discharge.	Sample semiannually	Gamma isotopic analysis on edible
FOOD PRODUCTS	1 sample each of principal food products grown at private gardens/ or farms in the immediate vicinity of the plant.	At time of harvest	
	1 sample of each of the same foods grown at distance of greater than 10 miles from the plant	Monthly when available	

Table 2

Sampling Location

Station	Sector	Samples Collected
PM-2	NW	AP,CF,FO,R,S
PM-3	NNE	AP,CF,FO,R,S
PM-4	NE/ENE	AP,CF,FO,R,S
PM-5	S	AP,CF,FO,R,S
RM-2	SW	AP,CF,FO,R,S
RM-3	NNW	AP,CF,FO,R,S
LM-1	SSW	AP,CF,FO,R,S
LM-2	N	AP,CF,FO,R,S
LM-3	NNE	AP,CF,FO,R,S
LM-4	SE	AP,CF,FO,R,S
Farm L	SSW	M,V,W
Farm Mo	NW	M,V
Farm H	W	M,V
Farm B	E	M
Farm C	SSW	M
Farm S	SW	M,V
Farm Mu	ESE	M,V,X

Sample codes:

AP = Air particulate filter
CF = Charcoal filter
CL = Clams
F = Fish
FO = Fallout
M = Milk
P = Plankton
R = Rainwater
S = Soil
SD = Sediment
SS = Shoreline sediment
SW = Surface water
V = Vegetation
W = Well water