County Economic Impacts IAG
February 4, 2004
Alcoa Conference Center
Badin, North Carolina

Final Meeting Summary

Meeting Agenda

See Attachment 1.

Meeting Attendees

See Attachment 2.

Welcome and Introductions

Wendy Bley, Long View Associates, opened the meeting with introductions and a review of the agenda. She distributed copies of the "Surrounding Counties Economic Impact Analysis Draft Study Plan" to those who needed a copy (see Attachment 3). Wendy introduced Katherine Heller, Research Triangle Institute (RTI), who reviewed the draft study plan and "Phase 2 Activities" (see Attachment 4).

Katherine explained that the study plan addresses two main issues: 1) the impact of different reservoir operations on economic activity in the surrounding five counties and 2) the impact of reservoir operations on the tax base and property values. Katherine described the technical approach for estimating economic impacts on the surrounding counties' economies. She said that RTI will first inventory businesses in reservoir-related commercial and industrial sectors (to be determined). RTI will use this information to characterize baseline conditions for reservoir-related businesses. In parallel, RTI will, for each of the alternative operating scenarios, estimate the impact of the operating scenario on the business sectors. Katherine noted that RTI may then use the input-output model IMPLAN, to estimate the overall impact of the alternative operating scenarios on the counties economies (as a result of the direct impacts to the business sectors).

Larry Jones, High Rock Lake Association, asked Katherine to add a fourth issue to the study plan, which describes that the economic impact to the surrounding counties economies will be estimated under several different alternative operating scenarios. Katherine agreed to revise the study plan accordingly.

Continuing, Katherine described the technical approach for estimating property value impacts. She said that RTI had made some progress on collecting necessary parcel level data for four of the five surrounding counties. She explained that RTI will have to purchase the parcel data from Montgomery County. Generally, these data include geographic reference data, structures on the property, the assessed value of the property, and sale price. She said that RTI is currently compiling these data into a single database. Sam Leaman, RTI, distributed an example of parcel data for Stanly County (see Attachment 5).

Katherine said that RTI will look into the availability of Multiple Listing Service (MLS) data for counties bordering the APGI and surrogate reservoirs. It may be that RTI will not be able to obtain MLS data for many counties; if not, RTI plans to obtain GIS databases from county planning departments that have parcel data, including assessed value and other descriptors of each parcel. She explained that RTI had not chosen surrogate reservoirs that will be used to quantify the impact of fluctuating water levels. She said that RTI had looked into using Kerr Reservoir and Lake Gaston as surrogate reservoirs, but the surrounding counties did not have the data that RTI would need to complete the analysis. Katherine said that RTI would continue to look for surrogate reservoirs. Larry Jones suggested that RTI look at the Duke Power lakes, such as Lake Wylie.

In reference to the Stanly County parcel data (Attachment 5) Greg Scarborough, Rowan/Salisbury Association of Realtors, asked why the land value/acre stopped as low as $15,000 and did not go higher. Katherine said that the Stanly County parcel data, as distributed, was just an example. She said that RTI has parcel data for individual parcels, and that values in the highest category ranged up to more than $100,000 per acre. She stated that RTI would select value categories to reflect the range of values better in describing the data, but that the analysis itself would be done based on the individual parcel data.

Jean Sink, Concerned Property Owners High Rock Lake, suggested that when RTI compares High Rock and Narrows reservoirs to other surrogate reservoirs, it should also discuss the businesses that do not operate at High Rock Reservoir because of the fluctuating water levels. Katherine said that it would be hard to demonstrate statistically a connection between the existence of a business and the way reservoirs are operated. Greg Scarborough noted that there is probably some correlation with sales revenue. Katherine was uncertain of the availability of this kind of data, but agreed to look into it. Randy Benn, Yadkin counsel, said that it would be difficult to guess which businesses are not operating at High Rock and why. Further, he explained that the Federal Energy Regulatory Commission (FERC) does not require the licensee to study the issue. Larry Jones asked if FERC requires a county economic impact study. Randy answered no. Randy said that Yadkin is required to conduct all "reasonable and necessary" studies. Larry said that the IAG asked RTI to compare the economies of the surrounding five counties to other economies, which surround reservoirs with stable water levels. Katherine explained that RTI aims to compare the sales values for a single reservoir during times of stable water levels and variable water levels and to quantify to the impact of water level fluctuations on shoreline property values. Greg Scarborough suggested that RTI look at reservoirs that are operated with stable water levels to determine the type of businesses that exist there that might not exist at High Rock because of the fluctuating water levels. Katherine noted that there are other variables besides water levels that might affect the type of businesses present, such as the proximity to population centers, transportation routes etc.

Jane Peeples, Meeting Director, asked Katherine to clarify how the data will used and reported. Katherine said that RTI hopes to develop a measure of water level stability/variability that can then be linked quantitatively to establish what share of property values is attributable to water levels (e.g. answer the question if High Rock Reservoir was full year round, would that contribute positively to property values).

Larry Jones offered Lake Norman as another potential surrogate reservoir. He said that Lake Norman, similar to High Rock Reservoir, is close to Charlotte and an interstate.

Continuing, Katherine explained that RTI will combine the results of this study with ERM's Recreation Economic Impact Study to provide a complete characterization of the impacts of alternative water level scenarios on the county economies. Larry asked that the RTI and ERM studies be conducted independent of one another. Katherine explained that the alternative water level scenarios evaluated in both studies will be the same. She said that it would be necessary to use the results from both studies to characterize the impacts of alternative operating scenarios on the economies. She noted that part of the economic impact will be on recreation spending, which ERM is studying. Larry said that the RTI study is much bigger than recreational spending, which is very minute in the broader context.

Next, Katherine reviewed the "Phase 2 Activities" (see Attachment 4). She noted that the first two tasks, data collection and model preparation, would be completed simultaneously. She said that RTI expected these two tasks would be completed in April. She said that RTI would then use the models to analyze impacts during the May through July time period. Katherine said that RTI anticipates a draft study report would be available by the end of September 2004. When asked about the use of models, Katherine explained that RTI may use IMPLAN if the direct impact of the water level scenario on the business sectors is substantial.

Greg Scarborough asked about the methodology for collecting information on reservoir-related businesses. Sam Leaman said that he would be contacting the local Chambers of Commerce and those businesses included in the High Rock Business Owners Group. He said that RTI aims to compile an exhaustive list of local businesses, which it will then use to contact a representative sample of the businesses. Greg asked how RTI would determine a "representative sample". Katherine said that RTI could possibly use a random sampling method within the SIC codes.

Steve Reed, NC Division of Water Resources, noted that the County Economic Impacts IAG would need to coordinate with the Recreation, Aesthetics, and Shoreline Management IAG to identify several alternative reservoir operating scenarios, which would be needed by May (based on RTI's proposed scheduled). He suggested that the County Economic Impacts IAG meet in May, when the Recreation, Aesthetics, and Shoreline Management IAG plans to meet to start these discussions. Wendy Bley agreed and suggested that since it may be early to focus on specific operating scenarios, that the alternative scenarios identified for use in the economics evaluations may have to be designed to bracket the range of alternative operating scenarios.

Monty Crump, Yadkin Pee-Dee Relicensing Coalition, submitted a copy of "An Economic Evaluation of Yadkin Hydroelectric Project and Yadkin Pee-Dee Hydroelectric Project" for the relicensing record (see Attachment 6).[1] He asked that the report also be made available to the

[1] Yadkin appreciates the effort put into the Yadkin Pee-Dee Relicensing Coalition's economic evaluation, and will include the study in the official relicensing record that will be submitted to FERC. Yadkin notes, however, that it has comments about several of the assumptions that underlie the analyses presented in the report. Most significantly, Yadkin does not receive a "capacity credit" for its energy (the author states that the South Atlantic Region does not yet have a market exchange for capacity. The study uses PJM (Pennsylvania – New Jersey – Maryland) regional data to establish a "market value" for capacity for Yadkin). A capacity credit is included in all six cases evaluated. Therefore, the valuations presented in the Summary of Economic Evaluation Table overstate the actual value of

IAG. He said the report summarizes the net revenues and net present values of the two projects. He commented that the value of the actual resource is often overlooked. He said that there is a transfer of wealth out of the region and that there should be some consideration given to what the companies can give back over the next 50 years.

In summary, Wendy Bley suggested that the IAG take another couple of weeks to review and comment on the draft study plan. Any comments on the draft study plan should be sent to RTI. She said that RTI would then finalize the study plan. Wendy said that if a discussion of alternative operating scenarios is added to the May 5, 2004 Recreation, Aesthetics, and Shoreline Management IAG meeting agenda, the County Economic Impacts IAG would be notified. Larry Jones suggested that the May meeting would also be a good opportunity to get an update from RTI.

The meeting adjourned at about 2:00 p.m.

energy. Also, the value developed in the study using available FERC Form 1 data substantially understates Yadkin's actual operating costs. This underestimate of the actual operating costs results in an additional overestimate of the net value of the Project energy output.

Attachment 1 – Meeting Agenda

Yadkin Project
(FERC No. 2197)
Communications Enhanced Three-Stage Relicensing Process

County Economic Impacts Issue Advisory Group Meeting

Wednesday, February 4, 2004
Alcoa Conference Center
Badin, North Carolina

1:00 PM – 3:00 PM

Preliminary Agenda

1. Introductions, Review Agenda
2. Review and Discuss County Economics Draft Study Plan
3. Review Schedule and Plans for County Economics Study
4. Schedule and Agenda for Next IAG Meeting

Attachment 2 – Meeting Attendees

Name	Organization
Brad Knisley	Long View Associates
Donna Davis	Stanly County
Gene Ellis	APGI, Yadkin Division
Greg Scarborough	Rowan/Salisbury Association of Realtors
Jane Peeples	Meeting Director
Jean Sink	Concerned Property Owners High Rock Lake
Jody Cason	Long View Associates
Katherine Heller	RTI
Larry Jones	High Rock Lake Association
Matt Brinkley	Town of Badin
Monty Crump	Yadkin Pee Dee Relicensing Coalition
Randy Benn	Yadkin counsel
Sam Leaman	RTI
Scott Leonard	Davidson County
Steve Reed	NC Division of Water Resources
Sue Hennessy	Yadkin Pee Dee Lakes Project
Wendy Bley	Long View Associates

Attachment 3 – Surrounding Counties Economic Impact Analysis Draft Study Plan

Yadkin Project (FERC No. 2197)
Surrounding Counties Economic Impact Analysis
Draft Study Plan
January 2004

Background

Alcoa Power Generating Inc. (APGI) is the licensee for the Yadkin Hydroelectric Project. The Yadkin Project is currently licensed by the Federal Energy Regulatory Commission (FERC) as Project No. 2197. This license expires in 2008 and APGI must file a new license application with FERC on or before April 30, 2006 to continue operation of the Project.

The Yadkin Project consists of four reservoirs, dams, and powerhouses (High Rock, Tuckertown, Narrows, and Falls) located on a 38-mile stretch of the Yadkin River in central North Carolina. The Project generates electricity to support the power needs of Alcoa's Badin Works, to support its other aluminum operations, or is sold on the open market.

As part of the relicensing process, APGI prepared and distributed, in September 2002, an Initial Consultation Document (ICD), which provides a general overview of the Project. Agencies, municipalities, non-governmental organizations and members of the public were given an opportunity to review the ICD and identify information and studies that are needed to address relicensing issues. To further assist in the identification of issues and data/study needs, APGI has formed several Issue Advisory Groups (IAGs) to advise APGI on resource issues throughout the relicensing process. IAGs will also have the opportunity to review and comment on Draft Study Plans. This Draft Study Plan has been developed in response to comments on the ICD and through discussions with the County Economic Impacts IAG, to provide additional information for consideration in the relicensing process.

Organization of the Study Plan

The Study Plan for the Surrounding Counties Economic Impact Analysis begins with a description of the regulatory setting in which the study takes place and a summary of the issues to be addressed. Next, the Study Plan specifies the objectives of the Study and presents the planned Technical Approach for analyzing each of the issue areas. Finally, the Study Plan describes the plan for reporting the Study findings to APGI and the IAG and presents the study schedule.

Overview

The Yadkin Division of APGI is in the process of relicensing its 216 MW Yadkin Hydroelectric Project, utilizing an enhanced version of the FERC three-stage relicensing process. One of the issues raised during the initial consultation and through the County Economic Impacts IAG relates to the impacts of the Project reservoirs on the economies of the surrounding five counties (Davidson, Davie, Montgomery, Rowan, and Stanly counties) under current reservoir operations and other water level scenarios. The Surrounding Counties Economic Impact study will examine the economic impact issues from several perspectives, as described below.

Issues

During the first County Economic Impacts IAG meeting, members identified questions relating to the reservoirs and their impacts on the counties' economies. These individual questions have been grouped into three overarching issue areas, as presented at the November 2003 meeting of the County Economic Impacts IAG. These issue areas are:

1. What are the reservoir related businesses in the five county area, what is their contribution to the economies of the five counties, and how are the businesses affected by the reservoirs?
2. What is the contribution of the reservoirs to surrounding property values and the county tax base?
3. What is the relationship between the reservoirs and recreation, tourism, and visitors?

Objectives

The overall objective of the Surrounding County Economic Impact Study is to document and analyze the relationship of the Project reservoirs to the economies of the surrounding five counties, under current reservoir operations and other alternative water level scenarios. Once appropriate alternative water level scenarios have been identified, RTI will use publicly available information to characterize the reservoir related business sectors, and to estimate the impacts of alternative water level scenarios on these business sectors. Similarly, RTI will use publicly available information to characterize the baseline effects of the reservoirs on property values and tax base within the five counties, and will characterize the impact of alternative water level scenarios on these endpoints. RTI will characterize tourism expenditures and opportunities at baseline and under alternative water level scenarios. RTI will combine information about reservoir recreation tourism collected by ERM, another consultant to APGI, with data on other tourism expenditures collected during the business inventory task. Finally, RTI will combine the results of the recreation impact study being conducted by ERM with the findings from the surrounding counties impact study to present a comprehensive report on the impacts of alternative water level scenarios on the counties' economies. Examples of data that may be used for the analysis include Census data, data embodied in existing studies and plans (such as the Central Park Region studies, county economic development plans, the Shoreline Management Plan, etc.), county property tax records and property tax rates, Geographic Information Systems (GIS) data for each county available, and information provided by experts in the area.

Technical Approach for Estimating Economic Impacts on Surrounding Counties' Economies

RTI will confer with the IAG to identify business sectors that should be considered for inclusion in the analysis. These business sectors may include industrial, recreation businesses, non-recreation tourism, residential and commercial construction, agriculture, and others, to be determined in consultation with the IAG. RTI will use its best professional judgment to determine which sectors should be considered reservoir-related, based on data it has collected and in consultation with the IAG. RTI will then prepare an inventory of existing, reservoir-related, businesses.

RTI will then characterize reservoir-related commercial and industrial sectors, including (depending on data availability), a descriptive characterization; an identification of number, type, and location of businesses in each affected sector; and/or estimated or actual sales and employment by business or by sector. (The exact definition of "sector" has yet to be determined, but one possible definition would be based on SIC codes.)

For these sectors, RTI will estimate the contribution to the county economies, and the reservoir-related share of employment and expenditures. A possible approach would use data from the IMPLAN input-output model of North Carolina to estimate county-wide indirect and induced expenditures resulting from the direct impact of these businesses on the county economies.

RTI will use the information described above to characterize baseline conditions for reservoir-related businesses. RTI will define the baseline as a continuation of current conditions.

RTI will then examine the relationship of the reservoirs and their water levels to these sectors. For each of the alternative water level scenarios (two or three alternatives are expected), RTI will estimate the direct impact of the water level scenario on the business sectors. Then, RTI will attempt to estimate the overall impact of the alternative water level scenarios on county economies as a result of these direct impacts. If IMPLAN is to be used, RTI will coordinate its use of IMPLAN with that of ERM to ensure that the assumptions underlying the two studies are consistent.

Technical Approach for Estimating Property Value Impacts

RTI will examine the relationship between property proximity to the reservoirs and property values, holding other factors constant. Then, RTI will attempt to evaluate the effect of alternative water level scenarios on property values. RTI will review the literature to identify studies that quantify the impact of reservoirs and reservoir water levels on property values. RTI will obtain Geographic Information Systems (GIS) parcel data for each county where available, and will explore the availability of Multiple Listing Service data for the counties. At the November meeting, IAG member Greg Scarborough of the Rowan/Salisbury Association of Realtors offered assistance in obtaining MLS data for Rowan County. MLS data provide greater detail in parcel description and also provide sales prices. RTI will then estimate the property value premium associated with shoreline proximity, by comparing measures of value, including dollars per acre and dollars per square foot of residences on the parcels, for parcels at varying distances from reservoir shorelines. If data permit, RTI will use statistical techniques to isolate the share of property value attributable to proximity to the reservoir from other factors that also affect value. RTI will also attempt to distinguish property types (residential, commercial, industrial, agricultural, etc.).

RTI will estimate the share of the counties' tax base represented by Project-related businesses and residences, using assessed value data listed above.

RTI will estimate the impact of different water level scenarios, using information from the literature, from local and national experts in Real Estate including those at the National Association of Realtors and the Urban Land Institute, and possibly information from other "surrogate" reservoirs that are similar in character to the Yadkin Project reservoirs. RTI will explore the availability of information from other reservoirs to use in quantifying the impact of fluctuating water levels. Ideal surrogate reservoir candidates would be reservoirs that are close to each other, have similar access to population centers and transportation corridors, but are operated differently: one reservoir has relatively stable water levels, and the other is more variable. If the reservoirs are sufficiently similar across attributes other than water level fluctuation, differences in property values for parcels bordering the reservoirs may permit quantifying the impact of the water level fluctuation. RTI will also examine alternative quantification methods, such as comparison of sales values for a single reservoir during times when water levels were relatively stable and times when water levels were more variable.

Integrating Recreation Impact Estimates with other Impact Estimates

RTI will obtain the results of the ERM recreation impact study from APGI. RTI will work with ERM and APGI to ensure that analysis methods, data used, and other parameters of the two studies are compatible, to the extent possible. To provide a complete characterization of the impacts of alternative water level scenarios on the county economies, RTI will combine the results from this study with the results from ERM's recreation impact study to prepare an integrated report.

Reporting

RTI will compile the data, methodology, and results of the analyses described above into a report for APGI and the County Economic Impacts IAG. The report will be comprehensive and also comprehensible. Detailed descriptions of data and analytical methods will be presented in appendices, along with other supporting information, so that the main body of the report is clear and thorough, but also easily understood. RTI will prepare a draft report which will be distributed to the County Economic Impacts IAG for review.

RTI will meet with APGI and the County Economic Impacts IAG to present the findings of the analysis, discuss the report, and receive comments on the report.

After receiving comments from APGI and the County Economics IAG, RTI will revise the draft report as appropriate. RTI will prepare and deliver the revised final report to APGI and the County Economic Impacts IAG.

Schedule

RTI expects to conduct the analyses described in this study plan over a period from February 2004 through October 2004. RTI will present the study plan to the IAG on February 4, 2004. The following table provides a schedule for significant project activities.

Project Activity	**Anticipated Performance Period**
Task 1 Activities	
Present Study Plan to IAG and prepare final Study Plan	February 4, 2004 through February 13, 2004
Task 2 Activities	
Collect data, review literature, inventory businesses, characterize baseline conditions	February 16, 2004 through April 30, 2004
Assess impacts of alternative water level scenarios*	May 1, 2004 through July 31, 2004*
Prepare and deliver draft report of findings	September 30, 2004
Prepare and deliver final report of findings	October 31, 2004

* Evaluation of alternative water level scenarios must be done in conjunction with a similar analysis being done by ERM as part of the Recreation Economics Assessment.

Attachment 4 – Phase 2 Activities

County Economic Impact Analysis
Phase 2 Activities:

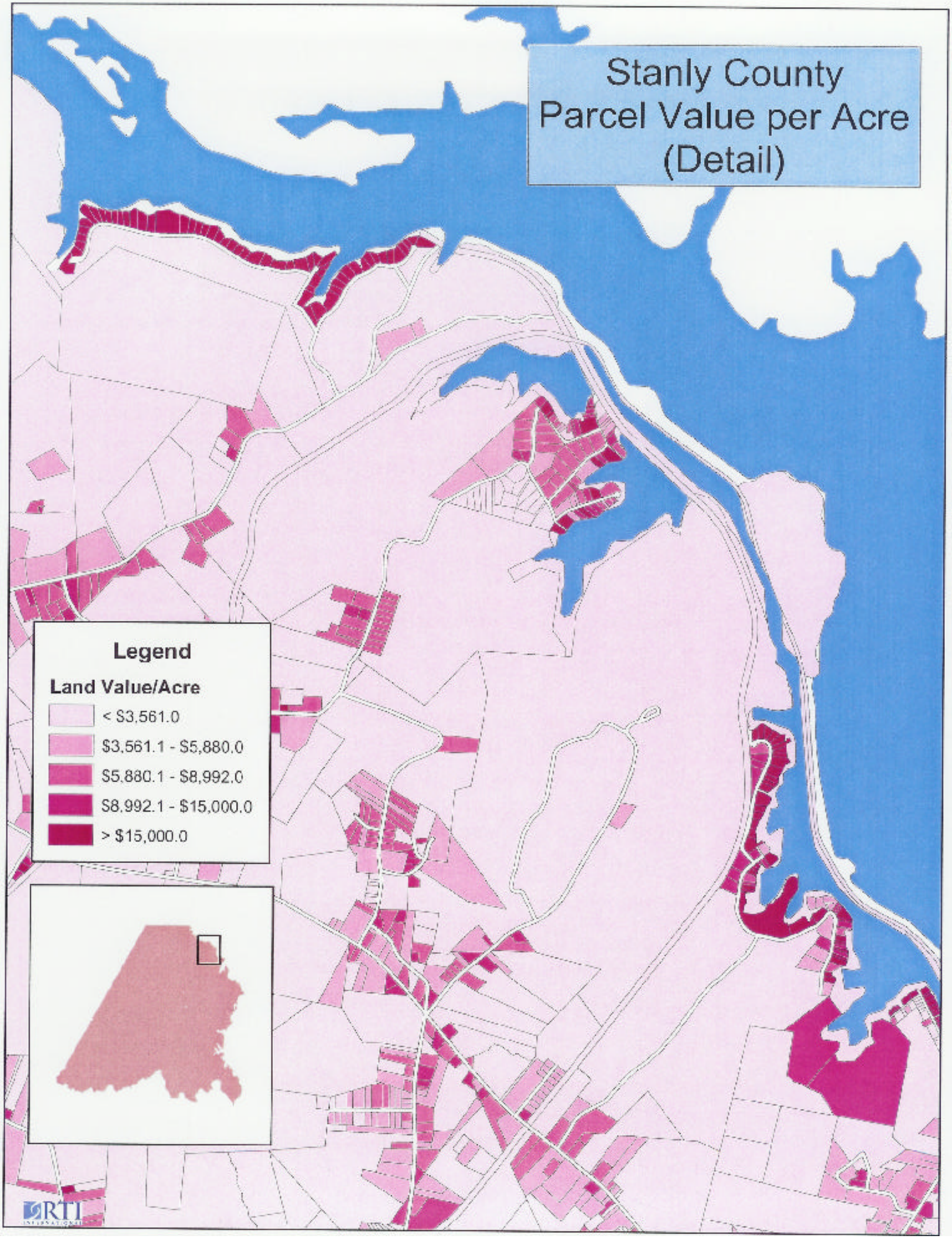
1. Complete data collection, literature review, inventory local businesses. Develop characterization of baseline conditions in the five-county region.
   - Data on properties (MLS data, GIS from County planning departments)
   - Data on reservoir-related businesses
   - Information from the literature on the impact of reservoirs and reservoir water levels on property values, economic activity.
2. Finalize analytical methods and models
   - Methods and models for both macroeconomic impact analysis and property value impact analysis
   - Task 2 occurs simultaneously with completing data collection under Task 1.
   - Methods may include:
     - Qualitative descriptions
     - Simple correlations and relationships
     - Statistical models, macroeconomic input-output model
   - Provide interim progress reports to APGI, AIG
3. Implement selected methods and models to analyze impacts
   - May use one or more of the above methods, depending on data available
   - Interim progress reports will be provided to APGI, AIG
4. Prepare draft report
   - Deliver draft report to APGI, AIG
   - Receive comments and suggestions from APGI and AIG
5. Prepare final report

Project Schedule

Project Activity	**Anticipated Performance Period**
Phase 1 Activities	
Present Study Plan to IAG and prepare final Study Plan	February 4, 2004 through February 13, 2004
Phase 2 Activities	
Collect data, review literature, inventory businesses, characterize baseline conditions	February 16, 2004 through April 30, 2004
Finalize analytical methods and models	March 15, 2004 through April 30, 2004
Assess impacts of alternative water level scenarios*	May 1, 2004 through July 31, 2004*
Prepare and deliver draft report of findings	September 30, 2004
Prepare and deliver final report of findings	October 31, 2004

* Evaluation of alternative water level scenarios must be done in conjunction with a similar analysis being done by ERM as part of the Recreation Economics Assessment.

Attachment 5 – Stanly County Parcel Data


Stanly County
Parcel Value per Acre
(Detail)
Legend
Land Value/Acre
< $3,561.0
$3,561.1 - $5,880.0
$5,880.1 - $8,992.0
$8,992.1 - $15,000.0
> $15,000.0
RTI

Attachment 6 – An Economic Evaluation of Yadkin Hydroelectric Project (FERC No. 2197) and Yadkin-Pee Dee Hydroelectric Project (FERC No. 2206) Prepared for Yadkin-Pee Dee Relicensing Coalition

AN ECONOMIC EVALUATION
OF
YADKIN HYDROELECTRIC PROJECT (FERC No. 2197)
AND
YADKIN-PEE DEE HYDROELECTRIC PROJECT (FERC No. 2206)

PREPARED FOR
YADKIN-PEE DEE RELICENSING COALITION

December 2000

Jan C. Phillips, P.E.
2611 Walnut Street
Allentown, PA 18104-6230

(610) 821-0160
jcphllps@enter.net

December 2000

AN ECONOMIC EVALUATION OF YADKIN HYDROELECTRIC PROJECT (FERC No. 2197) AND YADKIN-PEE DEE HYDROELECTRIC PROJECT (FERC No. 2206)

Introduction

A preliminary evaluation of the Yadkin and Yadkin-Pee Dee hydroelectric projects was performed for the Yadkin-Pee Dee Relicensing Coalition, in anticipation of the beginning of relicensing activity for the two projects. The Yadkin Project is licensed to Alcoa Power Generating Inc. ("Alcoa"), and the Yadkin-Pee Dee Project is licensed to Carolina Power & Light Co. ("CP&L"). Both licenses expire on April 30, 2008. The evaluation was conducted primarily from information available via the FERC Internet web site (www.ferc.fed.us); no site visits were conducted.

Alcoa's Yadkin Project consists of the High Rock, Tuckertown, Narrows and Falls developments (plants) on the Yadkin River (in downstream order). The project's total generating capacity is presently about 209 MW and expected to be about 217 MW upon completion of the recently authorized generating unit upgrades.

CP&L's Yadkin-Pee Dee Project consists of the Tillery and Blewett Falls developments (plants) on the Yadkin and Pee Dee rivers (in downstream order) downstream from Alcoa's Yadkin Project. The Yadkin-Pee Dee Project's total generating capacity is about 108 MW.

Summary of Results

Ranges of the respective projects' expected year 2001 "net revenues" and beginning-of-2001 net present values (NPVs) derived as described herein are:

	Expected Annual Net Revenue Year 2001	Net Present Value (NPV) As of January 1, 2001
Alcoa (Yadkin)	$25-35 million	$140-175 million
CP&L (Yadkin-Pee Dee)	$10-14 million	$55-70 million

"Net revenue" as used herein is the value of a project's output (capacity and energy) less expenses allocable to the project during a given time period (normally one year).

The estimate ranges for project net revenue and NPV tabulated above are believed to be reasonable but tending to be conservative; i.e., the estimate ranges are judged more likely to be too low rather than too high.

Approach to Evaluation

The "income approach" was adopted for this evaluation; this approach requires estimating and valuing the respective projects' outputs (capacity and energy) over an assumed period of analysis, estimating expense allocable to each project over the same period, estimating the respective present worth (PW) values of both output and expense, and determining the estimated NPV as the difference between the PW value of output and the PW value of expense. While the intent in concept is to estimate NPV to the present owner, the approach would be equally appropriate for estimating NPV to a prospective purchaser. Several different scenarios or cases were devised and evaluated.

Period of Analysis and Relicensing Impact

The projects were assumed to continue to operate under the present licenses for alternative periods of 10, 15 and 20 years beginning in 2001. Costs and outcomes of relicensing were not assumed in the evaluation. In complex and interrelated relicensings as these will surely be, it would be very optimistic to assume that new licenses might be issued earlier than 2011 and not unreasonable to assume that issuance of new licenses might be delayed until 2015, or later. Relicensing will likely cost each licensee several millions of dollars, and new licenses are almost certain to contain requirements for expensive new facilities and for operational changes detrimental to net revenues. Nevertheless, net revenues under the new licenses can be expected to be positive, so that the projects will continue to have post-licensing value. Conservatively, in this evaluation, no post-licensing value for either project was assumed.

Factors and Parameters Considered in Analysis

Project Capacity (MW)

The Yadkin and Yadkin-Pee Dee rated capacities were assumed as 217 MW and 108 MW, respectively, in all cases evaluated. This is considered reasonable because the projects' useable reservoir storage allows all the plants to operate as peaking capacity. However, Alcoa's schedule for upgrading its generating units extends through 2007; the additional upgraded capacity (8 MW) and associated energy (12,000 MWh/yr) were assumed to be effective in 2001, to simplify the analysis; this incremental output is small and will not significantly affect the results.

Value of Capacity or Capacity Credit ($/MW-yr)

Unlike the Northeast and California, the South Atlantic region does not yet have a market exchange for capacity and energy. Extensive market price data are available for New England and for the Pennsylvania-New Jersey-Maryland Interconnection ("PJM") control area. PJM price data for 1999 were used herein as a basis for the "market value" of the projects' capacity and energy.

Alternative values for capacity were based upon three sources: the average PJM 1999 month-ahead bid value for capacity; the announced cost of CP&L's planned new generating capacity (combustion turbines); and Duke Power's present tariff demand charge for industrial customers. The PJM average 1999 market capacity was very approximately (and conservatively) estimated as $60/MW-day; the capacity values based upon CP&L new capacity and Duke Power's tariff were roughly equal at about $100/MW-day.

Project Energy (MWh/yr)

The average net energy production (generation) for Yadkin and Yadkin-Pee Dee reported in the licensees' Form 1 filings with FERC for 1994 through 1999 (six years) were 890,000 MWh/yr and 346,000 MWh/yr, respectively. (See Figure 1.) In its evaluation of Alcoa's upgrade proposal for Yadkin, FERC stated Yadkin's average pre-upgrade net generation to be 829,000 MWh/yr and the expected additional generation due to the upgrade to be 12,000 MWh/yr. Annual energy production varies significantly with river flow. Estimated potential gross generations of the projects in an average river flow year, based on plotting reported gross generations vs. river flow for a small number of years, are 935,000 MWh/yr for Yadkin and 390,000 MWh/yr for Yadkin-Pee Dee. (See Figure 2.) In consideration of all of the foregoing, the average project energies selected for this evaluation are 840,000 MWh/yr for Yadkin and 345,000 MWh/yr for Yadkin-Pee Dee, assumed constant in all years, for all cases.

Value of Energy ($/MWh)

The average value of energy in 1999 was estimated from three sources: PJM hourly average marginal energy prices in 1999 (ref. first paragraph under *Value of Capacity*, above); Duke Power's present tariff for industrial customers; and Alcoa's 1993 replacement energy cost (unescalated). The PJM hourly 1999 average market price for energy was $28.30/MWh. The marginal rate in Duke Power's industrial tariff is $39.22/MWh; this rate is assumed to be in effect in 2001. In a 1996 analysis of the rule curve operation of High Rock, FERC indicated that Alcoa purchases replacement power when needed from CP&L or Duke Power and that the average cost of Alcoa's replacement power was $25/MWh in 1993.

Where the PJM energy value is used (as an indicator of market price), a "regional factor" was applied, assuming that the wholesale value of energy in the South Atlantic states is, on average, lower than in PJM. In CASE A, the assumed regional factor is 0.8 (80%). This factor is in line with the difference in industrial customer rates between Pennsylvania and North Carolina published by the U.S. Department of Energy, Energy Information Administration. However, 1999 market month-ahead, wholesale prices published by FERC suggest that South Atlantic wholesale prices may be comparable to PJM prices. In CASE F, a "compromise" factor of 0.9 (90%) was applied.

Peaking Energy Value

The High Rock, Narrows and Tillery reservoirs have relatively large amounts of usable storage and, consequently, support peaking operation at all the downstream plants. In some of the cases evaluated, credit for peaking was applied by dividing the annual energies (MWh/yr) into "on-peak," "intermediate value" and "off-peak" amounts, and applying appropriate value factors to the respective amounts.

Estimates of long-term monthly average river flow at each plant were derived from USGS historical streamgage data. The key gaging station is on the Pee Dee River at Rockingham, just below Blewett Falls Dam. Comparison of the average flows for each month at the Rockingham gage with the average flows for each month at upstream gaging stations (tributary to some or all of the plants) indicated that the variation in the average monthly flow at the Rockingham gage adequately reflects the variation in average monthly inflows at all the plants.

Using the hydraulic capacities (maximum generation discharges) of each plant and the estimated average flows for each month (January, February, etc.), the long-term average potential number of hours of operation each month could be estimated for each plant. These numbers of hours were then apportioned to three categories, as follows: the hours up to 40 hours per week as "on-peak" hours; the remaining hours (if any) up to an additional 28 hours as "intermediate value" hours; and the remaining hours (if any) as "off-peak" hours. The hours in each category for the twelve months were combined to estimate the hours of operation in each category for each plant during an average year. Then, the average-year generations (MWh) in each category at each plant were derived by multiplying the hours of operation in each category by the project capacity rating (MW). The MWh quantities were then aggregated among the plants in the Yadkin and Yadkin-Pee Dee projects, respectively.

The PJM 1999 hourly market clearing prices for energy ($/MWh) were averaged hour by hour for each of the 168 hours per week, and then averaged again, as follows, to obtain representative average prices for the three peaking value categories: (a) "on-peak" -- the highest priced eight hours each weekday (40 hours per week); (b) "intermediate value" -- the next highest four hours each weekday plus the highest four hours each weekend day (28 hours per week); and (c) "off-peak" -- the remaining hours (100 hours per week). These average prices for each category were then used to value the generation at each project in the cases when peaking credit was assumed. The 1999 PJM average values so derived are tabulated on the next page.

Category	Average PJM Value (1999)	Ratio to 1999 PJM All-hours Value
On-Peak (40 hrs/week)	$52.50/MWh	1.86
Intermediate Value (28 hrs/week)	$30.40/MWh	1.08
Off-Peak (100 hrs/week)	$18.00/MWh	0.64

Applying peaking value as estimated above increases the average value of energy by approximately 36% at Yadkin and 39% at Yadkin-Pee Dee.

Operating Expense ($/yr)

The direct operation and maintenance ("O&M") expenses of Alcoa and CP&L charged to their respective projects in recent years were determined from the companies' respective annual Form 1 reports to FERC. (These direct O&M costs are called "Production Expenses" on Form 1 and are presented for each plant.) The respective company-wide administrative and general ("A&G") expenses, depreciation, and taxes were then allocated to each project in proportion to the ratio of the project O&M expenses to other company "utility" expenses. The resulting estimated "allocated operating expenses" for each project are plotted in Figure 3, and trend lines drawn for each project. The 1999 intercepts of the trend lines are $6,600,000 for Yadkin and $3,700,000 for Yadkin-Pee Dee; these values are assumed to be the respective 1999 project operating expenses, subject to escalation, in all cases.

Period of Analysis (years)

As discussed above, 2001 is assumed to be the initial year of the period of analysis; alternative final years are 2010, 2015 and 2020, corresponding hypothetically to alternative dates of issuance of new project licenses. The longer the projects are assumed to operate under their current licenses, i.e., the longer the period of analysis, the greater the respective project values.

Discount Rate (%/yr)

Alternative discount rates (rates of return) of 15%, 18% and 20% were evaluated. The appropriate discount rate depends upon the nature of the business of the owner (or hypothetical potential purchaser) and the degree of risk involved with the investment. The greater the discount rate, the lower the respective project NPV. A rate of 15% might be appropriate for evaluating the projects from the standpoint of an owning utility, while a rate of 20% might be appropriate for investment in an unconstructed, riskier project. A rate of 18% might be appropriate for this evaluation, in which the projects have a long operating history but are operating in an increasingly competitive market and are facing relicensing in the near future.

Escalation of Capacity Value (%/yr)

Alternative escalation rates of 0.0%, 1.0% and 2.0% were assumed to apply to the value of capacity beginning in 1999. No reliable data are available from which to derive an escalation rate for capacity value.

Escalation of Energy Value (%/yr)

Alternative escalation rates of 2.0% and 3.0% were assumed to apply to the average value of energy beginning in 1999. These rates appear to reflect recent experience.

Escalation of Operating Expense (%/yr)

The plotted trends of operating expense for Yadkin and Yadkin-Pee Dee, respectively, as shown on Figure 1, increase at rates of about 3.5% and 4.8% respectively from 1998 to 1999. Alternative escalation rates of 4.0% and 5.0% were assumed to apply to operating expense beginning in 1999.

Factors Not Considered

The factors or issues listed below might significantly influence the results of an economic evaluation of the Yadkin and Yadkin Pee-Dee projects but were not considered:

Factors/issues that would tend to increase project value

- Credits or premiums for non-greenhouse gas energy production
- Ancillary services, such as spinning reserve, area regulation and synchronous condensing
- Future sale of project land for resort, commercial or residential development
- Use of projects for non-project purposes, such as new water supplies
- Optimized daily/weekly project dispatch
- Application of hourly generation values
- Reduced operating expense due to generating unit upgrades (Yadkin)
- Credit for post-licensing project value

It is very likely that significant addition project value could be attributable to the capability of Alcoa and CP&L to dispatch their respective projects in response to real-time energy values and to operate the projects to provide ancillary services. However, there was no reasonable way to value this dispatching flexibility from the data available.

Factors/issues that would tend to decrease project value

- Cost of relicensing
- Phase-in of the generating unit upgrades (Yadkin)

- Major, extraordinary repairs
- Transmission and transformation losses

While impending major or extraordinary repairs or modifications are not known to be required at either project, expensive remedial projects are always possible, particularly when uncertainty exists about project (dam) safety; the potential need to increase the spillway capacity at Blewett Falls is one such possibility.

Results

The attached table "Yadkin-Pee Dee Hydro Projects – Summary of Economic Evaluation" presents the assumptions and results of six cases (CASES A-F) analyzed on an Excel spreadsheet.

CASES A, E and F are considered "reasonable." For Yadkin, CASE E using the current Duke Power tariff rate for industrial customers (but not allowing credit for peaking) may be the most appropriate case. For Yadkin-Pee Dee, CASE F based upon market rates for capacity (PJM) and energy (PJM times a factor of 0.9), with credit for peaking, may be the most appropriate case.

CASES B and C probably undervalue the projects. CASE B assumes that Alcoa's 1993 replacement energy cost is the 1999 energy value, allows a very low ("token") capacity credit (in lieu of a demand charge), and includes no credit for peaking. CASE C is also based on Alcoa's 1993 replacement energy cost but allows a peaking credit and a modest capacity credit. CASE D probably overvalues the projects; it combines the lowest discount rate (15%) with a 15-year analysis period, despite using energy value based on Alcoa's 1993 replacement energy cost.

A sensitivity analysis was performed from CASE F as the "base case" and varying key values and parameters by plus/minus 10%. The analysis indicates that the results are most sensitive to energy value and discount rate, as shown below:

Parameter	Change (+/- 10%)	Change in NPV ($000)		Change in 1st Year Revenue ($000)	
		Alcoa	CP&L	Alcoa	CP&L
Discount Rate (%/yr)	+/- 1.8%	-/+ 9,000	-/+ 3,500	0	0
1999 Capacity Value ($/MW-day)	+/- $6.00	+/- 2,500	+/- 1,000	+/- 500	+/- 300
1999 Energy Value ($/MWh)	+/- $2.83	+/- 16,000	+/- 7,000	+/- 3,000	+/- 1,300
Escalation Rates					
Capacity (%/yr)	+/- 0.2%	+/- 500	negligible	negligible	negligible
Energy (%/yr)	+/- 0.3%	+/- 3,000	+/- 1,000	+/- 200	+/- 100
Expense (%/yr)	+/- 0.5%	-/+ 1,500	-/+ 1,000	-/+ 50	-/+ 50

Yadkin-Pee Dee Hydro Projects
Summary of Economic Evaluation

12/07/2000

Fixed Parameters:

	Yadkin (Alcoa)	Yadkin-Pee Dee (CP&L)
MW Capacity	217	108
Annual MWh	840,000	345,000
1999 Expense ($000)	6,600	3,700
1999 Expense ($/MWh)	7.86	10.72

Cases:	**A**	**B**	**C**	**D**	**E**	**F**
Variable Parameters:						
Analysis Period						
First Year	2001	2001	2001	2001	2001	2001
Last Year	2020	2010	2015	2015	2010	2010
Discount Rate (%)	18.0	20.0	20.0	15.0	18.0	18.0
Escalation Rates						
Capacity Value (%)	2.0	0.0	1.0	2.0	2.0	2.0
Energy Value (%)	3.0	2.0	2.0	3.0	3.0	3.0
Operating Cost (%)	4.0	5.0	5.0	4.0	5.0	5.0
Production Value						
Capacity Credit						
1999 ($/MW-day)	60.00	30.00	60.00	100.00	100.00	60.00
Source	PJM	Token	PJM	CP&L CT	CP&L CT	CP&L CT
Energy						
1999 Avg. ($/MWh)	28.30	25.00	25.00	25.00	37.70	28.30
Source/Region	PJM	Alcoa '93	Alcoa '93	Alcoa '93	Duke Tariff	PJM
Regional Factor	0.8	NA	NA	NA	NA	0.9
Peaking Credit?	Y	N	Y	Y	N	Y
Results:						
Alcoa						
1st Yr Revenue ($000)	**32,400**	**24,200**	**34,600**	**38,600**	**41,800**	**35,800**
1st Yr Expense ($000)	**7,000**	**7,300**	**7,300**	**7,100**	**7,300**	**7,300**
Net ($000)	**25,400**	**16,900**	**27,300**	**31,500**	**34,500**	**28,500**
PW Capacity ($000)	**30,000**	**10,000**	**24,000**	**54,000**	**41,000**	**25,000**
PW Energy ($000)	**179,000**	**100,000**	**155,000**	**214,000**	**174,000**	**159,000**
PW Expense ($000)	**49,000**	**39,000**	**45,000**	**53,000**	**42,000**	**42,000**
NPV ($000)	**160,000**	**71,000**	**134,000**	**215,000**	**173,000**	**142,000**
NPV ($/kW)	**740**	**330**	**620**	**990**	**800**	**650**
CP&L						
1st Yr Revenue ($000)	**14,000**	**10,200**	**14,900**	**16,800**	**17,900**	**15,400**
1st Yr Expense ($000)	**4,000**	**4,100**	**4,100**	**4,000**	**4,100**	**4,100**
Net	**10,000**	**6,100**	**10,800**	**12,800**	**13,800**	**11,300**
PW Capacity ($000)	**15,000**	**5,000**	**12,000**	**27,000**	**20,000**	**12,000**
PW Energy ($000)	**74,000**	**41,000**	**65,000**	**90,000**	**71,000**	**67,000**
PW Expense ($000)	**28,000**	**22,000**	**25,000**	**30,000**	**23,000**	**23,000**
NPV ($000)	**61,000**	**24,000**	**52,000**	**87,000**	**68,000**	**56,000**
NPV ($/kW)	**560**	**220**	**480**	**810**	**630**	**520**

FIGURE 1
Yadkin and Yadkin-Pee Dee Hydro Projects
Annual Net Generation
From Alcoa and CP&L FERC Forms 1

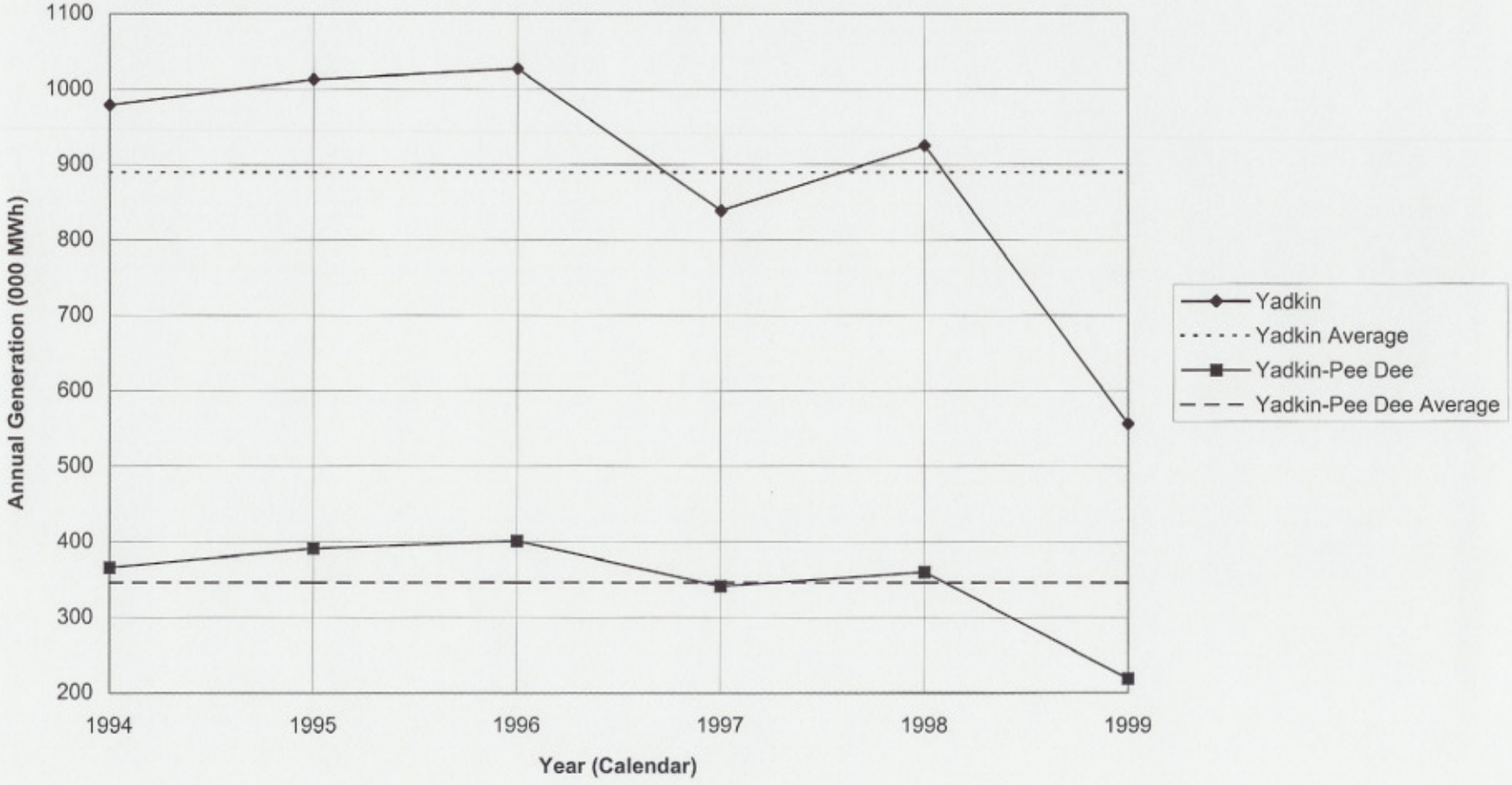


FIGURE 2
Yadkin Project No. 2197 and Yadkin-Pee Dee Project No. 2206
Annual Gross Generation vs. River Flow

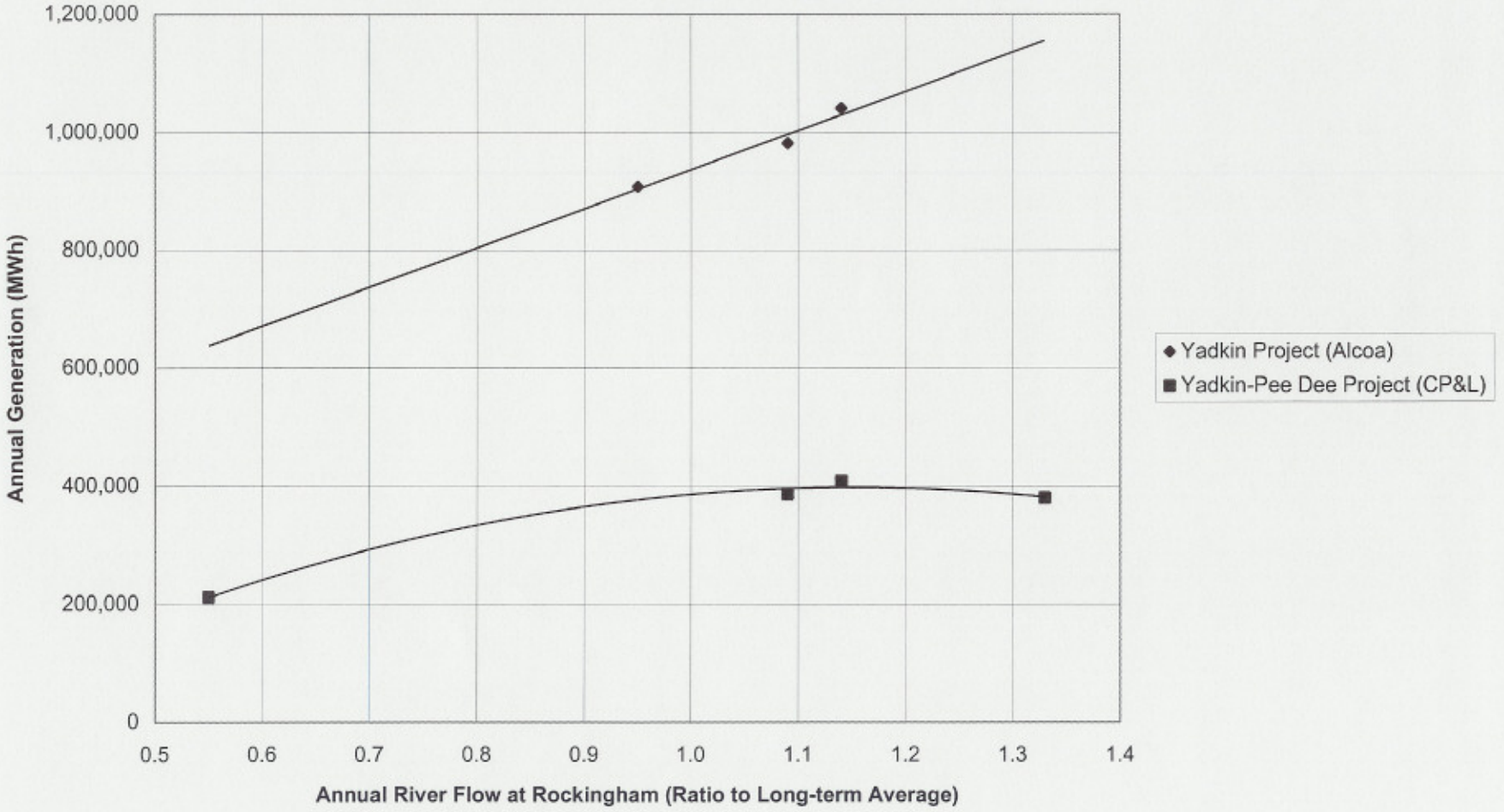


FIGURE 3
Yadin and Yadkin-Pee Dee Hydro Projects
Allocated Operating Expense
Derived from Alcoa and CP&L FERC Forms 1