

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

830 Power Building

September 11, 1978

Mr. Daniel Muller, Acting Director
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Muller:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

REC'D
SEP 12 11 12 52
NRC

STENOGRAPHER
JIMMY GRIFF

As requested in William H. Regan, Jr.'s letters to N. B. Hughes dated August 8 and August 16, 1978, enclosed are 40 copies of TVA's responses to agencies' comments received by the NRC on their draft environmental statement on the Watts Bar Nuclear Plant.

Very truly yours,

J. E. Gilleland

J. E. Gilleland
Assistant Manager of Power

Subscribed and sworn to before
me this 11th day of Sept., 1978

Bryant M. Lowery
Notary Public

My Commission Expires 4/4/82

Enclosures (40)
cc: Ms. Suzanne Keblusek, Project Manager (Enclosure)
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA SERVICE
Washington, D.C. 20235

JUL 5 1978

July 3, 1978

TO: William Aron, Director
Office of Ecology and Environmental Conservation

FROM: *Douglas M. Le Comte*
Douglas M. Le Comte
Special Projects

SUBJECT: EDS Review of DEIS 7806.02 - Watts Bar Nuclear Plant,
Units 1 and 2 Tennessee Valley Authority, TN

Page 2-11, Section 2.4.2: The text states that wind speeds at the 10-meter level averaged only 1.5 meters per second. If the wind measuring equipment is properly exposed, this is an improbably low wind speed. The data should be checked to determine if this is accurate. Additionally, the data summary presented in Figure 2.1 should have a caption which explains the data shown.



TVA RESPONSE TO COMMENT FROM THE DEPARTMENT OF COMMERCE

The mean wind speed at the 10-meter level for the period July 1, 1973, through June 30, 1975, has been calculated to be about 2.1 m/s.

The NRC-DES referenced Appendix I support information for the mean wind speed of 1.5 m/s. However, the Appendix I support information did not state this value. It is suspected that NRC estimated the mean wind speed from a joint frequency distribution of wind speed by wind direction. However, since NRC was also supplied with a magnetic tape of hourly average meteorological data for the subject period, it is also possible that they calculated the mean wind speed from the hourly data.

A quality assurance check has been performed on the 10-meter wind data for the 2-year period and has revealed no apparent instrument or exposure problem within this period.

Concerning the explanation of the data shown in Figure 2.1, it is suggested that the figure title be modified to read as follows:

Percentage Frequencies of Wind Direction Occurrences.
Onsite Wind Data, 10-meter (33-Foot) level July 1973 -
June 1975.



TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

Gary T. Myers, Executive Director
Roy H. Anderson, Ass't. Director

July 11, 1978

Ms. Bette Osborne
Natural Resource Staff
State Planning Office
660 Capitol Hill Building
Nashville, Tennessee 37219

Dear Bette:

Re: DEIS - Watts Bar Nuclear Plant, Units 1 and 2 TVA

We have completed our review of the referenced document and offer the following comments:

Page 5-5, under 5.4.1 Terrestrial Environment The Station - Part of the last paragraph is missing.

Page 5-8, 5.4.2 Aquatic Environment, paragraph four - This infers that the sauger is not a significant species in the Watts Bar Tailrace. Creel census data for Chickamauga Reservoir, which includes the Watts Bar tailwater, indicates that a significant sauger fishery exists. In the 1976-1977 creel an estimated 15,758 sauger averaging .75 lbs. were taken. This comprised 8.4% of the fishing pressure on Chickamauga. 1

Page C-19 Fish Production - Ichthyoplankton - This section draws the conclusion that the Watts Bar Tailwater is not a favorable spawning area for migratory spawners. This conclusion is based on a series of ichthyoplankton samples taken between March 29, and September 9, 1976. Since many factors may influence fish spawning in a given year, we do not agree with these findings. 2

Thank you for this opportunity for comment.

Sincerely,

TENNESSEE WILDLIFE RESOURCES AGENCY

James F. Sharber, Jr.
James F. Sharber, Jr.,
Environmental Planner

JFS:ss

cc: Mr. Reid Tatum
Mr. Anders Myhr

TVA RESPONSES TO COMMENTS
FROM THE
TENNESSEE WILDLIFE RESOURCES AGENCY

1. Paragraph 4 of Section 5.4.2 makes no inference that "the sauger is not a significant species in the Watts Bar Tailrace." It only states that the 1976 data do not demonstrate the significance of the tailwaters as a spawning site for migratory spawners. TVA creel data for years 1972 through June 1977 estimate that 1,410, 3,679, 4,737, 3,502, 8,869, and 8,023 (six months) sauger, respectively, were taken from the Chickamauga Reservoir.

2. TVA has not stated the conclusion that the Watts Bar Tailwater is not a favorable spawning area for migratory spawners. As given in response No. 1, larval fish data did not demonstrate the Watts Bar Tailwater to be a significant spawning area for migratory spawners in 1976. Data collected in 1977 were similar to the 1976 data and again did not demonstrate any significance of the tailwater as a spawning area for migratory species. TVA concurs that many factors influence fish spawning. Until additional data are collected and analyzed, no conclusive statement can be made regarding the significance of the Watts Bar Tailrace to migratory spawners.



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

50-390/391

PEP ER-78/500

Mr. William H. Regan, Jr., Chief
Environmental Projects Branch
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Regan:

Thank you for your letter of June 2, 1978, transmitting copies of the Nuclear Regulatory Commission's draft environmental statement for the operation of Watts Bar Nuclear Plant, Units 1 and 2, Rhea County, Tennessee. Our comments are arranged by subject.

Hydrology

Section 5.3.7 states that the radius of influence of the supply wells has been calculated to be 400 feet on the basis of discharging-well tests. The final statement should specify the well discharge rate corresponding to the given radius of influence. The final statement should also specify the elapsed time, that is, whether the radius of influence is calculated as 400 feet for the life of the project or for a short term. 1

The hydraulic characteristics of the aquifer used in the computations should be given and the aquifer(s) tapped by the preoperational and operational monitoring, listed on pages 6-1 and 6-6, should be identified.

Mineral Resources

The proposed project will have no adverse effects on mineral resources and may benefit mineral resources by providing electrical power for potential mineral development within the Tennessee Valley Authority service area.

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TVA RESPONSE TO COMMENT FROM
DEPARTMENT OF THE INTERIOR

1. The radius of effect created by pumping the main supply well at a rate of 2180 cubic meters per day (576,000 gallons per day) for three days was less than 122 meters (400 feet), since water levels in an observation well at that distance showed no measurable response. Transmissivity calculated from the test is about 370 square meters per day (4000 square feet per day). If storativity is 0.2, drawdown at a distance of 305 meters (1000 feet) would be 0.76 meter (2.5 feet) after 100 days of pumping at 2180 cubic meters per day, if no recharge occurred.

Monitor wells, listed on pages 6-1 and 6-6, are all finished in the Conasauga Shale.

50-390
391

Moore

July 3, 1978

U.S. Nuclear Regulatory Commission

Washington, D.C. 20555

Attention: Director, Division of Site, Safety and Environmental Analysis

In the Draft Environmental Statement for Watts Bar Nuclear plant, Unit 1 and 2 Tennessee Valley Authority, page 1, Summary and conclusions No.3 (b) states "The 967 acres of rural, partially wooded land owned by the applicant will be unavailable for other uses during the 40 year life of the plant".

Will you please explain what unavailable for other uses means? This is one of the many questions people are now asking in the Watts Bar vicinity. This is our reason for asking for a public hearing for the concerned citizens.

Thank you for your time and patience. The green book is very interesting.

Sincerely,
Jillie M. Jensen
Jillie M. Jensen R.N.

Route 1
Brandview, Va. 27807

ESP/10

Cooper
ESP/10

TVA RESPONSE TO COMMENT FROM ZELIA M. JENSEN

Item 1, on page 2.10-1, of the TVA FES states the following: "The major impact on land will be the conversion of approximately 967 acres of land to industrial use. That portion of this land which will be occupied by the buildings housing the nuclear steam supply system must be considered irretrievable for the foreseeable future. However, there are no anticipated routine operations of the plant which would prohibit attaining full use of the surrounding land."

Any future land use proposals by TVA would preclude the use of the 1200 meter exclusion area as defined in Section 2.1.2.2 of the Watts Bar Nuclear Plant Final Safety Analysis Report (FSAR). TVA is investigating land use proposals at the Watts Bar Nuclear Plant. Such land use proposals unrelated to power generation but consistent with plant operation and appropriate regulatory and environmental concerns may be considered.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

50-390/391

675 U. S. Courthouse, Nashville, Tennessee 37203

July 11, 1978

Mr. William H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U. S. Nuclear Regulatory Commissions
Washington, D. C. 20555

Dear Mr. Regan:

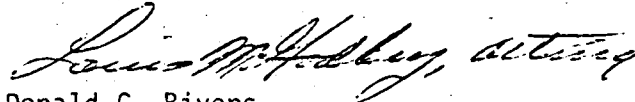
The Draft Environmental Impact Statement - Watts Bar Nuclear Plant, Units 1 and 2, TVA - was referred to the Soil Conservation Service for review and comments on June 2, 1978.

We have reviewed the draft statement and offer the following comment for your consideration:

1. We see no deficiencies relating to our areas of responsibility except for lack of treatment of prime farmland loss.

We appreciate the opportunity to review this draft environmental impact statement.


Sincerely,



Donald C. Bivens
State Conservationist

cc: R. M. Davis
Director, Office of Federal Activities, Environmental Protection
Agency

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ES/10 

TVA RESPONSE TO COMMENT
FROM
THE DEPARTMENT OF AGRICULTURE

Nonforested farmland in Rhea County and nearby Meigs County is 89,280 acres. The amount of prime agricultural land contained in the 967 acres obtained by TVA is not immediately available. However, the 967 acres acquired does not represent a significant loss in comparison to the total farmland in the two-county area.

50-390/391

MARVIN L. LEWIS
6504 BRADFORD TERRACE
PHILA. PA. 19149
JULY 13, 1978.

MR OLIVER D. T. LYNCH, JR.
DIRECTOR DIV OF SITE SAFETY & ENV ANALYSIS
OFFICE OF NUCLEAR REACTOR REGULATION
U.S. N.R.C.
WASH., D.C. 20555

SIR: PLEASE ACCEPT MY COMMENTS BELOW ON
THE "DES OF THE WATS BAR NUCLEAR PLANT,
UNITS 1 & 2 TVA"

#2 BACKGROUND RADIOLOGICAL CHARACTERISTICS. THIS IS A
VERY SHORT Φ ON AN IMMENSELY IMPORTANT SUBJECT.
CLEARLY, SOME ELABORATION OF HEALTH EFFECTS FROM
BACKGROUND IS NEEDED.

#3.2.1 CONSTANT SWITCHING FROM ONE SET OF UNITS
TO SEVERAL OTHERS MAKES DIFFICULT READING.
USE ONE SET OF UNITS, GALLONS PER DAY, AND GIVE
THE CONVERSION FACTORS.

P3-18 GASEOUS WASTE SUMMARY. HOW DOES THIS SUMMARY
COMPARE TO SIMILAR PLANT PRESENTLY IN OPERATION
PLEASE COMPARE MILLSTONE AND TURKEY POINT WITH WATS.

P3-21 HOW SENSITIVE IS THIS ANALYSIS OF 51000 IMPAUREM.
IF THE DIRECTION OF MMOR WINDS OR UNPLANNED
SPILLS OCCUR, WHAT HAPPENS TO THIS ANALYSIS?

P5-17 INTERESTING.

P5-21 TABLE 5-10. THIS IS THE INTERIM S-3 RULE. IT
IS PRESENTLY IN HEARINGS AND MAY BE
ELIMINATED OR CHANGED PRACTICALLY. HOW WILL
CHANGE OF S-3 EFFECT THIS DES?

P5-23 THESE NUMBERS DO NOT SEEM TO AGREE WITH
THE MORTON RAULH DES OR CHAUNCEY
KEPFORD'S DEPOSITION ON JUN 8, 78 IN THE
FERKIN'S NUKE CASE AT NRC, BETHESDA, MD.
PLS RECHECK ²²³RA NUMBERS AND ITS AGREEMENT
WITH KEPFORD'S DEPOSITION.

I CANNOT GO INTO ALL THE QUESTIONABLE AREAS IN THIS DES
VERY TRULY YOURS,

MARVIN L. LEWIS

PLS DO NOT
THINK I AGREE
WITH AREAS ON
WHICH I AM
NOT COMMENTING.

P.S. I'd send report to RFD 5352

to [unclear]

[unclear]

[unclear]

782020295

COOZ
ES/10

COMMENTS FROM MR. MARVIN L. LEWIS

- Paragraph 2.6 - Background Radiological Characteristics - This is a very short paragraph on an immensely important subject, clearly, some elaboration of health effects from background is needed. 1
- Paragraph 3.2.1 - Constant switching from one set of units to several others makes difficult reading. Use one set of units, gallons per day, and site the conversion factors.
- Page 3-18 - Gaseous Waste Summary - How does this summary compare to similar plant presently in operation? Please compare Millstone and Turkey Point with Watts Bar. 2
- Page 3-21 - How sensitive is this analysis of \$1000/man-rem if the direction of major winds or unplanned spills occur, what happens to this analysis? 3
- Page 5-7 - Interesting
- Page 5-21 - Table 5-10. This is the interim S-3 rule. It is presently in hearings and may be eliminated or changed drastically. How will change of S-3 effect this DES? 4
- Page 5-23 - These numbers do not seem to agree with the Morton Ranch DES or Chauncey Kepford's deposition on June 8, 1978, in the Perkin's nuke case at NRC, Bethesda, Maryland. Please check radon 222 numbers and its agreements with Kepford's deposition. 5

TVA RESPONSES TO COMMENTS FROM MR. MARVIN L. LEWIS

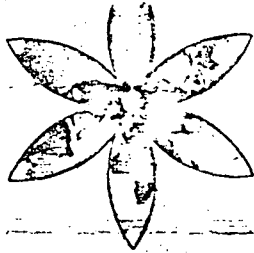
1. Health effects from natural background radiation are widely disputed within the industry today. However, most experts in the health physics profession feel that the biological effects due to natural background radiation are negligible and do not constitute a health hazard. The operation of Watts Bar Nuclear Plant is not expected to increase the background radiation exposure to residences of East Tennessee.
2. From Table 5.9 of NRC DES for WBNP, the highest calculated dose is 3.4 mrem/yr/unit, to the child thyroid. This is 23 percent of the Appendix I guideline and is due mostly to radioiodines and particulates. The following table compares plant releases for WBNP, Turkey Point, and Millstone:

Releases of Radioiodine and Particulates
(Sum of 2 units) (Ci/yr)

<u>Millstone</u>	<u>Turkey Point</u>	<u>WBNP</u>
3.17E+00	1.60E+00	2.12E-01

It can be seen that WBNP releases less of these effluents than do the other two plants. Therefore, WBNP appears to have less radiological impact on the basis of individual doses than do Turkey Point and Millstone.

3. The figure of \$1,000/man-rem is considered to be conservative under all conditions likely to be encountered during plant operation.
4. While Table 5-10 was written to incorporate interim values, only the value for releases of radon-222 is known to be in need of major redefinition. Further, NRC staff estimates regarding releases of radon-222 were listed in Section 5.5.3. We do not believe that small changes in any of the listed values would materially affect the conclusions drawn in the DES. We do not expect large changes in listed values; however, even such large changes would not necessarily affect the conclusions drawn in the DES. Changes drastically affecting the cost-benefit ratio could result in regulatory action.



RECEIVED
EPA REGION 4
JUN 3 5 54 AM '78
PLENTY

ENFORCEMENT
DIVISION

THE FARM - 156 DRAKES LANE - SUMMERTOWN, TENNESSEE 38483 - PHONE (615) 964-3574

RE: Application No. TN0020168
Public Notice No. 78TN006
NPDES Permit Application
Tennessee Valley Authority
Watts Bar Units 1 and 2

June 28, 1978

Enforcement Division
Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30308
ATTN: Mona Ellison

Dear MS. Ellison,

I received Notice 78TN006 on June 26, 1978. I am submitting this comment before the close of the thirty day period on July 1, 1978. I wish the contents of this comment to be fully addressed before the NPDES permit is issued for this application.

My name is Albert Bates. I reside at 156 Drakes Lane, Summertown, TN, 38483. I make this comment on behalf of PLENTY, a world charitable relief organization, by virtue of our interest in the State of Tennessee and the North American continent as a suitably safe and healthy habitat.

I agree to be subject to examination on all matters contained herein at our own expense. Areas which I contest are those set out in the Application's section 1.e., page 1, Proposed Pollution Abatement Facilities--neutralization and/or sedimentation of plant operating wastes; and PART I, Section A, page 7, EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS--Liquid Radwaste System. The part of the system I am concerned with is outlined on the diagram I enclose.

M. Ellison
June 28, 1978
p. 2.

1. e. Description of Proposed Pollution Abatement Facilities

COMMENT:

The proposed radioactive liquid waste treatment system is one which allows some portion of the radwaste to be discharged into the Tennessee River. This system cannot be considered effective in eliminating radioactive liquid waste from the waste water discharge. Unless an alternate system with proven effectiveness is substituted, all unnaturally radioactive waste water should be gathered and stored for permanent isolation from the biosphere.

The proposed pollution abatement system would certainly result in loss of life and serious debilitating diseases to the population downstream, and within the water-currents of the air-ocean world, now and in ages to come. Permanent degradation of the life-cycle--by permitting sedimentation of persistent, highly toxic radionuclides in the fresh water channels which sustain life--is criminally irresponsible.

M. Ellison
June 28, 1978
p. 3.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS--Liquid
Radwaste System

COMMENTS:

(1) Applicant-permittee proposes to limit discharges to the Tennessee River to 15 mg/l average and 20 mg/l maximum liquid radwaste daily. Dilution factors--the mg/l notation--make no indication of the weight, activity, persistence, or biological effectiveness of the suspended solids comprising the liquid radwaste discharge. Such indications are necessary for any realistic assessment of potential damage to biota. 2

(2) Several hundred different actinides may be contained in the discharge, principal among them being H-3, Ra-226, Cs-137, Sr-90, and I-131 by volume; Y-90,91, Rn-222, Ra 224,225, Th-234, and Cm-242 by activity; Ni-59, Rb-87, I-129, Cs-135, U-233,234,235,236,238, Np-237, Pu-242,244, and Cm-247 by persistence; and C-14, K-42, Po-210, Pu-236, 238, 239, 240, 241, and Am-241 by biological effectiveness. The permit neglects to specify any breakdown of these radionuclides, each of which presents a characteristic individual hazard to health. 3

(3) The proposed radwaste discharge is carcinogenic, teratogenic, mutagenic, and has non-specific immunity-reducing and life-shortening effects possible at doses well below that expected in drinking water downstream of this discharge. NRC and EPA have calculated health effects, including cancers and genetic diseases, expected in the general population, and found this acceptable. NRC does not have constitutional authority to accept health effects on behalf of unconsenting private citizens. Recent EPA public forums have demonstrated strong public opposition to the imposition of radioactive poisons on future generations. Recent acts of Congress have expressly forbidden release of cancer-causing material to the population. The Tennessee Code forbids intentional poisoning under penalty of life imprisonment. 4

M. Ellison
June 28, 1978
p.4.

(4) Health, physical security, and life are rights and privileges secured by the federal and state constitutions to all citizens. They may not be deprived without due process, meaning individual legal proceedings against any citizen to be deprived. Issuance of the permit as presently written would serve to deprive unspecified citizens of these rights and privileges and would thereby constitute "state action" within the meaning of § 42 U.S.C.A. 1981-5, the Civil Rights Acts. Moreover, this deprivation would fall unequally upon those with greatest susceptibility or who experienced the greatest exposure by virtue of geographic location or personal lifestyle. Such discrimination would run contrary to the Equal Protection Clause of the U.S. Constitution. EPA and the State of Tennessee are specifically forbidden from awarding the permit.

(5) Deaths to present and future generations projected by EPA and NRC to result from liquid radwaste discharges to the biosphere, insofar as they are committed intentionally by TVA, EPA, and State Public Health are humanicide within the meaning of the Nuremberg proceedings, the U.N. Declaration of Human Rights and subsequent covenants, and international treaties to which the United States is signatory. Humanicide is a crime of state for which individual officers, acting in their official capacity, may be held personally responsible.

(6) EPA and TVA have estimated the dose to an individual maximally exposed to the liquid radwaste discharge after dilution in the Tennessee River to be less than 1 millirem (mrem) per year. While this figure is extremely unrealistic and non-conservative, it can be accepted momentarily for the sake of argument. Recent scientific evidence based upon human experience and laboratory work in vitro at low dose ranges (not mathematically extrapolated downward from A-bomb doses as the older data had been) indicates that 0.1 to 1 mrem increases cellular damage 1%. EPA estimates that radiation causes 22,224 health effects/yr. in the U.S.. Background

M. Ellison
June 28, 1978
p. 5.

radiation is postulated now to be the cause of a very large percentage of all non-accidental deaths in the world population. Increases of even a single mrem yearly can therefore be seen to have significant impact on the public health. This impact is undesired by the majority of its victims. While EPA and State permissible limits are constantly revising downward in light of new evidence of serious risks previously unrecognized, the long-term genetic ramifications of past error are yet multiplying. Where radiation is concerned, there is no safe dose, and no known human tolerance.

Respectfully submitted,



Albert Bates

cc:f

Water Quality Control Board
Tennessee Department of Public Health
621 Cordell Hull Building
Nashville, TN 37219

Mr. David Freeman
Tennessee Valley Authority
TVA Towers
Knoxville, TN

TVA RESPONSE TO COMMENTS FROM PLENTY

1. U.S. Nuclear Regulatory Commission (NRC) has determined acceptable limits for liquid effluents from nuclear plants. The doses due to the radioactive liquid effluents for the WBNP are estimated to be far below the acceptable limits set by the NRC. Responsible scientific and political organizations recognize the impracticality of enjoying the benefits of electrical power (or transportation, or diagnostic medicine, etc., etc.) risk free. Socioeconomic judgements must be made regarding acceptable levels of risk when weighed against benefits of virtually every aspect of life in industrial countries. These judgements are implied in the standards and regulations governing nuclear power production. TVA's WBNP is designed to be operated within all applicable radiation dose standards and hence below "acceptable" levels of risk.
- 2,3. Environmental Protection Agency is responsible for regulation non-radiological releases from nuclear plants. The mentioned NPDES permit does not address radiological matters. Radiological releases are regulated by the NRC. Specifically, the suspended solid limitation mentioned in Item 1, Section A, page 3, is a standard criteria intended to regulate discharge of excess turbidity. Item 2, Section A, page 3, also is not applicable to the mentioned permit. Regulations applicable to radioactive discharges from the WBNP are very stringent and are described in the plant's environmental technical specifications. The NRC reviews and approves these specifications prior to operation.
- 4,5,6. The Nuclear Regulatory Commission (NRC) has been granted the authority to safeguard the radiological health and safety of the Nation by the Atomic Energy Act of 1954, 42 U.S.C. §§ 2011 et seq. (1970; Supp. V, 1975) and the Energy Reorganization Act of 1974, 42 U.S.C. §§ 5801 et seq. (Supp. V, 1975). The procedures adopted by the NRC to provide for participation by members of the public have been upheld as adequate. Vermont Yankee Nuclear Power Corp. v. NRDC, 55 L. Ed. 2d 460 (1978).

To the best of our knowledge, no person has ever died as a result of the radiological emissions from a nuclear power plant so that any aspersions as to "intentional poisoning" or "humanicide" are totally without basis. Without dignifying such remarks with a rebuttal, we would like to point out that such crimes require additional elements, such as malice, which are absent here.

7. The National Academy of Science, National Research Council has stated on the BEIR^a report that the only somatic risk that needs to be taken into account in settling radiation protection standards for the general population is cancer induction. The International Commission on Radiological Protection has concluded^b that the best estimate of the mortality risk factor for radiation induced cancers is approximately 10^{-1} mrem⁻¹.

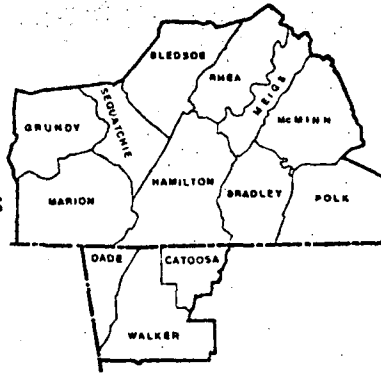
Doses due to routine radioactive effluents from a nuclear power plant are within variations in the natural background radiation dose. Commercial air service can increase the background dose rate ~ 0.3 mrad. Masonry building construction results in dose rates 3 times greater than for wooden construction, the background dose rates in western states are 50-100 mrem/yr higher than in eastern and central states. Clearly, if a decrease in background levels of radiation dose were perceived as important, options exist in how and where a person lives which are more effective in limiting radiation dose than by further limiting nuclear power plant effluents.

- a. National Academy of Science, National Research Council, "The Effects on Populations of Exposure to Low-Levels of Ionizing Radiation," Washington, November 1972.
- b. ICRP Publication 26, "Recommendations of the International Commission on Radiological Protection," Pergamon Press, New York, 1977.

CARCOG

CHATTANOOGA AREA REGIONAL COUNCIL OF GOVERNMENTS

JAMES M. CANTRELL
Chairman



SETDD

SOUTHEAST TENNESSEE DEVELOPMENT DISTRICT

C. L. THRAILKILL
Executive Director

July 17, 1978

Wm. H. Regan, Jr., Chief
Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: Docket Nos. 50-390 and 50-391 - Tennessee Valley Authority, Draft Environmental Statement for Watts Bar Nuclear Plant, Unit Nos. 1 and 2

Dear Mr. Regan:

In accordance with the Office of Management and Budget Circular A-95 this office, as the areawide clearinghouse, has reviewed the subject proposal.

Our review of the draft environment impact statement indicates that most initial review comments which this office raised have been satisfactorily answered. The notable exception is the issue of cumulative impacts from the series of nuclear plants in various stages of development along the Tennessee River. The enclosed map provides an overview of possible areas of cumulative impacts based on the 50 mile radius utilized throughout the impact statement. The primary cumulative impacts addressed were those of radiological impact. Other cumulative impacts and the relations of cumulative potentials were not adequately addressed or taken into consideration in analysis of various factors. 1

As an example of this oversight page 7-1 deals with Realistic Accident Analysis for the Watts Bar facility. Section 7.2 on this page states that "the probability of occurrence of accidents and the spectrum of their consequences to be considered from an environmental effect standpoint have been analyzed using best estimates of probabilities and realistic fission product release and transport assumptions". We are satisfied that in this example the estimates and assumptions of probabilities for accidents and consequences concerning the Watts Bar facilities are acceptable. We question if the assumptions and estimates of probabilities are reliable with respect to the impact area when one considers the cumulative fact that there are several nuclear plants in the same general vicinity. In essence the sum of the cumulative potential is likely to be greater than the individual potentials, estimates, probabilities, and impacts. This example we have cited is not unique but merely representative of the basic short coming of the EIS in not properly addressing cumulative impacts. 2

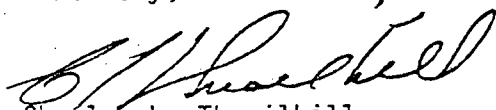
782050239

Cooper
7/11

Mr. Wm. H. Regan, Jr.
July 11, 1978
Page 2

Should there be any question, or if we may be of further assistance, please contact this office.

Sincerely,



Charles L. Thrailkill
Executive Director

CLT:HCB:cud

TVA RESPONSE TO COMMENTS FROM CARCOG/SETDD

1. The rule requiring related actions to be treated together for NEPA purposes and the corollary rule against segmenting a single action depend on the scope of the project and the separability of the project from other related projects. See Sierra Club v. Callaway, 400 F.2d 982 (5th Cir. 1974). Here, these three nuclear power plants, although located in approximately the same geographical area, are and always have been considered entirely separate projects. In addition to this independent treatment of the three projects by TVA, NRC, and EPA, these plants were started at different times. Thus, each project is a separate viable entity which stands or falls on its own merits and the EIS for each speaks for itself. The Watts Bar plant is not a component or element of either of the prior plants. See Callaway, supra. NEPA does not mandate a massive reanalysis of separate projects already in the project area.
2. Accidents severe enough to contribute to the population dose in overlapping areas have extremely small probabilities of occurring. This very small probability coupled with the dose is an estimate of the potential risk involved. The Reactor Safety Study (Wash-1400) estimates that there is 3-million times greater probability of an average person being injured from all non-nuclear accidents than from a nuclear accident. The risk of being injured in two nuclear plant accidents is 10^{-16} per year. Therefore, the cumulative potential is not significantly different from the risk from one nuclear plant and is therefore not considered.

Thus cumulative effects are considered but in most cases they are not significant enough to warrant including them in the EIS.

Route 1 Box 86 A
Grandview, In 37337
July 23, 1978

Mrs. Suzanne Heblusek
Environmental Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mrs. Heblusek

Thank you for accepting our additional comments.

Specifically, in the Draft Environmental Statement relating to operation of Watts Bar Nuclear Plant Docket Nos. 50 - 390 and 50 - 391 page one, summary and conclusions, 3 (b)

- a. Please define "unavailable for other uses during 40 year life of the plant."
- b. how will the fish survive in the warm water of Chickamauga Reservoir and Tennessee River and be kept free of contamination ?
- c. Where is the burial off-site for the radioactive solid waste ?
- d. Is the general population living within 2 miles radius of the Nuclear Plant aware of the "radioactive effluents released to the hydrosphere from the Watts Bar facility during normal operation" ?

Dr. Thomas Mancuso states that so-called "safe standards" should be reduced ten fold. Does the Nuclear Regulatory Commission agree with this statement ?

Sincerely yours

Zelig Jensen
Arthur Jensen

Mr. & Mrs. Arthur Jensen

782120003

COO2
4/10

COMMENTS FROM MR. AND MRS. ARTHUR JENSEN

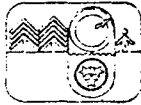
- a. Please define "unavailable for other uses during 40-year life of the plant." 1
 - b. How will the fish survive in the warm water of Chickamauga Reservoir and Tennessee River and be kept free of contamination? 2
 - c. Where is the burial offsite for the radioactive solid waste? 3
 - d. Is the general population living within 2 miles radius of the Nuclear Plant aware of the "radioactive effluents released to the hydrosphere from the Watts Bar facility during normal operation?" 4
- Dr. Thomas Mancuso states that so-called "safe standards" should be reduced ten fold. 5

TVA RESPONSES TO COMMENTS FROM MR. AND MRS. JENSEN

1. Please see TVA's response to Mrs. Zelia M. Jensen.
2. This question is assumed to refer to the heated discharge to the reservoir from the blowdown diffusers.

As is explained in the environmental statement, no significant impact to the aquatic biota is expected from the operation of the diffusers. Heated water will be discharged to the reservoir at velocities that would normally preclude the presence of fish. Since the area of highest temperature will be in the area of highest velocities, the fish will normally avoid these areas. As discharge velocities decrease, the heated water will be sufficiently mixed and temperatures should be no greater than 2-3°F above ambient.

3. The radioactive solid waste will be buried at the licensed facility at Barnswell, South Carolina.
4. The TVA WBNP FES is a published document available to the public. The release to the environment of radioactive effluents and their impact are thoroughly discussed in this public document.
5. Dr. Manusco's work has been reviewed extensively by several independent experts. At the present time his scientific work and his opinions are not persuasive.



Division of Planning and Development

2611 West End Ave. Nashville, TN 37203 [615] 741-1061

MEMORANDUM

TO: Bette Osborne
 FROM: Walter L. Criley *wlc/ec.*
 DATE: August 1, 1978
 SUBJECT: Draft Environmental Statement
 Operation of Units 1 & 2 Watts Bar
 Nuclear Plant TVA

The Tennessee Department of Conservation has reviewed the above referenced proposed project and submits the following comments:

The data base of the Tennessee Heritage Program shows the following reported occurrences of significant elements of natural diversity near the site of the Watts Bar Nuclear Plant:

Lampsilis orbiculata (Pink Mucket Pearly Mussel) Listed as an Endangered species on Federal Lists¹, State Lists², and Lists of the Tennessee Heritage Program. Collected 1.0 mile below Watts Bar Dam - 1975. 1

Pleurobema cordatum Lea (Pigtoe Pearly Mussel) Listed as a species of Special Concern by the Tennessee Heritage Program. Collected 1.0 mile below Watts Bar Dam - 1975. 2

Pandion haliaetus (Osprey) Listed as an Endangered species on State Lists and Threatened on Lists of the Tennessee Heritage Program. Old nest site on Yellow Creek about 0.5 kilometer from the Tn. R. A pair of mature birds seen at site in April of 1974. 3

This Environmental Statement acknowledges the existence of an Osprey nest within the project area and states that the species is not classified as threatened or endangered by the U.S. Fish and Wildlife Service. This may be true; however, the Tennessee Wildlife Resources Agency has classified the bird as Endangered in Tennessee and the Tennessee Heritage Program lists it as Threatened. Care should be taken to protect this nest site from disturbance or destruction since it may once again be utilized in the future. The Tennessee Heritage Program data base shows only five active Osprey nests in the State of Tennessee in 1978.

Bette Osborne
August 1, 1978
Page 2

This plant is on a section of the Tennessee River which has been designated as a mussel sanctuary (control area) by the Tennessee Wildlife Resources Agency. This section of the river serves as habitat for one known Federally endangered species and another which is of Special Concern to the Tennessee Heritage Program due to its limited distribution.

While the report indicates that the aquatic biota will not be significantly impacted, care should be taken to prevent continued degradation of this section of the Tennessee River since it is already classified as "effluent - limited" due to the fact that it does not meet dissolved oxygen criteria for the protection of aquatic biota³.

The Tennessee Valley Authority anticipates occasions when the river temperature will exceed the 30.5°C (86.9°F) which has been set as a maximum acceptable level by the Tennessee Water Quality Control Board and the Environmental Protection Agency. Such a situation would most likely occur during summer months when the river's flow rates are low and power generating demands are high. The low flow rates could result in increased concentrations of the estimated 987 kg/day of Sulfate, 630 kg/day of Sodium and 344 kg/day of Chloride contained in the plant effluent. This situation would represent a significant stress to the aquatic biota in the river downstream of the plant.

1
USDI/FWS 1976 U.S. Federal Register 41 (115) June 14, 1976 .

2
Tennessee State List - Enabling Authority - "Tennessee Nongame and Endangered or Threatened Wildlife Species Act of 1974 (Public Chapter 769)"

3
Water Quality Management Plan for the Upper Tennessee River Basin, Tennessee Department of Public Health, Nashville, October 30, 1975

pb

cc: Bill Lambert

TVA RESPONSES TO COMMENTS
FROM THE
DEPARTMENT OF CONSERVATION

1. Lampsilis orbiculata is widely distributed within the Interior Basin of the United States and specifically in the main channel of the Tennessee River. Specimens of L. orbiculata have been recently found inhabiting the tailwater areas below Fort Loudoun, Watts Bar, Gunterville, Wilson, Pickwick, and Kentucky Dams. The species has also been found by TVA to be widely distributed in an area of the Cumberland River extending over fifty miles downstream of the Cordell Hull Dam tailwater.

Surveys were conducted by TVA of the mussel populations in Chickamauga Reservoir in the vicinity of the Watts Bar Nuclear Plant site between 1972 and 1978. The resulting data indicates that the mussel populations near the plant tend to be located on the left side of the river (the nuclear plant is on the right bank) and are separated from the diffuser mixing zone by a deep navigation channel. Significant concentrations are also located downstream well beyond the influence of the diffuser mixing zone. The most recent surveys have revealed that L. orbiculata is widely distributed downstream of the State Mussel Sanctuary to about TRM 520.0.

NRC, EPA, and the Department of Interior have been thoroughly briefed by TVA on the mussels near the Watts Bar Nuclear Plant. EPA and the Department of Interior have concurred (letter from U.S.D.I. to EPA dated May 5, 1978) in the fact that the operation of the nuclear plant does not pose a threat to mussels across the river or those found well downstream.

2. Pleurobema cordatum (Pigtoe mussel) is widely distributed throughout the Interior Basin of the United States and specifically in the main channel of the Tennessee River. It has been sought commercially for button production, and in more recent years for use in cultured-pearl production. The species is the third most abundant mussel found in Chickamauga Reservoir and is not listed by the U.S.D.I. as threatened or endangered. The listing by the Tennessee Heritage Program may be in error. TVA is of the opinion that P. cordatum will be protected from plant induced impact by the same precautions being taken to protect L. orbiculata.
3. TVA is aware of and has closely promoted osprey nesting activity in the Chickamauga and Watts Bar Lake areas since 1973. The nest site at Yellow Creek was last used during spring 1974 and the nest tree was destroyed by a winter storm in late 1975. TVA erected three artificial osprey nesting platforms in suitable locations within the

Watts Bar Steam Plant Reservation during early spring 1976. However, neither the old Yellow Creek nest site nor the artificial platforms have been used by osprey. Operation of units 1 and 2 of Watts Bar Nuclear Plant are not expected to detrimentally impact local osprey populations nor will reuse of the old nest site be precluded, since no alterations in land use are planned for the Yellow Creek Wildlife Management Area.

Acknowledgement of the state classification of the osprey should be made in the NRC Final EIS.

4. TVA has committed to operate Watts Bar Nuclear Plant to ensure that the mixed water temperatures at the edge of the jet mixing zone will be within State Water Quality thermal criteria except when ambient river temperatures approach or exceed the maximum Tennessee Standard of 30.5°C (86.9°F).

The expected concentrations of the chemical discharge from the closed cycle cooling system at the pipe outlet and after jet mixing are shown in Tables 2.5-2 and 2.5-3 (see attached copy) of the Environmental Information Report, November 18, 1976. The instream concentrations are those expected at the edge of the jet mixing zone which correspond to the thermal mixing zone for the facility (73.2 m wide x 73.2 m long and full depth). These concentrations will be further reduced as additional mixing takes place with the flow of the river.

TVA is further committed to discontinue discharge from the nuclear plant at any time the release from Watts Bar Hydro Plant is less than 3,500 cfs (a figure established because of the operational limitations of the hydro installation). During those periods of river flow less than 3,500 cfs the blowdown discharge will be diverted into a yard holding pond for later discharge when flows are above 3,500 cfs.

Based on TVA's operational commitments and expected chemical concentrations at the edge of the jet mixing zone, conditions adversely affecting the indigenous mussel population will not occur.

Table 2.5-2

SUMMARY OF CHEMICAL DISCHARGES
Watts Bar Nuclear Plant

Waste Product Chemical	Mean ^a Annual Discharge of Product Chemical lbs.	Waste Product ^b Chemical Contribution to Discharge Concentration mg/l	Observed ^c Concentrations in River at TRM 529.9 mg/l		Concentrations ^d in Effluent CF = 2 mg/l		Concentrations in ^e River at Edge of Jet Mixing Zone mg/l	
			Mean	Maximum	Mean	Maximum	Mean	Maximum
Sulfates SO ₄ ⁻⁻	847,350	6.960	12.4	18	31.76	42.96	14.34	20.50
Sodium Na ⁺	530,230	4.355	6.4	50	17.16	104.36	7.48	55.44
Chlorides Cl ^{-f}	297,812	2.437	6.8	35	16.04	72.44	7.72	38.74
Ammonia NH ₃	14,227	0.117	0.06	0.18	0.237	0.477	0.078	0.210
Copper Cu ^g	<<6,200	<<0.051	<0.020	0.09	<0.091	0.231	<0.271	1.041
Nickel Ni ^g	<<690	<<0.006	<0.067	0.29	<0.140	0.586	<0.743	3.196
Dissolved Solids	1,762,439	14.422	94	180	202.42	374.42	104.84	199.44

a. Based on 365 days/year operation at rated capacity.

b. Equivalent concentration of added chemical end products in blowdown.

c. TVA data January 1973 - December 1975.

d. Concentration factor of blowdown = 2.

e. Based on jet diffuser designed to mix nine volumes of river water with one volume of plant discharge.

f. Computation is for chlorides since the chlorine demand of the cooling water is such that no residual chlorine will be discharged.

g. Although no copper or nickel will be "added" in plant operation, the values cited represent high estimates of corrosion losses. Actual losses are expected to be immeasurable.

(Revised Sept. 1976)

TABLE 2.5-3

SUMMARY OF OBSERVED TRACE METAL CONCENTRATIONS AND EXPECTED TRACE METAL CONCENTRATIONS IN THE EFFLUENT AND AT THE EDGE OF THE JET MIXING ZONE

Parameter Total	Observed Concentrations at TRM 529.9 Jan 1973 - Dec 1975			Expected Trace Metal Concentrations - $\mu\text{g/l}$ at Edge of jet Mixing ^b			
	$\mu\text{g/l}$			In Effluent: CF=2 ^a		zone: CF=2	
	Maximum	Minimum	Mean	Mean	Maximum	Mean	Maximum
Iron	1,300	190	498	996	2,600	547.8	1,430
Zinc	70	<10	<20.5	<41	140	<22.6	77
Barium	<100	<100	<100	<200	<200	<110	<110
Beryllium	<10	<10	<10	<20	<20	<11	<11
Silver	<10	<10	<10	<20	<20	<11	<11
Aluminum	1,800	<200	705	1410	3,600	775.5	1,980
Selenium	<2	<1	<2	<4	<4	<2.2	<2.2
Arsenic	<10	<5	<5	<10	<20	<5.5	<11
Manganese	120	30	64	128	240	70.4	132
Lead	130	<10	15	30	260	16.5	143
Chromium	5	<5	<5	<10	10	<5.5	5.5
Cadmium	13	<1	<2	<4	26	<2.2	14.3
Mercury	1.0	<0.2	<0.3	<0.6	2	<0.33	1.1

a. Concentration factor of blowdown = 2

b. Based on jet diffuser designed to mix 9 volumes of river water with one volume of plant discharge

Revised September 1976



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

AUG 1 1978

Mr. William H. Regan, Jr.
Chief, Environmental Projects Branch 2
Division of Site Safety and
Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Regan:

We have reviewed the Draft Environmental Impact Statement on the Watts Bar Nuclear Plants, Units 1 and 2, and have determined that the facility is capable of meeting the environmental radiation standards for nuclear power operations, 40 CFR 190 as well as the dose design objectives of 10 CFR 50, Appendix I.

There are, however, a number of areas which should be addressed in further detail in the Final Statement, i.e., the limits and control of all radionuclide plant effluent covered under the technical specifications for plant operation; the discharge of liquid radwaste; sensitivities of radiation monitors at the various effluent release points in terms of their ability to measure radioactivity concentration limits and discharge, and the radio-chemical toxicity of releases.

SPECIFIC COMMENTS

Pg. 5-23 Radioactive Effluents

The application of 100-year environmental dose commitment (EDC) for radioactive effluents such as Radon-222 is appropriately noted. We are encouraged that NRC is calculating EDC's as this is a big step toward evaluating the total EDC which EPA has urged for several years. Assessment of the total impact of the nuclear fuel cycle should incorporate the projected releases over the lifetime of the plant rather than just the annual release and be extended to consider for several half-lives or 100 years beyond the period of release. 1

Pg. 8-1 Decommissioning and Land Use

Upon completion of power generation a commercial nuclear power plant possesses waste characteristics quite different from those generated during operation. The environmental 2

effects of a plant's considerable value and radioactive inventory should receive consideration in its decommissioning plan before the end of the reactor's useful life. Considering the size, complexity and number of commercial nuclear power plants, it would appear prudent to begin planning for decommissioning in an ALRRA fashion as early in plant life as possible. For example, it may be necessary to institute plant design changes to facilitate future dismantling. In addition, evaluation of social impacts and resource commitment on present and future generations should be considered. We believe an orderly decommissioning procedure should be developed for each site containing a LWR nuclear power plant well before its retirement.

2

Relative to non-nuclear discharges, it should be noted that the NPDES permits for the sewage treatment plant (Pages E-2 and E-3) must be consistent with the more stringent State permit (Page E-15) for fecal coliform and chlorine residual effluent characteristics. It would also be advantageous to show in Figure 3.3 the approximate location and length of the water treatment plant outfall pipe. This pipe must be extended to an adequate length into the river to guarantee proper dilution and mix.

3

On the basis of the above, the facility was rated LO-2, i.e., no significant environmental objections, however, additional information is requested. As soon as the final statement is available, we will need five copies for our review.

If we can be of further assistance, feel free to call on us.

Sincerely yours

John A. Little, Deputy

John C. White
Regional Administrator

W

TVA RESPONSES TO COMMENTS FROM EPA

1. We believe that presentation of dose commitments per year of operation of a model facility is useful. Computation for different capacities and specified lifetimes involves only simple multiplication; indeed, the illustration presented on page 5-24 of the DES shows such a multiplication regarding health effects.

We do not understand the second portion of the last sentence because a period of "several half-lives or 100 years" was considered in the modeling.

2. Designing a plant to be decommissioned in an ALARA fashion may run counter to designing a plant to be operated with an ALARA design: that tradeoffs may have to be made between operation and decommissioning. However, in light of the fact that the radiological impact of a decommissioned plant is significantly less than the impact of an operating plant, it would seem that decommissioning in an ALARA fashion should be secondary to operating a plant in an ALARA manner.

TVA agrees that orderly decommissioning plans for LWR nuclear power plants are appropriate and necessary to assure protection of the public and the environment. However, we do not believe that such plans need to be prepared and included at the operating license stage of a given plant. Instead, the licensee should have the flexibility to prepare such plans during the course of plant operation so that valuable operating and maintenance experience can be factored into the decommissioning plan.

3. There is no outfall from the water treatment plant to the Tennessee River. The effluent from the water treatment plant is piped into the CCW system blowdown and discharged to the river via the diffuser.