TENNESSEE VALLEY AUTHORITY
APPLICATION FOR
SPECIAL NUCLEAR MATERIAL LICENSE
FOR
RECEIPT, POSSESSION, STORAGE, USE, TESTING, AND TRANSFER
OF LIGHT WATER REACTOR FUEL MATERIALS
AT TVA OFFICE OF POWER CENTRAL LABORATORIES,
CHATTANOOGA, TENNESSEE

I. GENERAL INFORMATION

The Tennessee Valley Authority hereby applies for a special nuclear material license to provide for receipt, possession, storage, destructive testing, packaging for delivery to a carrier, transfer, and shipment of light water reactor fuel materials at the TVA Office of Power Central Laboratories located at Chickamauga Dam Power Service Center, Chattanooga, Tennessee.

II. APPLICANT ORGANIZATION

A. Name of Applicant

Tennessee Valley Authority

B. Description of Business of Applicant

The Tennessee Valley Authority is a corporate agency of the Federal Government created by the Tennessee Valley Authority Act of 1933 [48 Stat. 58, as amended, 16 U.S.C. 831-831dd (1970; Supp. V, 1975)].

C. Corporate Organization

TVA's activities are conducted primarily in parts of Tennessee, Kentucky, Alabama, Mississippi, North Carolina, Georgia, and Virginia. The offices of the TVA Board of Directors and General Manager are at Knoxville, Tennessee. All of the directors and principal officers are United States citizens.

The names and address of the directors and principals officers are as follows:

Directors	Home Address	Office Address
S. David Freeman (Chairman)	1431 Cherokee Trail Unit 122 Knoxville, TN 37919	400 Commerce Avenue, E12A7 Knoxville, TN 37902
Director (Vacant)		
Richard Freeman (Director)	1539 G Coleman Road Knoxville, TN 37857	400 Commerce Avenue, E12A11 Knoxville, TN 37902

Officers	Home Address	Office Address
Leon E. Ring (General Manager)	6094 Cresthill Drive Knoxville, TN 37919	400 Commerce Avenue, E12B16 Knoxville, TN 37902
Herbert S. Sanger, Jr. (General Counsel)	5100 Malibu Drive Knoxville, TN 37918	400 Commerce Avenue, E11B33 Knoxville, TN 37902
Lewis B. Nelson (Manager of Agricultural and Chemical Development)	1918 Courtney Avenue Florence, AL 35630	A214 National Fertilizer Development Center Muscle Shoals, AL 35660
George H. Kimmons (Manager of Engineering Design and Construction)	Williams Road, Route 3 Concord, TN 37720	400 Commerce Avenue, Knoxville, TN 37902
Hugh G. Parris (Manager of Power)	9211 Pleasant Lane Ooltewah, TN 37363	500C Chestnut Street Tower II Chattanooga, TN 37401

The applicant is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

D. Agency

The applicant is not acting as agent or representative of another person in filing this application.

III. ACTIVITY

A. Location

The TVA Metallurgical Laboratory is located in Room 218 of the Central Laboratories Building in the Chickamauga Dam Power Service Center complex. This facility is situated at the north end of Chickamauga Dam at the intersection of Highway 153 and Access Drive near Chattanooga, Tennessee.

B. Organization

The Metallurgical Laboratory is part of the Laboratory Section, Transmission Maintenance and Test Branch of the Division of Power System Operations within the Office of Power. This laboratory has been in existence since 1942 doing various tests on materials used in TVA's power generation and transmission system. It has occupied its present facilities since 1962.

C. General Plan of Operation

Samples of low enriched uranium dioxide powder and pellets will be analyzed in the Metallurgical Laboratory to support TVA's nuclear fuel quality assurance efforts. These samples, containing natural uranium or uranium enriched to less than 4 percent in the uranium-235 isotope, will be obtained from TVA nuclear fuel suppliers as in-process or final products representative of the fuel materials contained or to be contained in a given TVA nuclear fuel project. Laboratory analyses will be conducted using selected procedures as detailed in American Society for Testing and Materials (ASTM) Standard C-696-72, which has been endorsed by the U.S. Atomic Energy Commission as Regulatory Guide 5.5. The only procedures listed in C-696-72 that will not be performed are those requiring the use of a mass spectrometer.

Additional examinations of samples will involve:

1. Visual and dimensional inspection of pellets
2. Determination of pellet density via geometric and immersion techniques
3. Inspection of pellet microstructure and pore morphology via metallographic mounting

At the conclusion of testing for a given fuel project, all recoverable uranium dioxide powder, pellet chunks and whole pellets will be appropriately packaged and stored for later shipment to the respective fuel supplier for recycle into that facility's laboratory waste, or otherwise disposed of at an approved burial site. All other waste materials and equipment, except that which can be decontaminated for reuse, will be appropriately packaged and delivered to a TVA nuclear power plant for inclusion into that plant's radioactive waste disposal system or to an approved burial site.

IV. PERIOD OF LICENSE

It is requested that a license be issued to remain in effect until such time as the licensee requests termination.

V. LICENSED MATERIAL

A. Name

The material will be natural uranium and uranium enriched to less than 4 percent in the uranium-235 isotope.

B. Amount

The maximum amount of material to be held at any given time is 340 grams of the uranium-235 isotope.

C. Specifications

The material will be in the form of uranium dioxide powder and reactor fuel pellets and the normal residues and waste materials produced incident to the test activities described in paragraph III.C. of this application.

VI. TECHNICAL QUALIFICATIONS

The technical qualifications of the laboratory staff authorized to be engaged in the licensed activity follow.

A. John Rose, Supervisor, Chemical Laboratory

1. Training

a. 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

d. 2 days Radiochemical Laboratory Training - Oak Ridge National Laboratory

e. 2 days Radiochemical Laboratory Training - General Electric Company, Wilmington Facility

2. Experience

a. 21 years - Chemical Laboratory work including conventional wet chemical techniques, instrumental analyses and supervisory functions - Velsicol Chemical Company

b. 7 years - Chemical laboratory work including conventional wet chemical techniques, instrumental analyses and supervisory functions - Tennessee Valley Authority

B. James C. West - Analytical Chemist

1. Training

a. B. S., Chemistry, 1943, University of Tennessee at Chattanooga (University of Chattanooga)

b. Post-graduate courses in chemistry, physics, and metallurgy

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

d. 2 days Radiochemical Laboratory Training - Oak Ridge National Laboratory

e. 2 days Radiochemical Laboratory Training - General Electric Company, Wilmington Facility

f. 12 hours training - "Introduction to Nuclear Power" - Tennessee Valley Authority

2. Experience

a. 5 years - Chemical and metallurgical laboratory work including supervisory functions - Chattem Drug and Chemical Company

b. 4 years - Chemical and metallurgical laboratory work including supervisory functions - Borg Warner Corporation

c. 4 years - Chemical and metallurgical laboratory work including research and teaching - University of Chattanooga Research Institute

d. 23 years - Chemical and metallurgical laboratory work including supervisory functions - Tennessee Valley Authority

VII. EQUIPMENT AND FACILITIES

A. Laboratory

The layout of the Metallurgical Laboratory and adjoining facilities is shown in the figure on page 14. It consists of a metallurgical laboratory room, a darkroom, and an etching room. Walls are indicated by dark heavy lines and work counter tops by the lighter lines. All three doorways are equipped with heavy metal-clad doors. Various equipment and work locations have been designated with a circled letter and identified by a legend on the figure.

B. Regulated Area

A regulated area will be established in one-half of the laboratory room and the etching room as indicated by the non-shaded area of the figure. Dashed lines represent chains bearing "Regulated Area" and appropriate radiation warning signs, which will be hooked from the walls to the mid-room work counter top to establish access control across the open floor areas. All testing of uranium samples will be conducted only within the regulated area and at times when access control is in effect.

Upon completion of work requiring the testing of uranium samples the area will remain regulated until appropriate radiation monitoring has been performed to verify that the area may be reopened for normal access (see paragraph VIII.I).

C. Equipment

1. A locked metal cabinet or drawer (A) will be provided in the regulated area for storage of samples and sample residues.
2. An open glove-box type chamber will be utilized inside the etching room hood (B) for sample preparation and any other operations which could generate airborne contamination. The hood will have a face intake velocity of 100 feet per minute and will be exhausted through a HEPA filter. There will be provisions for locking covers over the open glove-box parts.
3. A HEPA filter will be provided for the exhaust line of the emission spectrograph (C) ventilation system.
4. A wet, enclosed cut-off wheel (D) will be used for cutting operations so as to contain waste cuttings and prevent airborne contamination.

5. A wet vibratory polisher (E) will be used for polishing operations so as to keep the radioactive dust wet and prevent airborne contamination.
6. A 20 gallon metal garbage can with a plastic bag liner (F) will be provided for solid radioactive waste. The can's lid will be equipped with a locking mechanism.
7. Radiation monitoring will be performed with a count rate meter capable of using various types of detectors. Available detectors will include a geiger tube and alpha scintillation probe. Smear counting will be accomplished using a scintillation alpha counter.

VIII. PROCEDURES

A. Accidental Criticality

The type and amount of special nuclear material requested by this application is not sufficient to achieve criticality regardless of configuration or moderation.

B. Security

1. The laboratory is situated in a building complex known as the Chattanooga Power Service Center located at the TVA Chickamauga Dam Reservation. The outer access doors to the buildings are locked after work hours, and access is under control of key supervisory personnel and the security guards for the reservation. The buildings and grounds are periodically patrolled internally and externally by the guard force during nonwork hours, weekends, and holidays. The laboratory building will be locked during nonwork hours, weekends, and holidays, with access under the control of the Laboratory Section Head and the security force.

2. The sample storage container (A) will be kept locked at all times other than when handling of licens- material is required.

3. Key control to the building complex, laboratory room, and storage containers will be exercised by the Supervisor, Chemical Laboratory.

C. Control of Licensed Material

The Supervisor, Chemical Laboratory, will be the Nuclear Material Custodian and will develop, implement, and monitor a nuclear material control system for the licensed activity. This system will be documented.

D. Receipts

1. Samples will be received in sealed, plastic containers and marked as to weight and enrichment. The plastic containers will be further packaged in wooden or metal shipping boxes and cushioned with packing material.
2. The shipping boxes will be immediately smeared to check for surface contamination in accordance with the provisions of 10 CFR Part 20 205.
3. Shipping boxes and packing materials found to have been contaminated will be disposed of in the solid radioactive waste container.
4. The exterior of plastic sample containers will be monitored for contamination, decontaminated if necessary, and placed in the radioactive material storage cabinet.
5. Documentation of receipts will be accomplished in accordance with TVA internal procedures and 10 CFR regulations.

E. Sample Processing

1. When samples are being handled, all work counter tops in use will be covered with disposable paper runners.

2. Personnel will wear protective laboratory clothing when in the regulated area. This protective clothing will not be worn outside the regulated area.

3. Personnel departing the regulated area will be required to monitor their hands and clothing for contamination. Materials and equipment will not be removed from the regulated area unless monitored and the levels of transferable contamination are below those values described in Section VIII.I.5.(a).

4. All operations which could generate airborne contamination will be performed in the hood and glove-box arrangement.

5. Cutting, grinding, and polishing operations will be performed wet. The fluids will be filtered and recycled. Filtrates will be discarded as solid radioactive waste.

6. Unused portions of samples will be returned to storage.

F. Waste Disposal

1. Solid radioactive waste will be collected in the container as described in paragraph VII.C.6. This waste will be disposed of, as necessary, by shipment to a TVA nuclear power plant for inclusion into that plant's radioactive waste disposal system or to an approved burial site.

2. Liquid wastes may be disposed of in either of two ways. The first is as described in 1. above for solid wastes, i.e., shipment to a TVA nuclear plant. The other would involve monitoring, diluting if necessary and disposal through the laboratory sewage system in accordance with the provisions of 10 CFR Part 20.303.

3. Unused sample material and sample residue will be packaged and returned either to the nuclear fuel vendor from which they were obtained or to an approved burial site.

G. Shipments

1. Unused samples will be sealed in the same plastic containers in which they were received. These containers will be smeared and decontaminated, if necessary.
2. Sample containers will be further packaged into metal or wooden shipping boxes with appropriate packing materials. The boxes will be smeared and then decontaminated, if necessary.
3. Shipment will be accomplished through the U.S. Postal Service, a commercial carrier, or hand carried by a TVA employee.
4. Documentation of shipment will be accomplished in accordance with TVA internal procedures and 10 CFR regulations.

H. Decontamination

1. Before the regulated area becomes a non-regulated area the area and all equipment located therein will be monitored and decontaminated to within acceptable levels (See paragraph I).
2. Laboratory clothing intended for extended use will be sent to a TVA nuclear power plant for laundering.

I. Radiological Safety and Monitoring

1. Radiological safety support will be provided by the TVA Division of Occupational Health and Safety, Radiological Hygiene Branch. Health physics and radiological hygiene services will be made available as deemed necessary by the Radiological Hygiene Branch.
2. Disposable protective clothing will be worn during laboratory activities involving licensed materials. Items of personal

clothing belonging to laboratory personnel will be monitored for contamination each time exit from the regulated area is desired.

3. Contamination levels will be held as low as practicable while work with licensed material is in progress. Decontamination steps will be undertaken if periodic radiation monitoring indicates that contamination levels have exceeded 100 times the values listed in Section VIII.I.5.(a).

4. At the conclusion of work involving the handling of licensed materials, the regulated area will remain intact until a swipe survey has been performed on all work surfaces and equipment to verify that contamination levels are within acceptable limits. All samples and radioactive wastes will be properly stored or discarded.

5. Acceptable Radiation Levels

   (a) The regulated zone will remain intact until the radiation and contamination levels on work surfaces, floors, and equipment are below the following:

Direct Survey		Transferable (Smear)	
Alpha (dpm/100 Cm^2)	Beta Gamma (mrad/hr*)	Alpha (dpm/100 Cm^2)	Beta-Gamma (dpm/100 cm
300	.05 (200 cpm)	20	200

   (b) Equipment or packages leaving the regulated zone will meet the transferable contamination levels as stated in 5.(a) above.

   (c) Personal clothing of personnel exiting the regulated area will be maintained at below the following radiation and contamination levels:

Direct Survey		Transferable (Smear)	
Alpha (dpm/100 Cm^2)	Beta-Gamma (mrad/hr*)	Alpha (dpm/100 Cm^2)	Beta-Gamma (dpm/100 Cm^2)
150	.05 (200 cpm)	Not Detectable	

*Direct surveys will normally be performed with a GM survey instrument which gives a reading in counts per minute. The number in parenthesis may be used as an operational limit.

TENNESSEE VALLEY AUTHORITY

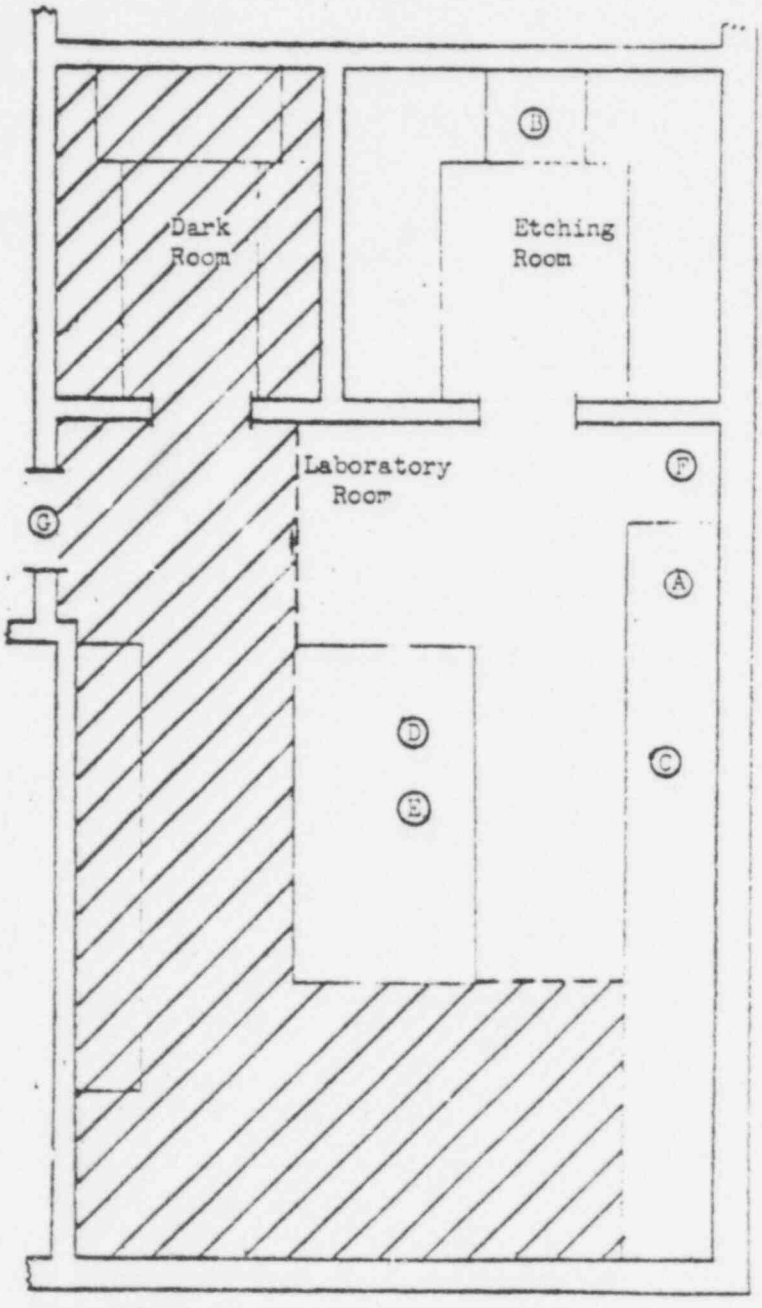
J. E. Gilleland
Assistant to the Manager of Power

Subscribed and sworn to before me this 15th day of April 1974

Notary Public

My Commission Expires 1-5-75

METALLURGICAL LABORATORY
ROOM 218



(A) Radioactive Material Storage Cabinet
(B) Hood and glove-box
(C) Emission Spectrograph
(D) Wet Cut-Off Wheel
(E) Wet Vibratory Polisher
(F) Solid Radwaste Disposal Can
(G) Main Laboratory Access Door