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FINAL ENVIRONMENTAL ASSESSMENT

ELIMINATION OF END-USE WHOLESALE RATE STRUCTURE AND INTRODUCTION OF TIME-OF-USE PRICING FOR ELECTRICITY AT THE WHOLESALE LEVEL

PREPARED BY:
TENNESSEE VALLEY AUTHORITY

JULY 2010

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

CCB	Coal combustion by-product
EA	Environmental assessment
EIS(s)	Environmental impact statement(s)
FCA	Fuel cost adjustment
GWh	Gigawatt-hour
HHW	Household hazardous waste
kW	Kilowatt
kWh	Kilowatt-hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NO_x	Nitrogen oxide
O_3	Ozone
$PM_{2.5}$	Particulate matter with particles ≤2.5 micrometers in diameter
PSD	Prevention of significant deterioration
PURPA	Public Utility Regulatory Policies Act
RCRA	Resource Conservation and Recovery Act
SO_2	Sulfur dioxide
TDEC	Tennessee Department of Environment and Conservation
TOU	Time of Use
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency
VOC(s)	Volatile organic compound(s)
WS-DE	Wholesale Schedule – Demand and Energy
WS-TOU	Wholesale Schedule – Time of Use

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CHAPTER 1

PURPOSE OF AND NEED FOR ACTION

1.1. The Proposed Decision and Need

Both peak load and the total average annual energy consumption in the Tennessee Valley Authority (TVA) power service area are growing. Peak load growth is more difficult to address in planning cost-effective capital outlays, in system operations, and for dispatch of power. A substantive result is that costs to produce power vary by time of day and season. TVA's current end-use wholesale rate structure does not reflect these disparities and cost variations. The structure also does not encourage distributors to manage their peak demands for electricity. TVA also desires to improve opportunities for customers to save money by shifting their power usage from on-peak to off-peak periods (i.e., load shifting). TVA is proposing to introduce a time-of-use (TOU) pricing structure for the electricity provided to power distributors in the TVA power service area.

In addition, the current end-use wholesale structure requires TVA to bill distributors based on compilations of millions of separate meters readings and varying processes that are difficult to verify independently. To address these two areas, TVA must decide whether to implement the rate changes and related matters as proposed in Chapter 2 of this environmental assessment (EA).

1.2. Background

1.2.1. TVA's Role in the Power Supply Region and Current Relationship to End-Use Customers

TVA is a self-financed, wholly owned corporate agency and instrumentality of the United States. TVA is a public power entity, has no shareholders and receives no appropriations (i.e., tax dollars).

Under the TVA Act of 1933, as amended, Congress has tasked TVA with advancing the social and economic welfare of the residents of the Tennessee Valley region. TVA currently serves a region that consists of parts of seven southeastern states (Figure 1-1). One of the most important ways that TVA fulfills its congressional mandate is by providing reliable, affordable electric power to the region's 155 power distributors and their approximately 9.1 million consumers of electricity. TVA's success is measured by its effectiveness in meeting the public needs, rather than in creating financial wealth for private shareholders. TVA's ability to serve its distributors at competitive wholesale power prices is critical to the success of TVA in accomplishing its mission of fostering a strong regional economy and a good quality of life.

TVA currently sells its power to local distributors through an end-use wholesale rate structure. The largest cost included in the consumer's retail bill is the cost of delivered wholesale power (what TVA charges) that the distributor passes through to the consumers. A portion of the bill (an "adder") also covers the distribution costs and margins of the distributors. Historically, as for most utilities, TVA's rates charged to end users have been based predominantly on the cost to serve those various customer groups—primarily three groups: (1) residential, (2) commercial and (3) industrial.

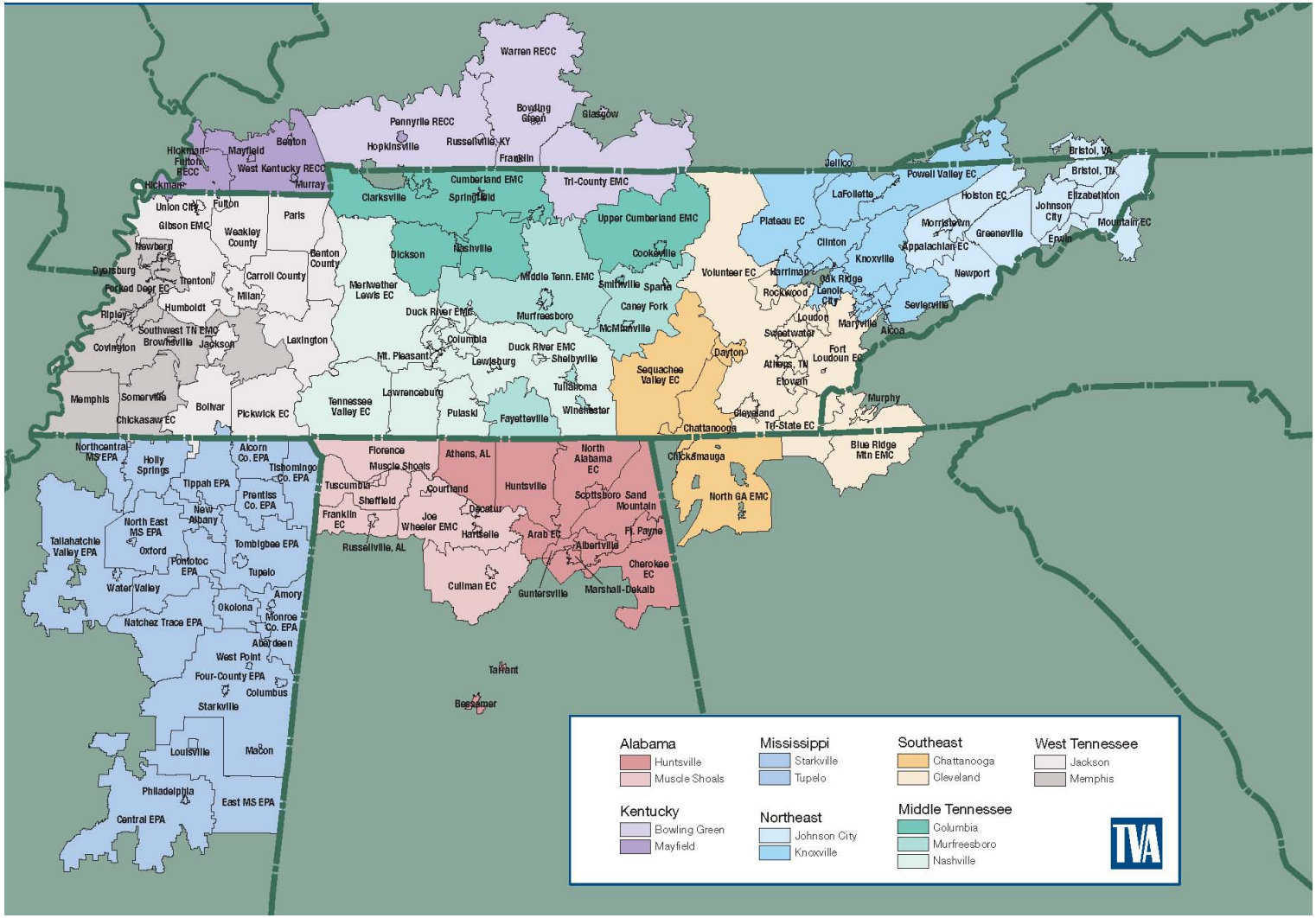

Figure 1-1. Map of the Seven-State TVA Power Service Area and Distributors

As the electric utility industry evolves throughout the years, a utility's rates must both truly reflect cost of service and be competitive within the market. With peak load growing in the TVA power service area and the related costs to produce power varying by time of day and by season, TVA's current end-use wholesale rate structure simply does not reflect this disparity, nor does it encourage distributors to manage their peak demands for electricity to assist in addressing the issue.

1.2.2. TVA Rate Setting Authority, Policies, and Procedures

The TVA Act delegates to the TVA Board of Directors sole responsibility for establishing the rates charged to power distributors and other customers for electric power supplied by TVA, as well as broad authority over distributor resale rates and conditions of service. As such, TVA not only provides electrical power to the distributors, but acts in a congressionally mandated regulatory rate-setting role. The TVA Board of Directors exercises its rate responsibility within the framework of, and for carrying out, the underlying policies and requirements of the TVA Act including those in Sections 10, 11, and 15(d) of the act.

Section 10 of the TVA Act authorizes the TVA Board of Directors "to include in any contract for the sale of power such terms and conditions, including resale rate schedules, and to provide for such rules and regulations as in its judgment may be necessary or desirable for carrying out the purposes of this Act."

Under Section 11 of the TVA Act, power projects are to "be considered primarily as for the benefit of the people" of the region as a whole, particularly the domestic and rural consumers to whom the power can economically be made available. As part of the bond financing amendment to the TVA Act in 1959, Congress directed TVA to: charge rates that produce gross revenues sufficient to provide funds for operation, maintenance, and administration; provide payments to states and counties in lieu of taxes; provide debt service on bonds; provide payments to the United States Treasury for repayment of past government appropriations plus an additional return; provide additional margin for investment in power system assets; and for other purposes connected with TVA's power business [TVA Act, Section 15(d)].

While the TVA Board of Directors exercises the responsibility to establish rates, which in its judgment will best implement the various policies and requirements of the TVA Act, procedures governing adjustments and changes in rates have been developed jointly and agreed to by the distributors and TVA. These procedures are set forth in a section entitled "Adjustment and Change of Wholesale Rate and Resale Rates" in the Schedule of Terms and Conditions that is a part of the power contract with each distributor. This section provides that the wholesale rate and resale rates in the power contract are subject to adjustment and change from time to time "in order to assure TVA's ability to continue to supply the power requirements of [the Distributor] and TVA's other customers on a financially sound basis with due regard for the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as feasible, and to assure [Distributor]'s ability to continue to operate on a financially sound basis."

It further provides that "wholesale power rates and charges shall be sufficient to produce revenue from TVA's wholesale power customers, which, together with revenue from its other power customers, will assure TVA's ability each fiscal year to:

- Meet the requirements of the TVA Act . . . and

- Meet all tests and comply with the provisions of TVA's bond resolutions . . . in such a manner as to assure its ability to continue to finance and operate its power program at the lowest feasible cost."

Under TVA's contract with its distributors, there are different processes for making "rate adjustments" and making "rate changes." A "rate change" is a process by which TVA places into effect changes in the structure of the rates (such as the current proposal). Rate changes generally are designed to be "revenue neutral" to TVA, i.e., the changed rates applied to the same billing data are intended to result in the same revenue being collected by TVA. Under the TVA distributor contracts, either TVA or a distributor may request that the parties meet and endeavor to reach agreement upon changes to the contract's Schedule of Rate and Charges. If the parties cannot reach agreement on the changes within 180 days, TVA may thereafter, upon 30 days' notice, place into effect such changes as TVA determines will enable it to carry out the objectives of the TVA Act and meet the requirements and tests of TVA's bond resolutions.

A "rate adjustment" is the process by which TVA increases or decreases rates to match revenue needs. Following the rate review procedures set forth in the wholesale power contracts, the TVA Board of Directors can adjust the demand and energy charges in the wholesale and resale rate schedules as necessary to assure adequate revenues and to provide adequate compensating revenues to the distributors. A "demand charge" is the fee-based on the peak amount of electricity (in kilowatts or megawatts) used during a billing cycle. An "energy charge" is the fee for electric service based on electricity consumed by kilowatt-hour (kWh). Residential customers are typically only levied energy charges.

1.2.3. Sarbanes-Oxley

The Sarbanes-Oxley Act requires TVA to assess the effectiveness of its internal control over financial reporting and disclose the assessment in its annual report filed on Form 10-K. In the past, TVA had a material weakness in its internal control over financial reporting due to its end-use wholesale structure for pricing electricity. While TVA has remediated this material weakness, TVA's proposal to eliminate its end-use wholesale structure for pricing electricity would further enhance TVA's internal control over financial reporting.

1.3. Other Pertinent Environmental Reviews or Documentation

This EA tiers from TVA's 1995 *Energy Vision 2020 Environmental Impact Statement* (EIS), in which TVA identified and selected a long-range strategy to enable TVA to meet the additional needs of its customers for electricity from 1996 to 2020. Other pertinent National Environmental Policy Act (NEPA) documents include:

Public Utility Regulatory Policies Act (PURPA) Standards - Final Environmental Assessment (TVA 2007)

Modification of Rate Structure for Pricing of Wholesale Electricity to Distributors Within the TVA power service area Final Environmental Assessment (TVA 2003)

Alternative Electric Power Rate Structures Final Environmental Impact Statement (TVA 1980)

Policies Relating to Electric Power Rates Final Environmental Impact Statement, Volumes 1 and 2 (TVA 1976)

Both the 1976 and 1980 EISs explained in detail TVA's fundamental rate structure and customer classes and its relationship with the electricity sellers (the distributors) and consumers of the Tennessee Valley region. The purpose of the 2003 EA was to restructure TVA's wholesale electric power rates to better align them with the cost of service and the competitive market surrounding TVA.

Both EISs and the EA concluded that the timing and magnitude of resulting impacts on the physical environment (the air, water, land, and other primary natural resources) was largely speculative, primarily because rate change (and rate adjustment) effects on the physical environment depend on numerous decisions to be made by persons and entities outside TVA's control. Despite these uncertainties, the 1976 and 1980 EISs and the 2003 EA concluded that in all likelihood any resulting physical environmental impacts would be insignificant. The analyses conducted for this EA confirm these earlier determinations.

1.4. The Scoping Process

By letters to all distributors dated July 8, 2009, TVA initiated the rate change process. This notification was made in accordance with the rate change provisions of the existing TVA power contracts. The July 8 notification initiated a process for meeting with distributors and endeavoring to reach agreement on the rate change proposal. TVA has now met with distributors numerous times to discuss a number of proposed changes to the current end-use wholesale rate structure, the corresponding resale rate structure, and the introduction of time-of-use pricing at the wholesale level. These meetings, including presentations, discussions, and listening sessions, have aided in the scoping of issues and alternatives considered for this EA.

Additionally, these changes were considered in light of the Time-Based Metering and Communication standard adopted by the TVA Board in 2007 as part of its consideration of the PURPA Standards set forth in the Public Utility Regulatory Policies Act of 1978 as amended by the Energy Policy Act of 2005. The TVA Board considered these standards in accordance with PURPA and the objectives and requirements of the Tennessee Valley Authority Act of 1933 and after review of the official record developed from the public's input on the standards.

1.5. Necessary Permits or Licenses

There are no federal permits or licenses required for TVA to undertake this action.

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CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section describes the No Action Alternative and the proposed Action Alternative. These alternatives reflect the outcome of discussions with distributors over the preceding months.

2.1. The No Action Alternative

Under the No Action Alternative, TVA would continue its practice of directly setting rates charged to end users including an add-on for distributor costs and margin. These rates have been based predominantly on the general cost to serve the various customer groups—primarily three groups: (1) residential, (2) commercial and (3) industrial, but without regard to seasonal or time-of-use variations in cost of producing the power. TVA would not introduce time-of-use pricing on a general scale under the No Action Alternative. Section 1.2.2 of this EA summarizes the current methodology; the environmental reviews noted in Section 1.3, herein incorporated by reference, cover it in detail. These additional documents are public record and available from TVA by written or e-mail request to tvainfo@tva.com.

2.2. The Proposed Action

Under the proposed Action Alternative, TVA would implement a time-of-use pricing structure at the distributor level, and move away from the current end-use wholesale rate structure. The development of a retail rate structure for customers would become the administrative responsibility of each distributor. However, as described in Section 1.2.2, under the noted sections of the TVA Act, TVA retains the congressionally mandated regulatory authority to approve or disapprove retail rate structures implemented by the distributors. Further, in accordance with TVA's responsibility under its power contract with distributors, TVA will provide default retail rates that will enable distributors to continue on a financially sound basis.

The proposed action would be implemented in a two-step process, an interim period during which distributors can select between two options that would apply for a period of time, followed by full implementation of the proposed wholesale schedule for all distributors after the interim period.

2.2.1. Choice of Wholesale Schedules by Distributors During Interim Period

During the period of time from implementation of the rate change until October 2012 (interim period), distributors would be able to choose between two wholesale rate schedules, either the time-of-use (WS-TOU) or demand and energy (WS-DE) schedule. (Appendix A).

As a transition option, a distributor could initially elect Schedule WS-DE for all or part of the interim period. In the absence of a distributor election, the distributor would be placed on Schedule WS-TOU for the entire interim period.

The rate changes described in more detail in Appendices A and B include, but are not limited to, the following:

Proposed Base Charges - The time-of-use rates in the currently proposed WS-TOU rate structure are nearly flat (i.e., there is little cost differentiation between on-peak and off-peak periods). This nearly flat structure is designed to be revenue neutral (i.e., producing no more or no less revenue in total or for customer classes than was produced by the present system). This approach is proposed in order to implement a pricing structure that more accurately reflects the cost of serving load at different times and levels of use and encourages distributors to manage peak demands, does so in a manner that allows for adjustment to the changes and avoids and minimizes immediate impacts to distributors and ratepayers. This nearly flat structure is the primary characteristic of the proposed action relevant to the potential for environmental impacts and evaluated in this EA. The same logic holds for the "nearly flat" WS-DE rates that would exist until the end of the interim period.

The base charges in the proposed rate schedules (Appendices A and B) reflect TVA's analysis of currently available data. During the ongoing rate change discussions with distributors, however, additional data will be gathered, and refinements may be made in the analysis, which could result in cost allocations and charges that differ in minor ways from those contained in the attachments.

After implementation of time-of-use pricing, the base demand charges and the base energy charges will be subject to "across-the-board" rate adjustments, but there is no provision that would allow TVA to change or adjust the seasonal price differentials and time-of-use price differentials without a subsequent rate change process. That is, just as occurs now for any rate change, future rate changes adjusting the seasonal price differentials or time-of-use pricing differentials would continue to be subject to the appropriate NEPA review.

TVA would bill the standard wholesale charges to distributors on a 60-minute basis. TVA would bill the wholesale charges for customers greater than 5,000 kilowatts (kW) on a 30-minute basis as is done today under the end-use wholesale structure.

The proposed base demand and energy charges exclude the existing fuel cost adjustment (FCA) and environmental adjustment. The FCA allows TVA to pass variations (both up and down) in fuel costs directly through to the distributors. Because the proposed zero-baseline FCA would recover FCA-defined fuel costs, the base energy charges in the proposed rate schedules (Appendices A and B) would not include recovery for those defined costs (i.e., they are not factored into the time-of-use rates). An Adjustment Addendum will provide for TVA's total fuel costs, as well as the environmental adjustment approved in 2003. If TVA approves an across-the-board rate increase or rate decrease in the future, it would also be listed in a future Adjustment Addendum.

The "Determination of Standard Service Demand and Energy Billing Amounts" section of the wholesale rate schedules describes the process for removing the demand and energy takings from the customers greater than 5,000 kW from the Standard Service wholesale takings. As some distributors have requested, TVA would offer any distributor the option to elect the Standard Service charges for all wholesale power and energy takings.

Metering Specifications - For customers greater than 5,000 kW, metering specifications would change under the proposed rate structure, and the rate schedules will specify that TVA shall have unrestricted remote access to meter data for customers greater than 5,000 kW. If TVA was not provided such access, the wholesale charges set out in the Standard Service subsection of the applicable rate schedule would apply to all power and energy taken under that schedule.

Structure of D Rates - The structure of the D rates (Appendix A) has the effect of correcting a loss-related error that had been present since 2003 in the D rates listed in the end-use wholesale rate schedule.

Notice of Change in TOU hours - The process for changing the TOU hours is the same as in the current time of day rates—one year's notice.

Hydro Generation Benefit – TVA would continue to allocate the value of the hydro generation benefits to residential customers through adjustments Nos. 2 and 4 in the wholesale schedules of Appendix A.

Pass Through of Minimum Energy and Minimum Demand Charges - Adjustment 3 of the Wholesale Schedule (Appendix A) would provide for the same pass-through of minimum energy charges as minimum demand charges.

2.2.2. Wholesale Schedule Following Interim Period

The transition for distributors on Schedule WS-DE would end no later than the expiration of the interim period, after which all distributors would be on Schedule WS-TOU.

Adjustment Addendum - As under the current rate structure, the wholesale and resale rate schedules will be subject to, and adjusted by, the effective Adjustment Addendum, which will be revised, as needed, to reflect the proposed rate structure, FCA, the environmental adjustment approved in 2003, and any future across-the-board rate increases or rate decreases approved by the TVA Board.

Final End-Use Wholesale Rate Distribution Loss True-Up - The current end use wholesale rates require periodic loss reconciliations. The new rates will not require loss reconciliations, but a rider to the proposed wholesale schedules in Appendix A will provide a mechanism for a final loss adjustment to reflect distribution losses actually incurred since the last annual loss reconciliation under the wholesale rate schedule that is being replaced.

2.2.3. Resale Rates by Distributors

Resale Rate Schedules - TVA is also proposing optional resale rate schedules for adoption/use by distributors in assuring full recovery of their costs under the wholesale rate structure and TOU rates proposed by TVA. Distributors may elect to develop their own rate structures, subject to final TVA regulatory approval (Section 1.2.2). TVA would discontinue the end-use wholesale time-of-day rates currently offered. Any alternative rate structures proposed by distributors would have to be supported by a cost study that demonstrates a clear cost justification. It is the intent of TVA that whatever rate structures the distributors implement, they be as close to revenue-neutral as practicable for classes of end users, as compared to the current system.

Wholesale Power Cost - To enable distributors to continue on a financially sound basis after the wholesale rate change, changes would also be made to the resale rate schedules to reflect the changes in wholesale power cost expected to result from the wholesale rate changes set forth in Appendix A.

Customers less than 5,000 kW - For customers whose power requirements are 5,000 kW or less, distributors would be able to elect any of the rate schedules that they would like to offer in accordance with their availability sections. However, distributors would have the option of making changes to the rates or establishing different rates with TVA's approval (see Section 1.2.2 of this EA). Among other things, the attached rate schedules provide for an increase in the contract requirement threshold for GSA customers.

Customers Greater than 5,000 kW - For customers whose power requirements are greater than 5,000 kW, TVA is proposing resale time-of-use rate schedules and alternative resale seasonal demand and energy schedules. The seasonal demand and energy schedules are very similar to existing rate schedules except that the prices vary by season. The time-of-use rate schedules are largely patterned after the current pilot Time Differentiated Hours Use of Demand schedules. The schedules include:

- A three-block rate, designed to minimize bill impacts on high-load factor customers.
- A minimum-energy component added to the minimum-demand component of the minimum bill.
- The customer would specify an on-peak and off-peak contract demand, as was previously a part of the time-of-day rates.

2.3. Comparison of Alternatives

Because of the limited magnitude of the direct and cumulative effect of the alternative rate structures, TVA expects that any induced indirect environmental impacts would also be small, essentially indiscernible for either the No Action or the proposed Action Alternative. The comprehensive environmental regulatory programs that exist throughout all of the Valley states would further ensure that any resulting environmental impacts are minor for either alternative. Because expected socioeconomic and environmental impacts are so small, TVA has not identified any mitigation measures necessary to offset or reduce the level of impacts for either alternative.

2.4. The Preferred Alternative

TVA's preferred alternative is the proposed Action Alternative.

CHAPTER 3

AFFECTED ENVIRONMENT

3.1. Socioeconomic Environment

In 2008, the gross product of the TVA power service area was about $361 billion. Total personal income was about $296 billion, with total nonfarm payroll employment of slightly more than 4 million people. Per capita personal income was about $31,700, or about 82 percent of the national average. Total population in the region was about 9.1 million. The area is more rural than the nation as a whole, and its economy depends more on manufacturing than does the nation as a whole. About 65 percent of the population lives in metropolitan areas, compared to almost 85 percent nationally.

Manufacturing accounted for about 12.4 percent of total employment in the region in 2008, well above the national share of about 8.0 percent. Manufacturing in the TVA region accounts for about 2.5 percent of all manufacturing earnings in the nation, and predictions indicate that this level will continue into the future. Numerous factors account for TVA maintaining this relative advantage, including its location, with good access to markets not only in the rest of the Southeast, but also in the Northeast, Midwest, and Southwest. Other factors include good transportation, relatively low wages (and cost of living), and abundant, relatively low-cost resources including land and electricity.

In recent years, employment in manufacturing has been declining nationwide. While manufacturing employment peaked nationally about 1979, the regional peak was about 1995. However, durable goods manufacturing in the region continued to grow until about 2000, while nondurables peaked about 1993. Despite the decline, manufacturing is still an important and vital part of the regional economy, accounting for about 12 percent of employment and 18 percent of earnings in the region.

Agriculture is an important part of the regional economy, although it is a very small share of the total. The regional farm sector directly provides approximately 157,000 jobs, about 3 percent of all jobs in the region. Many other jobs are farm related, such as food manufacturing. Nationally, the farm sector accounts for 1.6 percent of jobs. Much of the farming in the region occurs on a part-time basis, generally on relatively small farms. For example, in Tennessee in 2007, the average farm size was 138 acres with average reported sales per farm of $33,015 (U.S. Department of Agriculture 2007). Nationwide, the average farm size was 418 acres. Only 38.9 percent of principal farm operators in Tennessee reported farming as their primary occupation. Net cash farm income was reported to average $3,075 per farm. In comparison, net cash income per farm nationwide was $33,827, more than 10 times the Tennessee average.

Due at least in part to lower average incomes in the region, overall the service sectors account for a slightly smaller share of total employment than they do nationally.

3.2. Energy Use

TVA supplies electricity to a population of approximately 9.2 million people and a mix of residential, commercial, and industrial customers in the power service area. TVA had energy sales totaling 163,804 gigawatt-hours (GWh) for the fiscal year ending September 30, 2009.

The sales included 133,078 GWh to retail distributors serving residential, commercial, and industrial customers; 28,718 GWh to industrial customers directly served by TVA; and 2,008 GWh to federal agencies and others.

Over the past 10 years, the average annual demand for TVA energy has grown by almost 1 percent per year. During that same period, the peak, single hourly demand, has grown by 1.4 percent per year. After adjusting for the effects of non-normal weather, the average annual peak growth is 1.2 percent and the energy growth is 0.8 percent. TVA anticipates continued growth in demand for energy and expects the peak growth to grow at a slightly higher rate than the annual energy demand.

3.3. Air Resources

Most people consider air quality an important environmental resource value. Through its passage of the Clean Air Act, Congress has mandated the protection and enhancement of our nation's air quality resources. National ambient air quality standards (NAAQS) for the following criteria pollutants have been set to protect the public health and welfare:

- Sulfur dioxide (SO_2)
- Ozone (O_3)
- Nitrogen oxides (NO_x)
- Particulate matter whose particles are $\leq$10 micrometers
- Particulate matter whose particles are $\leq$ 2.5 micrometers ($PM_{2.5}$)
- Carbon monoxide
- Lead

Areas not meeting the standards are called "nonattainment" areas. The current 8-hour ozone standard is 0.075 parts per million. The implementation schedule for the 2008 ozone NAAQS required states to send their recommended designations to the U.S. Environmental Protection Agency (USEPA) in March 2009; USEPA finalized designations in March 2010. There are several nonattainment recommendations located in the Tennessee Valley region as shown in Table 3-1.

The current $PM_{2.5}$ 24-hour standard is 35 micrograms per cubic meter. When USEPA finalized new designations for $PM_{2.5}$ in December 2008, several counties were designated nonattainment in the Tennessee Valley region including: Jefferson County, Alabama near Birmingham; Anderson, Blount, Knox, and Loudon counties in Tennessee near Knoxville. Roane County, Tennessee near Knoxville was designated a partial non-attainment status (http://www.epa.gov/pmdesignations/2006standards/final/region4.htm).

Prevention of significant deterioration (PSD) regulations have been established to ensure that areas with good air quality do not lose this desirable status. PSD rules restrict the increment by which ambient pollutant levels may increase due to emissions from major new sources or the modification of existing sources. Before new sources can be constructed or existing sources modified in a major sort of way, permits to construct must be obtained from the states or USEPA. Sources must demonstrate that PSD increments and applicable ambient air quality standards will not be exceeded and that they will install and use state-of-the-art pollution control equipment known as Best Available Control Technology.

Table 3-1. Ozone Nonattainment State Recommendations in the Tennessee Valley Region Based on 2008 Ozone NAAQS

County	State Recommendations	City/State/Area
Jefferson	W	Birmingham, AL
Madison	W	Huntsville, AL
Murray	P	GA
Christian	W	Clarksville, TN
Simpson	W	KY
De Soto	W	MS near Memphis, TN
Burke	P	Hickory-Lenoir-Morganton, NC Area
Cherokee	P	Snow Bird Mountains - Joyce Kilmer-Slickrock Wilderness, NC Area
Hamilton	W	Chattanooga, TN
Meigs	W	
Anderson	W	Knoxville, TN
Blount	W	
Knox	W	
Loudon	W	
Sevier	W	
Shelby	W	Memphis, TN
Davidson	W	Middle TN Area
Rutherford	W	
Sumner	W	
Wilson	W	
Jefferson	W	Morristown, TN
Hawkins	P	Tri-Cities, TN Area
Sullivan	W	

Source: http://www.epa.gov/ozonedesignations/2008standards/rec/region4R.htm
W = Ozone Whole County recommendation
P = Ozone Partial County recommendation

More stringent PSD increments apply for sources affecting specially protected areas (PSD Class I) such as national parks and wilderness areas. Dispersion analyses (mathematical computer analyses) are generally required for sources subject to PSD review that are within 100 kilometers (or approximately 62 miles) of such an area. Class I areas in or near the TVA region include: Mingo National Wilderness Area in southeastern Missouri, Mammoth Cave National Park in south-central Kentucky, Sipsey National Wilderness Area in northwestern Alabama, Cohutta National Wilderness Area along the border of northern Georgia and southeastern Tennessee, Joyce Kilmer/Slickrock National Wilderness Area along the North Carolina-Tennessee border, Great Smoky Mountains National Park along the North Carolina-Tennessee border, Shining Rock National Wilderness Area in western North Carolina, and Linville Gorge National Wilderness Area in western North Carolina (http://www.nature.nps.gov/air/Maps/images/ClassIAreas.jpg).

Trends in air pollution in the TVA region have been toward generally improved conditions over the past two decades. The greatest gains have been for sulfur dioxide, particulate matter, and carbon monoxide. Nitrogen oxides, ozone, and lead had the least gains (although levels of lead emissions have substantively declined since the promulgation of the Clean Air Act in 1970). Carbon monoxide and lead are not regional problems, but the other four relate to concerns about levels of ozone, fine particulate matter, acidic deposition, visibility, and regional haze. The most sensitive areas in the region are high elevation, forested areas such as the Great Smoky Mountains National Park.

Although ambient levels of particulate matter in this region have decreased, currently, several particulate nonattainment areas are located in the region. Sulfur dioxide, nitrogen oxide, and carbon are precursor pollutants (pollutants that transform into fine particles). Strategies to reduce fine particle levels are expected to include additional controls on sources of SO_2 (power plants and industrial boilers), NO_x (motor vehicles, power plants) and carbon (diesel engines, including diesel-powered motor vehicles). Carbon is the dominant form for fine particles in urban areas and sulfur-containing particles is the dominant form in rural areas. TVA has been reducing its SO_2 emissions since the mid-1970s and has recently implemented additional reductions that have helped to decrease sulfur-containing particles in the region. In addition, this effort has contributed to reductions in acid deposition and regional haze. TVA has also reduced its NO_x emissions.

O_3 is a pollutant of concern during the “ozone season” of March through October in Tennessee and is usually at the highest concentrations in the summer months. The primary air pollutants that are involved in the complex reactions driven by warmth and solar radiation, which produce O_3 in the lower atmosphere are NO_x and volatile organic compounds (VOCs). In this region, natural sources of VOCs (e.g., trees) far exceed human sources, so reduction of NO_x is the most effective way to lower ambient O_3 concentrations. Reductions of emissions from electric generating facilities during the past two decades have apparently been largely offset by increases in emissions from other sources, such as mobile sources that continue to increase in numbers. TVA has implemented a major summertime reduction program involving selective catalytic reduction systems at coal-burning generating plants to reduce its emissions of NO_x further during the O_3 season (see discussion above) and in 2009 began operating its NO_x controls year around.

Acidic deposition, also commonly referred to as acid rain that is in excess of natural acidity is primarily associated with human-caused emissions of SO_2 and NO_x. In 1990, Congress amended the Clean Air Act to require electric utilities to reduce SO_2 and NO_x emissions in order to remedy acid deposition. As a result, TVA and other utilities with fossil-fuel

generation have been substantively reducing their SO_2 and NO_x emissions (see preceding discussion). Notable decreases in acid deposition have resulted. The additional SO_2 and NO_x reductions now underway on the TVA system and elsewhere are expected to reduce the acidic deposition further.

Regional haze is another issue of concern in the TVA region. Human-made pollutants, including SO_2 and NO_x, have increased the haze from the natural levels found in the region. Much of the reduction in visibility associated with the haze in this region is due to fine sulfate particles. Strategies to reduce haze are focused on restoring visibility in PSD Class I areas such as the Great Smoky Mountains National Park. The TVA programs for further reduction of SO_2 and NO_x emissions from TVA electric generating plants are expected to help in improving visibility in this region.

Among toxic or hazardous air pollutants, mercury has been given greater emphasis in recent years. The USEPA intends to propose air toxics standards for coal- and oil-fired electric generating units by March 10, 2011 and finalize a rule by November 16, 2011(http://www.epa.gov/camr).

3.4. Water Resources

The quality of the region's water (surface water and groundwater) is critical to protection of human health and aquatic life. These water resources provide habitat for aquatic life, recreational opportunities, domestic and industrial water supplies, and other benefits. Wastewater discharges from cities or industries and runoff from nonpoint source activities such as construction, agriculture, mining, and air deposition can potentially degrade water quality.

The scope of this EA covers the TVA power service area (Figure 1-1), which includes the entire Tennessee River and Cumberland River basins and portions of the lower Ohio River, lower Mississippi River, and Green River basins. TVA operates 11 fossil fuel and three nuclear power generating facilities on mainstream and tributary reservoirs and riverine portions of these river basins. Fresh water abounds in this area and generally supports most beneficial uses, including fish and aquatic life, public and industrial water supply, recreation, irrigation, and navigation. Water quality in the TVA region is generally good.

Sources of Pollution - Pollution involves a change in water quality that adversely affects a beneficial use such as swimming or aquatic life. Nonpoint sources of pollution are the largest contributor to adverse impacts in the region. These include land-disturbing activities like construction, agriculture, and mining that result in the runoff of sediment, nutrients, and other potential pollutants. State pollution control programs, discussed below, regulate industries (see Socioeconomic section), and municipalities in the region discharge treated wastewater effluents. These programs include water quality criteria, wastewater discharge permits and limits, monitoring, and enforcement actions to ensure that water bodies are suitable for their intended uses. Based upon total employment, the largest sectors in the region include services, wholesale and retail trade, nonfarm proprietors, manufacturing, and government. By far the largest non-consumptive user of water in the region is TVA through its withdrawal and discharge of cooling water for 11 fossil and three nuclear power plants. This once through noncontact use for cooling returns the water to the river system essentially unchanged in quantity and quality.

State Pollution Control Program - State regulations established under the Clean Water Act to protect water quality have three key components: (1) designated uses; (2) water quality criteria; and (3) allowable waste loads. Designated uses identify the important beneficial uses of each stream segment that need to be protected (e.g., recreation, fish and aquatic life, water supply, and navigation). Water quality criteria specify the conditions that must be maintained in the stream to protect each designated use (e.g., the minimum dissolved oxygen concentration necessary for a healthy fish population). The allowable waste load is the amount of various substances that can be discharged and assimilated without violating water quality criteria and adversely affecting the designated use. The wastewater discharged from an industry or municipality is limited by a National Pollutant Discharge Elimination System (NPDES) Permit that specifies the allowable quantity and quality of the effluent.

Every two years, states are required to submit a 305(b) report to USEPA. The report identifies the "impaired" lakes and streams that are not complying with water quality criteria and, consequently, are not suitable for their designated use. Thus, the state 305(b) reports provide a comprehensive and recent summary of water quality in each state.

Since the Tennessee comprises over half of the TVA power service area, the quality of Tennessee rivers and lakes provide a general indication of conditions in the region. The most recent 305(b) report indicates that 31,088 miles of the 60,417 miles (51 percent) of streams in Tennessee and 565,805 acres of the 572,165 acres (99 percent) of lakes have been assessed [Tennessee Department of Environment and Conservation (TDEC) 2008]. Table 3-2 indicates the number of river miles and the percent of assessed river miles that meet their individual use classifications. Table 3-3 provides the same use support information for reservoirs and lakes in Tennessee. Table 3-4 summarizes the causes of impairments in assessed rivers and reservoirs in Tennessee. State 305(b) reports for the other six states making up the remainder of the TVA power service area indicate similar information.

TVA Monitoring Activities - In addition to state programs, TVA conducts extensive aquatic monitoring to ensure that thermal and other discharges from TVA generating facilities do not cause adverse impacts even at permitted levels. This includes examining potential effects on spawning and development of cool-water fish species such as sauger, the attraction of fish to thermal plumes from power plants, and possible increases in undesirable aquatic life, such as zebra mussels and blue-green algae. TVA also conducts "Vital Signs Monitoring" of rivers and reservoirs in the Tennessee Valley. The major components include monitoring of:

- The ecological health or biological integrity of TVA reservoirs
- Conditions in tributary streams and watersheds
- Toxic contaminants in fish flesh
- The number and size of important game fish
- Bacteriological concentrations at recreational areas.

Results of these monitoring activities are provided to the states and included in their 305(b) assessment reports.

Aquatic Life - The construction of dams and reservoirs has fundamentally changed the character and aquatic faunas of the major rivers in the power service area. While dams promote navigation, flood control, power benefits, and river-based recreation by moderating the flow effects of floods and droughts throughout the year, they also change the daily, seasonal, and annual flow patterns that influence aquatic habitat and aquatic life.

Reservoirs on tributary rivers are typically deep and retain water for long periods. Low flow rates and regular periods of thermal stratification can result in low dissolved oxygen concentrations in the deeper waters. These aquatic habitats are simplified relative to natural streams, and fewer species are found. Lack of minimum flows and low dissolved oxygen in the first few miles below tributary dams may severely limit the habitat needed by native fish. This may restrict their movement, migration, reproduction, and available food supply.

Table 3-2. Individual Classified Use Support for Rivers and Streams in Tennessee

Designated Uses	Miles Of Streams Classified	Classified Miles Assessed	Miles Meeting Use	Percentage Of Assessed Miles Meeting Use*
Fish and Aquatic Life Protection	60,417	30,471	21,308	70%
Recreation	60,417	15,400	9,420	61%
Irrigation	60,417	30,942	30,942	100%
Livestock Watering and Wildlife	60,417	30,966	30,962	99.99%
Domestic Water Supply	3,691	3,379	3,354	99%
Navigation	383	0	0	100%
Industrial Water Supply	3,386	3,225	3,225	100%

*Note- All waters are classified for more than one use, but may or may not have all uses fully supporting. Thus, this table cannot be used to derive percentages for overall use support in Tennessee. In addition, assessment rates for individual uses may not match overall use assessment rates.

Table 3-3. Individual Classified Use Support for Reservoir and Lakes in Tennessee

Designated Uses	Acres Classified	Classified Acres Assessed	Acres Meeting Use	Percentage of Assessed Acres Meeting Use*
Fish and Aquatic Life Protection	572,165	563,904	523,202	93%
Recreation	572,165	565,125	398,289	70%
Irrigation	572,165	563,904	563,904	100%
Livestock Watering and Wildlife	572,165	561,795	561,795	100%
Domestic Water Supply	529,183	526,864	526,864	100%
Navigation	290,741	1,971	1,971	100%
Industrial Water Supply	428,991	428,976	428,976	100%

*Note: Reservoirs are classified for more than one use, but may or may not have all uses fully supporting. Thus, this table cannot be used to derive percentages for overall use support in Tennessee. Also, assessment rates for individual uses may not match overall use assessment rates.

Table 3-4. Causes of Impairment in Assessed Rivers and Reservoirs in Tennessee

Cause Category	Impaired Rivers and Stream Miles	Impaired Reservoir/Lake Acres
Flow Alteration		
Low Flow Alterations	378	11,444**
Nuisance Aquatic Species		
Native Aquatic Plants		4,550**
Loss of Native Species		
Loss of Native Mussel Species	13	
Nutrients		
Nutrient/Eutrophication Biological Indicators	327	15,636**
Phosphate/Total Phosphorus	1,218	
Nitrate/Nitrite	1,371	
Ammonia (un-ionized)	30	
Oxygen Depletion		
Oxygen, Dissolved	1,758	37,979
pH/Acidity/Caustic Conditions		
pH	396	
Sediment		
Sediment/Silt	5,520	18,175**
Solids (Suspended/Bedload)	17	
Pesticides		
Chlordane	248	14,031
Metals		
Manganese	160	
Lead	96	
Copper	51	2,254
Iron	211	2,254
Mercury	262	66,461
Zinc	51	2,254
Arsenic	84	
Chromium, Hexavalent	4	
Pathogens		
Escherichia coli	5,659	2,044
Radiation		
Cesium	5	
Strontium	7	

(Table continued on next page)

Table 3-4 (continued). Causes of Impairment in Assessed Rivers and Reservoirs in Tennessee

Toxic Organics		
Acetone	2	
Dioxins	256	10,370
Polychlorinated Biphenyls (PCBs)	299	95,596
Creosote	7	
Polycyclic Aromatic Hydrocarbons (PAHs)	31	
Toluene	2	
RDX	63	
Other		
Taste & Odor		45
Total Dissolved Solids	1	
Impairment Unknown	164	
Habitat Alterations		
Alteration in Stream-side or Littoral Vegetative Cover	1,369	
Other Anthropogenic Substrate Alterations	489	
Physical Substrate Habitat Alterations	3,891	
Toxic Inorganics		
Chloride	22	
Chlorine	3	
Sulfates	31	
Hydrogen Sulfide	7	
Observed Effects		
Color	5	
Pollutant		
Odor	7	
Oil and Grease		
Oil and Grease	56	
Thermal		
Temperature, Water	105	20,459
Bioassays		
Whole Effluent Toxicity (WET)	4	

*Note - Rivers and reservoirs can be impaired by more than one cause. Rivers include both river and stream miles. Data in this table should only be used to indicate relative contributions. Totals are not additive.

Dams on tributary rivers affect the habitat of benthic invertebrates (benthos), which are a vital part of the food chain of aquatic ecosystems. Benthic life includes worms, snails, and crayfish, which spend all of their lives in or on the streambeds, and aquatic insects, mussels and clams, which live there during all or part of their life cycle. Many benthic organisms have narrow habitat requirements that are not always met in reservoirs or tailwaters below dams. Further downstream from dams, the number of benthic species increases as natural re-aeration occurs and dissolved oxygen and temperature rise.

Mainstream reservoirs differ from tributary reservoirs primarily in that they are shallower, have greater flows, and thus retain the water for a shorter period of time. They generally do not become as strongly stratified as tributary reservoirs. Although dissolved oxygen in the lower lake levels is often reduced, it is seldom depleted. Winter drawdown on mainstream reservoirs is much less severe than tributaries, so bottom habitats generally remain wetter all year. This benefits benthic organisms, but promotes the growth of aquatic plants in the extensive shallow over bank areas of some reservoirs. Mainstream reservoirs in the power service area generally support healthy fish communities, ranging from about 50 to 90 species per reservoir. Good to excellent sport fisheries exist, primarily for black bass, crappie, sauger, white and striped bass, sunfish, and catfish. The primary commercial species are channel and blue catfish and buffalo.

Groundwater - Groundwater refers to water located beneath the surface in rock formations known as aquifers. Approximately half of the region has limited groundwater availability because of natural geo-hydrological conditions.

More than 64 percent of the region's residents rely totally, or in part, on groundwater for drinking water. More than 1.7 million residents (22 percent) in the region maintain individual household groundwater systems, usually a well. All areas in the Tennessee Valley region can generally supply enough water for at least domestic needs. For the most part, the groundwater quality is adequate to support existing water supply uses even though some minimal treatment, such as filtration and chlorination, is sometimes required.

3.5. Land Use

The TVA power service region is considerably more rural than the nation as a whole. In the region, about 44 percent of the population resides in rural areas, while only 21 percent resides in rural areas nationwide. However, population density in the region is higher than the national average. In the region, the average density in 2000 was 107.9 persons per square mile, compared to the national average of 79.6 persons per square mile. However, the distribution within the region, as within the nation is very uneven. For example, in 2000, Davidson County, Tennessee (Nashville), had a density of 1,134.6 persons per square mile while Clay County, about 70 miles to the northeast, had a density of 33.8 persons per square mile. The region consists of about 50 million acres of land, of which almost 21 million, a little less than 42 percent, is in farms. The percent of land in farms is similar to that of the nation, which has slightly more than 41 percent of its land in farms. Much of the industrial activity in the region is located in suburban and rural areas. Residential development is widely distributed in suburban and rural areas, where most of the growth has been in recent years, as well as in the region's towns and cities. Commercial development also has been spreading into suburban and rural areas in recent years.

3.6. Solid and Hazardous Waste Generation

Residential, Commercial and Industrial Wastes - Residential and commercial wastes are usually generated in many, diffusely located areas and handled at municipal solid waste landfills. Most municipalities and counties currently engage in long-range planning processes to ensure that adequate capacity is provided for solid wastes generated within their jurisdictions. Solid waste reduction and recycling is an important emphasis in most of these plans. For example, in the state of Tennessee, the 1991 Solid Waste Management Act (as amended in 1999) sets forth a 25 percent reduction and diversion goal (on a per capita basis) by June 30, 2003. It established 1989 as the base year for comparison. In 1989, Tennessee businesses, industries, citizens and others disposed of 6,000,000 tons of solid waste, which equated to 1.23 tons per capita. In 2001, the state's waste generation rate was 0.92 tons per capita.

Recycling collection and processing facilities in Tennessee have increased from 160 in 1992 to currently over 700. Additionally, Tennessee has 826 active used oil collection centers to dispose safely of used oil. TDEC also provides grants for counties to collect waste tires for beneficial uses such as tire-derived fuel, which TVA burns at its Allen Fossil Plant in Memphis, Tennessee. As a result, over 15 million tires have been diverted from landfills. Using 1995 as the base year, per capita waste reduction and diversion rate for 2001 was 24.0 percent, compared with 22.6 percent in 2000 (TDEC 2003).

Tennessee has also implemented a program for collection and safe storage and disposal of household hazardous waste (HHW). Ninety-two counties in Tennessee have participated in the mobile collection service since it began in 1993. The program collects and properly disposes of paint, flammable liquids, corrosives, oxidizers, batteries, and pesticides. An average event yielded 23,540 pounds of HHW.

The picture for industrial solid and hazardous waste generation and handling is similar. Current legislative and regulatory programs encourage and/or mandate the reduction, recycling, and proper disposal of industrial solid and hazardous wastes. The states within the TVA power service area have state-administered, Resource Conservation and Recovery Act *(*RCRA) equivalent programs, which emphasize waste reduction, recycling, and proper handling and disposal of solid and hazardous wastes. Industries benefit both financially and from a public relations standpoint by engaging in waste reduction and recycling opportunities in the same way that TVA benefits from its coal combustion by-product (CCB) marketing and utilization efforts. It is, therefore, likely that industrial solid and hazardous waste generation and disposal will continue to decline in the future.

TVA-Generated Wastes - About 63 percent of TVA's total generation capacity is produced at coal-fired steam electric plants. TVA currently produces a total of about 6 million tons of CCBs (fly ash, bottom ash, boiler slag, and scrubber gypsum) annually at its 11 operating coal-fired steam electric plants. Over the recent past, production of CCBs has ranged from 5,363,207 to 6,139,116 tons. This annual fluctuation in CCB production of up to plus or minus 6 percent is influenced by a variety of factors including primarily: plant planned and forced maintenance outages, load swings, plant dispatch (the process by which plants are directed to increase or decrease power generation based on the cost of production at each plant—generally the larger, more efficient units run more and the smaller, less efficient units run less), and variation in fuel supplies (BTU, sulfur, and ash content of the fuels burned).

TVA reduces the amount of CCBs disposed of at its plants through marketing and utilization of these by-products in a number of commercial applications including use of fly ash in concrete products, bottom ash as aggregate in cement block manufacturing, boiler slag for roofing granules and industrial abrasives, and scrubber gypsum in gypsum wallboard and cement manufacturing. In 2002, TVA successfully marketed or utilized about 2.7 million tons of CCBs, or 47 percent of total production. Marketing and utilization of these materials avoids disposal in landfills and conserves natural resources.

TVA facilities include large, small, and conditionally exempt generators of hazardous waste. Typically, TVA facilities generate paint-related wastes (excess paints, thinners, heavy metal-based paints that are removed; sandblast media from paint removal operations); heavy metal-based oils and greases, and various chemicals used in the plants and solvents. TVA reduction programs for hazardous waste, based upon source reduction, have been in place on the TVA system for some time.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1. Framework for Environmental Impact Analyses - The Electric Power Industry, Need and Supply, and Sources of Impacts

This section explains how TVA acts in the energy market, how environmental impacts could be associated with the proposed action for rate restructuring and the relative level of predicted effects. The power service area of the Tennessee Valley Authority will continue to need electricity. TVA expects that it will provide all or a substantial portion of that energy in the future. As evaluated and discussed in TVA's 1995 *Energy Vision 2020* EIS, TVA expects to provide this energy by generating it from its own facilities or by buying it from specific energy generators (e.g., independent power producers) or from the general power market.

The potential for environmental impacts (for instance to air quality, water quality or land use) directly depends upon: (1) the decisions made by the users of electricity in the region in response to products, services, and pricing (i.e., the market response in energy demand) and (2) how TVA provides the energy in response to those decisions.

The first source of impacts (Figure 4-1) potentially results from the direct and indirect responses by the customer market of end users of electricity. Different pricing structures for electricity may, all other factors held constant, induce behavior that leads to creating, maintaining, or eliminating jobs. This occurs through construction of new plants and opening of new businesses, the expansion of existing plants and businesses (through either additional or longer shifts or physical expansion of facilities), or the closing or reducing the output of existing plants and businesses. However, it is not reasonable to assume that all of the other factors that affect such behavior (these business decisions) would or can be held constant. Things affecting business and the economy change constantly. Thus, predicting behavioral changes is largely a speculative exercise.

The second source of impacts (Figure 4-1) potentially occurs if, in response to restructuring of power rates, energy use increases or decreases to the point that: (1) new generation facilities must be constructed or existing facilities operated more; (2) existing generation facilities are shut down or operated less; or (3) the mix of energy resources changes. With increases or decreases in energy demand, more or less transmission capability (such as more miles of transmission line) may also be needed.

For the suite of alternative rate structures for pricing of electricity proposed by TVA in consultation with power distributors of the region, the potentially affected resources include socioeconomics, energy use, air quality, water quality, land use, and production of solid and hazardous waste. These areas also serve as indicators of differences among the rate structure choices in the present EA.

4.2. Socioeconomics and Energy Use

No Action Alternative - Under this alternative, there would be no change in the way TVA currently determines and applies electricity pricing. Therefore, there would be no incremental effects on energy use or derivative socioeconomic impacts.

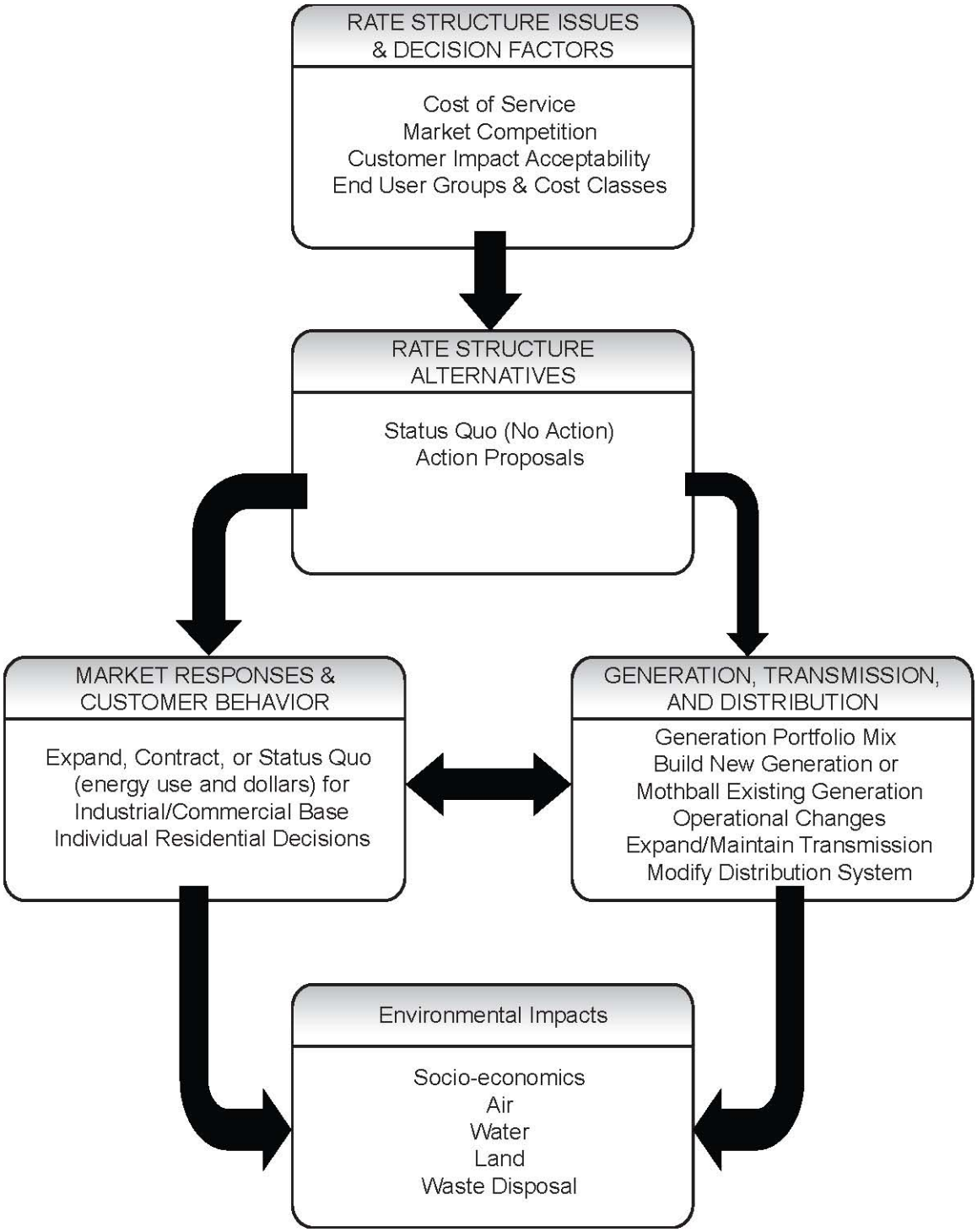

Figure 4-1. General Framework for Environmental Impact Analysis of Rate Change Impacts

Action Alternative - Under the Action Alternative, there are two proposed actions. The first change would be to recover TVA costs based on wholesale sales at the distributor wholesale delivery point rather than the current practice of using end-use customer demand and/or energy consumption. As discussed in Section 2.2, distributor revenues by class are expected to remain close to the same (although there would likely be some impact on individual customers). Therefore, from this change there would be little or no effect on energy usage, either in total or with respect to specific types of use and no noticeable socioeconomic impacts.

The second change would be the introduction of rates that vary by season. However, as proposed, these rates would be implemented under the Action Alternative with relatively small variation in pricing for time-of-use. Distributors would have a choice between seasonal time-of-use rates and seasonal demand and energy rates, as discussed in Section 2.2. The minor differences in rate by season and/or time of use likely would result in some small reduction in peak usage, offset to some extent by minor increases in off-peak usage. The higher rates proposed for summer usage would provide a small additional incentive for improved efficiency in air conditioning. While the proposal is likely to slightly reduce time-of-day and seasonal fluctuations in total demand, the differences would be small because of the wholesale rates introduced under the present proposal (Figure 4-2) do not have substantial price signals. It is not likely that these small differences would result in any noticeable change in energy usage overall. Therefore, due to the size of the change, any direct, indirect, or cumulative socioeconomic impacts are expected to be small.

Environmental Justice - Any changes in the recovery of TVA costs are expected to affect customers of each TVA distributor in a uniform fashion. For each distributor, households and businesses within a customer class would be impacted uniformly within that class. The introduction of rates that vary by season would also apply uniformly within a distributor's service area. Distributor service areas are large enough that none would have a disproportionately large share of minority or low-income customers. Since these classes would apply throughout the distributor's service area and there likely would be no substantive, disproportionate negative impacts to minority or low-income populations.

4.3. Air Resources

Under the No Action Alternative or "no change" alternative there would be no effect on air pollutant emissions and air quality. As discussed above in the socioeconomic and energy use section, potential economic and energy use changes for the proposed Action Alternative are expected to be so small as to be indiscernible. The magnitudes of percent changes in air pollutant emissions across the TVA region would be expected to vary with a magnitude similar to that for gross regional product. Changes, if any, would be so small that associated increases in ambient air pollution levels (air quality) would not be identifiable. To the extent there is any change in peak demand, reduction in peak demand would likely mean reduction in the operation of combustion turbines and their associated emissions. For both the No Action and proposed Action Alternative, the current conditions and trends in air quality for the region, as discussed in Chapter 3 of this EA, are expected to continue. Therefore, due to the size of the change, any direct, indirect, or cumulative impacts to air resources are also expected to be small.

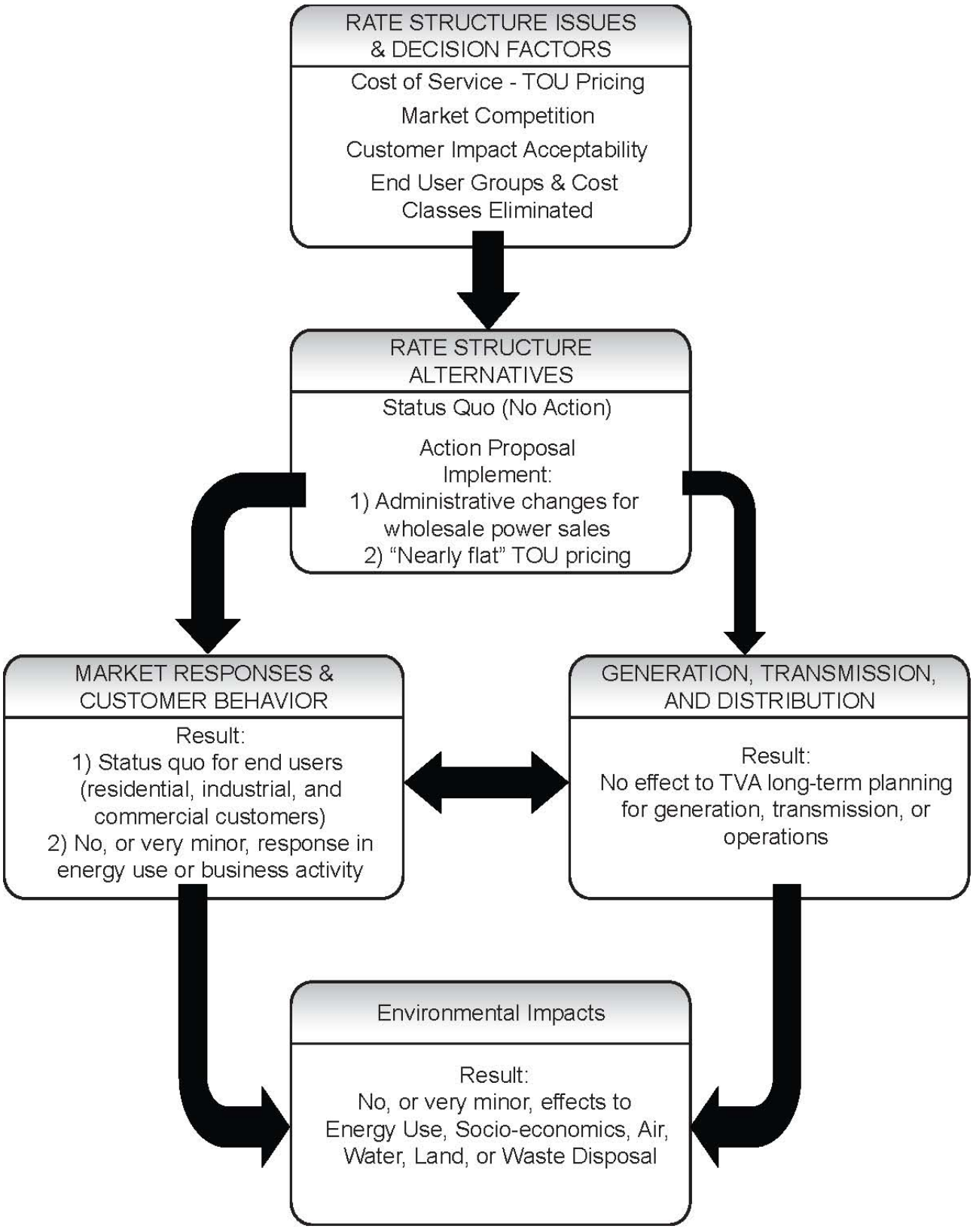

Figure 4-2. Environmental Impact Analyses for No Action and Proposed Action Alternatives

4.4. Water Resources

The impacts potentially occurring from rate changes are associated with changes in economic activity and those associated with changes in power demand. Increases in regional employment, income, or population can result in increased water demands, construction activities, and wastewater discharges. Likewise, increases in power demand can require additional generation and transmission facilities or longer operation of existing facilities. Impacts to water resources can result from the following types of activities associated with rate changes of sufficient magnitude.

- **Construction Activities -** Construction of new industrial, commercial, and general development, power generating, or transmission facilities can involve land clearing, erosion, and the runoff of potential pollutants associated with construction activities. If the construction is near surface waters, bank erosion and sedimentation can increase turbidity, clog small streams, increase nutrient inflows, and threaten aquatic life. Removal of the tree canopy along a stream can increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic biota.

- **Thermal Releases -** TVA power plants use large amounts of cooling water that is returned to the river in accordance with state NPDES requirements. TVA conducts extensive monitoring to ensure that the discharges do not adversely affect the aquatic environment. In general, these monitoring programs have detected no substantively adverse or negative effects from the release of heated water from TVA facilities.

- **Power Plant Wastewater -** Nuclear power plants have noncomplex wastewaters that are subject to various levels of treatment and usually discharged to surface waters. Coal-fired plants have a variety of liquid waste streams that are treated and released to surface waters. Hydro plants usually have minimal amounts of wastewaters that require substantial treatment. All of these releases are subject to and controlled by NPDES permits. Routine monitoring and periodic toxicity testing is performed on the discharges to ensure that the plant wastes do not contain pollutants or chemicals at deleterious levels that could affect aquatic life.

- **Runoff and Air Pollution -** Many nonpoint sources of pollution have not been subject to government regulations or control and can contribute a greater pollution load to receiving waters than point sources (Table 3-2). Principal sources of nonpoint pollution are agriculture, including runoff from animal waste and fertilizer, pesticides, and herbicide applications; erosion; mining; and urban runoff. Atmospheric deposition is another potential source of water pollution, particularly in relation to acid rain and fallout or toxic metals.

- **Hydro Generation -** Peak power demands in the region are often met using hydro generation facilities at dams along the Cumberland and Tennessee rivers. Changes in the peak demand, or need to supply river flows for cooling water in order to maintain operations of fossil and nuclear-fueled generating plants, can lead to alterations of the timing of generation patterns, which can potentially affect reservoir and tailwater flows, water quality, and aquatic life.

- **Secondary Economic Effects -** Increases in regional population, jobs, and income typically result in increased construction, water demands, and wastewater discharges. This places increased demands on the region's water resources and potentially increases pollution loads to receiving waters.

Since TVA would not implement a rate change under the No Action Alternative, there would be no effects resulting from such an action on existing conditions or trends for water resources of the region. Because of the limited price differentials associated with the proposed wholesale time-of-use schedule, and the consequent potential for any substantive changes in socioeconomics and energy use or any of the above identified types of activities remote, there would be essentially no, or only extremely minor impacts to, water resources from the proposed action. Therefore, due to the size of the change, any direct, indirect, or cumulative impacts to water resources are also expected to be small. Consequently, there would also be no effects to aquatic biological resources or federally listed species and their habitats.

4.5. Land Use

As stated, load demand can increase in response to pricing of electricity. For both the No Action Alternative and proposed Action Alternatives, current usages and land use trends would continue. As discussed under the socioeconomic section, impacts on employment and on population from any of the alternative rate structures are expected to be very small. Consequently, none of the alternatives is expected to result in the construction of new industrial or commercial facilities, the expansion of existing facilities, or the closing of existing facilities. As described earlier under the energy use section, the change in energy use predicted for any Action Alternative is also expected to be very small. These very small changes in energy use are not expected to require the construction of new generating or transmission facilities or even any discernible changes in how existing facilities are operated. Therefore, land use impacts (including those to floodplains or wetlands) that would be associated with the alternative rate structures would also be small or none. Consequently, there would also be no effects to terrestrial biological resources or federally listed species and their habitats.

4.6. Solid and Hazardous Waste Generation

Potential impacts of the rate structure modification on solid and hazardous waste generation could accrue from two aspects: (1) changes in generation and handling of solid and hazardous wastes from residential, commercial, and industrial facilities in the affected region and (2) changes in generation and handling of coal combustion wastes at TVA fossil plants used for power production. However, as discussed in earlier sections, the changes that are expected to result from either of the alternatives are small or indiscernible. Accordingly, any change to solid and hazardous waste generation and disposal in the TVA region are also expected to be essentially indiscernible from current regional trends.

Residential, Commercial, and Industrial Wastes - Solid waste is generated by most activities. Hazardous wastes are primarily by-products of industrial processes. Because neither alternative is likely to result in any discernable changes to the amount of energy use or in general socioeconomic effects, the proposed rate structure changes would result in no, or only minor, effects to the generation and handling of residential, commercial, and industrial solid and hazardous wastes in the region. Additionally, the existence of state-administered, RCRA-equivalent programs in the seven states of the TVA power service area, which emphasize waste reduction, recycling, and proper handling and disposal of

solid and hazardous wastes, would further ensure that direct, indirect, or cumulative effects from either of the alternatives (including No Action) would be minimal.

TVA-generated wastes - Because there are no anticipated changes resulting in consequences to TVA power generation, neither of the alternatives considered would likely have a measurable impact on CCB production at TVA's coal-fired plants. Any change would be much less than the existing large fluctuation in CCB production. Therefore, the alternatives considered would have no or, at most, a minor impact on regional CCB production and disposal that would be indiscernible from variations within the normal range of generating plant operations, nor would the equally indiscernible effects on hydro or nuclear generation result in additional wastes being generated under either of the alternatives. Similarly, no discernible changes in generation of hazardous waste by TVA facilities would result from either of the alternatives. Consequently, potential direct, indirect, or cumulative impacts from such waste generation would be small or indiscernible.

4.7. Summary of TVA Commitments and Proposed Mitigation Measures

There were no commitments or mitigation measures identified as needed to implement either the proposed Action Alternative or the No Action Alternative.

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CHAPTER 5

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Experience: 27 Years Progressive Utility Experience, Rates, Rate Design, Pricing, Cost of Service, Regulatory, Supply Contracts
Involvement: Development and Analyses of Proposed Rate Structure

Bradley D. Peters

Position:	Senior Manager, Power Contracts
Education:	B.S., Agricultural Economics; J.D., with an emphasis in Business Transactions
Experience:	5 years with TVA, Working with Power Contracts and Rate Schedules; Several Years of Legal Experience in Private Practice Prior to Coming to TVA
Involvement:	Description of Proposed Rate Structure

Bruce L. Yeager

Position:	NEPA Program Manager
Education:	M.S., Zoology (Ecology); B.S., Zoology (Aquatic Ecology)
Experience:	34 years in Environmental Compliance for NEPA and Water, Air, and Land Use Planning; Environmental Business Services
Involvement:	NEPA Compliance

CHAPTER 6

LITERATURE CITED

National Park Service. 2006. *Explore Air: Class I Area Locations*. Retrieved from <http://www.nature.nps.gov/air/Maps/classILoc.cfm>.

Tennessee Department of Environment and Conservation. 2003. *Annual Report to the Governor and General Assembly on the Solid Waste Management Act of 1991. Fiscal Year 2001-2002*.

———. 2008. 2008 *305(b) Report, The Status of Water Quality in Tennessee*.

Tennessee Valley Authority. 1976. *Policies Relating to Electric Power Rates Final Environmental Impact Statement*, Volumes 1 and 2.

———. 1980. *Alternative Electric Power Rate Structures Environmental Impact Statement*.

———. 1995. *Energy Vision 2020: An Integrated Resource Plan and Programmatic Environmental Impact Statement*.

———. 2003. *Modification of Rate Structure for Pricing of Wholesale Electricity to Distributors Within the TVA Power Service Area Environmental Assessment*.

———. 2007. *Public Utility Regulatory Policies Act (PURPA) Standards Environmental Assessment*.

———. 2010. *Water Quality*. Retrieved from <http://www.tva.gov/environment/water/index.htm>.

U.S. Department of Agriculture. 2009. *Census of Agriculture 2007: United States Summary and State Data*.

U.S. Environmental Protection Agency. 2006. *2006 24-Hour $PM_{2.5}$ Standards – Region 4 Designations*. Retrieved from <http://www.epa.gov/pmdesignations/2006standards/final/region4.htm>.

———. 2008. *2008 Ground-level Ozone Standards - Region 4 Recommendations and EPA Responses*. Retrieved from < http://www.epa.gov/ozonedesignations/2008standards/rec/region4R.htm>.

———. 2009. *Mercury - Controlling Power Plant Emissions: Chronology*. Retrieved from <http://www.epa.gov/mercury/control_emissions/decision.htm>.

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