State Water Resources Control Board
Hearing Name IID Transfer - Phase 1
Exhibit: 9
For Ident: _____ In Evidence: _____

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STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

IMPERIAL IRRIGATION DISTRICT and SAN DIEGO COUNTY WATER AUTHORITY,

Petitioners.

STATEMENT OF EXPERT QUALIFICATION AND WRITTEN TESTIMONY OF JAMES P. MERCHANT IN SUPPORT OF IID-SDCWA JOINT LONG-TERM TRANSFER PETITION

WRITTEN TESTIMONY OF JAMES P. MERCHANT

1. My name is James P. Merchant and I am Vice President of Dornbusch Associates, Inc. ("Dornbusch"), located at 2907 Claremont Avenue, Suite 120, Berkeley, California. As a Dornbusch Vice President, I have been an expert consultant on many water and water economic issues, including evaluating municipal water uses, irrigation and livestock development issues, and reviewing regional economic impacts, among others. During my career at Dornbusch, I have provided expert witness testimony in a number of court cases and I have lectured for the United Nations, Stanford University and U.C. Berkeley. I have also published a number of economic analyses pertaining specifically to irrigation development and water use. Copies of my Curriculum Vitae and that of my associate Jason Bass (who helped prepare the report detailed below), which accurately reflect our expert qualifications, are attached to this testimony as Exhibit "A," and are incorporated herein. The following testimony is provided under oath, as specified at the end of this document.

2. The overall purpose of my testimony is to provide the State Water Resources Control Board ("SWRCB") and its staff with a summary of the research and opinions developed by Dornbusch, stated in more detail in our report entitled "Evaluation of IID Grower Market Power" (the "Dornbusch Report"). The Dornbusch Report represents our firm's analysis and opinion on IID farmers' market power. It is attached to this testimony as Exhibit "B." I will be present at the hearing to answer any questions the SWRCB might have concerning the Dornbusch Report.

A. Purpose Of The Dornbusch Work

1. Our report analyzes whether IID farmers could pass through to the buyers of their products an increase in water supply or management costs associated with water conservation activities. We conclude that IID farmers do not have sufficient market power to pass on increased costs associated with water conservation. Though the Imperial Valley is a very fertile region producing about $1 billion in agricultural revenues annually, the markets for virtually all of the farm products grown in IID are price sensitive, and the markets are too large for IID farmers to influence. IID farmers also have to compete with growers in many different regions, including Mexico. IID farmers would suffer a reduction in their net revenue if production costs associated with water supply or water management increase.

B. Market Analysis Approach

1. We reviewed numerous supply and demand factors influencing the prices of IID's ten primary crops. In order to assess IID farmers' market power in each specific crop market, we analyzed: (a) the percentages of overall crop production allocable to IID farmers in each particular crop market; (b) the ability of non-IID farmers to produce more crops in response to IID's price increases (supply response); and (c) the reception buyers would have to IID's price increases (demand response). The rest of this testimony is a short summary of what we found.

2. In addition to certain crop-specific factors that affect farmers (discussed below, and in more detail in our report), we also found that IID's crop prices are constrained by the effects of the North American Free Trade Agreement ("NAFTA"). NAFTA was

implemented in 1994 by the United States, Mexico and Canada, and it was intended to dismantle import tariffs in order to facilitate cross-border trade and labor mobility. NAFTA has caused farmers in all three countries to experience stagnant or declining prices for many crops. For IID farmers, NAFTA-related tariff reductions have resulted in an increase in imports of lower-priced Mexican produce into the United States. Because Mexico's labor costs are substantially lower than those found in the United States, we discovered that it is increasingly difficult for IID farmers to compete with Mexican farmers in many crop markets.

C. IID Farmers Have Little Market Power

1. In regards to specific crops, we found:

a. Alfalfa Hay. Alfalfa hay is bulky and costly to transport, thus over 70% of IID's alfalfa hay goes to the relatively close Chino Basin dairies near Los Angeles. If IID's alfalfa hay prices increase, farmers in other areas could afford to ship their hay to the Chino Basin, or the local dairies there could use lower-priced feed substitutes. Additionally, we found that market competition factors (including stored hay, feed substitutes, government programs, and dairy cattle numbers), rather than farmer costs, drive alfalfa hay prices. Thus, IID farmers do not possess the market power to unilaterally raise their alfalfa hay prices to pass through additional water conservation costs.

b. Sudan Grass Hay and Bermuda Grass Hay. Sudan and Bermuda grass hay farmers in the IID compete with farmers throughout the Western United States, Canada, Australia and New Zealand. We compared historical IID prices with farm production

costs and average California farm wage rates. Such analyses showed little or no relationship between production costs and IID hay prices. Rather, Sudan and Bermuda grass hay prices are determined by market supply and demand. Thus, IID growers cannot raise prices to pass through additional water conservation costs without a resulting decline in the volume of their sales and associated revenues.

c. Sugar Beets. Sugar beets are also expensive to transport, and thus all of IID's sugar beets are processed in the Imperial Sugar plant in Brawley. Without Imperial Sugar, IID's farmers would have no meaningful market for their sugar beets, since the Tracy plant that at one time also processed some IID sugar beets has closed. (Until recently, there were four factories that processed all the sugar beets grown in California. Two, in Tracy and Woodland, have now closed due to financial troubles.) Imperial Sugar competes in a tough international market that has very depressed sugar prices. Thus, IID farmers are precluded from raising sugar beet prices due to the extremely competitive market for processed sugar.

d. Wheat. Shipping wheat is relatively inexpensive, and its long-term storage is possible. World wheat supplies are strong, and IID wheat competes in the world market. Since IID is a relatively small producer in a vastly larger world-wide wheat market, IID farmers cannot influence overall wheat prices.

e. Lettuce. Farmers in Yuma, Arizona, have much more lettuce acreage than IID farmers, enjoy a longer lettuce season, and package their lettuce under name brand labels. These Yuma growers generally dominate winter lettuce production for the

markets in which IID competes. IID lettuce prices are further constrained because IID lettuce is largely purchased by cost-conscious fast food chains for whom price increases as little as $.01 per pound cause buyers to seek lettuce elsewhere. Finally, by comparing IID lettuce prices and production costs, we conclude that IID farmers cannot effectively increase lettuce prices to offset increased water conservation costs.

f. Carrots. We conclude that IID farmers produce only a small percentage of the relevant extended carrot market and hence cannot increase their carrot prices without a resulting loss of sales volume and associated revenues. Two carrot packer/shippers control approximately 90% of the California market, and IID farmers contract to sell their carrots to these buyers before the carrots are even grown. These packer/shippers have varied and increasing alternative sources of supply and therefore are in a stronger position than are IID growers to influence farmgate carrot prices.

g. Broccoli. IID competes with Arizona and Mexico in the winter broccoli market. We confirmed that changing consumer demand is the primary factor driving recent trends in broccoli prices. A comparison of production costs and broccoli prices shows that IID farmers cannot increase their broccoli prices to recover any rising production costs.

h. Dry Onions. IID dry onion farmers compete in a national market. Our analysis revealed that IID farmers do not possess the market power to increase dry onion prices to recover increased costs of water conservation. A comparison of production

costs, farmer wage rates, and IID's historical dry onion prices shows no relation between IID's costs and IID's dry onion prices.

i. Cantaloupes. IID harvests 90% of its cantaloupes in the spring, when competitors in the Coachella Valley, Arizona, Texas and Mexico are also harvesting cantaloupes. Because of this competition, and the fact that historical IID cantaloupe prices do not correlate to IID production costs, we conclude that IID farmers cannot increase their cantaloupe prices to recover any increases in costs associated with water conservation.

D. Conclusion

1. If IID farmers are not compensated for the increased water conservation costs they may incur, they will suffer reduced income because they are unable to increase crop prices to recoup the increase in production costs associated with water conservation activities. In other words, IID's market power is not sufficient to pass through to buyers increased water conservation costs in the form of higher prices. IID farmers would then be at a disadvantage in the competitive market for farm products.

I declare under penalty of perjury under the law of the state of California that the foregoing is true and correct. Executed on 19 March, 2002, at Berkeley, California.

James P Merchant

JAMES P. MERCHANT

Name: **James P. Merchant**

Date of Birth: July 17, 1946

Citizenship: USA

Professional Organizations: California Bar Association
American Agricultural Economics Association

Awards: Phi Beta Kappa
Summerfield Scholar
Hilmer Oehlmann, Jr. Award for excellence in legal research and writing

Education: Juris Doctor, 1972, Stanford University
Master of Business Administration, 1972, Stanford University
BA in Economics, 1968, University of Kansas, with Honors & Highest Distinction

Experience:

1972 - present Dornbusch Associates, Inc., Berkeley, CA – Vice President

Municipal water use. Assist private utilities to evaluate financial and economic terms of a proposed water exchange agreement. Work with Indian tribes, cities and federal agencies to forecast future municipal water use needs and evaluate the benefits and costs from new supplies.

Feasibility of irrigation and livestock development. Evaluate irrigation and/or livestock issues with numerous Indian tribes to quantify water rights, negotiate water settlements, evaluate damages claims or prepare water resource plans. Provide various federal and state agencies, private irrigation districts and foreign countries with irrigation feasibility, water conservation and irrigation rehabilitation studies.

Recreation Economics. Conduct recreation feasibility and impact studies for Indian tribes, the National Park Service, California Department of Boating & Waterways, Minerals Management Service and individual marinas.

Regional economic impacts. Assist Indian tribes, marinas, municipalities, irrigation districts, state & federal agencies to evaluate the potential regional economic impacts from various types of project investments and operations.

Feasibility of new business ventures. Assist the National Park Service to assess the feasibility of new concession businesses in National Parks. Business types include marinas, hotels, restaurants and campgrounds.

1971 McColloch, Dezendorf, Spears & Lubersky Law Firm – Summer Associate

1970 Stanford Law School – course development work

Expert Witness Testimony: In re: San Carlos Apache Tribe Water Rights Settlement, Arizona

Superior Court
Globe Equity Decree, U.S. Federal District Court
Fort Mojave et al. v. United States, U.S. Claims Court
Washington State Dept. of Ecology v. Acquavella et al., Washington District Court
Cuyapaipe et al. v. United States, U.S. Claims Court
In re: Big Horn River Water Rights Adjudication, Wyoming District Court

Lecturer: Stanford University - two courses on First Amendment protection of expression

UC Berkeley Graduate School of Business Administration - seminar session on Analysis of Real Estate Development

United Nations and U.S. Information Service - lecture tour of Southeast Asia discussing economic, social and environmental effects of high-rise development.

UC Berkeley Dept. of Agricultural and Resource Economics - taught one session of class on Agricultural and Environmental Policy, focusing on history of irrigation and Indian water rights

Recent Reports/ Publications:

Economic Analysis of Future Irrigation Development, Yakama Indian Nation, Washington, Allotment HA355, prepared for the U.S. Department of the Interior, 2001 (principal author)

Economic Analysis of Future Agricultural Water Uses, Zuni Indian Reservation, prepared for U.S. Department of Interior, 2000 (co-author)

Animas-La Plata Project EIS, Water Use Scenarios for Southern Ute and Ute Mountain Ute Indian Tribes, Colorado, prepared for Southern Ute Tribe, 1999 (principal author)

Analysis of Potential Tribal Claim to Black River, San Carlos Apache Tribe Settlement Hearing, prepared for U.S. Department of Justice, 1999 (co-author)

Imperial County Economic Impact Analysis: Proposed Agreement for Transfer of Conserved Water between Imperial Irrigation District and San Diego County Water Authority, prepared for Imperial Irrigation District, 1998 (co-author)

Economic Analysis of Future Agricultural Water Uses, Winnabago Indian Reservation, Nebraska, prepared for Winnebago Tribe, 1996. (principal author)

Water Charges By Arizona Irrigation Districts, Gila River Counties, prepared for U.S. Department of Justice, 1996. (principal author)

Economic Analysis - San Mateo Basin Ground Water Resource and Basin Capacity Use Draft Lease Agreement, prepared for Tri-Cities Municipal Water District and Camp Pendleton Marine Base, 1995. (co-author)

Survey of Irrigators in California's Central Valley, prepared for California Department of Water Resources, 1995. (co-author)

Economic Analysis of Future Agricultural Water Uses, Toppenish-Simcoe and Satus Sub-Basins, Yakama Indian Reservation, prepared for the Bureau of Indian Affairs and the U.S. Department of Justice, 1994. (principal author)

Fort Mojave Tribe et al. v. United States, Defendant's Response - Economic Issues, prepared for U.S. Department of Justice, 1993. (principal author)

Economic Analysis of Future Agricultural Water Uses, Ahtanum Sub-Basin, Yakama Indian Reservation, prepared for the Bureau of Indian Affairs and the U.S. Department of Justice, 1993. (principal author)

Feasibility Analysis of Antelope Point Marina Concession Development, Glenn Canyon National Park, Prepared for the National Park Service, 1992. (co-author)

Feasibility Analysis of Crescent Bay Marina Concession Development, Grand Coulee NRA, Prepared for the National Park Service, 1992. (co-author)

Economic Study in Support of the Claim for the Cuyapaipe Band of Mission Indians, prepared for the Cuyapaipe Band, 1992. (principal author) Similar reports prepared for the Morongo, La Posta, Santa Rosa and Pechanga Bands of Mission Indians, 1992 (principal author).

Sample Projects

James Merchant at Dornbusch Associates has been providing economic analysis of water issues for approximately 30 years. He has conducted **agricultural economic feasibility analyses** on more than twenty Indian reservations and pueblos, including the following:

- Wind River Indian Reservation, Wyoming
- San Juan Pueblo, New Mexico
- San Carlos Pueblo, New Mexico
- Zuni Pueblo, New Mexico
- Shivwits Indian Reservation, Utah
- San Carlos Indian Reservation, Arizona
- Soboba Indian Reservation, California
- Yakama Indian Reservation, Washington

He has estimated **future Municipal &Industrial water use** for more than 15 Indian reservations, cities and pueblos, including the following:

- San Ildefonso Pueblo, New Mexico
- Pojoaque Pueblo, New Mexico
- Nambe Pueblo, New Mexico
- Tesuque Pueblo, New Mexico
- Southern Ute Indian Reservation, Colorado
- Ute Mountain Ute Indian Reservation, Colorado
- Navajo Indian Reservation, Arizona and New Mexico

- City of Gallup, New Mexico
- San Juan Pueblo, New Mexico
- San Carlos Pueblo, New Mexico
- Zuni Pueblo, New Mexico
- Shivwits Indian Reservation, Utah
- San Carlos Indian Reservation, Arizona
- Soboba Indian Reservation, California

He has conducted **economic analysis of proposed water transfers** for three clients:

- Imperial Irrigation District, California - analysis of economic impacts from transfer
- Tri-Cities MWD and Camp Pendleton Marine Base, CA - analysis of terms of transfer
- City in Northern California - analysis of value of water in agricultural uses.

He has **valued water used for irrigation** in three projects:

- City in Northern California.
- Globe Equity case, Upper Gila River, Arizona
- Imperial Irrigation District, California

Jason M. Bass
Principle – Dornbusch Associates

Jason Bass is an economic and financial analyst with over eleven years of experience working on a wide range of agricultural and other natural resource development and management issues. Jason's primary areas of expertise include agricultural project cost/benefit analysis, resource and business valuation, damages assessment, socio-economic impact estimation, financial feasibility evaluation, and water and recreation resource management planning. His clients in these areas include the U.S. National Park Service, the U.S. Bureau of Reclamation, the U.S. Department of Justice, the U.S. Bureau of Indian Affairs, Trinity County Department of Planning, the Central Utah Water Conservancy District, California Department of Water Resources, Imperial Irrigation District, Native American Rights Fund and numerous Indian tribes. Jason joined Dornbusch Associates in 1993.

Projects he has worked on have had the following specific objectives:

- Estimate the value and rates-of-return associated with alternative business investment and resource development/conservation alternatives.
-
- Assess impacts of water resource development project implementation and operation on local and regional, socio-economic (including demographics), agricultural, transportation, cultural, recreation, visual and health & safety conditions;
- Calculate fair market rates and feasibility for public land and water leasing;
- Design and implement methodologies for economic cost-benefit analysis;
- Evaluate economic feasibility of agricultural, hydropower and other water resource development projects;
- Collect primary and secondary data related to natural resource management, planning and degradation;
- Assess monetary damages related to mis-use of natural and cultural resources.
- Prepare environmental, and other compliance documentation in water resource and land use planning and policy proceedings;
- Evaluate legal, economic and cultural implications of natural resource planning as it affects Indian tribes;
- Estimate economic costs and benefits of environmental quality improvement programs;

Jason recently provided over two hours of direct, cross-examination and rebuttal testimony regarding the value of the $70 million per year hospitality enterprise at Grand Canyon National Park. He also has provided written expert-witness testimony regarding the valuation and investment opportunity associated with the primary retail concession operation at Yellowstone National Park. And, submitted several affidavits as an economic expert in

a dispute regarding farmer ability-to-pay for irrigation water in the Wapato Irrigation District in the Yakima Valley of Southern Washington.

Prior to joining Dornbusch Associates, Jason helped to develop a methodology for assessing the economic and environmental impacts of alternative timber management methods. The study focused on five demonstration forests in the lower Fraser River Basin and was conducted under a research fellowship from the University of British Columbia, Canada.

While a Masters student at the University of California, Davis, Jason worked extensively on a project sponsored by the U.S. Geological Survey to evaluate the potential economic and environmental impacts of stricter EPA water quality standards on agricultural irrigation drainage in California's Central Valley.

Before his masters study, Jason was an analyst for the accounting firm of Ernst & Young within their management consulting division in San Francisco, and EconomInc, an economic and financial consulting firm in Berkeley, California. His work with both firms required economic, financial, accounting and statistical research and analysis for litigation support engagements primarily in the areas of anti-trust, lost profits and business valuation.

Jason holds a Bachelors of Science in Political Economy of Natural Resources from the University of California, Berkeley (1988) and a Masters of Science in Agricultural & Resource Economics From the University of California, Davis (1992). Both degrees were received with honors. From 1992-93, he undertook a year of coursework, teaching and research within the Economics Department of the University of British Columbia, Canada. He is currently a level II candidate to become a Chartered Financial Analyst charter holder (CFA). He passed the level I exam in June of 2001.

The following is a brief description of some of Jason's work while a member of the Dornbusch Associates team:

- San Juan Basin, New Mexico – Analyzing water supply and water transfer agreements in the region to assess the cost and feasibility of transferring water from outside the Basin to address water supply needs in a proposed water rights settlement. Client: U.S. Department of Justice
- Central Valley, California – Preparing the agricultural, municipal & industrial and regional economic impact components of Central Valley Project water contract renewal environmental assessments for the Contra Costa, Shasta/Trinity and West Sacramento Canals Units of the CVP. Drafts have been completed and public comments received. Client: U.S. Bureau of Reclamation (under a subcontract to North State Resources).
- San Carlos Indian Reservation, Arizona – Evaluating the financial feasibility and potential socio-economic impacts of alternative proposals to develop an on-reservation commercial irrigation project

using the Tribe's allocation of Central Arizona Project water. Effort requires development of detailed crop cost of production budgets, assessment of regional crop markets and market channels as well as careful coordination with Bureau of Reclamation economic staff to ensure that the analysis framework is sufficient to secure previously authorized federal appropriations for the project. Client: San Carlos Apache Tribe.

- Glacier National Park – Evaluating the financial feasibility of alternative facility rehabilitation plans under consideration for the primary hospitality concessionaire operating at the Park. Effort includes the detailed analysis of historical financial statements and park visitation statistics, a study of market demand for concession services at the Park and an assessment of the implications for the concession's revenues from rehabilitation-related changes the enterprises scope and facility locations. Client: National Park Service.
- El Centro, California - Assisted Imperial Irrigation District (IID) evaluate the potential regional economic impacts of its water use and proposed water conservation measures. Conservation objective is to lease in excess of 200,000 acre-feet of water to San Diego annually. In a separate study, assessed the ability of IID growers to pay for water conservation with income generated from crop production. Compared IID ability-to-pay with other irrigation districts in the region, including Coachella Valley ID and Palo Verde ID. Client: Imperial Irrigation District.
- Wind River Indian Reservation – Assessed the potential economic impacts to local non-Indian irrigators from a reduction in their supplies of waters and associated market value of tribal water. Client: Shoshone and Arapaho Tribes of the Wind River Reservation.
- Central Valley, California – Assisted in the development of a survey that was administered to 200 Central Valley farmers to evaluate farmer response to changes in their water supply, irrigation technology and market conditions. Purpose of survey results was to verify assumptions incorporated into the Central Valley Production Model. Client: California Department of Water Resources.
- Duck Valley, Idaho – Assessed the monetary damages to the Shoshone-Piaute Tribes of the Duck Valley Indian Reservation due to off-reservation agricultural diversions of their water and the destruction of the salmon fishery of the Owyhee River. Also prepared an appraisal of agricultural and ranch lands owned by non-Indians upstream of the Duck Valley Reservation under different water supply scenarios. Client: Shoshone-Piaute Tribes.
- Rocky Boys Indian Reservation – Assessed the monetary damages due the Tribe as a result of the United States' failure to fully implement a planned irrigated agricultural project on the reservation. Client: Rocky Boys Tribe and Native American Rights Fund.
- Tule River Indian Reservation, California – Assessing the monetary damages due the tribe as a result of the federal governments historical mismanagement of the tribe's agricultural and timber resources and the taking of previously designated reservation land. Damages period extends back to the mid-1800s. Client: Native American Rights Fund.
- Menominee Indian Reservation, Menominee Wisconsin - Assisted with technical analysis to develop

recommendations regarding license conditions and annual charges in Wisconsin Power & Light's pending FERC license for continued operation of the Shawano Hydropower (pursuant to Sections 4(e) and 10(e) of the Federal Power Act). In addition, quantified past damages due the Tribe related to unpaid compensation for hydropower-related use of tribal land. Participated in settlement negotiations as part of FERC administrative hearing. Clients: Department of Interior, Solicitor's Office and Bureau of Indian Affairs.

- Pala Indian Reservation, California – Provided a financial evaluation of proposed acquisition and development of off-Reservation spring. Primary purpose of analysis was to derive alternative valuations of spring water based on alternative assumptions regarding tribe's investment rate of return objectives and wholesale market value of water. Client: Pala Band of Mission Indians.
- Lake Michigan – Evaluated the relative economic values of the Lake Michigan recreational and commercial fisheries. Lawsuit settled prior to completion of the analysis. Client: U.S. Department of Justice.
- Yakama Indian Reservation, Washington – Provided affidavit regarding the ability of certain Yakama Indian land-holders to pay for current and past due irrigation district assessments on their land with income generated through the production of crops. Client: Yakima Indian Reservation.
- Southeastern, Colorado – Helped to identify the agricultural and other water resource development opportunities on the Ute Mountain and Southern Ute Indian Reservations as part of preparation of the EIS for the Animas La Plata project. Client: U.S. Bureau of Reclamation.
- Skokomish Indian Reservation, Washington – Evaluated the historical economic impacts to Skokomish Tribe from Cushman Hydropower Project transmission line applying six alternative assessment methodologies. Quantified damages due the Tribe for the historical uncompensated use of their land for power transmission. Client: U.S. Department of Justice.
- Tule River Reservation, California – Prepared detailed agricultural development cost-benefit analysis. Has performed/Is performing similar agricultural economic studies on the following Indian Reservations.
    - Fort Yuma
    - Middletown Rancheria
    - Navajo
    - San Juan Pueblo
    - Santa Margarita
    - Shivwits
    - Walker River

  Much of this work serves to assist the tribes to secure their water rights

  Clients: Bureau of Indian Affairs, U.S. Department of Justice and Native American Rights Fund.
- Uintah Basin, Utah – Prepared the socio-economic section of the Programmatic EA for proposed

agricultural project development activities on the Uintah & Ouray Indian Reservation. Client: Northern Ute Tribe.

- Lake Berryessa, California – Assisting the Bureau of Reclamation assess the financial feasibility of alternative redevelopment plans for visitor concession services at the lake. Currently, a number of small concessions are operating lodging, food & beverage, camping and other services adjacent and on the lake. Most of these concession contracts are near expiration. Faced with a variety of health & safety concerns related to the condition of current concession facilities, the Bureau is seeking the financially and logistically most appropriate means to revitalize visitor facilities at the lake through one or several new concession contracts.
- Grand Canyon and Yellowstone National Parks – Estimated the fair market value of concessionaire and other fixed property at each park. Client: National Park Service.
- Grand Canyon National Park – Estimated the fee visitor would have to pay to use the proposed light rail system at the Park in order for the system to be financially feasible given prevailing market transit sector investment rates of return. Client: National Park Service.
- Owyhee Reservoir, Idaho – Evaluated the financial feasibility of alternative proposals for the development of visitor recreation and concession facilities at the Reservoir. Client: U.S. Bureau of Reclamation.
- Crater Lake National Park, Oregon; Wahweep Marina, Lake Powell Recreation Area, Arizona – Evaluated the financial feasibility of proposed contracts for continued private operation of each site's visitor concession facilities. In the case of Crater Lake, also helped to prepare financial component of contract prospectus and assisted in selecting the concession operator to award the contract. Client: National Park Service.
- Yosemite National Park, California – Estimated the regional socio-economic impacts of proposed changes in visitor access to the Park for the Valley Implementation Plan EIS. Client: National Park Service (under subcontract to BRW, Inc.).
- Potter Valley, California – Reviewed and critiqued a break-even/ability to pay analysis conducted by Pacific Gas & Electric (PG&E) for its Potter Valley hydropower facility on the Eel River. Client: U.S. Department of Justice.
- Yakima Basin, Washington – Evaluated the regional socio-economic impacts of proposed irrigation water conservation measures within the 155,000-acre Wapato Irrigation Project (WIP). Client: U.S. Bureau of Reclamation (under subcontract to Natural Resources Consulting Engineers).
- Uintah Basin, Utah - Managed preparation of the transportation, socio-economic, recreation, visual resources, health & safety and socio-culture sections of the EIS for the proposed Uintah Basin Replacement Project of the Central Utah Project. Client: Central Utah Water Conservancy District (under subcontract to Stetson Engineers).
- Cascade Lake, Idaho – Prepared a cost-benefit analysis of several short- and long-term agricultural, timber and recreation management proposals designed to reduce water quality degradation of Cascade

Lake. Client: U.S. Bureau of Reclamation (under subcontract to Natural Resource Consulting Engineers).

- Trinity River, California – Provided an ongoing critical review of the economic impact assessment being prepared for the proposed Trinity River Restoration EIS. Client: Trinity County Planning Department.
- Trinity River, California – Prepared Tribal Trust and Trinity region component of Environmental Justice sections of the Trinity River Restoration EIS. Client: U.S. Bureau of Reclamation (under subcontract to CH2M Hill).
- New Melones Reservoir, California – Assessed the financial feasibility of converting operation of the Reservoir's recreation visitor facilities from public to private management. Client: U.S. Bureau of Reclamation.
- Monterey Bay National Marine Sanctuary, California - Examined the volume and characteristics of recreational vessel traffic in the Monterey Bay National Marine Sanctuary and evaluated the real and potential impacts of those vessels on the Sanctuary's marine resources. Client: National Oceanographic and Atmospheric Administration.

Publications:

In addition to preparing reports for a majority of the projects listed above:

Bass J., B. Chase, D. Dornbusch, and M. Robinson. "How to Value Commercial Improvements in a National Park," Real Estate Issues, Winter 2001/2001

Bass J., L. Lipper, J. Merchant and D. Zilberman. "Cost Benefit Analysis in the Context of Indigenous Water Rights: A Critique of the U.S. Water Resource Council Principles and Guidelines," presented by Ms. Lipper at Girona Development Economics Symposium. Geneva, Switzerland. June 21, 2001

Evaluation of IID Grower Market Power

By:

Jason Bass
And
Jim Merchant
of

DORNBUSCH ASSOCIATES
Berkeley, California

February 20, 2002

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY

The Imperial Irrigation District (IID) has negotiated a Water Conservation and Transfer Agreement (Agreement) with the San Diego County Water Authority (SDCWA). Among other terms, the Agreement stipulates that IID would conserve 200,000 acre-feet of water per year (afy) and subsequently transfer that conserved water to SDCWA. In exchange, SDCWA would compensate IID growers for the transferred water to defray any grower conservation-related costs.

As the legal and institutional process to implement the transfer agreement has unfolded, a number of issues regarding IID's water resource management have been the focus of debate. One of these issues relates to how IID growers would be financially impacted if they were mandated to conserve water without receiving any offsetting third-party compensation such as that from SDCWA stipulated in the transfer agreement proposal.

This report evaluates the extent to which IID growers could realistically pass on conservation-related increases in their cost of water by unilaterally increasing their crop prices. Towards this end, we qualitatively and quantitatively analyzed the markets in which IID growers sell their crops, and for IID's most prevalent crop, alfalfa hay, also used a modified version of the Central Valley Production Model (CVPM) that the California Department of Water Resources developed to evaluate the impacts of water shortages and water price increases on California agriculture.

As discussed below, the analysis indicates that IID growers do not have power in their respective crop markets due to a range of competitive marketplace dynamics, including packer/shipper concentration, geographic scope, and falling trade barriers, among other factors. Consequently, IID growers cannot be expected to pay for the cost of water conservation by unilaterally increasing the prices they receive for their crops. Crop costs of production have continued to increase, while in most cases crop prices have remained stagnant or declined. Accordingly, any continued escalation in crop production costs, including any costs to implement water conservation measures, is likely to further erode IID grower profitability leading to a decline in farm property values, and adversely impacting the overall regional economy.

II. INABILITY OF IID GROWERS TO PASS THROUGH WATER RATE INCREASES

Regardless of the water conservation measure(s) IID growers and/or the District itself adopt to achieve their annual water conservation target of 200,000 acre-feet, conservation of this magnitude could result in a substantial and meaningful increase in the cost of water for the District's growers. This cost may derive directly from the capital investment and on-going O&M-expenses to implement specific on-farm or system-level water conservation measures, or indirectly from lost revenue due to deficit irrigation- and/or land fallowing. Irrespective of the method, water-conservation in IID will have financial impacts on District growers. Absent offsetting third-part compensation, the severity of those impacts, and associated regional economic effects, will depend largely on the extent to which IID growers have the market power to pass any conservation-related costs through to their customers by increasing crop prices. Ultimately, the less IID growers are able to mitigate water conservation-related costs with crop price increases, the greater the potential impacts of that conservation on grower income and subsequently, regional property values and local tax revenues.

Imperial Irrigation District is one of the largest irrigation districts in the western United States. In California, it is second only to the Westlands Irrigation District in terms of acreage under crop production (Westlands is located in the Southern San Joaquin Valley west of Fresno).[1] In 2000, 461,514 acres within IID received irrigation deliveries.[2] IID growers enjoy climate conditions suitable to the production of many different field, melon & vegetable and fruit crops on a year-round basis. Over 100 crops are grown commercially within the District. However, a majority of the District's land under production, about 71% in 2000, is consistently planted to relatively lower margin forage and grain crops, primarily alfalfa hay, Sudan grass hay, Bermuda grass hay, and wheat. (In 1998, 11% and 8% of the acreage in the Westlands and Coachella irrigation districts were planted to these types of crops, respectively.)

A. Study Approach

IID growers market their crops through many channels, including growers associations and brokers. The prices IID growers receive for their crops at a given time reflect

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[1] Westlands covers about 600,000 acres along the west side of the San Joaquin Valley within Fresno and Kings Counties. In 1998, the district reported a net cropped acreage of 530,371 acres (net of double-cropped and fallowed parcels as well as lands dedicated to wildlife purposes).

[2] Understates actual acreage harvested due to multi-cropping. In 2000, 537,076 acres of crops were reported, including 82,75,562 acres multi-cropped (i.e., more than one planting and harvesting of a crop in a single year).

numerous supply and demand factors that differ from crop to crop and season to season. These include the volume and harvest timing of the crop in other growing regions, the price and availability of substitutes[3] and complements[4] for that crop, the concentration of buyers, the relative quality of the crop, the crop's suitability for storage, the cost of transportation and storage for the crop, general economic conditions and even market perceptions, among other factors.

IID farmers do not just compete against growers from other regions in the markets for the crops they grow, but they also compete with each another. While the level of marketing competition within the District may be tempered by local cooperation through crop associations and other marketing coordination vehicles, the consensus among extension agents, brokers and growers with whom we spoke is that market competition within IID has an important influence on the crop prices realized by individual District growers.

Nonetheless, the central concept at issue is market power. Specifically, are IID growers:

- Price-takers for the crops they produce? This would mean they have no market power, and thus cannot influence the prevailing market price; they must sell their crop at prices determined purely by market forces or risk competition entering the market and undercutting their prices.
- Price-makers for a given crop? This would mean they have substantial market power, and thus can directly influence the prevailing price; absent are alternative sources of the subject crop or adequate substitutes for the crop that might constrain IID price escalation.
- Or, are they somewhere in the middle? They would then have some influence on price that might allow at least a partial mitigation of increased costs of production resulting from conservation.

We approached this assessment in three steps.

In the first step, we identified the primary crops produced in IID. While it is true that IID produces many different crops, ten crops account for about 80% of the total acreage under

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[3] An example of a substitute might be grain corn for alfalfa hay. If the price of grain corn drops relative to alfalfa hay due to an unanticipated bumper corn crop, livestock and dairy operators may increase the quantity demanded for grain corn as a substitute for alfalfa hay. This buyer response might decrease the demand for alfalfa hay and force alfalfa hay prices down if producers wish to sell all their production.

[4] The often-used example of complementary products is peanut butter and jelly. If the supply of peanut butter drops due to lower production of peanuts, people may buy less jelly as well, having a negative impact on growers supplying jelly producers with grapes and other fruit.

irrigation and about 85%, if we exclude forage seed crops.[5] Accordingly, we believe that an analysis of IID crop pricing and market power that focuses on these ten crops alone should adequately characterize the overall extent to which IID growers control the prices they receive for their crops.

In the second step, we defined the market for each of the crops selected for the analysis. Towards this end, we emphasized three separate market delineators:

- Geographic Region
  What other geographic areas produce the crops grown in IID and deliver those crops to the same markets as IID?
- Crop Substitutes
  What crops serve as good substitutes for the crops grown in IID and therefore influence the competitive landscape faced by IID growers?
- Temporal Influences
  To what extent does the seasonal timing of IID's harvest of the crop limit the competition faced by District growers in the production of that crop? This relates to the concept of market windows and is most important when examining the market for highly perishable crops such as lettuce. IID enjoys year-round conditions suitable to crop production that afford District growers with market window opportunities, specifically, in the production of vegetable crops during the winter and early Spring when many growing regions are idle.

In the third step, we examine the market for each crop as defined under step 2 to determine, as much as possible, the relative contribution and influence of IID growers, the ability of other producers to increase their production of the crop in response to increased prices from IID growers (supply response) and finally, the potential response of buyers of the subject crop to increased IID prices (demand response). All of this information was pooled to draw conclusions about the market power of IID growers within the respective market for each crop.

[5] Most of the seed grown in the district is alfalfa and Bermuda grass. These seed crops are harvested largely on stands previously used for the production of hay and allowed to go to seed in their last year of production.

B. IID Cropping Pattern

Table 1 summarizes the IID cropping pattern in 2000 itemizing the ten most important non-seed crops in terms of acreage.[6]

Table 1
Cropping Pattern Summary – 2000
Imperial Irrigation District

Garden Crops	Acres	% of Total	Field Crops	Acres	% of Total
Broccoli	10,916	2%	Alfalfa Hay	177,854	33%
Carrots	18,167	3%	Bermuda Grass Hay	41,918	8%
Lettuce	18,089	3%	Sudan Grass Hay	53,446	10%
Cantaloupes	11,270	2%	Sugar Beets	31,475	6%
Onions (dry)	12,377	2%	Wheat	49,868	9%
Other	27,615	5%	Other	59,647	11%
Total Garden Crops	98,434	18%	Total Field Crops	414,208	77%
Permanent Crops	24,434	5%			
Total Acres of Crops (Includes Multi-Cropping)				537,076	

Source: Imperial Irrigation District Annual Inventory of Areas Receiving Water, Years 2000,1999, 1998.

The table reveals that field crops account for approximately 77% of IID's cropping pattern, while permanent crops such as citrus account for only about 5%. In addition, the table indicates that alfalfa hay is planted to approximately one-third of IID lands under production. For this reason we focused a significant amount of our market analysis research on alfalfa hay.

C. Crop-Specific IID Market Power Assessment

Before examining IID grower market power on a crop-specific basis, it is appropriate to briefly discuss the North American Free Trade Agreement (NAFTA), as NAFTA has had a substantial recent influence on the dynamics of the crop markets in which IID growers participate. The U.S., Mexico and Canada entered into NAFTA on January 1, 1994. The primary objective of NAFTA, by design, was to increase North American trade and

[6] Excluding Sudan Grass and Bermuda Grass Hay, the remaining eight crops are also the most important non-livestock commodities produced in the District in terms of gross value of production.

economic efficiency, particularly in the manufacturing and natural resource sectors (including agriculture), by dismantling import tariffs and quotas, facilitating trade and environmental dispute resolution, and improving labor mobility among the three signatory countries.

Free trade has always been a politically charged issue, and the debate on NAFTA has proven no exception. Now, as the U.S. enters a new phase in international trade liberalization and trading partnerships, highlighted by the recent admission of China to the World Trade Organization (WTO) and attempts to fast track the expansion of NAFTA to include Central and South America, the socio-economic and environmental impacts of NAFTA during its brief history have become the focus of intense public and governmental scrutiny. While the conclusions presented in the associated literature tend to reflect public policy biases as much as hard analysis, the general consensus appears to be that since NAFTA's inception farmers in all three countries have experienced stagnant to declining prices for most crops and a subsequent erosion of incomes. Though many correctly point out that non-NAFTA factors, including recent currency exchange shocks, broad macro-economic trends, agricultural consolidation, weather problems (i.e., el nino and la nina) and government domestic agricultural policy changes have adversely affected U.S. farmers to varying degrees, NAFTA appears to have had, and continues to have, an important influence on the U.S. farm sector.

Within the NAFTA blueprint, U.S. policy makers expected anticipated increases in U.S. agricultural commodity imports from Mexico and Canada to be approximately offset with increases in U.S. agricultural commodity exports to those countries; an outcome that according to the USDA Economic Research Service has, in aggregate, by and large materialized. When one narrows the focus, however, to trade patterns for many of the non-hay crops produced in IID, particularly higher-valued crops of particular importance to District incomes, such as lettuce and melons, indications are that the NAFTA experience has been fairly one-sided in terms of trade flows. Aided by the Mexican Peso's devaluation in 1994/95, U.S. imports of Mexican produce have increased substantially under NAFTA. These imports compete directly with IID and other Southwestern growers, particularly during periods that have traditionally provided those growers with valuable seasonal market windows for their crops. For example, the Economic Research Service found that U.S. net imports of Mexican cantaloupe are 17% to 25% higher than they would be absent NAFTA-associated tariff cuts. This has had a clear negative affect on IID melon grower incomes. Another study of NAFTA by the University of Texas A&M's Center for North American Studies reports that the NAFTA-related elimination of U.S. vegetable import duties has contributed significantly to the near doubling of U.S. imports of broccoli, cucumbers and onions during the 1990s.

Furthermore, and referring to the period since NAFTA's inception, a recent study by the Public Citizen's Global Trade Watch concludes that "...North America's farmers and consumers have not benefited from the pact..." The report also indicates that the U.S.'s trade surplus with Canada and Mexico fell by $1.5 billion during the first seven years since NAFTA's inception. In contrast, the U.S.'s trade surplus with Canada and Mexico grew approximately $203 million between 1991 and 1994.

Our research indicates that while all of IID farmers have been financially squeezed by NAFTA, those most impacted are farmers producing relatively labor-intensive crops such as asparagus and melons. A primary cause is the substantial labor cost disparity between California and Mexico. In some situations, for example, what IID growers are paying laborers for an hour of work is approximately equal to what Mexican growers across the border pay for a full day of labor. With such a disparity in the cost of so essential a crop production input as labor, IID growers are at a disadvantage in competing with Mexico in the marketplaces for many fruit and vegetable crops. Prior to NAFTA, import tariffs allowed IID growers to compete effectively with Mexico despite relatively expensive labor associated with California's high (and ever increasing) minimum wage rate, and strict time-and-a-half requirements for overtime, among other labor cost factors. The situation is likely to deteriorate further as most of the remaining tariffs that now partially insulate IID growers are completely phased out per NAFTA's terms.

1. Alfalfa Hay

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 alfalfa hay was grown on 1.35 million acres in California producing about 7.6 million tons of hay. Alfalfa hay growers within IID are relatively high-yield producers, accounting collectively for approximately 13.2% of the State's 2000 alfalfa hay acreage and almost 18.9% (1.44 million tons) of the State's total alfalfa hay production in that year. According to the 1997 Census of Agriculture, there were 557 farms in Imperial County in 1997 of which about 57% (320) produced hay.

Alfalfa hay produced in IID is generally considered good to premium quality hay with high protein and nutrient levels and, for this reason, is sold primarily to dairies. According to Juan Guerrerro, an Imperial County agricultural extension agent, in excess of 70% of IID's alfalfa hay is shipped to dairies in the Chino Basin near Interstate 10 East of Los Angeles. The Chino Basin area has the largest concentration of dairies in the State and produces a large share of the State's milk and other dairy products. The

remainder of IID's alfalfa hay is sold for use in feed-lots (much of it local) and for horses, with about 15% exported mostly to Asian feed markets.

Discussions with representatives of several dairies in the Chino Basin, including Excelsior Farms, Syann Dairy and Three Brothers Dairy, revealed that while IID is their primary source of alfalfa hay, they also buy large amounts of hay from growers in the Yuma area of South-Western Arizona, growers around Blythe in Eastern Riverside County as well as growers in the Southern San-Joaquin Valley near Lancaster. All of these areas are large agricultural regions. Conversations with a number of alfalfa hay brokers working with IID growers and dairies in the Chino Basin confirmed that IID competes primarily with hay producers in these areas. Clark Seybert, principal of Clark Company, a hay broker operating out of Brawley in the Imperial Valley indicated that IID alfalfa hay growers compete in a marketplace that extends largely from the Southern San Joaquin Valley south and into Western Arizona.

Alfalfa hay is bulky and costly to transport and therefore is usually marketed fairly close to where it is grown. However, Mr. Seybert said that it is not uncommon for premium quality hay to be shipped long distances if the quality merits the added transportation costs. For example, some alfalfa hay grown as far away as Utah and considered to be of extraordinary quality is shipped to dairies in Southern California. Bill Sandige, California's border station supervisor for the state's Department of Food and Agriculture, believes that Utah hay is an important factor in the Southern California Dairy industry. According to Mr. Sandige, the Southern California market for alfalfa hay is very price sensitive. This would suggest that if the price of IID hay were to increase relative to other growers outside the area, IID's competition in the Chino Basin dairy market would increase because the cost to transport hay to the Chino Basin from producing areas further away would become relatively more economical.

Our own survey of approximately ten trucking companies in California, Arizona and Nevada that transport hay revealed that haul rates are as much a function of back haul opportunities available to the particular trucking company as they are of mileage. For example, the Lanting Hay Company in Chino quoted a cost to ship hay from the Phoenix Area (Maricopa County) Arizona, of $25 per ton, the same rate that many truckers, including Lanting, would charge to haul to the Chino Basin area from El Centro in the Imperial Irrigation District: a much shorter distance in road miles. This pricing reflects the fact that Lanting already hauls a variety of goods between Los Angeles and Phoenix along Interstate 10 and could absorb additional hay hauling on that route at relatively little cost. Frank Delpapa of Be and Me Trucking out of Bakersfield quoted the same price, $25, to haul hay from Sacramento to the Chino Basin.

According to Michael Rethwisch of the Riverside County Palo Verde Cooperative Extension office, alfalfa hay markets are defined based on quality. Blythe, El Centro, and Yuma produce premium quality hay during the winter. In the summer, Chino Basin dairies buy some of their hay from Nevada and Utah because summer hay from those areas is of a better quality than IID's. During the summer the price of hay drops in the Imperial and Palo Verde valleys because production increases result in reduced quality.

Alfalfa hay is considered the feed of choice among dairy farmers due to its high protein content, nutrient levels and palatability. Nonetheless, the dairy industry is extremely sensitive to feed expenses because feed accounts for over 50% of the cost to produce milk. Also, the dairy sector, perhaps more than any other agricultural sector, is very sophisticated in its cost management, applying linear programming and other quantitative techniques to maximize feed nutrition at a minimum of cost. Therefore, since alfalfa hay is a relatively high-priced feed source, many dairies proactively seek to reduce their purchases of alfalfa hay by substituting a wide range of alternative and lower cost feeds including grain, corn silage, oat and barley hay, even beet pulp and tomato pumice (waste from processing). For example, Seth Hoyt, a senior agricultural economist with the California Agricultural Statistics Service, believes that while recent alfalfa hay prices may face upward pressures due to a decline in acreage and strong dairy and export demand for hay, any price inflation may be tempered by lower grain and feedstuff prices.

While Imperial County does produce alfalfa year round, including during the winter and early spring months when many growers to the north are idle, alfalfa hay can be stored for long periods of time with little quality deterioration if properly stored. Nonetheless, Imperial growers do gain some competitive advantage in their winter season production of hay from avoided storage, shrinkage and general carrying-related costs incurred by growers targeting those markets with stored hay.

b. Market Power

Based on our research, we concluded that IID's primary market competition for alfalfa hay comes from other Southern California growers extending north to include the Southern San Joaquin Valley (i.e., Fresno, Kern, King counties, etc.) and extending east into Arizona including Yuma, La Paz, Pinal and Maricopa counties. This is not to suggest that the alfalfa hay market in which IID producers compete is not influenced by producers further afield (such as Utah), only that IID's primary competition is located within this area. In 1999, IID produced 15% of the alfalfa hay grown within this market region. However, according to Mr. Seybert and other brokers with whom we spoke, IID

growers have little ability to dictate their hay prices because of significant competition within and from outside the District as well as the availability of low cost substitutes.

In addition, we sought to assess IID alfalfa hay grower market power by examining and analyzing historical IID alfalfa hay price, acreage and production data. Figure 1 provides a graphic summary of the average price received by alfalfa growers in Imperial County between 1980 and 2000. During this period, grower costs of production steadily rose, yet as the graph shows, alfalfa hay prices fluctuated significantly. In fact, the average price of alfalfa hay in 2000 for the county was actually lower than the 1980 price. It should be noted that the prices presented here are average prices. Individual growers realize a range of prices on their hay based primarily on quality, time to market and seasonal demand.

Figure 1
AVERAGE ALFALFA HAY PRICES
IMPERIAL COUNTY
1980-2000

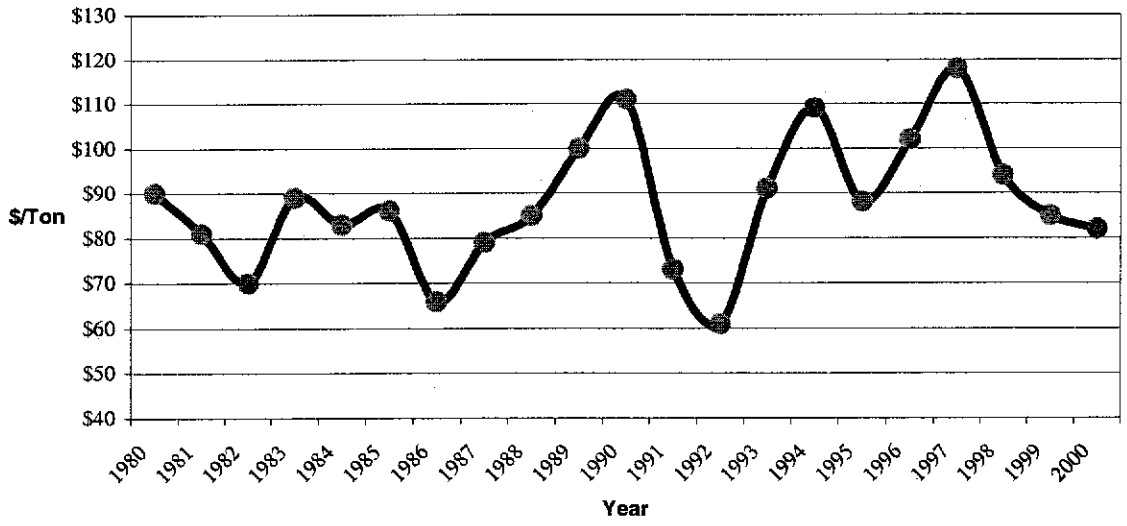

Figure 2 summarizes reported acreage of alfalfa in IID for the same 21-year period. The figure reveals fairly significant inter-year variation in the District's alfalfa hay acreage and total production. We compared the historical trend in IID alfalfa acreage and production with alfalfa hay prices, assuming different lags in production and price. This analysis suggests that the amount of total IID hay production does little to explain the prices received by growers for that hay (suggesting the hay market in which IID operates is larger than IID itself). For example, covering the period 1980 through 2000, the coefficients of determination comparing estimated total IID alfalfa hay production in a given year to, (1) the IID grower average price received for hay in that year, and (2) the

IID grower average price received for alfalfa hay in the previous year, are near zero. Therefore, very little of the variation in IID alfalfa hay production appears to explain variation in the average price received by growers for that hay. This serves as one indication that IID alfalfa growers are operating in a market substantially larger than that represented by their production and have little unilateral influence on prices.

At the same time, our analysis suggested little or no relationship between the lagged price for IID hay and the production of alfalfa hay, indicating that growers collectively are not making their alfalfa production decisions based on recent average prices received for their alfalfa.

We also conducted a similar correlation analysis by comparing historical IID average alfalfa hay prices and an index of farmer production costs. The purpose of this analysis was to evaluate the extent to which IID growers have been able to recoup unavoidable inflation in their costs of production through increases in the prices received for their crops. The farmer production cost index used was the Prices Paid by Farmers for Production, Interest, Taxes and Wages published by the USDA's Economic Research Service (PPITW). We believe that this index, though national in its coverage, reasonably characterizes the general trend and variability in overall crop production costs incurred by IID growers. (No appropriate State-level or regional farmer cost-of-production index is available.[7,8])

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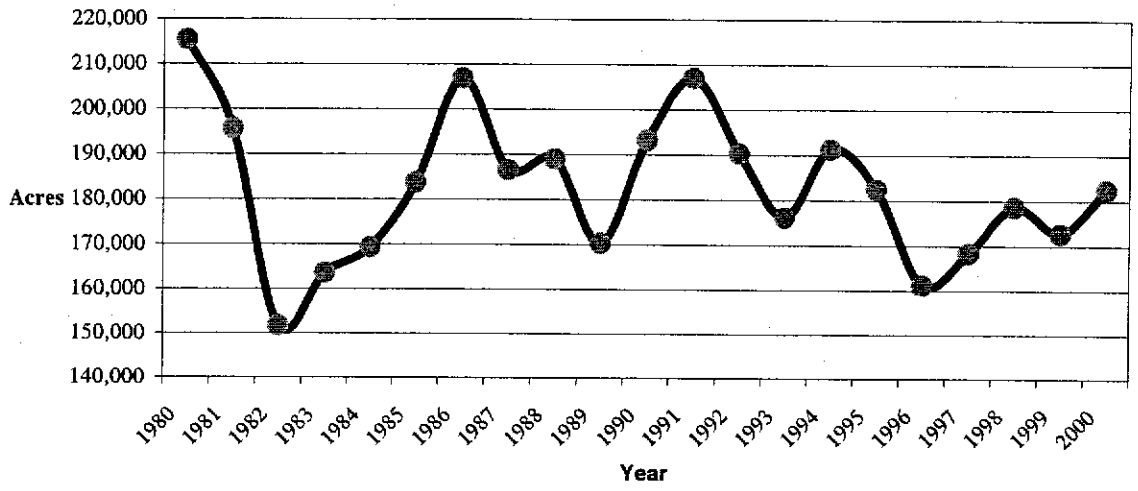
[7] To test the reasonableness of using a national farmer cost of production index (the PPITW) to characterize the trend and variability in overall Imperial Valley farmer production costs (absent a more geographically-specific production cost index), we compared the historical PPITW index to available consumer price indices (CPI) for the State of California as a whole as well as the Los Angeles (including Riverside) and San Diego areas individually. (These CPI indices are reported by the State of California's Division of Labor Statistics and Research.) The comparisons revealed that a significant amount, almost 90%, of the observed variation in the PPITW can be explained (is mirrored) by variation in the CPI indices. We believe this validates the use of the PPITW as a proxy for farmer cost of production trends and variability in IID since our own past analyses of consumer and producer price indices where available for specific geographic areas would suggest that the indices tend to track quite closely.

[8] An examination of available data on the cost in California of important farm inputs such as labor, chemicals and particularly energy reveals fairly substantial recent cost inflation that has eroded farmer income due to stagnant or falling crop prices.

Figure 2
AVERAGE ALFALFA HAY ACREAGE
IMPERIAL COUNTY
1980-2000



The correlation analysis indicates that only about 20% of the observed historical variation in IID alfalfa hay prices can be statistically explained by cost of production inflation, suggesting that while cost is certainly one factor driving hay prices, many other factors influence price as well, and IID growers could not expect to recoup increased water costs by unilaterally increasing the price of their hay. Thus, while a higher correlation would not necessarily imply market power as it could just relate to a general upward trend related to increased price levels throughout the economy, the low level of correlation found does imply that alfalfa hay growers are unable to control income erosion due to increasing costs through crop pricing. To further validate this conclusion, we performed an additional correlation analysis between IID historical alfalfa hay prices and a time series of farmer hourly wage rates for California reported by the USDA in the Department's Farm Labor Bulletin. The period of the analysis again covered 1980 through 2000. We believe this to be a meaningful analysis since labor is a major cost of crop production and the labor rate series used is specific to California. The analysis indicates a similar, though smaller statistical relationship between cost of production and price for alfalfa hay in IID.[9]

According to Steve Blank, an extension economist with the University of California Department of Agriculture, the factors most affecting the prices received by IID growers for their crops include the amount of hay in storage, cost of alternate feed sources,

[9] This would be expected since the PPITW and the farmer wage rate series for California are highly correlated.

government programs, conditions in other alfalfa producing areas, past prices and beef and dairy cattle numbers. All of these factors are outside the control of IID growers and therefore, severely constrain grower ability to influence the price they receive for alfalfa hay.

Finally, given the importance of alfalfa hay to the IID cropping pattern, we used a modified version of the Central Valley Production Model (CVPM) to project the impact on prices paid by Southern California dairies following an increase in IID grower cost of water. The CVPM model was developed by the California Department of Water Resources (DWR) in collaboration with private sector consultants, including CH2M Hill and a number of agricultural economists from the University of California. The model is used frequently by DWR and also the Bureau of Reclamation to evaluate the potential effects on California farming from changes in the cost and availability of production inputs, particularly water. The model uses sophisticated quantitative methods termed "positive quadratic programming" to relate farmer crop production decision-making to the relative cost, availability and efficiencies of different crop production inputs and technologies. For the purposes of our analysis of the alfalfa hay market in which IID competes, we expanded the model to include Yuma, La Paz, Pinal and Maricopa counties in Arizona. We also incorporated a model of the Southern California demand for alfalfa hay based on the work of Konyar and Knapp. This analysis indicates that even with conservation-induced increases in the cost of IID water, there would be no resulting increase in farm-gate alfalfa hay prices in the Southern California/Arizona marketplace

2. Sudan Grass Hay and Bermuda Grass Hay

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 Sudan grass hay was grown on approximately 77,500 acres in California, over 70% of which was in IID. The State does not separately monitor the production of Bermuda Grass Hay, but instead adds that production into a broader category, "Hay Unspecified," that includes Bermuda Grass, Timothy and other hay varieties. However, a review of Agricultural Commissioner reports for California's southern counties indicated that almost all the Bermuda grass hay grown in the State is produced by IID. In 2000, Imperial growers produced Bermuda grass hay on 41,918 acres, almost the same number of acres the state reported for "Hay Unspecified" in Imperial County. This hay production accounted for almost 20% of the State's total reported "Hay Unspecified," acreage in that year.

Unfortunately, the amount of market information available for Sudan and Bermuda grass hay is limited. However, based on our research, including conversations with hay brokers and exporters in the region, most of these hay products are exported to Asia, particularly Japan. In 1997, the U.S. exported 2.9 million metric tons of hay, 2.7 million of which went to Japan. Half of this hay was alfalfa. Since only about 15% of IID's alfalfa hay (or about 150,000 to 200,000 tons) is exported, much of the hay exported from the U.S. to Japan and Asia is coming from other hay-growing regions. Other countries exporting significant amounts of hay to Asia include Australia/New Zealand and Canada. Accordingly, IID Sudan grass hay and Bermuda grass hay production competes with other hay produced throughout the Western states as well as from different Pacific Rim countries.

Direct hay export statistics for Canada and Australia/New Zealand were unavailable. However, according to Terry Hansen with ACX Trading, a large hay exporter in Long Beach, California, the Asian hay markets are extremely price competitive and that IID-baled Sudan grass and Bermuda grass face strong competition, particularly from Australian oat hay and Canadian Timothy hay. He also indicated that IID Sudan grass hay competes with rye hay produced in the Wilamette Valley in Oregon. According to Mr. Hansen, Australia is exporting about 400,000 tons of oat hay annually into Asian markets, and that amount is steadily increasing. He also told us that Asian markets are tough to compete in because of the exacting and ever-changing requirements of buyers with respect to quality and appearance. This opinion is corroborated by James Kuhn with Kuhn Farms, a hay grower in Imperial. On the overall hay export market, Mr. Kuhn believes that an abundance of hay supply and production capacity in overseas markets is placing downward pressure on prices that is exacerbated by weakness in the Japanese and other Asian economies.

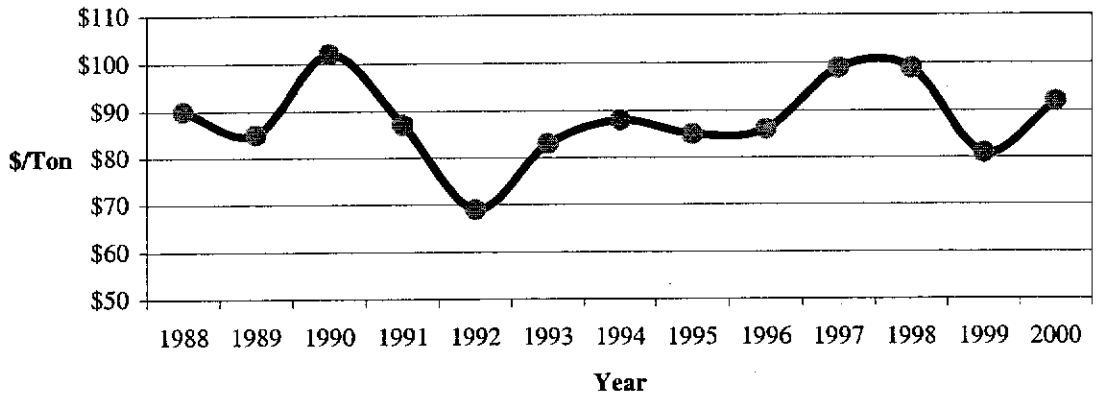
b. Market Power

Based on the above characterization of the "other" hay marketplace, it appears that IID growers cannot unilaterally respond to crop cost of production increases by increasing the price they receive for Sudan grass and Bermuda grass hay.

To validate this finding, we sought to assess IID Sudan and Bermuda grass hay grower market power, by analyzing historical price, acreage and production data for those crops. Figure 3 below provides a graphic summary of the average price received by Sudan Grass hay growers in Imperial County between 1988 and 2000 (price data before 1988 was not available, as Sudan grass hay was not previously reported as a separate hay crop from the County Commissioner's "Other Hay" category). During this period, while grower costs

of production steadily rose, average Sudan grass hay prices, despite some significant inter-year variation, did not. In fact, the Imperial County average price received for Sudan grass hay in 2000 was about the same as the 1988 average price.

Figure 3
AVERAGE SUDAN GRASS HAY PRICES
IMPERIAL COUNTY
1988 - 2000



We also conducted correlation analyses between historical IID average Sudan grass hay prices, and (1) the index of Prices Paid by Farmers for Production, Interest, Taxes and Wages (again lacking a comprehensive state-level or regional cost of production index) and (2) average farm hourly wage rates for California reported by the USDA. These analyses indicate almost no relationship between the farmer cost of production and the prices received by IID growers for their Sudan grass hay. This would support the opinion that production costs don't have a strong influence on prices and accordingly, IID growers have no real power to pay for higher water costs by correspondingly increasing the price they charge for Sudan grass increases. Market supply and demand factors appear to dictate the prices that IID farmers can receive for their hay in a given year irrespective of IID grower production costs.

Unfortunately, Imperial Valley Bermuda grass hay prices have not been tracked for more than the last several years. Accordingly, we were unable to perform a similar analysis for Bermuda grass. However, we believe that IID Bermuda grass hay growers also have little control over the price they receive for their hay as this hay is subject to similar competitive forces in the export market as Sudan grass hay.

3. Sugar Beets

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 sugar beets were grown on a little less than 100,000 acres in California producing almost 3.3 million tons of beets. IID accounted for over 31% of this acreage, 31,475 acres. California produces about 10% of the U.S.'s sugar beets. The majority of the country's sugar beets are grown and processed in the northern states, particularly the Red River Valley extending from Minnesota into eastern North Dakota.

Until quite recently, there were four factories that processed all of the sugar beets grown in California. They were located in Woodland, Tracy, Mendota and Brawley. A short time ago the Woodland and Tracy plants closed due to financial troubles. According to the USDA's current assessment of the U.S. sugar sector, it is anticipated that these plant closures will result in a sizeable reduction in the future acreages of sugar beets in the State. This is largely due to the high cost to transport beets. Due to transportation costs most processing facilities purchase beets from nearby growers.

The Brawley plant is operated by Imperial Sugar. All of the beets processed at Brawley are produced in IID. And, all of IID's beets are processed at the Brawley plant.[10] Accordingly, IID growers currently face no outside competition in supplying Imperial Sugar's Brawley processing facility with beets. However, the true market in which IID sugar beet growers compete is not limited to the Imperial Sugar's Brawley facility, but is really international in scope, since this is the geographic market in which sugar processors such as Imperial Sugar compete. According to representatives of the California Sugar Beet Association, IID is considered a relatively low-cost sugar beet producer due to its relatively high yields compared to other growing regions. This finding is supported by sugar beet cost of production analyses conducted by the USDA's Economic Research Service. At the same time, Imperial Sugar faces relatively high production cost conditions, largely due to the high cost of labor and power in Southern California.

According to Steve Kaffka, with the U.C. Davis Department of Agronomy and Range Science, the Tracy and Woodland sugar beet processing plants closed because their operator got into financial trouble when the price of sugar dropped 20% due to a

[10] Historically, Imperial shipped some of its beets to Tracy for processing prior to that plant's closure.

combination of factors, including increased production in North Dakota and Minnesota, oversupply and shortfalls in the USDA-administered U.S. sugar program.

Keith Mayberry, an Imperial County Cooperative Extension agent, informed us that even though IID is perhaps the highest sugar and highest yield sugar beet producer in the world, there is some talk of closing down the Brawley plant. The reason; an abundance of sugar supply (imported and domestically produced) has driven prices so low that US processors, no matter how efficient, are unable to compete. According to the USDA's Economic Research Service, while USDA intervention has helped to reduce supplies and support the prices received by some processors, the Department's legislated maximum intervention in the sugar marketplace has done little to keep prices up. It should be noted that the USDA participates in the sugar market by setting annual quotas on certain raw and refined sugar commodities and by providing loans to sugar processors that use sugar as collateral. In terms of the latter, if the price of sugar falls below the legislated loan rate per pound of sugar, the USDA takes delivery on the sugar in lieu of loan repayment. In this manner the loan rate serves as a price support on the affected sugar. Traditionally, beet and sugar cane growers themselves have not had direct access to any meaningful government support programs.[11]

b. Market Power

IID's sugar beet processors depend on the continued operation of Imperial Sugar's Brawley processor. Accordingly, those growers are forced to price their beets at a level that keeps Imperial Sugar competitive in the overall highly competitive sugar marketplace. Accordingly, IID sugar beet growers have little ability to raise their prices if they do not want to jeopardize the continued operation of the only outlet for their crop.

We sought to further assess IID sugar beet grower market power by examining and analyzing historical IID sugar beet price, acreage and production data. Figure 4 provides a graphic summary of the average price received by sugar beet growers in Imperial County between 1980 and 2000. During this period, grower costs of production steadily rose, yet as the graph shows, sugar beet prices were little changed. In fact, the average price received for sugar beets by Imperial County growers was $41 dollars per ton in 1981, and 15 years later in 1996, it was still only $41 dollars per ton, thus showing a significant real decline over the period when one factors in inflation.

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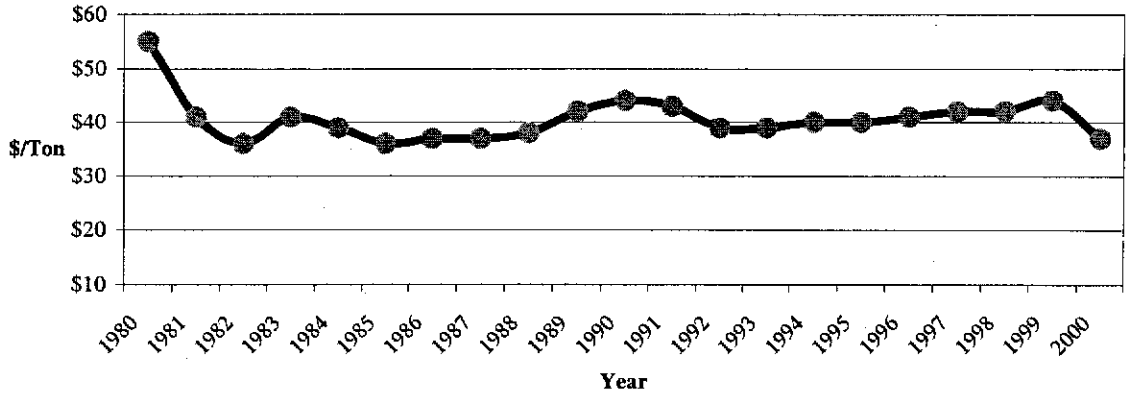
[11] The USDA, in an effort to improve the sugar market and reduce its stocks of sugar obtained from processor loan forfeitures (and ongoing related storage costs), has proposed to offer sugar beet growers sugar in exchange for not harvesting their crop. Unfortunately, this payment-in-kind program will be limited in 2001 to $20,000 per farmer, and such compensation reflects already depressed sugar prices.

Figure 4
AVERAGE SUGAR BEET PRICES
IMPERIAL COUNTY
1980-2000



We also conducted correlation analyses between historical IID average sugar beet prices and both the PPITW index and average farm wage rates. These analyses indicate almost no relationship between the trend in crop cost of production and the prices received by IID growers for their sugar beet production over the period 1980 through 2000. This would support the opinion that IID growers have no real power to recoup increased production costs for their sugar beets by increasing the prices they charge for that crop.

We also compared wholesale sugar prices in the U.S. to the average prices received by IID growers for their sugar beets for the period 1990 through 2000. This analysis indicated a moderate relationship between these two variables suggesting that IID sugar beet prices move somewhat in line with the national wholesale price of sugar over which IID growers have no control.

4. Wheat

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 wheat was grown on approximately 577,000 acres in California producing about 1.5 million tons of wheat. In that year, IID accounted for about 8.6% of this acreage, almost 50,000 acres. California produces only a small portion of the U.S.'s wheat. The U.S. is a net exporter of wheat but does import significant amounts, particularly from Canada. Wheat is highly storable and easily shipped. The geographic market for wheat is international in scope.

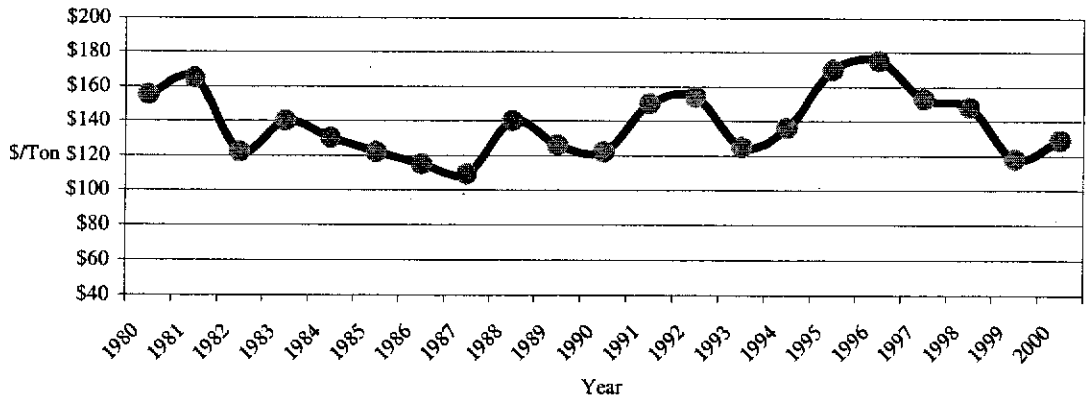
b. Market Power

IID has no power to influence the prices its growers receive for wheat given the relatively low cost to ship wheat, the international scope of the market and the overall continued glut of wheat in the marketplace.

We sought to validate this conclusion by examining and analyzing historical IID wheat prices, acreage and production data. Figure 5 provides a graphic summary of the average price received by wheat growers in Imperial County between 1980 and 2000. During this period, grower costs of production steadily rose, yet as the graph shows, the prices received for wheat did not. In fact the average price received for wheat by Imperial County growers was lower in 1999 and 2000 than in 1980 and 1981. From 1980 through 2000 the average cost to produce crops according to the PPITW Index increased by about 67%.

We conducted correlation analyses between historical IID average wheat prices and both the PPITW index and USDA farmer wage rate data. These analyses indicates almost no relationship between the variation and trend in crop cost of production and the variation and trend in average prices received by IID growers for their wheat over the period 1980 through 2000. This would support the opinion that IID growers have no real power to increase the prices they receive for their wheat to recoup increased production costs.

Figure 5
WHEAT PRICES
IMPERIAL COUNTY
1980-2000



5. Lettuce

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 lettuce was grown on about 204,000 acres in California. IID accounted for approximately 8.8% of this acreage, about 18,000 acres. California is the country's largest lettuce producer, followed by Arizona. Almost 70% of California's lettuce is grown in Monterey and other Central Coast counties. However, lettuce produced in this region is harvested in the late spring and summer months. Lettuce grown in IID, the majority of which is head lettuce, is harvested in late fall and early winter and therefore, does not directly compete with Monterey production. In fact, IID accounts for almost all of the late fall and winter lettuce harvest in California. According to Keith Mayberry with U.C. extension, IID's only competition in California comes from some production in Santa Maria, Ventura and the western San Joaquin Valley. IID's primary competition in the lettuce market, however, derives from growers in western Arizona, particularly the Yuma area. IID and Yuma together supply 85% of the US's supply of winter lettuce. In 2000, Yuma County reported over 50,000 acres planted to head lettuce, compared to IID's approximately 15,300 acres.

b. Market Power

According to Keith Mayberry with U.C. extension, Yuma's vegetable season starts earlier but also runs concurrent and even a little past IID's. This provides Yuma growers access to a particularly lucrative market window for lettuce between the end of the Salinas harvest (Monterey County) and the start of the IID harvest (when any competition is virtually non-existent). Then when IID lettuce starts coming off the fields Yuma's ongoing production competes directly with IID's. Mr. Mayberry has also found that Yuma lettuce tends to get higher prices than IID lettuce, not because of actual quality differences, but perceived differences in quality. Many of Salinas' well-known shippers also operate out of Yuma and IID during the winter season. However, more chose to set up shop in the Yuma area. Accordingly, much of Yuma's lettuce is labeled from Salinas, even though it is grown in, and shipped from, Yuma. This lettuce generally receives a premium price in the marketplace because of the image of quality maintained by Salinas's shippers.

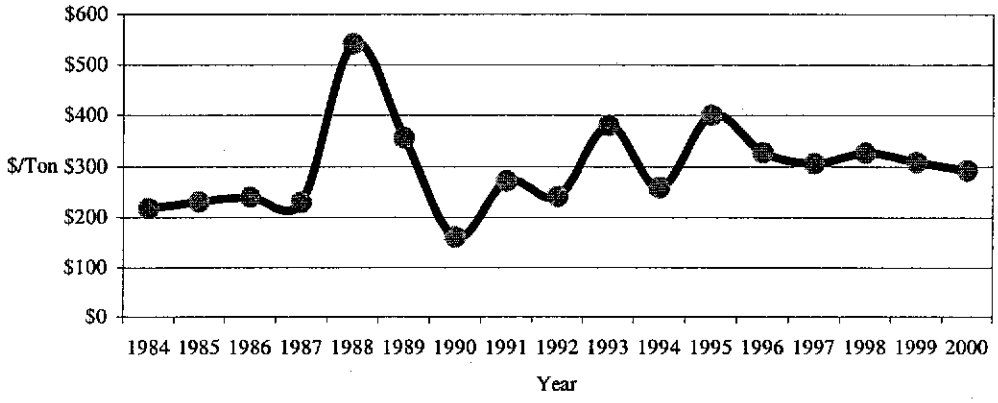
Overall, Mr. Mayberry believes that even though IID is an important player in the winter lettuce market, it would be impossible for IID growers to dictate the price of their lettuce.

Much of the lettuce produced in IID and Yuma is sold in bulk to fast food chains. In this market even very small price increases ($.01 per pound) will cause buyers to seek lettuce from other growers. Furthermore, the lettuce marketplace, like many other crop markets in which IID operates, is characterized by a highly concentrated and coordinated processing and transportation infrastructure that effectively limits the ability of growers to unilaterally dictate prices and other terms of sale.

In addition to anecdotal information, we sought to assess IID lettuce grower market power by examining and analyzing historical IID lettuce prices, acreage and production data. The focus of this analysis is on head lettuce since it comprises the majority of IID lettuce production. Figure 6 provides a graphic summary of the average price received by head lettuce growers in Imperial County between 1984 and 2000 (average head lettuce prices for IID were not published before 1984). During this period, grower costs of production steadily rose, yet as the graph shows, average head lettuce prices did not. In fact the average price of head lettuce in 2000 for the County was below the average price recorded from 1988 through 1990.

The volatility in the price of lettuce observed in the figure can be partially explained by the highly perishable nature of lettuce and subsequent influence of harvest timing on lettuce supply. The demand for lettuce is relatively inflexible—i.e., changes in production in a given period tend to have very large impacts seasonal and average annual prices. While a number of factors influence harvest timing, the weather and pests/disease play a significant and highly uncertain role. To mitigate as much as possible the impact of natural factors, shippers and handlers proactively manage the sequence of planting and harvesting within the different lettuce producing areas of California and Arizona through formal and informal production agreements with growers.

Figure 6
AVERAGE HEAD LETTUCE PRICES
IMPERIAL COUNTY
1984 - 2000



We also conducted correlation analyses between historical IID average head lettuce prices and both the PPITW index and farmer wage rates. From examining Figure 6, these analyses indicate trends in crop cost of production do little to explain the prices received by IID growers for their head lettuce production. This would support the opinion that IID growers have no real power to recoup increased lettuce production costs associated with water conservation by unilaterally increasing the price they charge for lettuce. This is particularly true since Yuma growers would not incur the same cost of production increases.

6. Carrots

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 carrots were grown on about 90,000 acres in California. In that same year, IID accounted for about 20% of this acreage, approximately 18,160 acres. About two-thirds of IID's carrot production is sold into the processing market. Kern County is the State's leading producer of carrots, accounting for more than half the State's production. Almost all of Kern County's production is sold into the fresh market.

California's largest competitor in the processing carrot market is Washington. In 2000, Washington growers produced processing carrots on about 5,000 acres. However, Washington carrots are harvested during the summer months, while IID growers harvest carrots during the late fall and winter (though seasonal harvest timing with processing carrots is much less a market factor than for fresh carrots).

A review of 1999 monthly arrivals of carrot shipments by terminal market tabulated by the USDA (including Chicago, Dallas, San Francisco, St. Louis and Los Angeles), indicates that during the winter months most of the U.S.'s carrots are produced in California, with some competition from Mexico. Mexican carrots compete with California carrots primarily in Dallas and other southern terminal markets.

According to Keith Mayberry, carrots are grown in Imperial as a winter crop while very few carrots are grown in Arizona. There is limited processing available in Imperial. Historically, it has been more cost-effective to ship carrots up to Bakersfield (Kern County) for processing/packaging.

b. Market Power

Our research indicates that IID fresh carrot growers as a group face little competition in the fresh carrot marketplace during the late winter months (January through March). However, carrot production in the Imperial Valley has declined because of the rising cost of transportation up to the Bakersfield processing plants that would otherwise be mostly idle during the primary IID carrot harvest. The volume of carrot production in IID is not high enough to attract investment in local processing/packing.

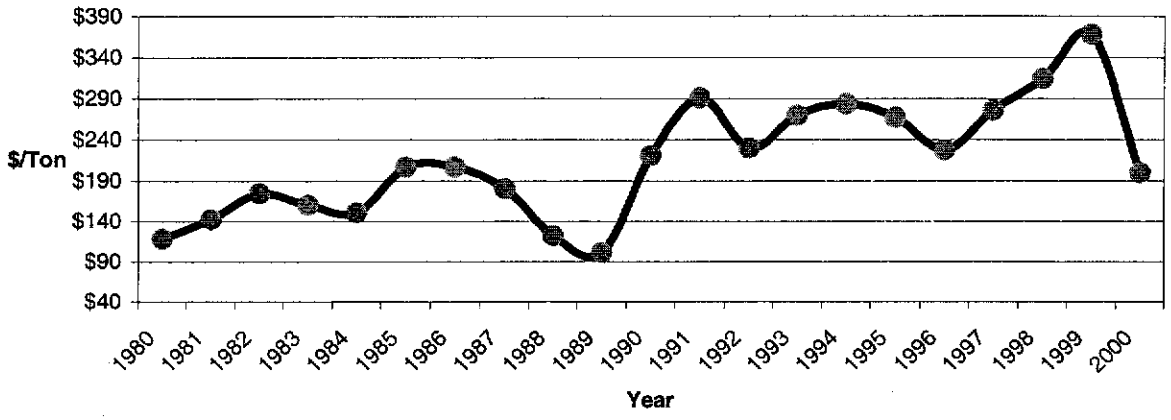
While most fresh market carrots are shipped soon after packing, they can be stored for extended periods. This limits the advantages IID growers have in the market as the only major fresh carrot producers in the U.S. during the late winter. This, combined with the fact that Imperial carrot farmers grow all their carrots under contract to a small group of packer/shippers, basically eliminates any market power of individual IID carrot growers. These contracts are inked prior to planting. The shippers themselves do the harvesting of the crop. There are eight primary shippers in California and the two largest control 90% of the market.

Figure 7 presents Imperial County fresh carrot prices for the period 1980 through 2000.[12] The figure clearly shows prices trending upwards over time, despite some inter-year variation (and a very sharp year-over decline in 2000 which Keith Mayberry with

[12] While processing carrots have recently comprised a larger share of IID's overall cropping pattern than fresh carrots, IID grower's only began farming significant acres of carrots specifically for the processing marketplace beginning in the mid to late 1990s. Accordingly, little IID-specific processing carrot price data is available for analysis.

Imperial County Agricultural Extension attributes to over-planting and subsequent production). The coefficient of determination between average Imperial County carrot prices and the USDA's farmer producer price index for the period is quite high, about 0.53. The coefficient of determination between average Imperial County carrot prices and the USDA's reported average farmer wage rates for California for the period is lower at about 0.48, but still quite high. However, given the apparent limits on IID carrot grower market power, this trend would appear to be more the result of supply and demand trends (particularly strong growth in consumer demand during the 1990s and associated upward price pressures) than an indication that IID growers have the ability to unilaterally pass on to packer/shippers a portion of any water-conservation-related increases in their costs of production. It should also be noted that in the middle of the 1990s, the U.S. for the first time became a net importer of fresh carrots, as producers in Mexico and Canada established a larger presence in the American marketplace. As these and other countries continue to adopt newer carrot production technologies already widely employed in the U.S., and remaining constraints to trade are eliminated under NAFTA and other agreements, competition faced by IID carrot growers is only expected to increase, constraining carrot price escalation and further limiting IID market power.

Figure 7
FRESH CARROT PRICES
IMPERIAL COUNTY
1980-2000



7. Broccoli

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 broccoli was grown on about 132,000 acres in California, including almost 90,000 acres of fresh

market production.[13] In that same year, IID growers planted almost 11,000 acres of broccoli. All of IID's broccoli production is sold into the fresh market. Accordingly, in the year 2000 IID accounted for about 12% of California's fresh broccoli acreage. The largest source of broccoli in the State is Monterey County, accounting for over half the State's production of fresh broccoli.

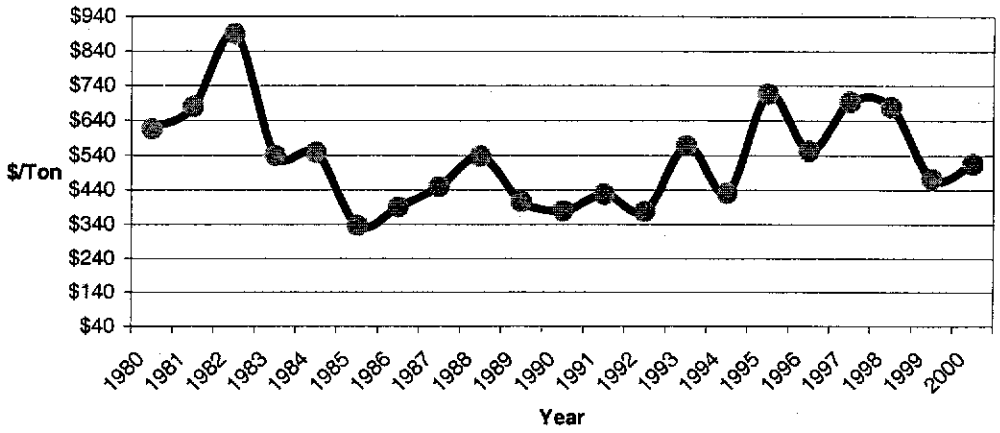
Growers in Monterey and Salinas ship broccoli year-round, though the production from these areas drops off during the winter months. IID's broccoli is harvested from October through March. During this time, the District's primary domestic competition comes from Arizona producers in Yuma and Maricopa counties. In 1999, these two counties together produced broccoli on approximately 12,000 acres (nearly the same acreage as IID in that year, though average per-acre yields were higher in IID). Texas also has small acreages of broccoli that are harvested during the winter months. Furthermore, an increasing share of the fresh broccoli consumed in the U.S., particularly during the fall and winter months, is imported from Mexico. Historically, Mexican exports of broccoli to the U.S. were constrained by high U.S. import tariffs; however, the NAFTA-driven phase-out of those tariffs, combined with a precipitous drop in the dollar to peso exchange rate during the mid-90's, has stimulated Mexican broccoli imports.

b. Market Power

A 1999 USDA Economic Research Service report concluded that the general upward trend in retail broccoli prices during the 1990's (inter-year variation aside), following a decline in those prices during the 1980's, has been driven by renewed consumer demand for broccoli and the successful marketing of value-added products such as specialty wrapped and cut fresh broccoli. As a result, broccoli packer/shippers have seen their marketing price spread on broccoli, the difference between farm-gate and retail prices for the crop, increase substantially. Concurrently, average prices received by IID growers for their broccoli also declined during the 1980's followed by a general upward trend in the 1990's (see Figure 8). In fact, the average broccoli price received by IID growers in the late 1990's was within the range, though still below the peak, of prices received about twenty years prior during the early 1980's. It would thus appear that like many crops, consumer demand trends are largely driving the prices received by IID growers for their broccoli, a factor over which IID growers have no control.

[13] A significant majority of all broccoli grown in the U.S. is sold into the fresh market.

Figure 8
BROCCOLI PRICES
IMPERIAL COUNTY
1980-2000



At the same time, crop production-cost trends do not appear to have a meaningful impact on IID grower broccoli prices since those costs generally trended upward over the entire twenty-one-year period of study. Examining the relationship between historical farm production costs and IID average broccoli prices validates this conclusion. Specifically, the coefficient of determination between IID average broccoli prices and both the PPITW and the USDA's reported average farm wage rates for California during the period 1980 through 2000 are near zero. Accordingly, broccoli growers in IID cannot expect to recoup increases in the cost of crop production (including the cost of water) by unilaterally increasing the farm-gate prices charged for broccoli; instead they must accept the market price for broccoli irrespective of their production cost situation.

8. Dry Onions

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 dry onions were grown on about 46,000 acres in California. In that same year, IID accounted for about 27% of this acreage, about 12,400 acres. IID growers harvest their dehydrator onions during the first three months of the year and onions for fresh market from April through June. The onion harvest begins in June in Fresno and Kern counties where half of California's acreage of dry onions is located.

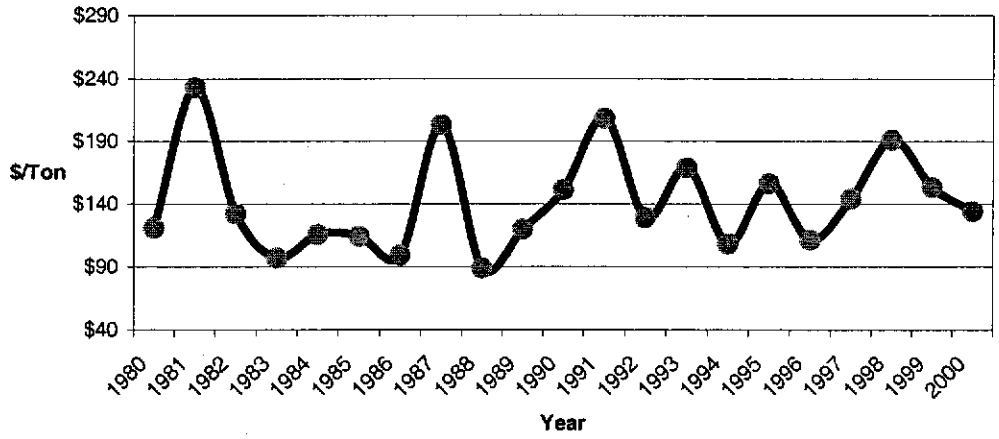
Dry onions are produced in many states, and advances in storage technologies have limited the significance of market windows, particularly during the late winter and early spring when IID (along with Arizona and Texas) is harvesting its onion crop.

We reviewed 1999 monthly arrivals of onion shipments by terminal market tabulated by the USDA (including Chicago, Dallas, San Francisco, St. Louis and Los Angeles). This data indicates that California onion growers compete nationally in the market for onions, as significant amounts of onions from Oregon, California, Texas, and many U.S. and international origins arrived at all the terminal markets throughout the year.

b. Market Power

Given the competitive landscape of the dry onion market, particularly the diversification of production throughout the country, we believe that IID growers would be unable to pass on additional costs of water by unilaterally increasing the prices for their dry onions. This finding was corroborated by an analysis of historical costs of farm production, farmer wage rates and IID average dry onion prices. Figure 9 presents those prices for the period 1980 through 2000. The figure shows prices remaining relatively flat, despite some fairly significant inter-year variation. The coefficient of determination between IID average dry onion prices and both farmer producer prices for the period and farmer wage rates is negligible, indicating that trends in the cost of production have little direct influence on prices received by IID farmers for their onions.

Figure 9
DRY ONION PRICES
IMPERIAL COUNTY
1980-2000



9. Cantaloupes

a. Market Definition

According to the State of California Agricultural Statistics Service, in 2000 cantaloupes were grown on approximately 58,000 acres in California. In that same year, IID accounted for almost 20% of this acreage, about 11,300 acres. Fresno County is the State's largest producer of cantaloupes, reporting about 28,700 acres in 2000.

Most of the State's cantaloupes are produced in the San Joaquin Valley and are harvested in the summer. In 2000, approximately 90% of IID's cantaloupes were harvested in the spring, April through June. IID's primary California competition during these months comes from nearby growing areas in the Southern part of the State, primarily Riverside County (Coachella Valley).

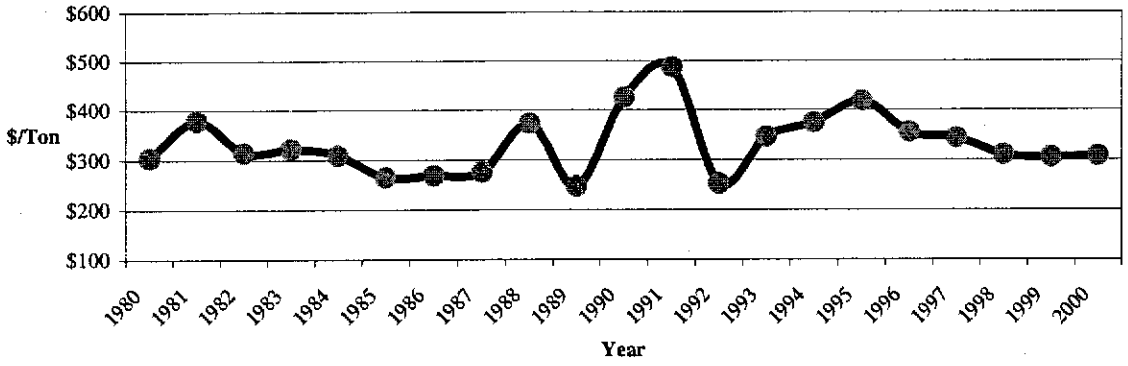
Other primary cantaloupe-producing states that compete directly with IID's spring production are Arizona and Texas. In 1999, Arizona produced over 12,000 acres of spring cantaloupes (primarily in Maricopa and Yuma Counties). However, IID's principal competitor in the spring cantaloupe marketplace is Mexico. IID's primary competition in the market for fall cantaloupes derives from Arizona and Mexico.

We reviewed 1999 monthly arrivals of cantaloupe shipments by terminal market tabulated by the USDA (including Chicago, Dallas, San Francisco, St. Louis and Los Angeles). This data indicates that about 40% overall, and a clear majority of cantaloupes shipped in May and June to the Los Angeles and Chicago terminal markets, respectively, have an international point of origin (primarily Mexico).

b. Market Power

Given the competitive landscape of the cantaloupe market and particularly the growing significance of Mexico's exports to the U.S. (as noted previously), it appears that IID growers have little control over the prices they receive for cantaloupes. Accordingly, IID growers would be unable to pass on additional costs of water by unilaterally increasing the prices for their cantaloupes. This finding was corroborated by an analysis of historical costs of farm production and IID average cantaloupe prices. Figure 10 presents those prices for the period 1980 through 2000.

Figure 10
CANTALOUPE PRICES
IMPERIAL COUNTY
1980-2000



The figure shows prices remaining relatively flat, despite some fairly significant inter-year variation. The coefficient of determination between IID average cantaloupe prices and both farmer producer prices and California farmer wage rates for the period is near zero, suggesting that trends in the cost of production have no meaningful influence on prices received by IID farmers for their cantaloupes.

III. CONCLUSION

To the extent that growers cannot pass on any increase in their cost of water, they will be adversely impacted financially. Individual growers will be affected differently, depending on their profitability prior to water cost increases and their ability to restructure operations to minimize the impact of higher water costs. Water rates aside, grower profit margins depend on a variety of factors, including crop mix, soil quality, terrain, debt structure and management capabilities. Some of these factors impact profitability by affecting yields and/or production costs.

It is our opinion that IID growers could not recoup increases in their cost of water by unilaterally raising crop prices. Generally, IID growers have little influence over the prices they receive for their crops. In many crop markets, IID is too small a player to exercise market power. For crops that IID growers collectively have a relatively large overall or temporal share of the marketplace, our research discussed above suggests that they still do not have sufficient market power to unilaterally raise their crop prices. With many of these crops, commodity prices are constrained by a highly concentrated packing/shipping infrastructure. Furthermore, NAFTA and continued trade liberalization

within the Western Hemisphere have proven significant additional constraints to IID grower market power.

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APPENDIX A
Price and Cost of Production Data Supporting Dornbusch Associates Analysis

Year	Crop Price									Production Cost Measures	
	Alfalfa Hay ($/ton)	Sudan Grass Hay ($/ton)	Sugar Beets ($/ton)	Wheat ($/ton)	Head Lettuce ($/ton)	Fresh Carrots ($/ton)	Broccoli ($/ton)	Dry Onions ($/ton)	Cantaloupes ($/ton)	PPITW Index	USDA California Avg. Farm Labor Rate ($/hr)
1980	$90.0		$55.0	$155.0		$118.0	$615.0	$121.0	$304.0	949	4.51
1981	$81.0		$41.0	$165.0		$142.0	$680.0	$233.0	$378.0	1035	4.84
1982	$70.0		$36.0	$122.0		$174.0	$889.0	$132.0	$314.0	1090	4.89
1983	$89.0		$41.0	$140.0		$160.0	$540.0	$97.0	$321.0	1104	4.85
1984	$83.0		$39.0	$130.0	$218.0	$151.0	$548.0	$116.0	$308.0	1129	5.32
1985	$86.0		$36.0	$122.0	$230.0	$207.0	$336.0	$114.0	$264.0	1131	5.47
1986	$66.0		$37.0	$115.0	$239.0	$207.0	$390.0	$99.0	$268.0	1109	5.64
1987	$79.0		$37.0	$109.0	$229.0	$180.0	$450.0	$203.0	$275.0	1139	5.90
1988	$85.0	$90.0	$38.0	$140.0	$541.0	$122.0	$538.0	$89.0	$373.0	1191	6.02
1989	$100.0	$85.0	$42.0	$126.0	$355.0	$101.0	$408.0	$120.0	$247.0	1261	6.39
1990	$111.0	$102.0	$44.0	$122.0	$161.0	$221.0	$380.0	$151.0	$427.0	1310	6.34
1991	$73.0	$87.0	$43.0	$150.0	$271.0	$291.0	$427.0	$208.0	$487.0	1334	6.41
1992	$61.0	$69.0	$39.0	$154.0	$241.0	$230.0	$378.0	$129.0	$251.0	1348	6.66
1993	$91.0	$83.0	$39.0	$125.0	$379.0	$270.0	$568.0	$169.0	$346.0	1381	6.56
1994	$109.0	$88.0	$40.0	$136.0	$258.0	$284.0	$431.0	$108.0	$374.0	1416	6.78
1995	$88.0	$85.0	$40.0	$170.0	$400.0	$268.0	$716.0	$156.0	$419.0	1454	6.83
1996	$102.0	$86.0	$41.0	$175.0	$327.0	$228.0	$553.0	$111.0	$355.0	1531	7.01
1997	$118.0	$99.0	$42.0	$153.0	$306.0	$276.0	$694.0	$144.0	$344.0	1574	7.32
1998	$94.0	$99.0	$42.0	$148.0	$326.0	$314.0	$680.0	$191.0	$310.0	1532	7.71
1999	$85.0	$81.0	$44.0	$118.0	$308.0	$368.0	$472.0	$153.0	$305.0	1531	7.88
2000	$82.0	$92.0	$37.0	$129.0	$292.0	$200.0	$515.0	$134.0	$307.0	1594	8.21

Sources: Imperial Irrigation District, Imperial County Agricultural Commissioner's Office and United States Department of Agriculture