Friant Power Authority Economic Impact Assessment

Friant Power Authority Economic Impact Assessment

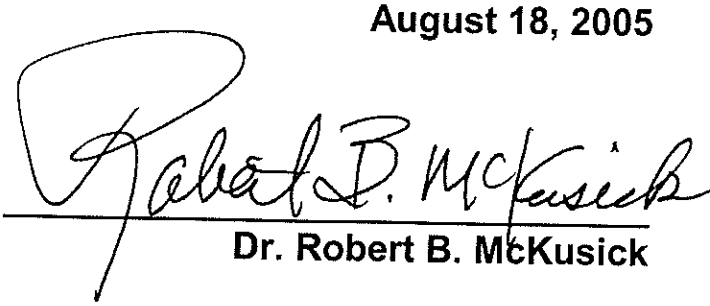
Submitted to

Minasian, Spruance, Meith, Soares, &Sexton, LLP
P.O. Box 1679
Oroville, CA 95965-1679

by

Dr. Robert B. McKusick
ENTRIX, Inc.
12009 N.E. 99th Street, Suite 1410
Vancouver, Washington 98684-2497

August 18, 2005



Dr. Robert B. McKusick

Table of Contents

Statement of Problem

The Friant Power Authority, comprised of eight member water, irrigation, and municipal utility districts, produces and sells power from the Friant Project. The Friant Project consists of three generators, one on each of the Madera Canal, Friant-Kern Canal, and the San Joaquin river outlet of the Friant Dam. The Friant Project currently produces approximately 31 MW of power annually, primarily through the two canal generators. The river outlet generator produces up to 2 MW of the total power generated at the Project.

I have analyzed the proposed reductions in flow through the two canals as it applies to the Friant Power Authority as a whole as well as to its member districts. Through the results of my analysis I have developed the following opinions.

Opinions

1. The Friant Power Authority will suffer an average annual revenue loss of $2.8 million under the Spring-Run scenario.

I relied on the analyses developed by Dan Steiner and Greg Reichert. Dan Steiner's hydrologic model determines the annual Friant power generation under water years 1922 through 2004. In his supplemental analysis to Dan Steiner's model, Greg Reichert applies the current PG&E seasonal contract prices for energy and capacity to the monthly power generated under the Spring-Run" scenario for each model year (1922-2004), to determine the average annual revenue lost to Friant Power Authority under the alternate scenario, compared to the existing hydrograph. The total annual average reduction in generation under the Spring-Run scenario is 36.9 GWh. Applying the May through October combined energy and capacity price of $77/MWh and the November through April combined price of $71/MWh translates to an average annual revenue loss to Friant Power Authority of $2.78 million under the Spring-Run scenario. The annual average revenues received by Friant Power Authority under this scenario are equivalent to the revenues received in a critically dry water year.

The revenues to Friant Power Authority, less overhead costs, are distributed to its eight member districts. Thus the revenue losses are passed through to these districts as well.

Additionally, running the direct revenue impacts through IMPLAN (a regional impact analysis model) indicates a loss of fewer than 10 direct jobs under the Spring-Run scenario.

2. The revenue loss to Friant Power Authority will lead to other indirect impacts in the region

The IMPLAN model also estimates indirect impacts in the region. As indicated above, under the Spring Run Scenario, the Friant Power Authority (as a part of the power generation and supply sector) sustains a direct loss in revenue of $2.8 million annually, on average. In addition, the region also loses another $907,000 in regional income annually. Therefore, total output losses within the region (i.e., direct Friant Power Authority revenue impacts plus other income losses) are estimated at $3.7 million. This alternate scenario also leads to an estimated loss of less than 15 total jobs in the region, including the original direct impact of fewer than 10 lost jobs.

3. PG&E will need to replace the lost generation from the Friant Project

The power produced at the Friant Facility is used by PG&E to supply customers within the Fresno Local Reliability Area (Fresno LRA). Since PG&E is the sole purchaser of power

generated at the Friant Facility, PG&E will also be subjected to impacts. The impacts to PG&E arise as the result of having to purchase replacement power from another source equivalent to the reduction at the Friant Facility to serve its customers in the Fresno LRA. It is unclear what the alternative source would be. It could take the form of a number of different options, some green and some non-green power. Some of these options include:

a. Purchasing short-term power from the spot market and importing it into the Fresno LRA, which assumes no transmission constraints;

b. Purchasing contract power from a different source and importing it into the Fresno LRA, which assumes no transmission constraints;

c. Purchasing power produced within the Fresno LRA not currently under contract and distributing it locally in the Fresno LRA, which assumes excess generation capacity within the Local Reliability Area; or

d. Building a new facility within the Fresno LRA.

The price of purchased or generated power can vary greatly, and it is difficult at this time to determine whether there will be an increase or decrease in power cost to PG&E. Based on the Dow Jones NP15, a forward-pricing index for power in northern California, between July 2001 and July 2005, with few exceptions, the weekly high peak and high off-peak day-ahead market price is less than the rate PG&E currently pays for Friant Power. Power from this northern-California market would need to be imported into the Fresno LRA. However, because the Fresno LRA is transmission-constrained, PG&E currently purchases power generated internally within the Fresno Local Reliability Area to serve those customers. During peak periods, it is not usually possible to increase power imports from outside of the Local Reliability Area.

PG&E can absorb any increase or decrease in costs or it can pass along the cost increase or savings to the customer (rate payer). PG&E will not experience any impact if it decides to pass along the change in costs to the customer. However, if the difference in costs between purchasing the Friant Project power and the replacement power are not significant to PG&E, it is unlikely that the utility will find it necessary to pass along any cost increases or savings. Because the reduction in power under the Spring-Run scenario is less than one-tenth of one percent of PG&E's total annual power requirements, it is unlikely that PG&E will pass along any cost increase or savings to the customer.

4. Fresno LRA PG&E customers will be impacted through increased costs and/or decreased reliability

If PG&E passes along the change in costs to the customer, the customers within the Fresno LRA will experience changes in their electricity rates, again the magnitude and direction of this impact is unclear.

Furthermore, if PG&E is unable to purchase power within the Fresno LRA and transmission capacity is unavailable for importing power into the region, then customers could also experience problems with power reliability.

5. Transmission capacity limitations will limit importing power to the Fresno LRA, increasing costs or decreasing reliability for consumers

As discussed above, it has been reported that unused transmission capacity within the region is scarce, as is regional generation to replace Friant power lost due to proposed increased San Joaquin River flows. Therefore limitations may exist, which cannot be quantified at this time with the data available.

To increase power supply from outside of the Local Reliability Area would require (1) an investment in transmission facilities to supply additional load, and/or (2) an upgrade of power transmission lines, also requiring a capital investment, and thus an increase in power costs.

Simulations have shown that there is risk of reduced transmission reliability if the Friant Project stops generating and the Bordon-Coppermine transmission line is lost, resulting in severe overload and severe low voltages. These simulations' results, combined with general industry experience, indicate blackouts could occur in the Fresno LRA. This implies that reductions in generation from the Friant Facility could also negatively impact transmission reliability in the Local Reliability Area.

6. Reduction in the green power generated at the Friant facilities will cause problems for PG&E, not only in replacing the power, but in meeting green power share requirements of the PG&E energy portfolio as well.

PG&E would lose renewable energy supply at a time when the utility has not yet met the future green power requirement threshold within their energy portfolio. PG&E is required to obtain twenty percent of its power from renewable resources (including hydro) by 2010. As of today, 13 percent of the utility's power comes from renewable resources, including the power from the Friant Facility. Thus, the loss of any renewable power, including Friant power, while PG&E is deficient in meeting its regulatory threshold of 20 percent is detrimental. If the power PG&E develops or purchases to replace the reductions in Friant power is not from renewable resources, the utility will lose renewable resource-driven generation and will be required to develop/purchase a higher amount of green power during the next 5 years (i.e., 2005 to 2010) than would be necessary under current conditions.

Information Relied Upon

1. Dan Steiner analysis
2. Greg Reichert analysis
3. PG&E FERC Form 1, 2004
4. "Western Price Data" a weekly publication of Energy Newsdata, available at http://www.newsdata.com/wps/index.html (accessed July 15, 2005 and July 18, 2005)
5. Developed spreadsheet, "PG&E gen and purch costs 080205.xls"
6. IMPLAN model and results
7. Email from Chifong Thomas, PG&E, to Krieg Brown, ENTRIX, with attachment, "Greater Fresno, Kern and Los Padres 2005 Assessment, Soussane Sadre, July 20, 2005", page 8.
8. Notes from telephone call between Krieg Brown, ENTRIX and Chifong Thomas, PG&E
9. Notes from telephone call between Krieg Brown, ENTRIX and Dave Landis, PG&E
10. Notes from telephone call between Jeri Sawyer, ENTRIX and Bill Carlisle, Friant Power Authority

Appendix A – Experience and Resume of Dr. Robert B. McKusick

Resume of Dr. Robert B. McKusick

Quality Solutions to Complex Problems | Northwest Economic Associates
www.nwecon.com
A division of ENTRIX

12009 NE 99th Street, Suite 1410

Vancouver, WA 98682-2497

Telephone: (360) 883-0191

Robert B. McKusick, Ph.D.

Vice President and Senior Principal

Areas of Expertise:

Agricultural Economics
Regional Economic Impacts
Natural Resources Economics
Water Rights Claims
Energy Economics
FERC Relicensing Analysis
Benefit-Cost Analysis
Litigation Support
Negotiation Support

Education:

Ph.D., Agricultural Economics, University of California (Davis), 1973

M.S., Agricultural Economics, University of California (Davis), 1967

B.S., Agricultural Economics, University of California (Davis), 1965

A.A., Business Administration, Sacramento City College, 1963

Experience:

Vice President and Senior Principal, NEA, a division of ENTRIX, Inc., 2004-present

President, Northwest Economic Associates, 1991-2004

Senior Vice President, Northwest Economic Associates, 1978-91

Deputy Director, Northwest Agricultural Development Project, 1978-81

Program Leader, USDA Economic Statistics and Cooperative Service, 1975-78

Statement of Qualifications:

Dr. McKusick has over 30 years of experience in natural resource economics research and project management, including economic analysis of water resources, benefit-cost analysis, economic base studies, transportation pricing, land-use analysis, comprehensive natural resource planning, water and energy conservation, agricultural development, and damage analysis and valuation. He is a nationally recognized expert in water and natural resource planning and evaluation, and has testified in numerous litigation cases, involving Indian water rights, economic feasibility, energy development and use, agricultural damages, ESA, interest rates, beneficial use of water, and water allocation. He has also served as an economic expert and technical team leader for negotiations related to water rights, damage claims, water leasing and marketing, and land settlements.

Dr. McKusick received his B.S., M.S., and Ph.D. in Agricultural Economics from the University of California at Davis. Prior to joining NEA in 1978, he worked with the USDA, where he gained valuable experience in river basin and watershed planning and analysis, and managed resource conservation and development programs. He also led water and conservation research, and served on task forces for the Secretary and a Senate committee.

Dr. McKusick has worked extensively on water and energy issues related to California agriculture. He has provided economic analysis and testimony since 1983 on water policy issues and impacts to the Kern County Water Agency, one of California's largest state agricultural water contractors. He has testified before the State Water Resource Control Board and State Legislature, the Kern County Board of Supervisors, and EPA. From 1990 to 1995, he chaired the Economic Technical Advisory Committee for the California Bay Delta Water Hearings.

During the last 25 years, Dr. McKusick has worked as an economic technical expert for Kern County Water Agency, California irrigation and water districts, the California State Water Contractor, federal contractors, Indian tribes, U.S. Department of Interior, Office of the Secretary, and U.S. Department of Justice.

Dr. McKusick has also conducted studies related to energy issues throughout the western U.S., including several studies for the Bonneville Power Administration and providing testimony for wholesale power rate hearings. He is the principle designer of a multi-state comprehensive economic impact model that is used to evaluate economic impacts associated with changes in energy rates, transportation costs, and other economic variables. He has also prepared PUC rate hearing materials and analysis relating to irrigation ratepayers for several private utilities. He has led all of NEA's past and current technical and economic studies of hydroelectric project relicensing before FERC, involving the development of Section 4(e) conditions, Section 10(a) recommendations, and Section 10(e) annual charges.

Experience (continued):

Technical Advisor and Assistant to Deputy Director, USDA Economic Statistics and Cooperative Service, 1975-78

Agricultural Economist, USDA Economic Statistics and Cooperatives Service, 1965-73

Produce Buyer, Safeway Stores, Inc., 1965-67

Laboratory Technician, Department of Plant Pathology, University of California (Davis), 1963-67

Professional Societies:

American Agricultural Economics Association

Western Agricultural Economics Association

American Water Resources Association

Other Activities:

Soboba Water Rights Settlement Technical Leader for Water, Land and Economic Development Fund, 1995 – present.

Water Rights Technical Negotiator, Duck Valley, Nez Perce, Fort Belknap, Soboba, and Flathead Indian Reservations, 1990 - present

Kern County Water Agency Representative, California Department of Water Resources, Modeling Work Group for California Water Plan Update 160-03, 2000-present.

Torrez Martinez Settlement Technical Leader for Damage Claim Settlement and Payment,

Chairman, Technical Advisory Committee of Bay Delta Economics Committee, 1990-95

Clark County Cooperative Extension Service Advisory Board, 1984-92

Board of Directors and President, Clark County Fair, 1983-95

ESCS Representative, Rural Clean Water Program Committee, Washington, DC, 1978

ESCS Representative, National Water Policy Task Force, 1977-78

ESCS Representative, USDA Land and Water Conservation Program Evaluation Task Force, 1977-78

Dr. McKusick directs all of NEA's water resource evaluations on American Indian reservations, and has completed or initiated studies on more than 30 reservations in the western U.S. These studies examine past, present, and future water needs for irrigation, recreation, fish and wildlife, municipal and domestic, commercial and industrial, and cultural and environmental uses. He has led multi-disciplinary study teams comprised of engineers, hydrologists, soil scientists, geologists, biologists, historians, and attorneys. He has provided expert testimony for water right court cases, and prepared materials in support of related litigation and negotiations.

Research Reports (Author and Co-Author):

"Socioeconomic Base Study Report for the Spokane River Hydroelectric Project Relicensing," report to Avista Utilities, August 2004.

"The Economic Benefits of Improved Water Supply Reliability in the Yakima River Basin," draft report to Benton County, Washington, February 2004.

"Regional Economic Impacts of the Proposed Casino and Hotel Complex," report to the Soboba Band of Luiseño Indians, April 2003.

"Present and Future Comprehensive Ground Water Need for the Lummi Peninsula on the Lummi Indian Reservation Homeland," report to the U.S. Department of Justice and Bureau of Indian Affairs, February 2003.

"Description of the Lummi Indian Reservation Homeland," Appendix A report to the U.S. Department of Justice and Bureau of Indian Affairs, February 2003.

"Recent Trends and Expected Development of the Whatcom County Economy," Appendix B report to the U.S. Department of Justice and Bureau of Indian Affairs, February 2003.

"Economic Feasibility and Water Requirements of Greenhouse Tomato Production on the Lummi Indian Reservation," Appendix F report to the U.S. Department of Justice and Bureau of Indian Affairs, February 2003.

"Substantial Evidence in Support of Section 4(e) Conditions for the Pelton Round Butte Hydroelectric Project (FERC No. 2030)," report to the Bureau of Indian Affairs, Northwest Regional Office, November 2002.

"Population Projections for Portland and Six Parks and Recreation Sub-Areas, 2000 through 2020," summary and technical documentation reports to Portland Parks and Recreation, September 2002.

"St. Lawrence-FDR Draft 10(a) Recommendations," draft report to the Solicitor's Office, Department of the Interior, and Bureau of Indian Affairs, Eastern Division, August 2002.

"West Enfield Operations Modification Assessment," report to the Bureau of Indian Affairs, Eastern Regional Office, April 2002.

"Comprehensive Water Plan for the Soboba Indian Reservation," report to the Soboba Band of Luiseño Indians, February 2002.

"Shoreline Erosion Study and Monitoring Near St. Ann's Church," report to the Bureau of Indian Affairs, Eastern Regional Office, November 2001.

Other Activities (continued):

Editor, Agricultural Economics Research, 1975-78

ESCS Representative, Economics Committee of the Water Resources Council, 1975-78

Member, California Rural Affairs Council Task Force on Land Use Planning, 1974-75

Thesis Advisory, California Production and Marketing of Field and Vegetable Crops, 1973-75

Head Economist, San Joaquin Valley River Basin Study, 1971-75

Member, California Crop and Market Outlook Task Force, 1973-74

Selected Trade and Market Development Missions:

Marketing Potential of U.S. Pinto Beans to Mexico, December 1985.

Washington State Seed Mission to China, October 1985.

Washington State Trade Mission to China, April 1985.

Mexico Market Development for Mutton and Purebred Breeding Stock, September 1984.

Agriculture Market Development in China, April 1984.

Alfalfa Trade and Education Mission to Korea, October 1982.

Alfalfa Trade Mission to Japan, October 1982.

Western U.S. Sheep Mission to Mexico, March 1982.

"Expert Witness Report – Interest Rate Analysis for Tulare Lake Basin Water Storage District et al. vs. United States," report to the Tulare Lake Basin Water Storage District and the Kern County Water Agency, April 2002.

"Market Analysis of Alaska Groundfish Fisheries: Alaska Pollock, Pacific Cod, and Atka Mackerel," report to the North Pacific Fisheries Management Council and the National Marine Fisheries Service, August 2001.

"Milk River Project GIS Case Study Analysis," report to the U.S. Bureau of Reclamation, Montana Area Office, and Bureau of Indian Affairs, Rocky Mountain Regional Office, April 2001.

"Regional Economic Profile of the Counties of Polk and Yamhill, Oregon," report to the Confederated Tribes of Grand Ronde, May 2001.

"Staff Questionnaire Results for the Confederated Tribes of Grand Ronde," report to the Confederated Tribes of Grand Ronde, April 2001.

"Social and Economic Assessment Report — Confederated Tribes of the Grand Ronde, 2000," report to the Confederated Tribes of the Grand Ronde, April 2001.

"Dredged Material Management Plan and Environmental Impact Statement - McNary Reservoir and Lower Snake River Reservoir - Appendix C - Risk-Based Analysis of the Lewiston Levee System," report to the U.S. Army Corps of Engineers, Walla Walla District, January 2001.

"Preliminary Assessment of Damages to the Santa Clara Pueblo Reservation as a Result of the Cerro Grand Fire," report to the Santa Clara Indian Pueblo, September 2000.

"Summary Report on the Proposed San Manuel Bottled Water Facility," report to the San Manuel Band of Mission Indians, July 2000.

"Market Penetration Study for the Proposed San Manuel Bottled Water Facility," report to the San Manuel Band of Mission Indians, June 2000.

"Estimate of Section 10(e) Annual Charges for Cushman Project (FERC No. 460)," report to the Bureau of Indian Affairs, Northwest Regional Office, April 2000.

"Cushman Hydroelectric Project (FERC No. 460) Feasibility Study of Decommissioning Dam Number 2," report to the Bureau of Indian Affairs, Northwest Regional Office, April 2000.

"Estimated Value of San Manuel Spring Water," report to the San Manuel Band of Mission Indians, May 1999.

"Economic Analysis of Agricultural Development Options on the Soboba Reservation," report to the Soboba Band of Mission Indians, January 1999 "Reconnaissance Study on the Economics of a Golf Course on the Soboba Reservation," report to the Soboba Band of Mission Indians, November 1998.

"Analysis of a Joint Venture in Soboba Citrus," report to the Soboba Band of Mission Indians, November 1998.

"Benefits of Irrigated Crop Production in the North Kern Water Storage District Service Area," report to the North Kern Water Storage District, May 1998.

"Benefits of Release Water in the North Kern Water Storage District Service Area," report to the North Kern Water Storage District, May 1998.

"Financial Evaluation of the Capital Investment Program Relative to the 1950 Project," report to the North Kern Water Storage District, May 1998.

"Financial Evaluation of the Capital Investments Relative to the Purchase of Storage Rights in Isabella Reservoir and the Beardsley Main and Calloway Central Canals by North Kern Water Storage District," report to the North Kern Water Storage District, May 1998.

"Farm Level Payment Capacity for Secondary and Tertiary Treated Water in Sonoma County," report to the Sonoma County Water Agency, October 1997.

"Annual 10(e) Charges for the Wisconsin River Headwaters Project (FERC No. 2113)," report to the Bureau of Indian Affairs, Minneapolis Area Office, September 1997.

"Analysis of the Impacts of Surface Water Reduction on the Eastern San Joaquin Valley of California," report to the Friant Water Users Authority, August 1997.

"The Economic Impacts of Mitigation Habitat Protocols on Operators of Evaporation Ponds in the Tulare Lake Basin of California," report to Downey, Brand, Seymour and Rohwer, June 1997.

"The Economic Benefits of Enhanced Water Supplies in the Yakima River Basin," report to the Tri-County Water Resource Agency, April 1997.

"Licensing Conditions and Annual Charges Related to Milford Hydroelectric Project FERC Application," report to the Bureau of Indian Affairs, Eastern Area Office, April 1997.

"The Role and Value of Agriculture in the San Joaquin River Exchange Contractor's Service Area," report to the San Joaquin River Exchange Contractor Water Authority, April 1997.

"Annual 10(e) Charges for the St. Louis River Hydroelectric Project (FERC No. 2360)," report to the Bureau of Indian Affairs, Minneapolis Area Office, October 1996.

"Agribusiness and Water Shortages: The Impacts Quantified," report to the California Farm Water Coalition, November 1995.

"Economic Impacts of the 1992 Drought: An Analysis of Economic Costs in Kern County," report to the Kern County Water Agency, December 1994.

"Settlement Proposal for Water Use in the San Jacinto River Basin," report to the Soboba Band of Mission Indians, November 1994.

"Economic Impacts of Proposed Federal Bay/Delta Standards on the California Dairy Industry," report to the Western United Dairymen, August 1994.

"Regional Economic Analysis for the System Operation Review, An Analysis of Indirect Economic Impacts for Inclusion in EIS," report to the U.S. Army Corps of Engineers, North Pacific Division, June 1994.

"Regional Economic Analysis for the System Configuration Study, Analysis of Indirect Economic Impacts for Phase I Alternatives," report to the U.S. Army Corps of Engineers, North Pacific Division, June 1994.

"Economic Impacts of the December 15, 1993, Proposed Federal Action on San Joaquin Valley Agriculture," report to the Kern County Water Agency, March 1994.

"Economic Impacts of 1992 California Drought and Regulatory Reductions on the San Joaquin Valley Agriculture Industry," report to the San Joaquin Valley Agricultural Water Committee, December 1993.

"Subsistence Agriculture on New Mexico Indian Pueblos," report to the Bureau of Indian Affairs, Albuquerque Area Office, December 1993.

"Economic Impacts of Potential Restrictions to Irrigation Storage in Isabella Reservoir," report to the Kern River Water Districts, November 1993.

"Economic Impacts of SWRCB Water Rights Decision 1630," report to the Kern County Water Agency, February 1993.

"System Operation Review: Framework for Indirect Impacts Analysis," report to the U.S. Army Corps of Engineers, North Pacific Division, February 1993.

"Feasibility of Rangeland and Livestock Management Options on the Flathead Indian Reservation, Montana," report to the Confederated Salish and Kootenai Tribes, November 1992.

"Economic Damage Assessment of San Xavier Allotted Lands, Arizona," report to the San Xavier Allottee Association, San Xavier District Council, and San Xavier Cooperative Association, July 1992.

"Economic Impacts of the 1991 Drought on Kern County Agriculture," report to the Kern County Water Agency, May 1992.

"Agricultural Development Plan for the Flathead Indian Reservation, Montana," report to the Confederated Salish and Kootenai Tribes, May 1992.

"Economic Impacts of the 1991 California Drought on San Joaquin Valley Agriculture and Related Industries," report to the San Joaquin Valley Agricultural Water Committee, March 1992.

"Economic Impact Study of AB 3214 (California Legislature)," report to the Association of California Water Agencies, March 1992.

"Economic Impacts of the 1991 Drought on Kern County Agriculture, KCWA Service Area, Impacts Associated with a 200,000 AF Emergency Pool Allocation," report to the Kern County Water Agency, July 1991.

"Sports and Economic Development: The Washington Sports Impact Model," report to the Washington Department of Community Development, July 1991.

"PFC Cotton Planting Decision Model," report to Paramount Farming Company, February 1991

"Evaluation of the Economic Impacts of 1991 Drought Alternatives for Kern County Surface Water Districts," report to the Kern County Water Agency, January 1991.

"An Analysis of Farm Level Payment Capacity for Irrigation Water in Kern County," report to the Kern County Water Agency, December 1990.

"Review, Study and Critique of System Analysis Model II," report to the Bonneville Power Administration, October 1990.

"Damage Analysis for California Pear Grower," report to Burger and Flaherty, Attorneys, April 1990.

"Evaluation of Alternative Lease Options for the Grapefruit Land Rental Proposal," report to the Soboba Band of Mission Indians, February 1990.

"The Role of Electricity in Pacific Northwest Irrigated Agriculture, Irrigation Price Elasticity of Demand," report to the Bonneville Power Administration, February 1989.

"Food Processing Feasibility Study," report to the Tri-City Industrial Development Council, January 1989.

"BPA Agricultural Model—Users Manual," report to the Bonneville Power Administration, September 1988.

"Economic Analysis of Agricultural Markets, Family Garden and Feast Day Water Needs, and the Discount Rate—Jemez, Zia, and Santa Ana Pueblo," report to the Bureau of Indian Affairs, Albuquerque Area Office, May 1988.

"Analysis of British Columbia/Pacific Northwest Electric Energy Relationships," report to the Bonneville Power Administration, March 1988.

"Economic Analysis of Benefits of Coastal Projects Authorized for Commercial Fishing Purposes," report to the U.S. Army Corps of Engineers, Portland District, January 1988.

"Economic Analysis of Benefits for Coastal Projects Authorized of Navigation Purposes," report to the U.S. Army Corps of Engineers, Portland District, January 1988.

"Partial Irrigation Feasibility Study and Demonstration Project, Phase IV Report," report to the Bonneville Power Administration, September 1987.

"Agricultural Economic Analysis in Support of Kern County Water Agency—1987 Bay-Delta Hearings," report to the State Water Contractors and Kern County Water Agency, June 1987.

"USDA Socioeconomic Analysis of the Copper River Basin, Alaska," report to the USDA Soil Conservation Service, West National Technical Center, April 1987.

"An Economic Analysis of the Kilauea Geothermal Development and Inter-Island Cable Project," report to the Native American Rights Fund and the Pelé Defense Fund, April 1987.

"Partial Irrigation Feasibility Study and Demonstration Project, Phase III Report," report to the Bonneville Power Administration, December 1986.

"Analysis for the Competitive Position of Electricity in the Pacific Northwest," report to the Bonneville Power Administration, December 1986.

"Modeling Irrigation Conservation and Electricity Load," report to the Bonneville Power Administration, November 1986.

"Assessing the Impacts of Irrigation Rate Design for Utilities," report to the Bonneville Power Administration, October 1986.

"Marketing Seed to the People's Republic of China," report to the Washington Department of Agriculture, October 1986.

"AGLOAD—An Irrigation Load Forecasting Model," report to the Bonneville Power Administration, September 1986.

"Wholesale/Retail Rate Relationships in the Pacific Northwest," report to the Bonneville Power Administration, July 1986.

"Marketing Electricity to Industrial Consumers," report to the Bonneville Power Administration, February 1986.

"Partial Irrigation Feasibility Study and Demonstration Project, Phase II Report," report to the Bonneville Power Administration, February 1986.

"Technical Information for Selling Seeds to China," report to the Washington State Department of Agriculture, October 1985.

"Washington Seed and Specialty Crops with Export Potential," report to the Washington State Department of Agriculture, March 1985.

"An Economic Investigation of Agricultural Benefits in the Sand Creek Watershed," report to the USDA Soil Conservation Service, November 1984.

"Modeling and Analysis of Irrigation Electricity Rate Designs," report to the Bonneville Power Administration, November 1984.

"Pacific Northwest Irrigation Wholesale and Retail Rates and Designs—Findings from Public and Private Utilities," report to the Bonneville Power Administration, June 1984.

"Forecasting Food Processing Employment, Output and Electricity Use," report to the Bonneville Power Administration, June 1984.

"Deficit Irrigation Feasibility Study and Demonstration Project," report to the Bonneville Power Administration, June 1984.

"Northwest Fruit and Vegetable Industries: The Future Environment," report to Project 1995 Farm Credit System, March 1984.

"Economic Study of Transportation Pricing," report to the U.S. Army Corps of Engineers, Portland District, September 1983.

"Washington State Small Scale Farming," report to the Washington State Department of Agriculture, June 1983.

"The Impact of the State Water Project in Kern County: 1983 Economic Study," report to the Kern County Water Agency, May 1983.

"Alternative Futures of Irrigated Agriculture in the Pacific Northwest," paper presented at the OSU 1983 Agricultural Conference Days, March 1983.

"Economic Damages Sustained from Water Losses, 1865-1981, on the Soboba Indian Reservation, California," report to the Soboba Band of Mission Indians, February 1982.

"Impacts of Construction, Rate Changes and Deficits, Independent Review of WPPSS WNP-4 and WNP-5," report to the Center for Applied Energy Studies, Washington State University, January 1982.

"Appendix B, Industry Studies—Irrigated Agriculture, Food Processing and Lumber and Wood Products," report to the Center for Applied Energy Studies, Washington State University, January 1982.

"Computerized Cost and Production Information System for Fish Hatcheries on the Columbia River," report to the National Marine Fisheries Service, October 1981.

"Economic Analysis of a Ban on Log Exports in Washington State," report to the Pacific Northwest Regional Commission, June 1981.

"Final Report of the Northwest Agricultural Development Project," report to the Pacific Northwest Regional Commission, June 1981.

"Evaluation of Farmer Incentives from Federal Resource Conservation Programs," report to the USDA Soil Conservation Service, January 1981.

"Eastern Washington Crop Potentials for Processed Tomatoes, Energy Crops, Alfalfa Pellets, and Cubes," report to the Washington Department of Agriculture and Agricultural Marketing Service, U.S. Department of Agriculture, December 1980.

"Cargo Projections to the Year 2000 for the Columbia/Snake River System," report to the Port of Portland, December 1980.

"National Economic Development Irrigation Benefit Estimation," report to the U.S. Army Corps of Engineers, Portland District, April 1980.

"Wood and Energy in New England," report to the U.S. Department of Agriculture, Literature of Agriculture, 1980.

"Impacts of Sugar Beet Factory Closure," report to the Farmers Home Administration, U.S. Department of Agriculture, September 1979.

"Economic Model to Evaluate Impacts of Alternative Energy Technology in the Columbia River Basin Region," report to the Pacific Northwest River Basins Commission, April 1979.

"Pacific Northwest Sugar Beet Feasibility Study," report to the Washington Department of Agriculture, February 1979.

"Regional Development and Plan Evaluation, the Use of Input/Output Analysis," USDA Agricultural Handbook, 1978.

"Regional Resource Use and Commodity Supply Response," Agricultural Economics Research, 1977.

"The Value of Goods and Services—Implications for a Flexible National Water Policy," *Water Resources Bulletin*, 1977.

"Projection System for Agricultural Land Use Planning," *Western Agricultural Economics Journal*, 1975.

"San Joaquin Valley Crop Yields, Prices and Production Suitability," USDA River Basin report, 1974.

"Economic Evaluation of the Derived Demand for Irrigated Water from Tree Fruits and Nuts, and Grapes in California," Ph.D. dissertation, 1973.

Testimony and Deposition:

Laub vs. Norton, et al., Case No: CV-F-00-6601 OWW SMS – Declaration and deposition for the California Farm Bureau, January 31, 2005

United States on Behalf of the Lummi Indian Nation v. State of Washington Department of Ecology et al No. CO1-0047Z – Expert report and Deposition for the U.S. Department of Justice on behalf of the Lummi Nation, June 9, 2004.

Natural Resources Defense Council, et al. vs. Kirk Rodgers, et al., Case No. CIV-S-88-1658 LKK/GGH – Declaration on behalf of the Friant Water Users Authority, June 2004.

Tulare Lake Basin Water Storage District, et al., Plaintiff, vs. the United States, Defendant — Expert report and deposition for the Tulare Lake Basin Water Storage District, et al., in the U.S. Court of Federal Claims, No. 98-101L, July 2002.

Orradre Ranch, Plaintiff, vs. Monterey County Water Resources Agency, Defendant — Testimony prepared for the Monterey County Water Resources Agency, Monterey, California, October 2000.

State of New Mexico ex rel. State Engineer, Plaintiff, vs. R. Lee Aamodt et al., Defendants, and United States of America, Pueblo de Nambe, Pueblo de Pojoaque, Pueblo de San Ildefonso, and Pueblo de Tesuque,

Plaintiffs-in-Intervention — Testimony for U.S. Department of Justice in the United States District Court for the District of New Mexico, No. CIV 6639 M, August 1998.

North Kern Water Storage District, Plaintiff, vs. Kern Delta Water District, Defendant — Deposition and testimony for North Kern Water Storage District in the Superior Court of the State of California in and for the County of Tulare, No. 96-172919, July-November 1998.

Economic Impacts of December 15, 1993, Proposed Federal Action on San Joaquin Valley Agriculture-Declaration in Support of Kern's Motion for a Partial Summary Judgment, Westlands Water District, et al, U.S. Department of the Interior, et al, January 9, 1995.

Kern County Zone of Benefit Hearings—Testimony for the Kern County Water Agency on the Repayment of the California Water Project, September-November 1981, 1982, 1983, 1987, 1988, 1990, 1997.

Economic Impacts of the Federal Bay Delta Standards for Kern County and the San Joaquin Valley—Written testimony for the Kern County Water Agency, Bakersfield, California, March 1994.

The Allocation of a Scarce Resource—A Balance of Values, Hawaiian Law Symposium, April 1993.

Economic Impacts of SWRCB Water Rights Decision 1630 for Kern County and the San Joaquin Valley, for the Kern County Water Agency, Bakersfield, California, February 1993.

Agricultural Damages — Torres-Martinez v. Imperial Irrigation District — Testimony for U.S. Department of Justice on behalf of the Torres-Martinez Band, September 1992.

Economic Impacts of Water Shortages – Testimony before the California State Water Resources Control Board, March 1992.

Water Shortages to Kern County Agriculture: Implication from the 1991 Drought – Testimony before the Department of the Interior, Threatened Status of the Delta Smelt, Proposed Rule, October 3, 1991.

Bonneville Power Administration Wholesale Electricity Rate Hearings—Support material for Irrigation Discount Rate, January 1991.

Agricultural Damages—California Pear Grower—Testimony for Burger and Flaherty, Attorneys, and McClain Farming Co., April 1990.

Economic Damages from Water Losses Updated to 1989 — for Soboba Band of Mission Indians and Thomas Luebben, Attorney, January 1990.

Washington Water Power Irrigation Electric Usage Market Research—Testimony prepared for the Washington Utilities Commission, April 1989.

Economic Analysis in Support of the Jemez, Zia, and Santa Ana PIA Reserved Water Right—Analysis prepared for U.S. Department of Justice, 1988.

Ability to Pay for the WPPSS Plants 4 and 5 by the Columbia Defendants—Analysis prepared for Helsell, Fetterman, Martin, Todd and Hokanson, September 1988.

Feasibility of the Mescalero Irrigation Water Plan—Deposition and testimony on the proposed Water Development Plan on the Mescalero Indian Reservation, 1985-1988.

California Bay-Delta Hearings—Testimony for the Kern County Water Agency and California State Water Contractors, June-September 1987.

Economic Feasibility of the Kilauea Geothermal Development—Testimony for the Native American Rights Fund and the Native Hawaiians, April 1986 and 1987.

North Natomas Community Plan—Testimony for the Gateway Point Association on the North Natomas Environment Impact Statement to rezone 14,000 acres of land for commercial and industrial use, 1984-1986.

North Natomas Sports Complex—Testimony for the Gateway Point Association on the proposed Sacramento Sports Complex, 1984-1986.

Bonneville Power Administration Wholesale Electricity Rate Hearings—Testimony for Bonneville Power Administration on the Proposed Irrigation Rate Designs, February 1985.

Bonneville Power Administration Wholesale Electricity Rate Hearings—Testimony for the Northwest Irrigation Utilities and the Washington Farm Bureau on the Feasibility of an Irrigation Discount Rate, May 1983.

Revised: August 2005.

Court Cases, Deposition, and Testimony– Dr. Robert B. McKusick 1998-2005

I have testified, prepared expert reports, and/or been deposed as an expert witness in the following cases in the last 7 years:

1. Laub vs. Norton, et al., Case No: CV-F-00-6601 OWW SMS – Declaration and deposition for the California Farm Bureau, January 31, 2005
2. Tulare Lake Basin Water Storage District, et al., Plaintiff, vs. the United States, Defendant — Expert report and deposition for the Tulare Lake Basin Water Storage District, et al., in the U.S. Court of Federal Claims, No. 98-101L, July 2002.
3. North Kern Water Storage District, Plaintiff, vs. Kern Delta Water District, Defendant — Deposition and testimony for North Kern Water Storage District in the Superior Court of the State of California in and for the County of Tulare, No. 96-172919, July-November 1998.
4. United States on Behalf of the Lummi Indian Nation v. State of Washington Department of Ecology et al No. CO1-0047Z – Expert report and Deposition for the U.S. Department of Justice on behalf of the Lummi Nation, June 9, 2004.
5. State of New Mexico ex rel. State Engineer, Plaintiff, vs. R. Lee Aamodt et al., Defendants, and United States of America, Pueblo de Nambe, Pueblo de Pojoaque, Pueblo de San Ildefonso, and Pueblo de Tesuque, Plaintiffs-in-Intervention — Testimony for U.S. Department of Justice in the United States District Court for the District of New Mexico, No. CIV 6639 M, August 1998.
6. Natural Resources Defense Council, et al. vs. Kirk Rodgers, et al., Case No. CIV-S-88-1658 LKK/GGH – Declaration on behalf of the Friant Water Users Authority, June 2004.

Payment for Work and People that Assisted with Report

My billing rate for this project is $187.00 per hour.

Related Experience

Since joining NEA in 1978, I have completed extensive analyses on projects related to California and San Joaquin Valley agriculture. These have included economic studies with irrigation and water districts, state and federal water contractors, Kern County Water Agency, Indian tribes, individual farmers, agricultural corporations and federal, state, and local governments. I have testified as an expert witness in the Superior Court of the State of California, Sacramento and Tulare Counties and the U.S. District Court in San Diego. I have also consulted extensively on Bay-Delta issues, and from 1990 through 1995 served as co-chair of the Technical Advisory Committee of the California Bay Delta Economic Committee. The Committee included agricultural, water, environmental, public, and private stakeholders and helped develop methodologies for evaluation of the economic impacts of alternative water scenarios for the Delta. I also appeared extensively as a witness before the State Water Resources Control Board on behalf of Kern County Water Agency, the State Water Contractors, and Central Valley Project Water Users.

I have extensive experience in energy projects. I have provided technical economic expertise to the Bureau of Indian Affairs for the protection of tribes and their resources on several hydroelectric relicensing projects, developing recommendations for Federal Power Act Section 4(e) conditions and Section 10(e) annual charges. I have also provided other public and private clients regional socioeconomic impact analyses for changes in river flows, some within the state of California, and wind power development. Other energy project experience includes utility rate analyses and analyses of irrigation rates, loads, conservation and demand. As a result of this experience, I am very familiar with energy issues in the west. I have worked with utilities, federal, state, and local agencies, and private clients and these various issues.