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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Nuclear Regulatory Commission

In the Matter of	)	
	)	Docket Nos. 50-259 OLA
TENNESSEE VALLEY AUTHORITY	)	50-260 OLA
	)	50-296 OLA
(Browns Ferry Nuclear Plant,	)	(Low-Level Radioactive
Units 1, 2, and 3)	)	Waste Storage Facility)

TENNESSEE VALLEY AUTHORITY'S RESPONSE TO APPEAL BOARD ORDER

On May 17 the Appeal Board issued an order that, although recognizing a lack of jurisdiction because the proceeding was before the Commission for review, requested that TVA and NRC staff counsel explain why TVA's November 3, 1981 submittal was not contemporaneously provided to the Appeal Board which then was considering the matter.

TVA recognizes its obligation to make available to the Board and other parties all new information material to the issues before it and regrets any misunderstanding about the November 3, 1981 document. TVA certainly had no intention to mislead the Appeal Board. TVA received a copy of the NRC staff counsel's November 24, 1981 letter to the Chairman of the Appeal Board, transmitting the original and amended application and TVA's environmental assessment as requested. Having received that letter, TVA never considered that

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the Appeal Board might think it needed anything more. TVA would have immediately provided to the Appeal Board copies of the application and any other related documents had it been so requested.

In any event, TVA does not believe that the November 3 submittal was material to the issues before the Appeal Board, and whether or not the Appeal Board had the document, its decision should not have been affected. The document referred to did not amend TVA's July 31, 1980 application for storage of low-level radioactive waste (LLRW), as amended on November 17, 1980 which the Appeal Board had requested and received. It merely updated the application to reflect questions and responses exchanged between the NRC staff and TVA. It is a normal practice for an applicant from time to time during the course of an application to update licensing documents by incorporating in them all of the then current information and commitments generated during the course of the NRC staff's review.

The information in the update essentially dealt only with the health, safety, engineering, and security aspects of five-year storage. By contrast, the proposed contentions being considered by the Appeal Board related to TVA's alleged long-term LLRW storage and volume reduction plans and the cost of decommissioning. That portion of the update in which these matters were mentioned (update section 1.3) discloses no new information. Section 1.3 of the update at page 1-3 identifies the need for five-year storage and its independence from volume reduction, which is still under consideration by TVA. This discussion is fully consistent with TVA's statement in its briefs to

the Licensing Board (May 8, 1981 brief at 2-4, 9) and the Appeal Board (appeal brief at 4-5, 21-22 n.9) as well as those made at the prehearing conference by counsel (tr. 24, 71-73). Thus, the update contained nothing new that was relevant and material to the matters then under consideration by the Appeal Board.

Under these circumstances, the Duke Power Co. case cited by the Appeal Board is completely inapposite. In that case, In re Duke Power Co. (William B. McGuire Nuclear Station, Units 1 & 2), ALAB-143, 6 AEC 623 (1973), and its progeny (In re Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), LBP-75-34, 1 NRC 626 (1975), and ALAB-355, 4 NRC 397 (1976)), the new information at issue was clearly relevant and material to the specific factual dispute under consideration. In this case, the update disclosed no new information relevant and material to the questions before the Appeal Board. Thus, TVA had no obligation to provide the document to the Appeal Board.

So that there will be no question about what information has been supplied to the NRC staff, enclosed with this memorandum are copies of all documents TVA has sent to the NRC staff about this matter.

Respectfully submitted,

Herbert S. Sanger, Jr.
General Counsel
Tennessee Valley Authority
Knoxville, Tennessee 37902
Telephone No. 615-632-2241
FTS No. 856-2241

Lewis E. Wallace
Deputy General Counsel

James F. Burger

W. Walter LaRoche

Attorneys for
Tennessee Valley Authority

Knoxville, Tennessee
May 27, 1982

APPENDIX

400 Chestnut Street Tower II

April 7, 1982

Director, Office of Nuclear Material Safety
and Safeguards
Attention: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the)
Tennessee Valley Authority) Docket No. 30-19102

Please refer to L. M. Mills' letter to you dated November 3, 1981 in which we submitted an updated amendment to TVA's July 31, 1980 application for the storage of low-level radioactive waste at the Browns Ferry Nuclear Plant. We are submitting a few changes to that submittal which are minor in nature but warrant your attention. Accordingly, please change the submittal to reflect the enclosed corrections.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

M R Wisenburg

M. R. Wisenburg
Nuclear Engineer

Subscribed and sworn to before
me this 7th day of April 1982.

Paulette H. White
Notary Public

My Commission Expires 9-5-84

Enclosure
cc: See page 2

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Mr. L. C. Rouse April 7, 1982

cc (Enclosures):

Mr. Charles R. Christopher
Chairman, Limestone County Commission
P.O. Box 188
Athens, Alabama 35611

Dr. Ira L. Myers
State Health Officer
State Department of Public Health
State Office Building
Montgomery, Alabama 36104

Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

U.S. Nuclear Regulatory Commission
Region II
ATTN: James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Mr. K. D. Fagan, Supervisor - Nuclear
General Electric Company
832 Georgia Avenue
Chattanooga, Tennessee 37401

ENCLOSURE

CHANGES TO BROWN FERRY NUCLEAR PLANT
LOW-LEVEL RADIOACTIVE WASTE AMENDED APPLICATION
DATED NOVEMBER 3, 1981

1. Page 2-9, Section 2.2.2.2.1, last sentence, should read, "Before offsite shipment of a previously stored liner, the liner will be dewatered to remove any accumulated water to meet the State of South Carolina free-standing water criterion."

2. Page 2-11, first paragraph, delete the following sentences, "While retardation of bacterial growth should occur to a level of 2.7×10^4 pCi/ml, a biocide can be added to the waste to prevent bacterial decay during storage. This biocide will be compatible with the container and waste form."

3. Page 2-12, first partial paragraph, add the following sentences, "Other liners fabricated under similar specifications by TVA or vendors may also be used. As an option, high-integrity containers meeting the requirements of the State of South Carolina may be used for storage or disposal."

4. Page 2-12, Section 2.2.3.2, second and third sentences should read as follows, . . . "Liners to be used for onsite storage are coated on the exterior surfaces with one coat of primer and two coats of alkyd gloss enamel and on the interior surfaces with one coat of a two-part epoxy coating to a minimum thickness of eight mils. These coatings are applied with sufficient quality control to ensure that uniformity and minimum thickness requirements are met."

5. Page 2-13, first incomplete sentence, add the following sentence, "High density polyethylene is used to construct high-integrity containers."

6. Page 2-13, Section 2.2.4, first sentence should read, ". . . chemical attack from the liner contents and the enamel coating precludes. . ."

7. Page 2-13, Section 2.2.5, add the following sentence, "One-percent water is allowable in high-integrity containers."

8. Page 2-15, Section 2.6.1, last paragraph add the following sentence, "Subsequent to the initial monitoring, program samples of the ground water will be taken as warranted."

9. Page 2-15, first incomplete sentence should read, ". . . fires will be fought by specially assigned personnel of the BFNP fire brigade."

10. Page 2-15, Section 2.6.2, end of the second paragraph add the following sentence, "During resin liner handling operations, administrative controls shall be implemented to ensure individuals not associated with the handling operations are not located in the immediate vicinity of the OSF."

11. Page 3-1, fourth paragraph, second sentence should read, "Drums will be stored up to four layers high."

12. Page 3-2, third paragraph, last sentence should read, "Sampling wells in the storage area could be checked to indicate if any radioactive contamination has reached the underlying aquifer."

13. Page 3-5, Section 3.2.1.2.1, first paragraph, delete, and replace with the following paragraph.
"Because of the high cumulative dose rate expected from stored containers within a module compartment, there will be no direct visual inspection of the liners. Instead, remote television monitors will be used during liner placement to observe liners already stored within a module cell. After it is filled, each cell containing dewatered resin in steel liners will be opened on at least a quarterly basis and the contents will be examined using the remote television monitors to detect signs of swelling, exterior corrosion of the liner, and breach of container integrity. In partially filled cells (three liners or less), the tops and sides of the liners will be visible using television cameras. In cells containing four to six liners, only the top row will be visible from above. Some portions of the sides of the liners on the bottom row are also expected to be visible through the grating that separates the two levels of containers. To ensure maximum container visibility, TVA will administratively restrict dewatered resin storage in steel liners to three liners per cell (the top row will be empty), or to the three liners in the top row of each cell with solidified waste on the bottom row unless prohibited by waste volumes. Television monitors will be used to ensure that occupational doses during monitoring are kept as low as reasonable achievable. High-integrity containers, if used, will be visually examined on an annual basis. Solidified waste requires no visual inspection to verify container integrity."

14. Page 3-5, Section 3.2.1.2.1, second paragraph, last sentence should read, "TVA will take measures to vent stored liners in the nuclear plant."

15. Page 3-6, Section 3.2.2, last paragraph which is continued on the following page, should be deleted and replaced with the following.
"No air sampling equipment is built into the module since no gaseous releases are expected from the sealed containers. However, an air sample may be pulled through the compartment sump liquid sampling connection. TVA will take an air sample from a module compartment through this sampling connection before opening a module cell if the compartment has been sealed for two months or longer. The sample will be analyzed for explosive gases and airborne radioactivity before the cell cap is removed. Detection of significant concentrations of these gases will require that the compartment be cleared before a cell cap is removed. The compartment atmosphere will be removed using a portable air pump and filtered through a portable HEPA filter. The filter effluent will be monitored using a portable radiation detector and released to the atmosphere. Although, as stated previously, no gaseous releases are anticipated from sealed containers, this method will preclude the possibility of unmonitored releases from the storage modules."

16. Page 3-7, third paragraph, second and third sentences should read, "Detection of radioactive releases in a module will require an intensive check of all containers and the inside of the module to determine the source. Corrective actions, including repackaging of a leaking container will be undertaken."

17. Page 3-7, Section 3.2.3, first sentence should read, "Sampling wells in the storage area could be checked to indicate if any radioactive contamination has reached the underlying aquifer."

18. Page 4-3, Table 4.1-1, replace with attached Table 4.4-1.

19. Page 4-11, Table 5.1-1, replace with attached Table 4.5-1.

Table 4.1-1

BROWNS FERRY NUCLEAR PLANT - MAJOR ASSUMPTIONS FOR RADIOLOGICAL ASSESSMENT OF FIVE-YEAR ONSITE LOW-LEVEL WASTE FACILITY

General

Type of Waste	LLW - miscellaneous non-volume reduced trash and spent resins
Activity	9,875 Ci/yr - resin 113 Ci/yr - trash
Resin Isotopic Breakdown	About 89 percent Cs-137 and Ba 137m, 1 percent Co-60, 2 percent Co-58, 7 percent Cs-134 and 1 percent other fission, activation, and corrosion products.

OSF Operational Releases

Under normal operation, any potential leachate in the storage modules will be collected and sampled prior to release. However, it is postulated that due to operator error or equipment malfunction, a certain portion of the estimated annual leach reaches the river via ground water.

Maximum Stored Activity	Releases are assumed to occur when the activity in the OSF reaches a maximum (at 5 yrs.). The 5-year activity is estimated at about 4.2×10^4 Ci composed of essentially all Cs-137 and about 0.022 percent of Sr-90.
Annual Leach Fraction	1 percent of the 5-year activity is assumed to leach out of the storage container per year.
Travel Distance to River	700 m (2,300 ft)
Ground Water Velocity	1.5 m/d (5 ft/d)
Total Soil Porosity	50 percent
Bulk Soil Density	1.6 g/cm^3
Distribution Coefficient (K_d)	500 cm^3/g for Cs and 50 cm^3/g for Sr-90

4-3

Table 4.5-1

BROWNS FERRY NUCLEAR PLANT - DOSES FROM INTEGRITY MONITORING

Crane Operator or Flagman	person-rem/yr
Exposed primarily to a skyshine field of 5.2×10^{-3} R/h for 170 h/yr from the quarterly inspection of resin liners contained in 125 module cells	0.9
Manual Sampler	
Exposed to a direct radiation field of 200 mrem/h for 2·h/yr from the manual sampling of the control resin liner contents once per quarter	0.4
Air Sampler	
Doses are included under monitoring personnel in Table 4.2-1. Air sampler dose contributes about one half of the monitoring personnel dose listed	
Doses in Unrestricted Areas	mrem/yr
Due to skyshine during visual inspection of cell liners	
1. Non-nuclear workers - exposed to 3.8×10^{-3} mR/h, 170 h/yr	0.6
2. Site Boundary - exposed to 6.0×10^{-2} mR/h, 170 h/yr	10.2
3. Nearest Resident - exposed to 4.4×10^{-3} mR/h, 170 h/yr	0.8

400 Chestnut Street Tower II

October 22, 1981

Director, Office of Nuclear Material
Safety and Safeguards
Attention: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the)
Tennessee Valley Authority) Docket No. 30-19102

In response to your letter to H. G. Parris dated August 10, 1981, we are providing responses to your questions and the request for additional information on TVA's July 31, 1980 application for the storage of low-level radioactive waste at the Browns Ferry Nuclear Plant.

If you need any additional information, please let us know.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Regulation and Safety

Subscribed and sworn to before
me this 22nd day of October 1981

Paulette H. White
Notary Public

My Commission Expires 9-5-84

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Enclosure: 40

cc: See page 2

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Director, Office of Nuclear Material Safety and Safeguards

October 22, 1981

cc (Enclosure):
Mr. Charles R. Christopher
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Mr. K. D. Fagan, Supervisor - Nuclear
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U.S. Nuclear Regulatory Commission
Washington, DC 20555

BROWNS FERRY NUCLEAR PLANT (BFNP)
LOW-LEVEL RADIOACTIVE WASTE (LLRW)
STORAGE FACILITY LICENSE APPLICATION
NRC QUESTIONS AND REQUEST FOR ADDITIONAL INFORMATION

NRC QUESTION

1. Resin Characteristics and Container Integrity

Historically, there have been several accidents involving resins stored in a radiation field that have caused considerable damage. More recently, safe storage of TMI-EPICOR loaded resin liners for long periods of time has been questioned; with estimates of liner perforation occurring in 15 to 19 months. Although these situations may not be directly applicable to your proposed action, we have similar concerns regarding the ability of the storage containers to maintain their integrity for the duration of storage. Based upon the information in the application and discussions with the TVA staff (March 18 and 19, 1981), there is insufficient information to support any conclusion regarding container integrity and potential problems with five-year or life of plant storage of wastes, in particular spent ion exchange resin liners. We therefore request you to provide us with an evaluation of potential problems and the ability of waste storage containers to maintain their integrity during the five-year license term and life-of-plant storage.

The evaluation and its bases should consider, but not be limited to, such things as follows:

1. physical, chemical and radiological characteristics of the wastes;
2. changes in the physical and chemical characteristics of wastes which may be expected to occur (i.e., decomposition, gas generation, etc.);
3. physical and chemical characteristics of the container materials;
4. compatibility of the container materials to the waste forms and environmental conditions external to the containers;
5. ranges of waste compositions that could be stored in the containers;
6. provisions to minimize potential problems (i.e., containers equipped with special vent designs to allow depressurization).

TVA RESPONSE

1.0 Container Integrity

1.1 Steel Drums

All miscellaneous trash will be stored in steel drums. In general, these containers will meet the DOT specification 17H (or equivalent), and will have a capacity of 55 gallons. As an alternative, metal boxes meeting DOT specifications may be used for storage. These containers will be constructed of at least 18-gauge steel and shall be externally coated to reduce container corrosion. No wooden or cardboard packages will be stored in the storage facility.

Most of the radioactive waste stored in these containers will be dry and inactive. On occasion, moist material (with no free-standing water) may be packaged for storage. All moist material will be packaged in a sealed polyethylene bag before it is placed in the steel container. Double bags will be used when necessary. Therefore, no corrosion of the inside of the steel container is expected, and no coating will be applied to the inside of the container. Without a mechanism for internal or external corrosion, it is expected that 5-year storage of miscellaneous trash in steel drums or boxes can be accomplished without loss of container integrity.

1.2 Steel Liners

1.2.1 Waste Form

1.2.1.1 Physical Properties

Ion exchange waste will be stored in steel liners in the storage modules. This material consists of the following: anion and cation resin in both powdered and bead form (the majority is powdered), cellulose filtration material, radioactive crud, and water contained within the other materials (about 60 to 70 percent by weight). There is no free water, i.e., the resin has been dewatered to meet the State of South Carolina's 0.5-percent free-standing water criterion. The resin consists of a plastic material (copolymerized styrene crosslinked with divinyl benzene) with strong acid cation (hydrogen form) ion-change capacity and strong base anion (hydroxide form) capacity. It should be noted

that the resins will be fully or partially exhausted after being used in plant systems. A fiberous filtering material (under various trade names) is used as an overlay material on a demineralizer precoat and consists of a cellulose-like filtration material. This fiberous material makes up approximately 30 percent of the precoat volume utilized by the condensate cleanup system and is sometimes used in the radwaste and reactor waste cleanup systems. Radioactive crud (consisting mostly of corrosion products) is filtered from water within the nuclear plant and has been estimated to make up about 2 percent of the total weight of the waste.

1.2.1.2 Chemical Properties

The pH of unexhausted cation resins is approximately 6.8. The pH of typical mixture of anion and cation resins ranges from 5.0 to 5.3 in locations of collected water. As the resins are depleted, pH values will approach 7.0 (neutral pH). Condensate cleanup resins are rarely fully exhausted, but reactor water cleanup and radwaste filter resins are usually exhausted before disposal or storage. Resin conductivity ranges from 0.5 to 2 umhos. The above conditions could be corrosive to carbon steel, and internal coating of the liner will be required.

1.2.1.3 Radiological Properties

The activity of ion-exchange resin varies depending on plant operating conditions and the source of the water that is demineralized by the resin. Currently, condensate cleanup resins range in activity from about 0.2 to 10 uCi/cc with liner contact dose rates from 100 mrads/hr to 7 rads/hr. Reactor cleanup resin activities range from about 2 to 230 uCi/cc with liner contact dose rates from 500 mrads/hr to 45 rads/hr. The design source terms provided in table 4.1-1 of the licensing submittal are applicable for nonvolume-reduced waste as well as for volume-reduced waste. Based on these source terms, we have determined the maximum absorbed doses to nonvolume-reduced resins during five years of storage. We have also determined the maximum

absorbed doses that these resins will have received prior to the storage period. The absorbed doses are as follows:

	Absorbed Dose		
	Gamma Dose (rads)	Beta Dose (rads)	Total Dose (rads)
Prior to Storage	1.5×10^6	7.2×10^5	2.2×10^6
During 5 Years Storage	5.9×10^6	2.4×10^6	8.4×10^6
Total	7.4×10^6	3.1×10^6	1.1×10^7

1.2.2 Changes in Waste During 5-Year Storage

1.2.2.1 Physical

No physical changes are expected in the radwaste itself. There is a possibility of resin densification (packing) during the storage period with a resultant increase in free water. This increase is expected to be minor and will probably not exceed the State of South Carolina's free-water limitation in TVA's liner design. Before offsite shipment of a previously stored liner, an attempt will be made to dewater the liner to remove any accumulated water.

1.2.2.2 Chemical

There are several mechanisms that can produce chemical changes in the resin during storage.[1] These include resin degradation through:

a. direct irradiation of the resin
b. formation of hydrogen peroxide through radiolysis of water
c. thermal heating from decay of Sr-90 and Cs-137
d. nitric acid production through oxidation of nitrogen compounds in the resin and air in the liner (secondary reaction)

e. sulfuric acid production from cation resin degradation (secondary reaction)
f. formation of amines from anion resin degradation (secondary reaction)
g. carbonic acid production from the reaction of water with carbon dioxide (secondary reaction)
h. bacterial decay of cellulose material or other organics

These reactions can produce acids (sulfuric, sulfonic, nitric, carbonic, and nitrous), various gases (hydrogen, oxygen, carbon dioxide, nitrous oxide, nitric oxide, sulfur dioxide, methane, carbon monoxide, and nitrogen) as well as amines, hydrogen peroxide, and sodium acid sulfate. These constituents (with the exception of methane and carbon dioxide from bacterial decay)[2] result from irradiation of the waste over a long period of time and do not become significant until the total absorbed exposure to the resin exceeds 10^7 to 10^8 rads.[2,3] As previously stated, the maximum expected integrated dose to the resins based on design basis source terms during the 5-year storage is about 1.1×10^7 rads. Therefore it can be seen that Browns Ferry waste will not exceed the radiation levels that will produce significant resin degradation during the storage period.

The only mechanism which may produce a chemical reaction in the waste container during storage is bacterial decay. Decomposition of cellulose or other organics can release methane and carbon dioxide if microorganisms are present in the

waste. Recent studies have shown that bacterial growth is retarded at a radionuclide concentration of 2.7×10^4 pCi/ml and completely inhibited at a concentration of 2.7×10^5 pCi/ml.[1] For a 186 ft^3 TVA liner of waste, bacterial growth would be completely inhibited if the liner contains 1.4 curies of waste (1.2 curies for a 156 ft^3 liner). All of the ion-exchange resin shipped from Browns Ferry since March 1978 has contained in excess of these activities as did the large majority of the waste shipped before that time. All future shipments are expected to contain at least these amounts of activity. Because of radioactive decay, the specific activity of some of the waste stored may fall below 2.7×10^5 pCi/ml during storage. While retardation of bacterial growth should occur to a level of 2.7×10^4 pCi/ml, a biocide can be added to the waste to prevent bacterial decay during storage. This biocide will be compatible with the container and waste form. Before offsite shipment of a previously stored liner, each liner will be vented under controlled conditions inside the nuclear plant to relieve potential gas buildup.

1.2.2.3 <u>Radiological</u>

Radiological changes will occur only due to decay of the original radioactive isotopes. After five years of storage, most of the short-lived isotopes will have decayed and the remaining radioactivity will be primarily Cs-137 and Co-60. The activity levels will, of course, be dependent on the initial level and the time in storage.

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1.3 Container Description

1.3.1 Physical

TVA's resin liner is constructed of 0.25-inch A-36 carbon steel in the shape of a cylinder. These liners are constructed for TVA by the TVA Power Operations Service Shops in Muscle Shoals, Alabama, in accordance with TVA drawings (enclosed). All welding is performed utilizing welders and procedures qualified to the requirements of TVA Division Procedure Manual (DPM) No. N73M2 (construction procedure G29M).

During and following construction of the liners, a number of tests and inspections are performed to ensure that the liner is properly built. These include a hydrostatic or pneumatic pressure test at a minimum pressure of two psig for 10 minutes to ensure container integrity, visual inspection of interior and exterior welds in accordance with procedure 3.M.5.1 (d) of DPM N73M2, visual inspection of internal dewatering elements and pipe fittings, and a final inspection check to ensure that the liner meets all tolerances. Upon receipt at Browns Ferry, the liner will be inspected to ensure that exterior coatings are properly applied, that the liner and the coating have not been damaged during transportation, and that there are no obvious defects in fabrication.

Radwaste liners may be lifted using either a permanently attached sling or an air-actuated remote lifting device. Closure of liner penetrations (countersunk pipe plugs) is accomplished using a TVA-approved thread sealant (such as Teflon tape or Loctite) before storage of the waste. All lifting devices and closures are visually inspected to ensure proper fabrication and installation before liner use.

1.3.2 Chemical

Liners currently used for offsite disposal are coated on the exterior surfaces with one coat of primer and two coats of alkyd gloss enamel. Liners to be used for onsite storage are coated on both the interior and exterior surfaces with one coat of primer and one coat of of a 2-part epoxy coating to a minimum thickness of 8 mils. This coating is applied with sufficient quality

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control to ensure that uniformity and minimum thickness requirements are met and, when possible, will be checked for pin holes defects. The coatings preclude chemical attack on the liner material during waste storage.

1.4 Compatibility

The epoxy coating protects the interior of the liner from chemical attack from the liner contents and precludes corrosion of the exterior surface from high humidity, rain, temperature extremes, and other expected corrosion-producing mechanisms. The coatings are selected to provide corrosion protection for periods exceeding the 5-year storage period.

1.5 Range of Compositions

The storage liners allow the storage of any mixture of depleted or partially depleted anion and cation ion-exchange resins, cellulose, and other waste constituents. Although only material with a pH of 5.0 to 7.0 is expected to be stored, the protective coating will allow storage of waste with a pH range of 2 to 13 during the 5-year storage period. Free-standing water content ranges from nondetectable levels to less than 0.5 percent of the container volume (from 5.8 to 6.9 gallons depending on the container). Experience has shown that free-standing water is not detectable in TVA liners.

1.6 Provisions to Minimize Problems

The following is a list of potential problems and the TVA action to be taken to minimize or preclude the problem.

Potential Problems	TVA Action
a. Internal liner corrosion	Internal epoxy coating, observation of input pH of waste, control of hydrogen peroxide formation by controlling amount of free water, observation of activity of waste stored to reduce irradiation of resin, storage of only waste with low radionuclide heat production, observation of a control liner.

b. External liner corrosion	External epoxy coating, coating inspection before use, storage inside weather-resistant structure, observation of a control liner.
c. Overpressurization resulting from bacterial decay	Addition of a bactericide to waste, liner leakage test, visual inspection of welds, use of thread sealant on penetration plugs, observation of minimum radionuclide concentration (optimum concentration is 2.7×10^5 pCi/ml and above), observation of a control liner.
d. Overpressurization resulting from resin degradation	Observation of input activity, observation of a control liner, possible venting (to be determined from experience).

In addition to the above actions, TVA is evaluating the use of solidification, offsite shipment of all ion-exchange resin, offsite shipment of the most radioactive resin, high-integrity containers and liner vents for some resin waste at Browns Ferry. These evaluations may have an effect on the volume and form of the resin to be stored at Browns Ferry.

0003/0313

NRC QUESTION

2. Integrity Monitoring

Periodic inspections (at least quarterly) of container integrity (swelling, corrosion products, breach) should be performed. Use of high integrity containers (300 year lifetime design) would permit an inspection program of reduced scope. Please provide a description of your proposed container monitoring program. Features to be considered might include, but not be limited to the following:

1. type inspection to be performed;

   a. visual,

   b. TV monitors,

   c. inspecting and sampling designated waste containers. (Designated waste containers should comprise a representative sample of types of waste containers stored, length of time stored and number of modules in use.)

2. the characteristics to be monitored;

3. other monitoring to detect potential problems;

   a. fire detection,

   b. air sampling (airborne radioactivity, explosive gases),

   c. liquids sampling.

4. evaluation of occupational and population doses, if any, resulting from the monitoring program.

TVA RESPONSE

2.0 Integrity Monitoring

2.1 Drum Inspection

Because the waste stored in steel drums is dry, chemically inactive, and usually of very low activity, no inspection program will be set up to monitor the integrity of those containers. TVA and other industry experience has shown that drum monitoring is not necessary.

2.2 Liner Inspection

Actions taken to ensure container integrity are expected to prevent any breach of the liner and subsequent release of the waste to the module or the outside environment. To ensure this, a liner inspection program will be established to determine the status of stored resin containers.

2.2.1 Visual Inspection

Because of the high cumulative dose rate expected from stored containers within a module compartment, there will be no direct visual inspection of the liners. Instead, remote television monitors will be used during liner placement to observe liners already stored within a module cell. After a cell is filled (six liners), each cell will be opened and the liners visually inspected on at least a quarterly basis to determine swelling, corrosion of the exterior of the liner, or breach of container integrity. Television monitors will be used to ensure that occupational doses during monitoring are kept as low as reasonably achievable.

In order to provide a check on liner contents and the changes [illegible] ay occur during storage, TVA will set up two wo[illegible] control liners in empty storage module compar[illegible]s or in the radwaste packaging bay at the plant. One liner will be filled with a mixture of 50-percent ion-exchange resin and 50-percent cellulose filtration material which will be used to process low-activity laundry water. This liner will be equipped with a pressure gauge to monitor possible gas evolution. If excessive pressurization of this liner takes place, TVA will take measures to vent liners in storage.

Direct visual examination and manual sampling of this control liner's contents will be possible since the liner is expected to have a relatively low dose rate. Gases will be collected from the liner to determine whether radioactive or explosive gases are generated during resin storage. In addition, resin samples will be taken from the liner on a quarterly basis to check the pH, amount of free water, activity, and for signs of of resin degradation. Samples of coated liner material will be suspended in the liner and checked quarterly for signs of coating degradation. Although no action is anticipated to be needed at this time, TVA will take appropriate action to vent the liners or stabilize stored waste if indicated by these tests.

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The second control liner will be filled with high-activity resin. This liner will be equipped with a pressure gauge which can be read remotely to minimize employee exposures during monitoring. Gas evolution will be monitored to determine if high-activity resin produces significant quantities of gas during storage. TVA will take appropriate action to vent the liners or stabilize stored waste if indicated by these measurements.

2.3 Module Monitoring

As stated in the July 31, 1980 license submittal, the only significant potential for fire at the storage facility is from an external exposure fire. Therefore, no fire detection devices will be incorporated into the module design. External fires will be detected by periodic security patrols made through the storage area or by workers during storage operations. The facility is of noncombustible construction and designed to provide a 3-hour fire resistance rating from external exposure fires.

No air sampling equipment is built into the module. However, an air sample may be pulled through the compartment sump liquid sampling connection. TVA will take an air sample from a module compartment through this sampling connection before opening a module cell if the compartment has been sealed for 2 months or longer. The sample will be analyzed for dangerous gases and airborne radioactivity before the cell cap is removed. Detection of significant concentrations of hazardous gases will require that the compartment be cleared of these gases by pumping and filtering the compartment atmosphere before the cell is opened.

Liquid sampling will be done in accordance with section 3.2.1 of the July 31, 1980 license submittal.

2.4 Radiation Exposures Resulting From Monitoring

Using the above liner and module monitoring techniques, occupational and population radiation exposures have been estimated and are shown in Table 5. These exposures are well within regulatory limits.

NRC QUESTION

3. Operation of Modules

In your application you provided estimates of doses from normal operations based on the assumption that the stored waste would be volume reduced by incineration. However, since TVA has not made an application to reduce LLW by incineration, the NRC staff requires additional information. Based on the same time and motion analyses, operating conditions and site data, and assuming the waste stored is not volume reduced by incineration, please provide an assessment of the occupational and environmental doses for the five-year license term and life-of-plant storage.

Please provide the three additional information requirements in this area. They are:

1. A copy of page VI.B-2 (RMSM, dated 12/15/80, Revision 8) the time and motions estimates. It is not in the information provided during the site visit.

2. Confirmation that Table 3.3-1 of Design Criteria #BFN-50-D745 is currently the design basis for non-volume reduced waste. Futhermore, license limits for the total curie content of both the resin and miscellaneous wastes should be specified. These limits should be large enough that they would not be exceeded, during anticipated normal operations, for the five-year duration of the license.

3. A discussion of the schedule for placement of trash and resin liner containers into the storage modules. In particular, if batching is anticipated, please provide estimated number of containers per batch for each type of waste.

TVA RESPONSE

3.0 Operation of Modules

3.1 Occupational and Environmental Doses

The radiation exposures resulting from the storage of as-produced radwaste over a 5-year period are given in Supplement 1. Doses for life-of-plant storage of volume-reduced waste were given in the July 31, 1980 submittal. All doses are within regulatory limits.

3.2 Storage Requirements

Page VI.B-2 of the Radioactive Material Shipment Manual (RMSM) is not enclosed. Instead, the recently revised loading sequence from section VI.B is enclosed as Supplement 2. This section contains an updated version of the loading sequence given to NRC during the site visit.

3.3 Activity Limits for Storage

Table 3.3-1 of Design Criteria #BFN-50-0745 provides the information regarding nonvolume-reduced waste currently used in all of TVA's calculations for this storage facility. The license limits for the total curie content of both the resin and miscellaneous wastes are 9875 Ci/yr and 113 Ci/yr, respectively, as indicated in Table 4.1-1 of the licensing amendment application for a total of 9988 ci/yr. Currently, all wastes generated at BFNP are being shipped offsite for disposal. Records indicate that the above limit is more than sufficient to accommodate total onsite storage.

3.4 Schedule for Waste Placement

It is TVA's intention to store radwaste in the storage modules as soon as approval is given. Over 1,000 drums of low-activity trash and sandblasting sand are currently in temporary storage because of decreased space allocations at the Chem-Nuclear disposal facility. These drums will be stored in lots of 140 to 160 at a time, although only one drum will be placed in the module at a time. Resin liners requiring storage will be transported and stored one at a time.

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NRC QUESTION

4. Control of crane lift height

In the application, four accidents involving the dropping of a module cap are discussed. Three of these accidents involve dropping a module cap onto another cap, and dropping the cap into or onto the module itself. In each accident the consequence is mitigated by controlling the height that a cap can be lifted (five feet above an open module). The type of control is administrative.

From the control cab of the crane it would appear difficult to estimate the height of the lift by direct observation. Please describe how an operator can comply with the administrative controls, and describe any instrumentation that an operator would use to control the lift height.

TVA RESPONSE

4.0 Control of Crane Lift Height

TVA will restrict the lift height of a cell cap to 5 feet above an open module by setting a crane upper limit switch for a high hook position of 28 feet 7-3/4 inches. also, at this height, the clearance between the bottom of the lifted cap and the top of an adjacent cap in place will be 2 feet 6 inches. However, a crane upper limit switch is currently not in place. Installation of a high hook limit switch will require approximately 6 months. In the interim, the lift height of a cell cap will be administratively controlled through the use of a flagman. This flagman will ensure that the clearance between the bottom of the lifted cap and the top of an adjacent cap in place is kept at approximately 1 foot. The flagman will coordinate his duties with the crane operator when the cell cap is being moved.

NRC QUESTION

5. Design basis for radiation protection

In discussions with TVA on March 18 and 19, 1981 the design considerations for analysis of modules were discussed. Your "Design Criteria for the Long-Term Onsite Storage Facility for Low-Level Radioactive Waste" indicates that the modules are designed for conformance with 10 CFR 20. To complete a review of this design a description of the basic assumptions and methods of calculations used is necessary. This discussion should describe the assumed source term(s), shielding characteristics of the concrete, and the methods of calculation.

TVA RESPONSE

5.0 Design Basis for Radiation Protection

A. Radioactivity Sources

The source terms employed in the calculations of all dose equivalents are given in Table 4.1-1 of the license amendment application as 9875 curies per year in resins and 113 curies per year in trash. These source terms have the following bases:

1. For trash, the annual radioactivity inventory employed is 10 times annual inventories experienced at Browns Ferry Nuclear Plant through June 30, 1979. The annual inventory experienced at Browns Ferry Nuclear Plant is conservatively assumed to consist entirely of Co-60. The specific activity of Co-60 is calculated from measured exposure rates outside radioactive trash containers. Combining this specific activity with the annual trash volume produces the experienced inventory.

2. The annual inventory of resin radioactivity that can be stored in the facility is limited by the criterion that the dose equivalent to the nearest resident from facility operation not exceed 10 mrem per year. This dose equivalent is considered an appropriate allocation to the storage facility operation from the 40 CFR 190 limit of 25 mrem per year from the entire fuel cycle. The dose equivalent to offsite residents from trash storage operations is negligible.

Therefore, the 10 mrem per year can be allocated entirely to resin storage operations. The corresponding resin radioactivity inventory is calculated to be 9875 curies per year. (The nuclide distribution is given in Table 4.1-1 of the license amendment application.) This annual inventory of resin radioactivity would be produced if all three units are operated continuously with approximately .015 percent failed fuel. To date, failed fuel experience at the Browns Ferry Nuclear Plant has been considerably better than this.

During the first years of facility operation, nonvolume-reduced waste will be stored. If volume-reduction equipment is purchased and becomes operational, volume-reduced waste will be stored. Annual dose equivalents depend significantly on whether nonvolume-reduced or volume-reduced waste is placed in the facility. This is best explained by examination for each case of the following two components of occupational and offsite dose equivalents: (a) the dose equivalent during operations to place waste in the modules, and (b) the dose equivalent from waste during its storage in the modules. Analysis shows that the second component is essentially independent of whether the stored waste is in volume-reduced or nonvolume-reduced form. The reason is that the radioactivity inventory is the same for both cases. However, the first component is considerably greater in the case of volume-reduced waste. The principal reason for this is that during the operations of placing volume-reduced waste in a module, the waste already in the module being filled is unshielded from above for longer periods of time than in the case of nonvolume-reduced waste. These longer time periods result in greater dose equivalents from skyshine in the case of the volume-reduced waste.

The conclusion from the analysis of the components of dose equivalents from facility operation is that the dose equivalents are greater when waste is stored in volume-reduced form. Therefore, the dose equivalents corresponding to placement and storage of volume-reduced waste in the facility were presented in Tables 4.2-1 and 4.3-1 of the license amendment application.

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B. Calculational Methods

Each reported whole body dose equivalent is the sum of the two contributions: (1) a contribution estimated with the point kernel code, QAD P5Z Rev 3, and (2) the major skyshine contribution estimated using ANS LOG 210, Appendix C, "Applicability of Simplified Approximation Techniques for Air and Concrete Gamma Ray Scattering", by E. A. Warman et al.

C. Additional Dose Equivalent Considerations

There are other facility operations that require consideration. When and if the volume reduction equipment becomes operational, nonvolume-reduced waste that has been stored in the facility would be retrieved, volume reduced and restored. These operations would result in additional dose equivalents. However, the operations can be performed in years during which the solid waste radioactivity that is produced is less than that corresponding to the source terms described above. Should the failed fuel experience at the Browns Ferry Nuclear Plant continue to be good, scheduling the retrieval, volume reduction and storage operations such that the annual dose equivalents from facility operation do not exceed the estimates in Table 4.2-1 and 4.3-1 of the license amendment application should be achievable.

NRC QUESTION

6. Volume Reduction

In calculating occupational and population doses, you have assumed that all waste will be volume-reduced by incineration, trash by a factor of 36 and resins by a factor of 15. However, you have not included doses from the incineration operations nor described the operations for our review. Is volume reduction by incineration intended to be part of the storage program? If so, we require additional information about its impacts. If not, why are the doses calculated using the assumption of incinerated wastes?

TVA RESPONSE

6.0 Volume Reduction

At this time, TVA is still in the process of evaluating the use of incineration for volume reduction; however, no decision has been made on the installation of an incineration system. If TVA decides to construct and operate an incinerator for LLRW, the incineration system will be independent from the storage facility. Therefore, volume reduction by incineration is not part of the TVA storage submittal. Use of the storage facility does not depend on the future incineration of the waste. Therefore, no radiation exposures or process descriptions can be given until volume reduction equipment is approved and selected for Browns Ferry. If TVA decides to use incineration equipment at Browns Ferry, a separate submittal (with no direct effect on waste storage modules) will be prepared and sent to NRC for review and approval.

Because of the uncertainty on the use of an incineration volume reduction system, the storage modules were designed for assumed worst case storage conditions. Assumed worst case storage conditions consist of (1) life-of-plant storage duration (2) volume-reduced radwaste, and (3) the entire inventory is essentially CS-137. The doses presented in the July 31, 1980 submittal were calculated assuming worst case conditions. The worst case doses produced minimal radiological impacts and the storage of unreduced radwaste for 5 years has much smaller impact. The answer to NRC's question No. 3 presents the doses resulting from 5-year storage.

NRC QUESTION

7. Need for the Proposed Action

Your application discusses the need for the proposed action in Section 1.3. It states the proposed action is needed because:

- Chem-Nuclear Systems, Inc. has reduced TVA's monthly allotment of burial volume, and

- TVA is now generating waste at other nuclear plants besides the Browns Ferry Plant and where as TVA has additional wastes to dispose of within the allotted volume.

These arguments are convincing to an informed reader. However for readers not familiar with the schedule for future TVA nuclear plants, the volume of low-level waste generated from different reactor types, and TVA's historical allotment and actual volume used, these reasons may not be so convincing. Therefore, please provide specific information concerning:

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(1) historical data on the allotments at various disposal sites;

(2) historical data on actual volume shipped to various disposal sites; and

(3) continued anticipated future utilization of disposal sites for disposition of Browns Ferry low level waste;

(4) projection of the volume to be disposed of over the next 5 years from both the Browns Ferry Plant and other TVA plants.

This kind of specific information will put the need for the proposed action into perspective and clearly show the real requirements for managing Browns Ferry Waste.

TVA RESPONSE

7.0 Need for the Proposed Action

Historical data on TVA's volume allocation and the total volumes shipped is enclosed as Supplement 3.

TVA's future use of the volume allocation at Barnwell is under continuing review. Because of uncertainty in TVA being able to obtain sufficient disposal allocations at Barnwell, our present plans are to store radioactive material onsite when our storage facility is licensed. We will evaluate continued offsite disposal during the 5-year storage period, if commercial burial space remains available. Based on allocations for offsite disposal and rate of production of waste in all TVA plants, it will be necessary for TVA to begin using the onsite storage modules immediately upon receipt of authorization. Therefore, use of the modules will be required independent of continued use of the present disposal site. This use will ensure that TVA's long-term waste management plans are flexible enough to provide for the protection of the health and safety of the public while considering the best interest of TVA ratepayers.

Historically, Browns Ferry has produced about 90,000 ft^3 of LLRW annually, but this number can vary depending on outage and modification activities. The design basis values for the Sequoyah, Watts Bar, and Bellefonte Nuclear Plants are approximately 56,000 ft^3 per year each. This number, however, assumes periodic steam generator tube leakage and annual refueling outages for each unit. As a result, the LLRW production rate during the initial years of operation at these plants should be significantly lower. Current schedules provide for fuel load in the first unit at Watts Bar Nuclear Plant in late 1982, and at Bellefonte in early 1983. Therefore, total volume to be disposed of over the next 5 years (January 1982-December 1986) is less than 1.1 million ft^3.

NRC QUESTION

8. **Retrieval**

Impacts from retrieval of waste from the storage modules at the conclusion of storage were not included in the application. Within the context of your response to questions 6 and 7, please provide estimates of how long it would take to remove the wastes at the end of the 5-year license term as well as at the end of life-of-plant storage, and an evaluation of the occupational and population doses from retrieval. In these estimates and evaluation, you should also consider the availability of the following items:

(1) container handling equipment
(2) shipping casks and vehicles
(3) clement weather
(4) anticipated disposal capacity

TVA RESPONSE

8.1 **Assumptions**
In order to respond to this question, the following assumptions have been made.

a. The waste volume to be removed consists of the total contents of 14 modules (slightly less than 5 years total LLRW production) and is divided as follows:

Resins - 5 modules, 150 liners per module, 186 ft^3 per liner

Trash - 9 modules, 3900 drums per module, 7.5 ft^3 per drum

b. Sufficient offsite disposal capacity exists for unrestricted shipment of all accumulated waste.

c. Handling times are as follows:

Liner retrieval - 1.7 hours per liner, loaded 5 days per week

Drum retrieval - 18.4 hours for 144 drums, suitable weather conditions 80 percent of time, retrieval conducted 12 hours per day, 5 days per week

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d. A round trip to the disposal facility requires 16 hours and the drivers rest 8 out of each 24 hours. Two casks and unlimited trash transport equipment are assumed to be available.

8.2 Transportation Equipment

TVA now owns two shielded transportation casks for use in transporting resin-type waste from Browns Ferry. Additionally, at least eight other casks are available within TVA, and others are on order which can be used for the Browns Ferry resin liners. TVA also maintains contracts for rental of other casks as necessary. Tractors and trailers are easily available within TVA and through common carriers for transportation of drummed trash. As a result, TVA does not anticipate that lack of transportation equipment will affect the retrieval time for the stored waste.

8.3 Results

Based on the above assumptions, the retrieval time has been calculated as approximately 35 months. This time is obviously directly proportional to the volume of waste stored during the 5-year license period. Retrieval after life-of-plant storage has not been addressed since the license submittal requests only 5 years of storage.

8.4 Doses

The total occupational and population doses from retrieval of stored waste are similar to those received during initial storage of the waste, and may be somewhat lower due to radioactive decay during the storage period. The dose rate, however, is dependent upon the retrieval time. Using the assumptions in 8.1, the annual dose rate to the workers and members of the public would be 1.6 times higher than the values shown in tables 3 and 4 of Supplement 1 since the LLRW was stored for 5 years and removed in 3 years (5/3 = 1.6).

NRC QUESTION

9. Organizational

Please identify those organizations within TVA and BFNP having responsibility for radiological safety and discuss how these organizations meet the requirements of 10 CFR 33.13(c). This may be described by reference to the appropriate portions of the reactor operating license if applicable.

TVA RESPONSE

9.0 Organizational

Radiological Hygiene Branch

The Radiological Hygiene Branch is responsible for radiological hygiene activities at the plant. It develops and applies radiation standards and procedures; reviews proposed methods of plant operation; participates in development of plant documents and assists in the plant training program, providing specialized training in radiation protection. It conducts comprehensive environmental monitoring before, during, and after plant startup and provides radiological health coverage for all operations, including maintenance, fuel handling, waste disposal, and decontamination. It is responsible for personnel and in-plant radiation monitoring, and maintains continuing records of personnel exposures, plant radiation, and contamination levels.

Health Physicist

The health physicist is the onsite supervisor representing the Radiological Hygiene Branch and is responsible for direction of an adequate program of radiological hygiene surveillance for all plant operations involving potential radiation hazards. He reports to the plant superintendent for day-to-day direction for implementation of the plant radiation protection program and keeps the plant superintendent informed at all times of radiological hazards and conditions related to potential personnel exposure, contamination of plant and equipment, or contamination of site and environs. His duties include training and supervising health physics technicians; planning and scheduling monitoring and surveillance services; scheduling technicans to assure around-the-clock shift coverage as required; maintaining current data files on radiation and contamination levels, personnel, exposures, and work restriction; and ensuring that operations are carried out within the provisions of developed radiological hygiene standards and procedures. He provides monitoring assistance and technical advice to plant operations and medical staffs in emergencies where radiation and contamination hazards are involved.

The minimum qualifications of the plant health physicist comply with requirements set forth in Regulatory Guide 1.8, "Personnel Selection and Training," Revision 1, September 1975.

Division of Occupational Health and Safety

The Division of Occupational Health and Safety (OC H&S) is responsible for furnishing special services in the fields of safety, industrial hygiene, radiological protection, and other related areas. The Radiological Hygiene Branch, within the OC H&S provides administrative supervision for the Health Physics Unit at the plant. The Radiological Hygiene Branch is responsible for the preparation and review of radiological protection standards and for establishing and conducting all phases of the offsite radiological monitoring program. The Safety and Industrial Hygiene Branch performs onsite surveys of nuclear plants for the purpose of assuring compliance with TVA hazard control standards and requirements relevant to industrial hygiene. It also appraises and recommends appropriate engineering controls as required to control potential sources of occupational illnesses. The Standards and Compliance Branch develops hazard control standards and requirements which are applicable to nuclear plants. They work with the Division of Engineering Design for assurance that nuclear power plants are designed in accordance with these standards and requirements.

They also audit nuclear plants to assure that the hazards in the environment are being effectively controlled. They perform objective reviews and audits from an agency standpoint, of the occupational compliance activities and consultation services provided to the power plants by the safety organizations within the Division of Nuclear Power, which operates the nuclear power plants in TVA.

Division of Medical Services

The Division of Medical Services is responsible for TVA's overall health program. This includes providing employee health services at the plant.

NRC QUESTION

10. Fire Detection and Suppression

Please explain the basis for your decision not to incorporate automatic fire detection and fire suppression systems into the design of the storage modules.

TVA RESPONSE

10.0 Fire Detection and Suppression

It is TVA's position that automatic fire detection, fire suppression, smoke removal systems, and accessibility (i.e., aisle space between drums) for manual firefighting within the modules are not required. The only significant potential for fire in the facility is an external exposure fire, and three-hour fire resistive construction of each storage module will be adequate to prevent exposure of the low-level radioactive waste containers.

Potential fires within the storage modules have been assessed. TVA has performed an analysis that establishes that the potential spontaneous combustion of packaged trash is not a concern and dew ᐧered resins when placed in sealed liners are not considered to be flammable.

NRC QUESTION

11. Miscellaneous

The following is a list of information per..nent to the analysis in support of the TVA low-level waste storage request provided verbally during the site visit of March 18 and 19, 1981. Please confirm or clarify the following:

(1) The water table under the waste storage site is between elevation 530 and 550 feet (i.e., 30 to 50 feet below the grade of the storage area).

(2) Th metal gratings are to be used on the floor of each module as well as between layers of containers.

(3) The fire hydrant water can be taken from two independent sources.

(4) All applicable features, practices, and procedures described in your facility operating licenses, including FSAR's and EIS's will apply to construction and operation of the low-level waste storage modules (i.e., health physics practices, monitoring, etc.).

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TVA RESPONSE

11.0 Miscellaneous

11.1 Water Table

The water table under the waste storage site is between elevation 552 and 572 feet (i.e., 28 to 8 feet respectively below the grade of the storage area which is 580 feet).

11.2 Metal Gratings

TVA will utilize metal gratings as an interface medium between the storage module floor and the first layer of containers and successive layers of containers.

11.3 Fire Hydrants

The Browns Ferry OSF will have a remotely located 150,000-gallon bladder-type storage tank serviced by a diesel-driven fire pump. The storage tank will be supplied by a water line branching from a local water utility main servicing Browns Ferry Nuclear Plant. This water line will also serve as a second source of fire hydrant water in the event the storage tank is not available.

Until the storage tank is constructed and available, a portable fire pumper will be stationed at the OSF.

11.4 Procedures

All procedures, practices, and features described in our facility operating license concerning health physics practices, monitoring, and other operational procedures will apply to the construction and operation of the low-level waste storage modules. A generic description has been written to cover the storage of low-level waste in the storage modules. Each plant will write plant-specific procedures from this generic description at their option.

References:

1. Final Report on Definition of Waste Forms Produced by TMI Auxiliary Building Water Cleanup with the Epicor II System - TCC # 0188 - Prepared for Sandia Laboratory by Ridihalgh, Eggers, and Associates, April 6, 1981.

2. General Electric Information Letter SIL - 54, "Pressurization of Radwaste Drums" dated January 31, 1974.

3. "Amber-hi-lites - Helpful Hints in Ion-Exchange Technology," Dr. Robert Kunin, Robin and Hass Company, March 1974.

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SUPPLEMENT 1

TABLE 1

BROWNS FERRY NUCLEAR PLANT - MAJOR ASSUMPTIONS FOR RADIOLOGICAL ASSESSMENT OF FIVE-YEAR ONSITE LOW-LEVEL WASTE FACILITY

General

Type of Waste	LLW - miscellaneous non-volume reduced trash and spent resins
Activity	9,875 Ci/yr - resin 113 Ci/yr - trash
Isotopic Breakdown	About 89 percent Cs-137 and Ba 137m, 1 percent Co-60, 2 percent Co-58, 7 percent CS-124, and 1 percent other fission, activation, and corrosion products.

OSF Operational Releases

Under normal operation, any potential leachate in the storage modules will be collected and sampled prior to release. However, it is postulated that due to operator error or equipment malfunction, a certain portion of the estimated annual leach reaches the river via ground water.

Maximum Stored Activity	Releases are assumed to occur when the activity in the OSF reaches a maximum (at 5 yrs.). The 5-year activity is estimated at about 4.2×10^4 Ci composed of essentially all Cs-137.
Annual Leach Fraction	1 percent of the 5-year activity is assumed to leach out of the storage container per year.
Travel Distance to River	700 m (2,300 ft)
Ground Water Velocity	1.5 m/d (5 ft/d)
Total Soil Porosity	50 percent
Bulk Soil Density	1.6 g/cm^3
Distribution Coefficient (K_d)	500 cm^3/g for Cs

TABLE 1 (Continued)

River Dilution	Spillage is assumed to mix with 1/10 of the average river flow ($4x10^{16} cm^3/yr$) before reaching potential receptor pathways.

OSF Accidental Fire Release

Non-volume reduced LLW trash from one section of a storage module (about 1/11 of one year's waste) as assumed to catch fire due to an unspecified incendiary event.

Activity in Module Section	About 10.7 Ci Co-60
Fractional Release from Fire	0.01 for particulates[a]
χ/Q (fifty-percentile, 1 hour, ground level	$4.7x10^{-2}$ s/m^3
Distance to Site Boundary	164 M (540 ft)

a. WASH-1238.

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TABLE 2

BROWNS FERRY NUCLEAR PLANT - SUMMARY OF RADIOLOGICAL ASSESSMENT FOR FIVE-YEAR ONSITE LOW-LEVEL WASTE FACILITY

OSF Operational Releases	
Leach to River (10 CFR 50 Appendix I guidelines: 9 mrem/yr - whole body; 30 mrem/yr - organ)	3.0×10^{-5} mrem/yr (whole body) 9.0×10^{-6} mrem/yr (thyroid)
OSF Accidental Fire	
Air Submersion Dose at Site Boundary	2.8 mrem (whole body)
Inhalation Doses at Site Boundary (10 CFR 20 guidelines: 500 mrem/yr to whole body and 1,500 mrem/yr to individual organs other than the thyroid)	2.4 mrem (whole body) 970 mrem (lung)

TABLE 3

BROWNS FERRY NUCLEAR PLANT - OCCUPATIONAL DOSE ESTIMATES FOR FIVE-YEAR LLW STORAGE FACILITY

General Assumptions

1. Non-volume reduced trash is stored in 55-gallon drums; non-volume reduced resins are stored in 156 ft^3 and 186 ft^3 liners
2. About 9.6 liners of RWCU resins, 145 liners of condensate demineralizer resins, 3939 drums of combustible trash, and 4446 drums of noncombustible trash are stored per year
3. Exposure rates at 10 feet from individual containers are 2.9 R/h for RWCU resins, 6.9×10^{-1} R/h for condensate demineralizer resins, 8.3×10^{-4} R/h for combustible trash, and 3.6×10^{-5} R/h for noncombustible trash
4. Maximum number of curies in facility is about 4.2×10^{4} Ci
5. Maximum number of curies in a module cell is about 381 Ci
6. Modules have 3.5-ft concrete walls (trash modules have 2.0-ft walls) and 2.0-ft concrete cap (cap is removed for waste placement)

	Person-rem/yr
Transport Personnel	
One driver exposed to 2 mR/h, 50 h/yr	0.1
Crane Operator	
Two operators exposed to 5.3×10^{-3} R/h[a], 263 h/yr; and 4.8×10^{-3} R/h[a], 965 h/yr	12.1
Waste Handlers	
Two handlers and one health physics technician exposed to: 1.0×10^{-3} R/h[b], 427 h/yr; 0.01 R/h[c], 26 h/yr; 1.4×10^{-3} R/h[a], 263 h/yr; and 1.7×10^{-3} R/h[a], 965 h/yr	8.1
Monitoring Personnel	
One health physics staff member exposed to 3.9×10^{-3} R/h[d], 156 h/yr	0.6

a. Includes direct and skyshine radiation from facility during waste placement; crane operator is adjacent to module wall, waste handling individuals assumed to be 40 feet from the facility.
b. Average exposure rate during remote handling of drums assuming workers at 40 feet from drum.
c. Exposure during cask removal for only one worker.
d. Includes direct and skyshine radiation from facility with cap in place; individual assumed to be 10 feet from facility

TABLE 3 (Continued)

	Person-rem/yr
Nuclear Plant Employees	
1. Distance is approximately 975 m (3,200 feet) to plant	0.3
1. 2,500 persons exposed, assuming no shielding by building Exposed to 1.8×10^{-8} R/h[d], 2,000 h/yr Exposed to 3.5×10^{-7} R/h[a], 263 h/yr	

TABLE 4

BROWNS FERRY NUCLEAR PLANT - DOSES IN UNRESTRICTED AREAS

	mrem/yr
Onsite Non-Nuclear Facility	
1. Distance to nearest non-nuclear facility is 425 m (1,400 feet) from nearest module	1.2[a]
2. Non-nuclear personnel exposed to 1.1×10^{-4} mR/h[b], 2,000 h/yr and exposed to 3.8×10^{-3} mR/h[c], 263 h/yr	
Site Boundary	
1. Distance to nearest site boundary is about 165 m (540 feet) from nearest module	24
2. Exposed to 6.1×10^{-2} mR/h[c], 263 h/yr and exposed to 8.7×10^{-4} mR/h[b], 8,766 h/yr	
Nearest Resident	
1. Distance to nearest resident is about 400 m (1,310 feet) from nearest module	2.4
2. Exposed to 4.4×10^{-3} mR/h[c], 263 h/yr and exposed to 1.4×10^{-4} mR/h[b], 8,766 h/yr	

a. 0.02 person-rem/yr for 20 employees at this location.
b. Includes direct and skyshine radiation from facility with cap in place.
c. Includes direct and skyshine radiation during waste placement.

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TABLE 5

BROWNS FERRY NUCLEAR PLANT - DOSES FROM INTEGRITY MONITORING

	mrem/yr
Crane Operator	0.9
Exposed primarily to a skyshine field of 5.2×10^{-3} R/h for 170 h/yr from the quarterly inspection of resin liners contained in 125 module cells	
Manual Sampler	0.4
Exposed to a direct radiation field of 200 mrem/h for 2 h/yr from the manual sampling of the control resin liner contents once per quarter	
Air Sampler	
Doses are included under monitoring personnel in Table 3. Air sampler dose contributes about one half of the monitoring personnel dose listed	
Doses in Unrestricted Areas	
Due to skyshine during visual inspection of cell liners	
1. Non-nuclear workers - exposed to 3.8×10^{-3} mR/h, 170 h/yr	0.6
2. Site Boundary - exposed to 6.0×10^{-2} mR/h, 170 h/yr	10.2
3. Nearest Resident - exposed to 4.4×10^{-3} mR/h, 170 h/yr	0.8

VI.B. Long-Term Storage

1. NONVOLUME-REDUCED RESINS (GENERIC)

a. Loading Sequence

Cell Cap Removal	Estimated Duration (Min)
*1. Position the transport vehicle adjacent to the storage module cell designated to store the LLRW shipment(s). (Note: Ensure that the crane is not in motion.)	N/A
2. Index the transport vehicle such that the liner is positioned on the correct transverse axis.	1
3. Attach the storage module cell cap (SMCC) lifting rig to the crane hook.	1
*4. Drive the mobile crane to the designated storage module cell. (Note: Ensure that transport vehicle is in position and not in motion when the crane is moving.)	1
5. Index the crane for SMCC removal/placement.	2
6. Detach the four SMCC holddown bolts with an air wrench.	7 (14 man-minutes)
7. Attach the SMCC lifting rig to the SMCC lifting lugs.	3 (6 man-minutes)
8. Lift the SMCC and transport it to the remote work area or place the cap on an adjacent cell.	3
9. Detach the SMCC lifting rig assembly from the crane hook.	1
Grating Placement	
10. Drive the mobile crane to the remote work area.	1
11. Attach the electromagnet assembly to the crane hook, make connections, and pick up grating(s).	3
12. Drive the mobile crane to the storage module cell.	1

*Revision

13. Position crane and trolley for grating placement.	3
14. Lower grating(s) into place and disengage electromagnet.	15
15. Raise the electromagnet.	1
16. Drive the mobile crane to the remote work area.	1
17. Detach the electromagnet assembly from the crane hook.	3
<u>Cask Cover Removal</u>	
18. Drive the mobile crane to the storage module cell.	1
19. Engage the shield cask cover and sling assembly with the crane hook.	1
20. Unbolt the shield cask cover with an air wrench.	10
21. Lift the shield cask cover and transport it to the remote work area.	3
22. Disengage the shield cask cover and sling assembly from the crane hook.	1
<u>Liner Removal from Cask and Placement</u>	
23. Attach the proper liner lifting rig to the crane hook and make all connections.	3
24. Drive the crane to the storage module cell.	1
25. Position the mobile crane for liner placement.	2
26. Position the trolley to engage the liner.	1
27. Engage and lift the liner.	1
28. Position the trolley (for mobile crane operator shielding).	0.5
29. Partially lower the liner (for mobile crane operator shielding).	0.5
30. Position the trolley for liner placement.	0.5

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31.	Lower the liner into place.	0.5
32.	Disengage the liner lifting rig from the liner.	N/A
33.	Raise the liner lifting rig.	1
34.	Drive the mobile crane to the remote work area.	1
35.	Detach the liner lifting rig from the crane hook.	3

<u>Cask Cover Replacement</u>

36.	Engage the shield cask cover and sling assembly with the crane hook and lift.	1
37.	Drive the mobile crane to the storage module cell.	1
38.	Place the shield cask cover on the cask and bolt the cover on with an air wrench.	3
*39.	Drive the transport vehicle away from the storage module. (<u>Note</u>: Ensure that the crane is not in motion.) If cell contains 3 liners, complete Steps 10-17 (grating placement) before going to Step 40.	N/A

<u>Cell Cap Replacement</u>

40.	Attach the SMCC lifting rig assembly to the crane hook.	1
41.	Lift the SMCC and drive the mobile crane to the storage module cell.	3
42.	Position the crane for SMCC removal/placement.	2
43.	Lower the SMCC into place.	2
44.	Replace and tighten the SMCC holddown bolts.	7 (14 man-minutes)
45.	Detach the SMCC lifting rig from the SMCC and raise the lifting rig.	3 (6 man-minutes)
46.	Drive the mobile crane to the remote work area.	1

*Revision

47. Detach the SMCC lifting rig from the crane hook.	1

Summary

Approximately 102 minutes (1.7 hours) will be required to load one liner into a storage module cell and replace the cell cap. This is based in part on the following:

1. A liner is received at the LTOSF on its transport vehicle, and

2. The cap is removed and replaced only once during the loading operation.

To fill one storage module cell, this process must be performed six times.

*2. NONVOLUME-REDUCED TRASH (GENERIC)

a. Loading Sequence

Cell Cap Removal	Duration (Min)
*1. Position the transport vehicle adjacent to the storage module cell designated to store the LLRW shipment(s). (Note: Ensure that the crane and truck are not in motion at the same time.)	N/A
2. Attach the SMCC lifting rig to the crane hook.	1
*3. Drive the mobile crane to the designated storage module cell. (Note: Ensure that the crane and truck are not in motion at the same time.)	1
4. Index the crane for SMCC removal/placement.	2
5. Detach the four SMCC holddown bolts with an air wrench.	7 (6 man-minutes)
6. Attach the SMCC lifting rig to the SMCC lifting lugs.	3 (6 man-minutes)
7. Lift the SMCC and transport it to the remote work area or place the cap on an adjacent cell.	3
8. Detach the SMCC lifting rig assembly from the crane hook.	1

*Revision

Grating Placement

9.	Drive the mobile crane to the remote work area and detach the drum lifting rig from the hook.	2
10.	Attach the electromagnet assembly to the crane hook, make connections, and pick up grating(s).	3
11.	Drive the mobile crane to the storage module cell.	1
12.	Position the crane and trolley for grating placement.	3
13.	Lower the grating(s) into place and disengage the electromagnet.	15
14.	Raise the electromagnet.	1
15.	Drive the mobile crane to the remote work area.	1
16.	Detach the electromagnet assembly from the crane hook.	3

55-Gallon Drum Placement

17.	Attach the 55-gallon drum lifting rig to the mobile crane hook.	3
18.	Drive the mobile crane to the storage module cell.	1
19.	Index the mobile crane to the storage module cell for drum placement.	2
20.	Index the transport vehicle (55-gallon drums) to the storage module cell for drum placement.	1
21.	Position the trolley over a drum.	1
22.	Engage and lift the drum.	1
23.	Position the trolley (for mobile crane operator shielding and ALARA).	0.5
24.	Partially lower the drum (for mobile crane operator shielding and ALARA).	0.5

25.	Position the trolley for drum placement.	0.5
26.	Lower the drum into place.	0.5
27.	Disengage the drum lifting rig from the drum.	N/A
28.	Raise the drum lifting rig.	1
29.	Repeat steps 2.A.19 through 2.A.28 (as necessary) until one complete layer of drums has been placed in the cell.	232

<u>Additional 55-gallon Drum and Grating Placement</u>

30.	Repeat steps 2.A.9 through 2.A.29.	273
31.	Repeat steps 2.A.9 through 2.A.29.	273
32.	Repeat steps 2.A.9 through 2.A.29.	273
*33.	Drive the mobile crane to the remote work area and detach the drum lifting rig from the mobile crane hook. Drive the truck away from the storage module.	3

<u>Cell Cap Replacement</u>

34.	Attach the SMCC lifting rig assembly to the crane hook.	1
35.	Lift the SMCC and drive the mobile crane to the storage module cell.	3
36.	Position the crane for SMCC removal/placement.	2
37.	Lower the SMCC into place.	2
38.	Replace and tighten the SMCC holddown bolts.	7 (14 man-minutes)
39.	Detach the SMCC lifting rig from the SMCC and raise the lifting rig.	3 (6 man-minutes)
40.	Drive the mobile crane to the remote work area	1
41.	Detach the SMCC lifting rig from the crane hook.	1

*Revision

Summary

Approximately 1,105 minutes (18.4 hours) will be required to fill one trash storage module cell. This is based in part on the following:

1. 144 drums (in a removable-top transport vehicle) arrive at the LTOSF sequentially, and

2. The cap is only removed and replaced once during the operation.

*3. VOLUME-REDUCED RESINS AND TRASH (GENERIC)

a. Loading Sequence

Cell Cap Removal	Duration (Min)
*1. Position the transport vehicle adjacent to the storage module cell designated to store the LLRW shipment(s). (Note: Do not move the crane at the same time.)	N/A
2. Index the transfer vehicle such that a drum(s) is positioned on the correct transverse axis.	1
3. Attach the SMCC lifting rig to the crane hook.	1
4. Drive the mobile crane to the designated storage module cell.	1
5. Index the crane for SMCC removal/placement.	2
6. Detach the four SMCC holddown bolts with an air wrench.	7 (14 man-minutes)
7. Attach the SMCC lifting rig to the SMCC lifting lugs.	3 (6 man-minutes)
8. Lift the SMCC and transport it to the remote work area or place the cap on an adjacent cell.	3
9. Detach the SMCC lifting rig assembly from the crane hook.	1

*Revision

Cask Cover Removal

10.	Drive the mobile crane to the storage module cell.	1
11.	Engage the shield cask cover and sling assembly with the crane hook.	1
12.	Unbolt the shield cask cover with an air wrench.	10
13.	Lift the shield cask cover and transport it to the remote work area.	3
14.	Disengage the shield cask cover and sling assembly from the crane hook.	1

55-Gallon Drum Placement

15.	Attach the 55-gallon drum lifting rig to the crane hook.	3
16.	Drive the crane to the storage module cell for drum placement.	1
17.	Position the crane for drum placement.	2
18.	Position the trolley to engage a drum.	1
19.	Engage and lift a drum.	1
20.	Position the trolley (for mobile crane operator shielding).	0.5
21.	Partially lower the drum (for mobile crane operator shielding).	0.5
22.	Position the trolley for drum placement.	0.5
23.	Lower the drum into place.	0.5
24.	Repeat steps 3.A.18 through 3.A.23 five times repositioning the transfer vehicle as necessary to position drums beneath the trolley travel axis.	20
25.	Drive the mobile crane to the remote work area.	1
26.	Detach the drum lifting rig from the crane hook.	3

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Cask Cover Replacement

27.	Engage the shield cask cover and sling assembly with the crane hook and lift.	1
28.	Drive the mobile crane to the storage module cell.	1
29.	Place the shield cask cover on the cask and bolt it on with an air wrench.	2
*30.	Drive the transport vehicle away from the storage module. (Note: Do not move the crane at the same time.)	N/A
31.	Drive the mobile crane to the remote work area.	1

Additional Cask Cover Handling and 55-Gallon Drum Placement

32.	Index the transfer vehicle such that a drum(s) is positioned on the correct transverse axis.	1
33.	Repeat steps 3.A.11 through 3.A.23.	25
34.	Repeat steps 3.A.18 through 3.A.23 five times repositioning the transfer vehicle as necessary to position drums beneath the trolley travel axis.	20

Cask Cover Replacement

35.	Repeat steps 3.A.25 through 3.A.31.	9

Cell Cap Replacement

36.	Attach the SMCC lifting rig assembly to the crane hook.	1
37.	Lift the SMCC and drive the mobile crane to the storage module cell.	3
38.	Position the crane for SMCC removal/placement.	2
39.	Lower the SMCC into place.	2
40.	Replace and tighten the SMCC holddown bolts.	7 (14 man-minutes)
41.	Detach the SMCC lifting rig from the SMCC and raise the lifting rig.	3 (6 man-minutes)

*Revision

42. Drive the mobile crane to the remote work area.	1
43. Detach the SMCC lifting rig from the crane hook.	1

Summary

*Approximately 149 minutes (2.5 hours) will be required to load 12 drums of volume-reduced waste (resin or trash) into a cell. Grating placement has not been included above since, for volume-reduced waste storage, it is to be done very infrequently (about once every 3 months). Grating shall be placed under each layer of drums. The procedure is as follows:

Grating Placement

44. Drive the mobile crane to the remote work area.	1
45. Attach the electromagnet assembly to the crane hook, make connections, and pick up grating(s).	3
46. Drive the mobile crane to the storage module cell.	1
47. Position crane and trolley for grating placement.	3
48. Lower grating(s) into place and disengage electromagnet.	15
49. Raise the electromagnet.	1
50. Drive the mobile crane to the remote work area.	1
51. Detach the electromagnet assembly from the crane hook.	3

*Revision

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Supplement 3

Historical Data - TVA Allocations and Total Volumes Shipped (ft^3)

Month	Allocation	First-Come First-Served Pool	Total Shipped BFNP	Total Shipped SQNP
October 1979	-	-	7,506	-
November 1979	-	-	5,936	-
December 1979	-	-	4,434	-
January 1980	4,102	-	4,095	-
February 1980	3,293	-	3,286	-
March 1980	3,293	924	4,217	-
April 1980	2,828	15,839	18,667	-
May 1980	2,827	2,732	5,559	-
June 1980	2,827	4,967	7,794	-
July 1980	6,607	-	5,294	240
August 1980	5,948	3,310	8,858	400
September 1980	5,948	-	5,606	-
October 1980	5,463	5,914	11,377	-
November 1980	5,463	1,707	7,170	-
December 1980	5,463	1,076	6,539	-
January 1981	4,999	1,055	6,054	-
February 1981	4,999	921	5,920	-
March 1981	4,999	1,480	6,479	-
April 1981	4,535	3,266	7,481	320
May 1981	4,535	2,272	5,430	1,377
June 1981	4,535	962	5,497	-
July 1981	4,050	3,580	5,510	2,120
August 1981	4,050	1,615	5,665	-

0003/79849

400 Chestnut Street Tower II

September 28, 1981

Director, Office of Nuclear Material Safety
and Safeguards
Attention: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the) Docket No. 30-19102
Tennessee Valley Authority)

Since early 1980, TVA has been faced with the decreasing availability of commercial disposal space for low-level radioactive waste (LLRW) produced at its nuclear facilities. To ensure that the uncertain availability of commercial disposal space would not adversely affect operations at the Browns Ferry Nuclear Plant (BFNP), TVA immediately began investigating alternatives to the disposal problem. On January 21, 1980 TVA submitted a request for permission to temporarily store LLRW in a cable storage warehouse onsite. Permission for the temporary storage of LLRW in the cable warehouse was granted on March 17, 1980. Because of temporary increases in allocations at the Barnwell, South Carolina, disposal facility the cable storage warehouse has never been used.

As an alternative solution to the LLRW disposal problem, TVA began construction of concrete storage modules in the spring of 1980. On July 31, 1980 TVA submitted a license application for permission to operate the storage module facility. As you are aware, the license application is still pending your approval.

Our present LLRW generation rates have now reached a point where they are exceeding allocations for disposal, and use of the cable storage warehouse will become a necessity. This situation has become worse because of increased LLRW generation resulting from ongoing torus modifications at BFNP. The cable storage warehouse approval expires in March 1982 and we will again be faced with a disposal problem.

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In lieu of using the cable storage warehouse, we request permission to use the storage modules until a decision is made on our license application. The modules would be utilized for the storage of "trash" only. Resins and the higher activity trash would continue to be shipped to Barnwell as allocations permit. Since the storage modules have been specifically designed for storage of LLRW, we believe that their use will provide the safest and most environmentally acceptable means for handling the storage problem while ensuring that the uncertain space at commercial disposal facilities will not present undesirable impacts to the continued operation of BFNP.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

KPP:RHS:BT

cc: Office of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

400 Chestnut Street Tower II

August 19, 1981

Director, Office of Nuclear Material
Safety and Safeguards
Attention: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the Tennessee Valley Authority) Docket No. 30-19102

In response to your letter to H. G. Parris dated August 10, 1981, we are currently preparing responses to your questions and the request for additional information on TVA's July 31, 1980 application for the storage of low-level radioactive waste at the Browns Ferry Nuclear Plant. We anticipate a submittal date of September 11, 1981.

In addition, we will revise the July 31, 1980 application to reflect the responses to these questions and additional information. We anticipate submitting the revised application by September 25, 1981.

If we can provide any additional information before the September 11 submittal, please let us know.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

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400 Chestnut Street Tower II

July 29, 1981

Director, Office of Nuclear Material Safety
and Safeguards
Attn: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the	)	Docket No. 30-19102
Tennessee Valley Authority	)	

Please refer to my letters to H. F. Denton dated July 31 and November 17, 1980 in which TVA requested amendments to facility operating licenses DPR-33, DPR-52, and DPR-68 for onsite storage of low-level radioactive waste generated from the operation of Browns Ferry Nuclear Plant (BFNP).

TVA has reevaluated the physical security commitments contained in the July 31, 1980 letter for the BFNP low-level radioactive waste storage facility and finds them to be more restrictive than the minimum security requirements described in draft 10 CFR part 61 for the disposal of low-level radioactive waste. Since the BFNP facility is for storage only, we believe the following changes will result in an adequate security system.

Accordingly, please change the BFNP licensing documents to read as follows.

Page 2-6 presently reads:

2.2 SECURITY

The storage facility will be surrounded by a wire fabric fence with three strands of barbed wire, totaling eight feet in height with a 20-foot isolation zone on each side. An intrusion detection system and CCTV system are provided and terminate in a gatehouse. The gatehouse is designed for 24-hour operation with communications with

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the nuclear plant via radio and telephone. Yard lighting of 0.2 foot-candle and a patrol road within the fenced area is provided for surveillance purposes. Two points of access through the fence will be provided. The primary source of power for all electrical security equipment is offsite power. Backup power will be provided by a diesel generator located within the facility boundary.

Change to:

2.2 SECURITY

The storage facility will be surrounded by a wire fabric fence with three strands of barbed wire, totaling eight feet in height. All individuals and vehicles, while on the facility site, will be monitored--either physically or electronically. Communication equipment is located at each nuclear plant to contact local, State, and Federal law enforcement agencies and emergency services. The fence will be provided with one or more points of access and access will be positively controlled while individuals and vehicles enter and exit the LTOSF. All individuals entering and exiting the LTOSF will be positively identified. TVA will conduct a yearly audit of the LTOSF security system.

Page 2-5 presently reads:

2.7 ELECTRICAL REQUIREMENTS

The LTOSF will be provided with electrical power from offsite by the local utility. As a backup, the facility will have an electrical power generator sufficiently sized to provide the power required to operate all security features for a minimum of 12 hours. The generator will be remote from the security gatehouse with manual controls located inside the gatehouse.

Change to:

2.7 ELECTRICAL REQUIREMENTS

The LTOSF will be provided with electrical power from offsite by the local utility.

Director, Office of Nuclear Material Safety   July 29, 1981

Page 3-4 presently reads:

3.1 SECURITY OPERATIONS

Closed circuit television (CCTV) monitors will be used to detect and observe potential intrusion into the storage area. Monitor screens will be located in the gatehouse. In the event of a loss of CCTV, security personnel will call for immediate repair. A spare CCTV will be put in service, if available. During the time that the CCTV is out of service, the area normally covered by CCTV observation shall be continuously patrolled by security personnel to ensure that the security of the area is not compromised. Additional security personnel shall be utilized when necessary.

Change to:

3.1 SECURITY OPERATIONS

Either the physical or electronic measures will be used to monitor individuals and vehicles while on the facility site as well as when leaving the facility. Those measures will ensure that the security of the area is not compromised. Additional measures (to include security personnel) shall be utilized when necessary.

We believe these recommended changes are appropriate based on our reevaluation of existing NRC requirements, no perceived security threat, and consequently a more cost effective program for TVA.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

cc: See page 4

cc: Mr. Charles R. Christopher
Chairman, Limestone County Commission
P.O. Box 188
Athens, Alabama 35611

Office of Nuclear Reactor Regulation
Attn: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. K. D. Fagan, Supervisor - Nuclear
General Electric Company
832 Georgia Avenue
Chattanooga, Tennessee 37402

Mr. Ira L. Myers
State Health Officer
State Office Building
Montgomery, Alabama 36104

400 Chestnut Street Tower II

May 5, 1981

Director, Office of Nuclear Material Safety
and Safeguards
Attn: Mr. L. C. Rouse, Chief
Advanced Fuel and Spent Fuel
Licensing Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rouse:

In the Matter of the) Docket No. 30-19102
Tennessee Valley Authority)

Please refer to my letters to H. R. Denton dated July 31 and November 17, 1980 in which TVA requested amendments to facility operating licenses DPR-33, DPR-52, and DPR-68 for onsite storage of low-level radioactive waste generated from the operation of/Browns Ferry Nuclear Plant (BFNP).

Comments have been received from members of the public about the ability of the facility to withstand tornadoes. Accordingly, we are providing you with the following clarification regarding tornado design specifications for your information.

TVA is proposing the storage of low-level radioactive waste at several of its nuclear plant sites and, in an effort to economize, has developed a design for storage module construction which covers a spectrum of design basis events for use at all TVA nuclear plant sites. Thus, using the current approach, design parameters employed by TVA at some plants are in some cases more conservative than is necessary for that particular plant. This is done in order to facilitate a design which is acceptable for all plants; however, if conditions change, site specific designs may be used for future facilities.

The storage modules at BFNP shall be able to meet the following design specifications:

> Each storage module is designed to withstand the forces exerted by a tornado wind having a peripheral rotational velocity of 290 miles per hour at a radius of 150 feet from the center of the tornado and a translational velocity of 70 miles per hour. The storage modules are also designed for a tornado depressurization load of 3 pounds per square inch.

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Director, Office of Nuclear Material Safety
and Safeguards

May 5, 1981

In addition to the design parameters noted above, the storage modules are constructed of thick reinforced concrete due to shielding considerations and will be capable of resisting tornado missile penetrations.

We would like to emphasize that this information is provided for clarification and does not represent a change in the original design of the proposed facility. The original facility design, which included a tornado analysis, was developed in early 1980.

If we can provide you with any additional information, please let us know.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

cc: Mr. Charles R. Christopher
Chairman, Limestone County Commission
P.O. Box 188
Athens, Alabama 35611

Office of Nuclear Reactor Regulation
Attn: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. K. D. Fagan, Supervisor - Nuclear
General Electric Company
832 Georgia Avenue
Chattanooga, Tennessee 37402

Mr. Ira L. Myers
State Health Officer
State Office Building
Montgomery, Alabama 36104

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Nuclear Regulatory Commission

In the Matter of	)	
	)	Docket Nos. 50-259 OLA
TENNESSEE VALLEY AUTHORITY	)	50-260 OLA
	)	50-296 OLA
(Browns Ferry Nuclear Plant,	)	(Low-Level Radioactive
Units 1, 2, and 3)	)	Waste Storage Facility)

CERTIFICATE OF SERVICE

I hereby certify that I have served the original and two conformed copies of the following document on the Nuclear Regulatory Commission by depositing them in the United States mail, postage prepaid and addressed to Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Service Section:

Tennessee Valley Authority's Response
to Appeal Board Order

and that I have served a copy of the above document upon the persons listed below by depositing it in the United States mail, postage prepaid and addressed:

Mr. John H. Frye III
Administrative Judge and Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

*Mr. Stephen J. Eilperin, Chairman
Atomic Safety and Licensing
Appeal Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mrs. Elizabeth B. Johnson,
Administrative Judge
Oak Ridge National Laboratory
P.O. Box X
Building 3500
Oak Ridge, Tennessee 37830

Dr. Quentin J. Stober,
Administrative Judge
Fisheries Research Institute
University of Washington
Seattle, Washington 98195

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Washington, DC 20555

Robert B. Pyle, Esq.
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4783 Highway 58 North
P.O. Box 16160
Chattanooga, Tennessee 37416

This 27th day of May, 1982.

W. Walter LaRoche

W. Walter LaRoche
Attorney for Applicant
Tennessee Valley Authority

*Chairman Eilperin received an additional copy by telecopy on May 27, 1982.