I3
0764

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

LA PSC 1

'84 NOV 13 P1:39

November 8, 1984

Ms. Cordelia Harvey
U.S. Nuclear Regulatory Commission
Material Licensing Branch
Division of Fuel Cycle and Material Safety
Washington, D.C. 20555

Dear Ms. Harvey:

This is in response to your letter to me dated September 7, 1984, and the letter from Joseph C. Wang, of the Nuclear Regulatory Commission, to J. A. Coffey, of the Tennessee Valley Authority, dated February 14, 1984. We believe that the additional information enclosed will satisfy the concerns expressed in these two letters. The item numbers mentioned in the enclosures refer to the item number of the by-product material license application submitted to Mr. Wang on May 22, 1984.

We believe that it is appropriate that R. B. Maxwell remain the radiation protection officer as specified on the license application. Mr. Maxwell manages a staff of professional health physicists and health physics technicians who are responsible for TVA's health physics programs that are offsite from TVA's nuclear power plants. We believe that this staff is fully capable of supplying an adequate radiological safety program at this laboratory. Our primary assurance of radiological safety is our commitment to always provide qualified health physics surveillance and guidance at critical times while work is being done on contaminated items.

If you have any questions, please let me know.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

Hillary A. Taff

Hillary A. Taff, Chief
Central Laboratories Services

Enclosures: 4

ENCLOSURE 1

Item 3 is revised to read: G.A. Erickson, Supervisor, Measurements Laboratory. This revision reflects a change in duties for Mr. Erickson.

Item 4 is revised to read: Tennessee Valley Authority, Central Laboratories Services, LA PSC 1, Chattanooga, Tennessee 37401. This revision provides a more complete mailing address for Central Laboratories.

ENCLOSURE 2

Item 6 is revised to read:

John L. Rose, Jr., Supervisor, Chemical Laboratory Section

Rebecca J. Stokes, Supervisor, Metallurgical Laboratory Section

Gerald A. Erickson, Supervisor, Measurements Laboratory Section

Resumes of these individuals reflecting their training in radiation safety and their experience in working with radiation are provided in Enclosure 4. In addition to the training listed on their resumes, supervisors at the laboratory will be given one day of training in radiation protection with specific emphasis on the types of problems expected at this laboratory. This training and the training provided to general workers, as required by 10 CFR 19 and outlined in 15.1 (Enclosure 3), will be provided by a professional health physicist or by an ANSI qualified health physics technician on the staff of the Radiation Protection Officer. Resumes of three people who may conduct this training (Marty L. Jamieson, Arthur K. Rose and Jesse H. Coleman) are attached. Because of potential changes in personnel, other people with equivalent education and experience will be substituted to provide this training as necessary.

RESUME

Marty L. Jamieson

Education:

B.S. in Physics, David Lipscomb College, Nashville, Tennessee, 1974.

Radiation Emergency Response, Las Vegas, Nevada; sponsored by the Federal Government.

Health Physics, Oak Ridge Associated Universities, Oak Ridge, Tennessee. Intensive 10 week Course in Health Physics.

Experience:

November 1983--Present

Tennessee Valley Authority, Muscle Shoals, AL
HEALTH PHYSICIST
Involved in radiation safety in the power service shops (where certain contaminated reactor components are repaired), leak testing of sources, contamination surveys of laboratories where radioisotopes are used, accelerator safety, radiography inspection, medical X-ray and personnel training.

August 1978--November 1983

Tennessee Department of Health and Environment, Nashville, TN
RADIOLOGICAL PHYSICIST
Responsible for review and evaluation of X-ray inspections of Tennessee "Registered Inspectors," engaged in the Nationwide Evaluation of X-Ray Trends (NEXT) to determine human exposure to X-ray radiation in Tennessee, developed new and more accurate inspection techniques to determine compliance with State and Federal regulations, involved in the training of division personnel, developed Certified Registrations in conjunction with accelerator safety assessment, and recommended methods for minimizing radiation exposure in health care facilities.

RESUME

Arthur Keith Rose

Education: B.S. in Biology, Chemistry minor, University of North Alabama, 1977.

Experience:

4/29/84-Present	HEALTH PHYSICS TECHNICIAN Tennessee Valley Authority Muscle Shoals, AL
1/9/83-4/29/84	HEALTH PHYSICS TRAINING INSTRUCTOR Tennessee Valley Authority, Browns Ferry Nuclear Plant, Decatur, AL
4/25/82-1/9/83	HEALTH PHYSICIST Tennessee Valley Authority, Muscle Shoals, AL
12/16/79-4/25/82	HEALTH PHYSICS TECHNICIAN Tennessee Valley Authority, Browns Ferry Nuclear Plant, Decatur, AL
6/17/79-12/16/79	HEALTH PHYSICS TRAINING CLASS Tennessee Valley Authority, Muscle Shoals, AL
5/6/79-6/17/79	CHEMICAL LABORATORY ANALYST Tennessee Valley Authority, Gallatin Electrical Generating Plant, Gallatin, TN
10/16/78-5/6/79	CHEMICAL LABORATORY ANALYST Tennessee Valley Authority, New Johnsonville Electrical Generating Plant, New Johnsonville, TN
9/5/78-10/16/78	ENGINEERING AIDE IN HEALTH PHYSICS Tennessee Valley Authority, Browns Ferry Nuclear Plant, Decatur, AL
6/26/78-9/5/78	ENGINEERING AIDE IN ENVIRONMENTAL PLANNING Tennessee Valley Authority, Muscle Shoals, AL
4/14/78-6/26/78	ENGINEERING AIDE IN HEALTH PHYSICS Tennessee Valley Authority, Browns Ferry Nuclear Plant, Decatur, AL

RESUME

Jesse H. Coleman

Education:

B.S. in Mathematics and Physics, Jacksonville University, Jacksonville, Florida, 1968.

M.E. in Environmental Engineering, University of Florida, Gainesville, Florida, 1971.

Radiation Protection Short Course, Georgia Institute of Technology, two weeks, 1981.

Internal Radiation Dosimetry Course, one week, 1982, presented by Dr. Kenneth W. Scrable, Chelmsford, Massachusettes.

Applied Health Physics, five weeks, Oak Ridge Associated Universities, Oak Ridge, Tennessee, 1984.

Experience:

November 1980--Present: Health Physicist, Tennessee Valley Authority, Muscle Shoals, Alabama; Duties include: estimation of radiological dose via environmental pathways; participate in radiological emergency plan as dose assessor and field monitor; survey laboratories, shops, and instruments for radiological contamination; evaluate health physics programs for regulatory compliance and potential improvements.

April 1971--November 1980: Environmental Engineer, Tennessee Valley Authority, Muscle Shoals, Alabama; Duties included: design and conduct of field studies of atmospheric plumes from cooling towers and coal-fired power plants; supervisor of 6-man field team; evaluation and reporting of data, design of atmospheric models, and computer codes.

ENCLOSURE 3

Item 15 is revised to read:

Radiation Protection Program

15.1 Transport and Receipt of Contaminated Equipment and Items:
All equipment and items that are contaminated with radioactive material will be shipped to and from the laboratory in accordance with all applicable regulations promulgated by the U.S. Nuclear Regulatory Commission and the Department of Transportation. These regulatory requirements are incorporated into the laboratory's operating procedures.

Upon arrival at the laboratory, each package containing contaminated equipment or items will be placed in an area used only for storage of radioactively contaminated materials. The storage area will be posted and surveys and monitoring will be conducted in accordance with applicable regulations and guidance. These packages will not be opened until a work area is prepared for safely handling the material and qualified health physics surveillance is present.

Contaminated equipment or items will not be shipped to the laboratory until they have been decontaminated ALARA. No equipment or item will be shipped to the laboratory if it exceeds 50,000 disintegrations per minute per 100 square centimeters beta/gamma transferable on exterior surfaces or 5 millirem/hour gamma direct radiation on contact.

15.2 General Procedures For Working With Contaminated Equipment or Items:
All laboratory work performed on or with contaminated equipment or items will conform with applicable NRC regulations and guidance.

No work will be performed on or with contaminated equipment or items unless:

a. Contaminated equipment or items being worked on are decontaminated ALARA prior to beginning work.

b. Qualified health physics surveillance and guidance is conducted prior to beginning work and as work continues, particularly at critical times during work such as during equipment disassembly, etc.

c. Proper precautions are taken to prevent spreading contamination and to minimize the doses to workers by direct radiation and ingestion pathways using ALARA principles. Precautions taken will be commensurate with the potential hazard and applicable regulations and guidance.

d. Work procedures specifying the radiological aspects of all work performed on contaminated equipment or items are followed.

e. All personnel who work on contaminated equipment or items or who may in the course of their work come into contact with radioactive contamination have received training in accordance with the Code of Federal Regulations, Title 10, Part 19. Attachment 15.1 is an outline of the training provided.

Health physics surveillance will be provided by health physics technicians with at least three years' experience and supervised by a professional health physicist. For emergency requests, nuclear power plant staff with equivalent experience may be utilized.

15.3 Decontamination of Facilities and Equipment Prior to Release For Unrestricted Use:

Residual contamination will be eliminated to the extent possible consistent with ALARA principles. No facilities or equipment will be released for unrestricted use until they have been surveyed to be less than the levels in table 15.1.

Table 15.1

Levels For the Release of Facilities or Equipment
(disintegrations per minute per 100 square centimeters)

Direct Survey		Smear Survey	
Alpha	Beta	Alpha	Beta
200	10,000	20	200* 1,000**

*This level applies if it has not been shown that Sr-90, I-126, I-131, or I-133 are not present.
**This level applies if it has been shown that Sr-90, I-126, I-131, or I-133 are not present.

Radiological waste will be placed in approved containers and shipped to a nuclear power plant for disposal.

15.1 OUTLINE OF RADIATION SAFETY TRAINING

I. Introduction

II. Basic Principles of Radiation

A. Atomic and Nuclear Structure

1. Atoms and Elements
2. Molecules and Compounds
3. Fundamental Particles: Proton, Neutron, Electron
4. Atomic Configuration
5. Atomic Weight and Number
6. Isotopes

B. Types of Radiation

1. Discovery of Radiation
2. Types of Radiation
   a. Particulate: Alpha, Beta, Neutron
   b. Electromagnetic: X-rays and Gamma
3. Properties of Radiation
   a. Range and Attenuation
4. Electromagnetic Spectrum

C. Radioactive Decay

1. The Curie
2. Decay Curves
3. Decay Schemes

D. Interaction of Radiation with Matter

1. Ionization and Ions
2. Ionization by Particles

3. Ionization by Electromagnetic Radiation

a. Photoelectric Absorption

b. Compton Scattering

c. Pair Production

E. Sources of Radiation

1. Natural

2. Man-Made

III. Radioactivity Measurements and Monitoring Technique

A. Radiation Measurement Units

1. Exposure: Roentgen

2. Dose: Rem and Rad

3. Contamination: dpm per $100cm^2$

B. Radiation Monitoring Equipment

1. Survey Meters, portable and fixed location

a. Types of Survey Meters

b. How to use them

2. Dosimeters

a. Pocket Chamber

b. TLD Badge

c. Issuing and wearing dosimeters

3. Smearing For Contamination and Counting the Smear

4. More Complex Methods

a. Gamma Spectra - NaI and GeLi

b. Alpha and Beta Spectra

c. Chemical Separation (Sr-90)

IV. Dose and Biological Effects

A. Dose Rate and Dose

B. Basic Principles of Controlling Dose

1. Dose from External Sources

a. Time - Allowable Working Time

b. Distance - Inverse Square Law and Range of Particles

c. Shielding

2. Dose from Internal Sources

a. Contamination

b. Ingestion - Inhalation

c. Critical Organs

d. Biological Half-Life

e. Bioassay

3. Importance of Good Practices

4. Doses from Natural Sources

C. Biological Effects of Radiation

1. The historical record

2. Types of effects

a. Genetic/Somatic Effects

b. Stochastic/Non-stochastic Effects

3. The rem as a measure of risk

4. Comparison with other hazards

D. The ALARA Concept

V. Radiation Protection Standards and Guidelines

A. The Nuclear Regulatory Commission

1. 10 CFR 19, 20, 21, 30, 31

2. Authority from Congress, Atomic Energy Act of 1954

3. Licensing, Inspections

4. Consequences of Violations

5. Regulatory Guides

B. The Department of Transportation

C. Other Agencies

D. Permissible Levels of Radiation

1. Unrestricted Areas

2. Restricted Areas: 500 mrem in any 1 year, 100 mrem in any 1 week

3. Prenatal Indoctrination

E. Barricades, Signs, Symbols, etc.

1. Radioactive Material Signs

2. Radiation Area Sign: between 5 mrem per hour and 100 mrem in any 1 hour

3. High Radiation Area: 100 mrem

F. Practical Considerations

1. Smoking, eating, or drinking is not allowed in restricted areas

2. Protective Clothing

a. Dress out procedures

b. Procedures for removal of protective clothing

3. Proper disposal of waste while in a regulated area

4. Monitoring procedures when leaving a regulated area

a. Report all contamination to supervisor and health physics personnel

ENCLOSURE 4

Items 16 and 17 are revised to read:

RESUME

John L. Rose, Jr., Supervisor, Chemical Laboratory Section

1. Training

   a. B.S., Chemistry, 1949, University of Tennessee
      M.S., Chemistry, 1951, University of Tennessee

   b. Post-graduate courses in radiation chemistry and nuclear physics

   c. 3 days' Radiological Hygiene Instruction - TVA Radiological Hygiene Branch - 1972

   d. 2 days' Radiochemical Laboratory Training - Oak Ridge National Laboratory - May 1973

   e. 2 days' Radiochemical Laboratory Training - General Electric Co., Wilmington, North Carolina, facility - November 1972

2. Experience

   10 years' experience with quality assurance acceptance test and analysis of non-irradiated uranium power reactor fuel pellets enriched to less than 4 percent that are received from TVA suppliers.
   Presently listed on Nuclear Regulatory Commission License SNM-1476, Docket No. 070-01622, issued to TVA's Central Laboratories as an individual who will directly supervise the use of licensed material.

RESUME

Rebecca J. Stokes, Supervisor, Metallurgical Laboratory Section

1. Training

   a. B.S., Metallurgy, 1963, University of Alabama
      M.S., Metallurgical Engineering, 1976, University of Kentucky

   b. 1-1/2 days' Radiological Hygiene Instruction - TVA Radiological Hygiene Branch - March 1982

2. Experience

   3-1/2 years' experience with quality assurance test and analysis of non-irradiated uranium power reactor fuel pellets enriched to less than 4 percent that are received from TVA suppliers. Presently listed on Nuclear Regulatory Commission License SNM-1476, Docket No. 070-01622, issued to TVA's Central Laboratories as an individual who will directly supervise the use of licensed material.

0764

RESUME

Gerald A. Erickson, Supervisor, Measurements Laboratory

1. Training

   a. A.S., Avionics Systems Technology, Community College of the Air Force, 1977

   b. Presently in fourth year toward B.S. degree in Engineering Management

   c. 40 hours, Radiological Measuring Instruments and Theory, U.S. Air Force, Lowry Air Force Base, Colorado, 1967

2. Experience

   a. 1 year, radiological calibration experience, U.S. Air Force, Carswell Air Force Base, Fort Worth, Texas - 1968

   b. 4 years, radiological protection monitor, listed on AEC license issued to U.S. Air Force at Alconbury Air Base, England. In charge of cesium-137 and plutonium-239 radioactive calibration sources regarding handling, shipping, use, storage, and compliance with Air Force manuals and regulations - 1968 to 1972

   c. 5 years, radiological survey and inspection of calibration laboratories, U.S. Air Force, Newark Air Force Base, Newark, Ohio - 1972 to 1975 and 1976 to 1978

   d. 1 year radiological calibration experience, U.S. Air Force, Kunsan Air Base, Korea - 1975 and 1976