



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23TB5  
ATLANTA, GEORGIA 30303-8931**

March 29, 2002

EA-02-024

Tennessee Valley Authority  
ATTN: Mr. J. A. Scalice  
Chief Nuclear Officer and  
Executive Vice President  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: EXERCISE OF ENFORCEMENT DISCRETION - NRC SPECIAL  
INSPECTION REPORT NOS. 50-259/01-08, 50-260/01-08, 50-296/01-08,  
50-327/02-06, 50-328/02-06, 50-390/02-05 AND 50-391/02-05**

Dear Mr. Scalice:

On March 1, 2002, the NRC completed an inspection at your Corporate Office in Chattanooga, Tennessee. The enclosed report presents the results of that inspection which were discussed on March 1, 2002 with Mr. J. R. Rupert and other members of your staff.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The inspectors reviewed selected procedures and records and interviewed personnel.

Based on the results of this inspection, two findings were identified which were also determined to involve violations of regulatory requirements. The first issue, described in paragraph 2OS2.1 of the enclosed report, was not assessed in accordance with the significance determination process because it was identified and corrected by the licensee prior to implementation of the Reactor Oversight Process and involved a non-compliance with 10 CFR 50.9. In accordance with Section VI of the Enforcement Policy, this Severity IV violation is being treated as a non-cited violation. If you deny this violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspectors at the Browns Ferry, Watts Bar, and Sequoyah facilities.

Regarding the second issue, described in Paragraph 4OA3 of the enclosed report, involving a 1981 overexposure of a minor, the NRC has concluded the exercise of enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy is appropriate, and this violation is not being cited. The basis for this conclusion is presented in the enclosed report.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Charles A. Casto, Director  
Division of Reactor Safety

Docket Nos.: 50-259, 50-260, 50-296,  
50-327, 50-328, 50-390,  
50-391

License Nos.: DPR-33, DPR-52, DPR-68,  
DPR-77, DPR-79, NPF-90  
and Construction Permit  
No. CPPR-92

Enclosure: NRC Inspection Report  
w/Attachment - Supplemental Information

cc w/encl:  
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NAME	ETesta	DJones	ABoland	PFredrickson	JHenson	CEvans	
DATE	3/24/2002	3/29/2002	3/29/2002	3/29/2002	3/29/2002	3/28/2002	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-259, 50-260, 50-296, 50-327, 50-328, 50-390, 50-391  
License Nos: DPR-33, DPR-52, DPR-68, DPR-77, DPR-79, NPF-90 and  
Construction Permit No. CPPR-92

Report Nos: 50-259/01-08, 50-260/01-08, 50-296/01-08, 50-327/02-06,  
50-328/02-06, 50-390/02-05, 50-391/02-05

Licensee: Tennessee Valley Authority (TVA)

Facility: TVA Corporate Office

Location: 6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

Dates: December 3-7, 2001, January 14-18, 2002, and  
February 25-March 1, 2002

Inspectors: D. Jones, Senior Health Physicist  
E. Testa, P.E. Senior Health Physicist

Approved by: Anne T. Boland, Chief  
Plant Support Branch

Enclosure

## SUMMARY OF FINDINGS

IR 05000259-01-08, 05000260-01-08, 05000296-01-08, 05000327-02-06, 05000328-02-06, 05000390-02-05, 05000391/02-05, on 12/03-07/2001, 01/14-14/2002, and 02/25-03/1/2002, TVA Corporate Office, ALARA planning and controls.

The inspection was conducted by two Region II senior health physicists. The inspection identified one non-cited violation. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using the Significance Determination Process (SDP) found in Inspection Manual Chapter 0609. Findings to which the SDP does not apply are indicated by "No Color" or by the Severity Level of the applicable violation. The NRC's program for accessing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process web site.

A. Inspector Identified Violations

None

B. Licensee Identified Violations

One violation characterized at Severity IV which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken and planned by the licensee appear appropriate (Section 2OS2.1).

## Report Details

### **2. RADIATION SAFETY**

#### **Cornerstone: Occupational Radiation Safety**

##### 2OS2 ALARA Planning and Controls

##### .1 Personnel Exposure Records/Dose Reconciliation Project

##### a. Inspection Scope

The inspectors reviewed the status of the Radiological Exposure Records Reconciliation Project initiated in 1994 to correct personnel exposure records to determine whether the licensee identified appropriately and corrected dose discrepancies. Those activities were evaluated for consistency with the requirements for radiation exposure related records and reports specified in Subparts L and M of 10 CFR 20 and 10 CFR 50.9.

##### b. Findings

One licensee identified non-cited violation was noted regarding the failure to maintain complete and accurate radiation exposure records as required by 10 CFR 50.9(a), "Completeness and Accuracy of Information."

As background, Tennessee Valley Authority (TVA) has used several systems-of-records for recording personnel radiation exposures. A manual tracking system was used from 1957 to 1969. The Radiological Hygiene Personnel Exposure Database (RADPERS), the first electronic database, was used from 1970 to 1984; the Radiation Exposure Management System (REMS) was used from 1985 to 1991; and the Radiation Exposure System (REXS) was used from 1992 to 1999. Since 1999 the Canberra HIS-20 database has been used for on-line collection of personnel exposures, and the Exposure Data Repository (EDR) has served as the overall system-of-records for personnel exposures.

In 1994, Sequoyah site personnel determined that certain personnel exposure information which should have been in the REXS database was not available. Significant Corrective Action Report (SCAR) No. CHSCA940002 was issued to document the finding, to determine the extent-of-conditions and to identify the necessary corrective actions subsequently, the licensee chartered the Radiological Exposure Records Reconciliation Project (RERRP) to conduct the investigation and oversee implementation of corrective actions. The RERRP's investigation resulted in the issuance of more than 18 additional Problem Investigation Reports (PERs) related to personnel exposure records. The project was initially scheduled to be completed by October 2001 but was completed ahead of schedule on January 11, 2000, with the submittal of revised dose information to the NRC.

The inspectors reviewed selected PERs related to the RERRP. The RERRP identified problems concerning the transfer of exposure data from the RADPERS to the REMS database during 1983 and the subsequent transfer of the REMS database to the REXS database in 1992. When the RERRP investigation began in 1994, the project staff found

that the original RADPERS electronic database for the years 1977 through 1984 had been retained but the electronic database for the years 1970 through 1976 no longer existed. Therefore a "reconstructed" RADPERS electronic database for the years 1970 through 1984 was created and used by the RERRP as the tool for their investigation. The reconstructed RADPERS database for the years 1970 through 1976 was created by optically scanning printouts of exposure records from the original RADPERS which had been stored on microfilm. Those records consisted of listings of monthly exposures for each monitored individual and the individuals were identified by Social Security Number (SSN). Annual dose totals from the reconstructed RADPERS database were compared, by individual, to annual dose totals from the REXS database in order to identify missing or inconsistent records. That comparison identified 11,320 occurrences (individual-years) in which there was a difference of 1 mrem or more in an individual's total annual dose between the two databases.

Given the inherent limitations and uncertainties associated with radiation dose measurements, the RERRP established a dose difference threshold for identifying which of the 11,320 occurrences should be further evaluated. The criteria established for identifying dose differences requiring further evaluation were: if the difference between the annual dose for an individual as determined from the reconstructed RADPERS database and that individual's annual dose determined from the REXS database was 10 mrem or greater and if the relative difference between the two annual dose values was greater than 5 percent, then the individual's dose for the identified year would be further evaluated. This criteria was based on the licensee's previous performance during proficiency testing for accreditation of their dosimetry program which indicated that the licensee's Lower Limit of Detection for dosimetry measurements was 10 mrem and the uncertainty for those measurements was  $\pm 5$  percent. The inspectors evaluated that criteria and determined that those threshold values were conservative and adequate for the purpose of identifying which individual-years should have been further evaluated. If the difference exceeded the established threshold, then a detailed evaluation of the individual's dose would be performed to determine whether the individual's dose should be reconstructed for the year identified and recorded in the EDR. The reconstructed dose was to be determined from the original RADPERS records. Application of those criteria yielded 7,978 occurrences which were below the threshold and, therefore, no further evaluation was required. That left 3,342 individual-years which required further evaluation. Detailed comparison of the original RADPERS records to the REXS database indicated that there was in fact no difference greater than 1 mrem for 1,835 of the 3,342 identified individual-years. Therefore dose reconstruction and entry into the EDR was required for 1,507 individual-years.

An attachment to PER CHPER970069, issued in May 1997, provided a listing of the 1,507 dose difference occurrences (individual-years) identified by the comparison of the reconstructed RADPERS database to the REXS database. The inspectors selected representative samples (individual-years) from that listing to review. Printouts obtained from microfilmed records of the monthly doses recorded in the original RADPERS database for each individual selected were compared to the doses recorded in the EDR for the identified year. The inspectors verified that appropriate corrections had been made to the EDR.



The RERRP's comparison of the reconstructed RADPERS to REXS also identified approximately 1,400 individuals who were listed in the reconstructed RADPERS database as having been monitored for exposure but were not included in the REXS database for one or more years. The closure documentation, dated December 6, 1999, for PER CHPER970069 indicated that 1,378 of those individuals had been identified and information had been entered into the EDR to correct, as necessary, their exposure records. The closure documentation also indicated that demographic data had not been located to identify the remaining 22 individuals. As of the week of the inspection on February 25-March 1, 2002, the licensee had identified all but 3 of those 22 individuals. The licensee indicated that number transpositions had been found in SSNs for 19 of the 22 individuals and that a search of the Human Resource Department's personnel database could not produce any record of the remaining 3 individuals ever having been employed by the licensee. The reconstructed RADPERS indicated that the assigned dose for two of those individuals was zero for the identified year and that the incurred dose for the third individual was 108 mrem during 1971.

The inspectors selected a representative sample (individual-years) from the population of 1,400 missing individuals. The samples were selected from an attachment to PER CHPER970069 which listed, by SSN and year, each individual that was included in the reconstructed RADPERS database but not in the REXS database. A number of the samples selected had been identified as missing individuals as a result of their SSN having been recorded incorrectly in either the reconstructed RADPERS or in the original RADPERS database. The inspectors verified that the SSNs for these individuals had been corrected in the EDR and that their doses recorded in the EDR for the identified year were consistent with their doses recorded in the original RADPERS database. Printouts obtained from microfilmed records which showed the monthly doses recorded in the original RADPERS database were examined by the inspectors for the years associated with the other selected samples. The inspectors determined that there were no exposures recorded in the original RADPERS database for those individuals for the indicated years. The inspectors also noted that the EDR indicated that initial exposures for these individuals began in subsequent years.

On February 27, 2002, the licensee issued PER 02-000061-000 to investigate this apparent anomaly. The licensee's preliminary review indicated that exposure data for the period April through July 1977 was entered incorrectly into the reconstructed RADPERS database as both 1973 and 1977 data. The licensee indicated that the apparent effect of those manual data entry errors was the erroneous identification of individuals as being in the reconstructed RADPERS database but not in the REXS database for the affected years and, therefore, an inflated number of individual-years were required to be evaluated by the RERRP. The licensee's follow-up actions and extent of condition review with regard to this issue will be reviewed during a subsequent inspection (Inspector Follow-up Item (IFI) 50-259/01-08-01, 50-260/01-08-01, 50-296/01-08-01, 50-327/02-06-01, 50-328/02-06-01, 50-390/02-05-01 and 50-391/02-05-01).

The inspectors also selected additional samples of dose records for individuals whose dose records were not identified as discrepant by the licensee's comparison methodology as established in CHPER970069. Based on a review of the monthly dose records, the

inspectors verified that the doses recorded in the EDR, for all but one individuals, were consistent with the doses recorded in the original RADPERS database for the years selected. Duplicate dose entries (separated by 1 second) for three months of 1981 were found in the EDR dose records for the one individual. It was also noted that a 22 mrem entry for September 1981 was recorded in the original RADPERS database for this individual but was not included in the EDR. On January 17, 2002, the licensee issued PER 02-000018-000 to document these issues and to determine the extent-of condition. The licensee determined that there were 181 duplicated monthly dose records for various individuals in the EDR and deleted those duplications. The inspectors reviewed a representative sample of the dose records for these individuals in the EDR to verify that the duplications had been removed. The licensee also determined that the missing 22 mrem was not a database error but was a manual correction made to the original RADPERS database in September 1983 to delete the 22 mrem from the individual's records. No documentation was found to support that correction; however, the licensee stated that corrections were routinely made during that time frame to dose records when appropriate. Absent that 22 mrem, the individual's total recorded dose for the third quarter of 1981 was 63 mrem, well below the 1250 mrem quarterly limit in effect at that time.

The inspectors determined that the licensee had developed a sufficiently scoped dose reconstruction program with appropriate methodology for identification of discrepancies in personnel exposure records using action thresholds set at adequate detection levels. Based on the NRC's sampling, discrepancies in personnel exposure records identified through the established process were appropriately corrected. As a result of the Radiological Exposure Records Reconciliation Project, the total person/rem reported to the NRC for the period 1971-1998 increased by 44.1 person/rem, out of a total 38,059 person/rem and the total number of individuals reported increased by 92 out of 234,506 worker-years of data.

10 CFR 20.401 and subsequently 10 CFR 20.2106 requires that the licensee maintain records of doses received by all individuals for whom monitoring was required. 10 CFR 50.9 requires, in part, that information required by the Commission's regulations to be maintained shall be complete and accurate in all material respects. Contrary to these requirements, the licensee failed to maintain accurate records of personnel exposures during the period 1970 to 1999. This violation was not assessed in accordance with the significance determination process because it was identified and corrected prior to implementation of the Reactor Oversight Process and involved a violation of 10 CFR 50.9. Therefore, in accordance with Section VI of the Enforcement Policy, this licensee identified and corrected Severity IV violation is being characterized as a non-cited violation (NCV) and is identified as NCV 50-259/01-08-02, 50-260/01-08-02, 50-296/01-08-02, 50-327/02-06-02, 50-328/02-06-02, 50-390/02-05-02 and 50-391/02-05-02)<sup>1</sup>, Failure to maintain complete and accurate personnel dose records as required by 10 CFR 20.401, 10 CFR 20.2106, and 10 CFR 50.9 . This issue is in the licensee's corrective action program as

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<sup>1</sup>Part 30 docket numbers are also affected by this violation but are not enumerated here due to their number.

Problem Evaluation Report (PER) CHSCA940002 Personnel Exposure  
Records-Reconciliation Project.

## .2 Problem Identification and Resolution

### a. Inspection Scope

The inspectors evaluated audits and special assessments related to the Radiological Exposure Records Reconciliation Project to determine whether the licensee appropriately assessed, identified and resolved exposure record discrepancies. The inspectors evaluated the following Audits and Special Assessments:

- Special Assessment Report NA-CH-99-005 - Exposure Data Repository (EDR) Project - Radiological Exposure System (REXS) Data Transfer to EDR, dated September 23, 1999
- Nuclear Assurance (NA) - Supplier Audit 2000V-31 - Intergroup Agreement No. 5 (IGA-5) - Information Services (IS) - Chattanooga and Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants - Audit Report, dated October 2, 2000
- Self-Assessment Report - CRP-RP-00-05 Radiological Control Exposure Records, NRC Form 4 (Lifetime Occupational Exposure History), dated, May 22, 2000
- Self-Assessment Report - CRP-00-04 Effectiveness Evaluation of Exposure Data Repository (EDR) conducted, May 1-26, 2000
- Self Assessment Plan and Findings TVA Exposure-Related Records, conducted March - April 1999
- Self Assessment Plan and Findings TVA Exposure-Related Records, conducted May 27 - June 17, 1998
- Employee Concern Investigation ECP-99-CH-001-F1, dated August 5, 1999

The inspectors also interviewed the team leader of the 1999 Special Assessment Report NA-CH-99-005, and members of the self-assessment teams to determine the scope of the reviews and the nature of findings identified.

### b. Findings

No findings of significance were identified.

## 4. **OTHER ACTIVITIES**

### 4OA3 Event Follow-up

(Closed) LER 50-259/1999-R001-00: An Overexposure Violation of a Minor in the Third Quarter 1981 due to an Incorrect Year in the Date of Birth. On October 29, 1999, a radiation exposure, 15 mrem in excess of the 10 CFR 20.104(a) limit of 125 mrem for an individual less than 18 years of age, was identified which had occurred in the third quarter of 1981. The exposure was discovered by the licensee during the Radiological Exposure Records Reconciliation Project.

Based on the inspectors' review of the LER and dose history for the individual, during the period of June 18 - August 8, 1981, a contractor employee at the Browns Ferry (BFN) plant who was 17 years of age received a total whole body dose of 140 mrem. This dose

was determined through measurements by three thermoluminescent dosimeters (TLD) (0 mrem, 56 mrem, 34 mrem, respectively) and a pocket ion chamber which was issued to the individual for an 18 day period after the individual lost his issued TLD (50 mrem). The individual was subsequently rehired during the period of August 1-17, 1982, at BFN and received a deep dose of 72 mrem, as measured by TLD.

Discussions with the licensee and review of licensee's documentation indicated that the three TLDs issued to the individual in 1981 were apparently issued by three different security officers. The TLD issue forms included a block for the individual's birth date. On all three forms for 1981, the birth year was recorded incorrectly as 1963. The monitoring records for 1982 indicated a birth year of 1964 which was later determined to be the correct birth year. Consequently, in 1981, the individual was erroneously presumed to be 18 years of age and his dose was improperly controlled to the adult quarterly whole body limit specified in 10 CFR 20.101(a) of 1250 mrem, rather than to ten percent of the adult limit specified by 10 CFR 20.104(a), or 125 mrem. This failure to control the dose of a minor to less than the limits of 10 CFR 20.104(a) was identified as a violation.

On June 20, 1991, the occupational dose limits of 10 CFR Part 20 were revised. In accordance with 10 CFR 20.1207, the occupational dose limits for minors were revised to 10 percent of the annual dose limit of an adult worker specified in 10 CFR 20.1201, or 500 mrem total effective dose equivalent. Therefore, the 140 mrem whole body exposure for the individual in the third quarter of 1981 (also his annual dose for 1981) would not constitute a violation under the current regulations nor would it be considered more than a minimal health risk. Based on these factors, and the fact that the violation was identified and appropriately addressed by the licensee, the NRC has determined to exercise enforcement discretion in accordance with Section VII.B.6 of the enforcement Policy and not cite the violation of 10 CFR 20.104(a).

#### 4OA6 Management Meetings

The inspectors presented the inspection results to Mr. Jon Rupert, Vice President, Engineering and Technical Services, and other members of licensee management on March 1, 2002.

**SUPPLEMENTAL INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

M. Burzynski, Manager Nuclear Licensing  
R. Brown, Project Manager, Corporate Licensing  
E. Chandrasekaran, Manager, Radiological and Chemistry Services  
J. Flanigan, Program Manager, Radiological Control  
S. Haider, Specialist, Corporate Licensing  
M. Harding, Manager, Concern Resolution Program  
J. Rupert, Vice President, Engineering and Technical Services  
J. Semore, Corporate Quality Assurance

**LIST OF ITEMS OPENED AND CLOSED**

Opened

50-259, 260, 296/01-08-01	IFI	Follow-up on licensee's actions with regard to 1977 exposure data being entered into the reconstructed RADPERS database as 1973 data.
50-327, 328/02-06-01		
50-390, 391/02-05-01		

Opened and Closed

50-259, 260, 296/01-08-01	NCV	Failure to maintain complete and accurate personnel dose records as required by 10 CFR 20.401, 10 CFR 20.2106, and 10 CFR 50.9 (Section 20S2)
50-327, 328/02-06-01		
50-390, 391/02-05-01		
50-259, 260, 296/01-08-02	LER	Exposure of a minor in third quarter of 1981 in excess of the requirements of 10 CFR 20.104 (Section 40A3)
50-327, 328/02-06-02		
50-390, 391/02-05-02		