Some Impacts of Arizona Department of Environmental Quality (ADEQ) Enforcement in the Dairy Industry in Maricopa County, Arizona

By Ronald Hemmer
Agricultural Economist - Technology Staff
USDA Natural Resources Conservation Service - State Office
Phoenix, Arizona

AAEA Session OS-7F

Tuesday, August 4, 1998, 1:30 - 3:00

ABSTRACT

Although water quality is a valid purpose for watershed projects under the PL83-566 Watershed Protection and Flood Prevention Act, historically very few water quality projects have ever been implemented in Arizona. This is largely due to the difficulty in measuring "non-controversial" monetary benefits associated with positive water quality impacts and to policy biased in favor of those projects with a higher monetary benefit-cost ratio. These reasons, among others, has prompted NRCS field economists to seek alternate methods to measure project benefits and costs.

While the direct measurement of water quality benefits would be the preferable method to use, IMPLAN, through regional economic impact analysis, provides a way of measuring another category of benefits that can be used in the economic analysis of watershed projects.

The key to proper use of IMPLAN is the correct problem definition and accurate modeling of the local economy. The assumptions used in the analysis must be acceptable to the interdisciplinary team and the project sponsors.

Key Words: IMPLAN, Input-Output, watershed analysis, water quality, NRCS, conservation, regional analysis

Some Impacts of Arizona Department of Environmental Quality (ADEQ) Enforcement in the Dairy Industry in Maricopa County, Arizona

I. Background: The Need for the Impact Analysis

In 1995, the Agua Fria-New River and Buckeye-Roosevelt Natural Resource Conservation Districts sent an application to the Secretary of Agriculture requesting assistance in preparing a plan for works of improvement for the West Maricopa Watershed, State of Arizona, under the authority of the Watershed Protection and Flood Prevention Act (PL83-566). The West Maricopa watershed project area consists of about 240,000 acres of land including roughly 100,000 acres of irrigated cropland and 20,000 acres of built-up land (urban use) and the remainder comprised of desert range and mountain land. The principal natural resource problem in the project area was the existing and potential nitrate contamination of groundwater.

Natural conditions and a number of human activities contribute to the nitrate problem in the project area. Potential human-caused sources of nitrate include septic tanks, wastewater treatment plants, urban horticulture, and agricultural activities. Major agricultural activities of concern include application of fertilizers and irrigation water, and management of animal wastes associated with concentrated animal feeding operations (CAFOs).

Agricultural activities are initially regulated under a general permit, which requires use of Best Management Practices (BMPs) to minimize nitrogen discharges. Guidance Practices (GPs) are those site-specific conservation measures which are necessary to achieve the BMPs. The Arizona Department of Environmental Quality (ADEQ) encourages the adoption of BMPs and implementation of GPs through regular contact and educational efforts with agricultural producers. Some technical and financial assistance is available through the conservation districts, the USDA Farm Service Agency, the Cooperative Extension Service and the NRCS. Private consultants also provide services.

While significant progress on adoption of BMPs and implementation of GPs has occurred on irrigated croplands in recent years, many CAFOs remain only marginally in compliance with general permit requirements. In the past several years, numerous complaints have been filed with ADEQ, primarily regarding odor problems on CAFOs. Due to lack of resources, ADEQ's compliance efforts have been largely limited to these complaint-driven situations. If a CAFO was found to be in non-compliance, the general permit would be revoked and the operator would have to apply for an individual permit. It is believed by the project sponsors that the expense and time required to secure an individual permit would force most operators out of business.

Implementation of Guidance Practices on CAFOs including improved animal waste management systems requires extensive resources for design and installation. At any one time, over a dozen requests for technical assistance on CAFOs are on file in the local NRCS field office. A similar number of cost-share requests are received by CFSA. With limited technical and financial resources available, however, only two to three improved systems can be implemented in any one year.

The Sponsor's primary objective in applying for assistance is to reduce the potential for nitrate contamination of the groundwater supply due to CAFOs. They also desire to have CAFOs remain in compliance with general permit requirements and maintain the agricultural component of the regional economy. They propose to realize these objectives by providing accelerated assistance to operators for implementing needed GPs on their operations.

The Sponsors also indicated that, with increased interest by ADEQ in animal waste in general and in CAFOs in particular, they believe enforcement of the existing requirements will be stepped up. They have also stated that certain dairy operations may indeed be forced out of business due to the inability to install animal waste management systems without additional financial and technical assistance. In a letter to the NRCS dated July 1996 the Sponsors stated that:

1. Dairy operations will continue to become fewer in number and larger in size with waste management facilities becoming less adequate for expanding operations.

2. The lack of adequate technical assistance will cause some operations to be found in non-compliance with agricultural general permit requirements. The expense and time required for obtaining an individual permit would force some operations to close.

3. Dairy operations will continue to be vital contributors to the local economy. Additional technical and financial assistance is needed to keep dairy operations in compliance and maintain the local economy.

A project action alternative involves accelerated implementation of needed GPs on 50 CAFOs in the project area, including improved animal waste management systems. Evidence exists of beneficial effects from successful implementation of such systems through ongoing conservation programs. Proper soil, water, plant, nutrient, and pest management practices would be implemented on croplands associated with the CAFOs.

PL83-566 Program Requirements

Traditionally in its management of the PL83-566 program, NRCS has required that the benefits exceed the costs of the project in order to receive funding. Although current policy emphasizes that benefits can be either monetary or non-monetary (water quality, wildlife, cultural, etc.), in the recent past a project with a monetary benefit cost ratio of less than 1:1 was viewed with great suspicion and generally had great difficulty in getting the authorization to proceed with planning and implementation.

Planning for the Small Watershed program must utilize the Principles and Guidelines of the Water Resource Council. P&G requires that project benefits be displayed in 4 separate accounts. They are:

1. National Economic Development - Beneficial effects in the NED account are increases in the economic value of the national output of goods and services from a plan.

2. Environmental Quality - Beneficial effects in the EQ account are favorable changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

3. Regional Economic Benefits - The positive effects of a plan on a region's income are equal to the sum of the NED benefits that accrue to that region, plus transfers of income to the region from outside the region.

4. Other Social Effects - These are the positive effects on income, employment, and population distribution, fiscal condition, energy requirements and energy conservation many be reported on a positive or negative basis

The Difficulty of Benefit Analysis

With the categories of benefits traditionally used in PL83-566 analysis watershed planners were at a loss to quantify the positive benefits of the West Maricopa Watershed Project both monetary and otherwise. Efforts **are** underway, however, in the Army Corps of Engineers' Institute for Water Resources and in the NRCS to develop more direct methods of measuring the monetary benefits that derive from the protection or enhancement of water quality but those new methodologies are not yet available.

Acceptable indirect methods exist (contingent valuation, hedonic pricing, etc.) but in most cases the cost of doing the analyses is prohibitively high and the length of time required to do such studies is not acceptable. NRCS field economists no longer have the resources to conduct such detailed studies. For the West Maricopa Watershed Project there existed the distinct possibility that despite the implementation of BMPs the inability to quantify the potential project benefits would jeopardize project approval.

Additionally, the measurement of the beneficial effects of a water quality project has always been a difficult task due primarily to the lack of baseline starting data. When baseline data is not available it is impossible to estimate the potential benefits (cause and effect) of a project to improve the water resource. One reason for the lack of preexisting data is the high cost of water quality monitoring.

When considering how to quantify the benefits of the West Maricopa Project several strategies were investigated and then discarded. For example, it would be possible to measure the actual nitrate contribution to the groundwater from participating dairies but the PL566 program is voluntary and it is not known at the present time who the participants might be. Monitoring is too costly to be conducted for all potential project locations.

The IMPLAN regional impact analysis model, however, provided the economist and other project planners the opportunity to link the expected future without a project to real and measurable effects on the watershed economy, allbeit not water quality monetary benefits. In this case, Implan would measure the negative effects on the watershed economy if dairies in the watershed were shut down because they could not afford or otherwise obtain the technical assistance they needed to stay in business.

It is acknowledged that the following analysis is of very narrow focus. It looks only at the direct effect on the dairy industry and the backward linkages of that industry (onsite effects). The direct and indirect effects on water quality (onsite and offsite) are not estimated due primarily to the reasons discussed above. Additionally, regulations that require the adoption of BMPs and GPs impose a cost on the dairy producers ($80,000 per waste management system including associated measures and technical assistance) which has not been discussed in this analysis. A more complete economic analysis might discover very different results indeed.

II The Setting

There are about 70 commercial concentrated animal feeding operations in the West Maricopa project area, including 60 dairies and 10 feedlots. The IMPLAN analysis showed that in 1993 the Maricopa county dairy industry produced $163 million in products, mostly unprocessed fluid milk and another $26 million in byproducts. Most of this fluid milk was purchased by local milk processors who added value to the raw milk by processing it and then selling the finished product to the grocery industry. In the 10 year period from 1982 to 1992 the value of dairy products sold by dairy farms in the county has increased by 32%.

This $191 million industry paid more than $20 million in direct wages to supply more than 1,800 local jobs (full and part time).

The number of dairy farms in Maricopa county has decreased by 38% during the 1982-1992 period, but the number of milk cows in the county has increased 12.5%. Farms are fewer in numbers, but those remaining are getting larger. Output per cow has also increased

The Analysis

The IMPLAN analysis measures the economic impacts to Maricopa County from a potential closure of a 1000 head dairy. The closure occurs when a dairy farm is required to adopt BMPs and GPs but due to lack of technical assistance and financial hardship they are instead forced to close.

A 1000 cow dairy, a typical size in Maricopa county, spends more than $800,000 per year on local labor, services, and goods, most of which are produced locally. Dairies hire labor to milk, feed, and maintain the herd. Local service companies are paid for utilities, repair, and maintenance, vet services, milk hauling, marketing, etc. Goods are purchased from local hay and grain farms, feed companies, fuel suppliers, agricultural supply companies, farm machinery

dealers... More than $800,000 is additionally spent on fixed cost-type items - taxes, capital expenditures, hired labor, owners retained earnings, etc. Farm equipment is purchased from equipment dealers; taxes are paid to the local, state, and federal governments.

A 1000 head dairy supplies more than $2 million in local milk to local milk processors. These milk companies might otherwise have to buy from more expensive sources outside the area. Any reduction in the cost of wholesale milk industry can mean lower priced retail milk available for consumers.

The economic activities generated from these backward and forward linkages are lost when a dairy business ends operations. The dairy industry no longer purchases as much hay, fuel, labor and other inputs. In turn, the hay, fuel and labor industries no longer buy as much as their inputs as usual. The ripple effect of a lost dollar in output means substantial more overall economic impacts.

Economic Impact Assessment

Loss in economic activity generated by the dairy industry can come about directly (i.e. sales decrease from $191 million to $170 million, and the inputs used to produce these sales contract proportionately) or indirectly (i.e. sales increase 5% in the next ten years instead of a projected 10%). Either way, the loss would have a damaging effect on businesses that either buy the dairy industries products (forward linked industries) or businesses from whom dairies purchase good, labor and services (backward linked industries). The economic impacts analyzed in this report involve only a decrease in purchases by the dairy industry from backward linked industries.

Table 1 (Page 7, columns 1 to 3) shows the dairy farm enterprise budget that was used to determine the amount of economic activity in backward linked industries that would be lost if a dairy closed. At the time of the analysis budget data was not available for Maricopa County. Instead this data comes from a 1993 survey of 90 “South Valley” dairies completed by the California (State) Department of Food and Agriculture. The similarity in climate and agricultural production methods between the southern San Joaquin Valley and Maricopa County permits valid analysis.

This budget data was then allocated to the backward linked industries shown in Columns 4 to 8 in Table 1. These industries were chosen based on their prominence in supplying inputs to the Maricopa County dairy industry. The value-added categories shown in Table 1 are not directly used in this analysis (input-output modeling mainly is concerned with variable cost industries).

Although Table I shows only about 10 industries impacted, these impacts are actually spread out among all the production activities in each of these industries. The final industries impacted total several dozen (this information is available from the authors). The main economic impacts still occur in the original 10 industries.

Table 1. Dairy Farm Budget and Backward Linked Industries'

Variable Activity	Budget	cost/cwt	IMPLAN Event	RPC	Indust. # Name
Roughage					
	Dry Roughage	$1.63	Hay (dry roughage)	0.75	13 Hay and Pasture
	Wet Roughage	$0.84	Silage (wet roughage)	0.75	13 Hay and Pasture
Concentrate					
	Roughage	$3.13	Feed Grain	0.15254	12 Feed Grain
			Prepared Feed	0.5	78 Prepared Feed
			Soybean Meal	0	87 Soybean Mill
Marketing					
	Milk Hauling	$0.22	Milk Transportation	0.9224	435 Motor Transportation
	Other Marketing	$0.33	Other Marketing	0.692	26 Agricult.
Services					
Interest					
	Interest	$0.01	Interest	0.6404	456 Banking
Operating					
	Operating Cost	$1.44	Wholesale Trade	0.808	447 Wholesale Trade
	Ag. Services			0.69218	26 Agric. Services
	Utilities			0.812	443 Electric Services
	Veterinary			0.899	493 Other Med. & Health
	Maintenance/Repair			0.724	56 Maint. and Repair -
	Machinery repairs			0.5439	309 Farm Mach.
& Equip					
Total Variable Costs	$7.60				

Value Added Costs (Note: The economic impacts reported in this analysis do not use the following items directly)

Labor	$1.38	Hired labor	1000	Employee Compensation
Herd Replacement	$1.34	Herd Replacement	1001	Proprietor Income
Taxes and insurance	$0.07	Insurance	1001	Proprietor Income
		Taxes	1001	Proprietor Income
Depreciation	$0.36	Depreciation	1003	Other Property Income
Return on Management	$0.55	Ret. toManagement	1001	Proprietor Income
Return on Investment	$1.20	Ret. on Investment	1003	Interest
Total Value Added Costs	$4.90			

Total cost	$12.50
Blended Milk price	$11.50
Production	
Cwtlcow	190
Typical herd size	1,000

Using the IMPLAN Output

Two scenarios were used to analyze economic impacts. The first, a *Short Term* scenario, assumed the local economy is basically inflexible. When a 1,000 cow dairy goes out of business, backward-linked economic activities also end. Hired labor stops spending money at stores, hay acreage declines, fertilizer companies sales decrease, local feed grain companies do less business, etc. This may be a realistic snapshot of how the local economy is impacted in the short term.

The second scenario, a *Long Term* scenario tries to account for flexibility in the local economy When a 1,000 cow dairy goes out of business, substitute economic activity occurs: other dairies increase their herd size, new dairies enter the industry, hay acreage converts to other crops or to housing, hired labor finds new employment, etc.. This may be a realistic snapshot of how the local economy is impacted over a longer period. The actual time needed for an economy to make these adjustments depends on many factors (size, depth, diversity, entrepreneurs, ...) not analyzed for this report.

Table 2 shows the results for the *Short Term* scenario: a 1,000 cow dairy producing an average 19,000 pounds of milk per cow per year goes out of business.

Table 2. Economic Impacts from a 1,000 cow dairy shut down (negative **numbers).**

Economic Activity	Direct Effects	Multiplier Effects	Total Effects
Backward Linked Industries			
Final Demand	$713,000	$518,000	$1,231,000
Total Industry Output	$713,000	$719,000	$1,432,000
Total Value Added	$543,000	$458,000	$1,001,000
Income (Wages)	$157,000	$247,000	$ 404,000
Jobs	16.8	11	28
Dairy Industry			
Disposable Income	$157,300	$ 276,900	$ 434,200

Table 2 shows that dairies stop purchasing about $713,000 of the services and goods produced by backward linked industries (see Table I for the main industries impacted'). This is shown as *Direct Effects to Final Demand* This causes a $713,000 reduction in the economic output (sales) of these backward linked industries *(Direct Effect to Total Industry Output).* The value added by these industries decrease by about $543,000 *(Direct Effects to Total Value Added.*- see Table I - value added includes the dairy owner's profits, depreciation on capital, taxes paid, and other non-variable cost items).

The local income (wages for hired laborers) lost in these backward linked totals about $157,000 and consists of 17 full time and part time jobs *(Direct Effect on Income* and *Jobs).* In the dairy farm industry itself, an additional $157,000 of disposable income is lost (gross wages minus 40% for taxes and benefits) which accounts for about 10 full time and part time jobs *(Direct Effect on Disposable Income and Jobs).*

These direct economic impacts (i.e. *Direct Effects)* lead to the secondary impacts that are listed in the *Multiplier Effects column. Multiplier Effects* include "indirect" effects and "induced" effects. Indirect effects occur because the direct inputs needed by an industry to produce its output and sales, require additional inputs (i.e. indirect) to produce. For example**,** every $ 1.00 of milk sold by the dairy industry may have required $.60 of direct inputs to produce (i.e. $.02 for replacement calf milk; $.03 for fuel, $.5 for feed, etc.); but each of these direct inputs required *additional* variable cost inputs to produce (i.e. the $.02 in replacement calf milk would have required exactly the same proportional milk, fuel and feed costs to produce as the original $1 in sales -$.0004 replacement calf milk, $.0006 fuel, $.0l for feed ...). These secondary inputs requirements are captured by indirect effects.

Induced effects occur from the loss in consumer spending that occurs from lost income (hired labor wages and lost proprietor income in an industry. For example, every $1 in wages may be spent on $1 in food, $.05 clothing. $.10 recreation, etc.). The $.10 reduction in recreation industry sales results in additional lost wages in the recreation industry that *again* result in lost consumer expenditures (i.e. a $.0l loss in recreation industry wages causes reduced expenditures of $.00 on food, .005 in clothing, .00 in recreation, etc.). These income expenditure effects are known as induced effects.

The combined induced and indirect effect mean that every $1 decrease in dairy industry purchases gets multiplied into lost economic activity by backward linked industries. The decrease in sales also result in less wages being paid -Every $1 in lost wages gets multiplied into lost consumer expenditures. These multiplied economic impacts are summarized in Table 2, Column 2, *Multiplier Effects. Adding Multiplier Effects to Direct Effects* results in the *Total Economic Effects.*

In summary, the total short term, economic impacts of a 1,000 cow dairy going out of business includes:

- 50 lost full time and part time jobs
- $1,400,000 less local sales (industrial output in backward linked industries)
- $550,000 less regional wage income (from hired labor wages in backward linked industries and the dairy industry)
- $1,000,000 less value-added economic activity (i.e. employee compensation, owner income taxes, and other property income).

In the short term**,** the main impact of dairy farm closures in Maricopa county studied in this report was on industries that are backward linked to it, such as hay and feed producers. Depending on the number of dairies exiting the industry, these impacts could be severe. Each 1,000 dairy that closes could result in the loss of 50 full time and part time farm labor jobs, and $1.4 million in sales in these backward linked industries.

In the long term, the economic impacts of dairy closures will be less severe. Dairies that remain in business might continue their trend of increasing their herd size; new dairies might enter the business; new markets for hay might be found; alternative crops might be grown.

This simplifies the analysis. The actual economic activities that would adjust to losses of dairy farm businesses would be more complicated. Other dairies might expand, alternative markets might be found for hay, alternative crops might be grown on hay ground etc... The assumptions needed to incorporate these changes would be tenuous at best and far fetched at worst.

Assumptions Used for the West Maricopa Watershed

The emphasis for this paper is not to detail the analysis but to demonstrate how the results of the IMPLAN analysis were used to calculate the NED benefits in the watershed area affected by the West Maricopa Watershed Project.

Because of the lack of specific data and in order to quantify the monetary benefits for the West Maricopa Watershed study, the following assumptions were made with the advice and consent of the project Sponsors and other local persons knowledgeable with the project area.

Two additional alternatives were analysed to reflect other potential outcomes should a dairy in the West Maricopa Watershed be forced out of business due to increased DEQ enforcement.

Alternative 1:

1) We will assume that 60% of the direct benefits (the purchases and other backward links of the dairy) will be directly from the watershed and 40% will be to areas outside of the watershed. Dairies hire labor to milk, feed, and maintain the herd. Local service companies are paid to provide utilities, repair equipment and buildings, mend sick cows, haul milk, and a host of other items. Goods are purchased from local hay and grain farms, feed companies, fuel suppliers, agricultural supply companies, farm machinery dealers, and others. The percentages used are only estimates. Extensive research would be needed to determine the actual numbers.

2) We will assume that in the future without project scenario the dairy will go out of business and will not relocate to another area of the watershed or outside of the watershed. There is no available evidence to assume any other possibility.

3) Even though the project sponsors believe that up to 10 percent of the potential participants may not be able to meet the state requirements for animal waste management and may be subject to closure in the without project scenario for purposes of the study we will assume that one dairy operation will go out of business.

4) The timing of the business closure in important in determining the actual benefits of the financial assistance project. We will assume that it will occur in year one of the project lifetime.

5) The 1,000 head dairy will be used as the dairy assumed to go out of business.

6) It is difficult to account for differences in the short-term scenario and the long-term scenario. As with the IMPLAN study of the dairy, the Short Term scenario is used to

represent the probable occurrence in the watershed for years 1-8; then the Long Term scenario for years 9-25.

7) With Project Scenario - All dairies in the watershed have the financial resources (or assistance) to meet state requirements for proper animal waste utilization. All remain open during the 25 year time scenario.

8) Without Project Scenario - One dairy goes out of business because they do not have the financial resources and access to technical assistance to make the improvements necessary to meet state requirements for proper animal waste utilization.

9) Impacts due to substitution of manure for store-bought fertilizer were not calculated.

10) While the model which has been used to produce the results presented in this analysis is called a regional impacts model it is more accurately, in this case, a watershed-wide impact model since the information is collected on a county by county basis and extrapolated to the watershed level. The benefits are therefore NED benefits and are not RED benefits for PL83-566 purposes.

11) The monetary impacts to the watershed are considered NED benefits. In this case, the stated future without project becomes the basis of comparison. The project action will prevent deintensification of agriculture in the watershed and the other negative effects which have been stated in the future without project conditions.

12) The primary group of employees directly affected by the closure of the dairy are Mexican or Mexican-American employees who are low skilled with little formal education. Currently unemployment rates for this group are above 20 percent and thus employment benefits are NED benefits.

The analysis and modifications is shown in Table 3 , page 14. Page 15 shows the amortization of the results.

Alternative 2:

1). This alternative assumes that the Short Term effects last for three years.

2) The chance of agricultural land converting to other land use is quite dependent on its location in the Watershed. Those CAFOs located close to the sububs of the Metro area have a much better chance of being developed. Approximately 46 percent of the CAFOs are located east of the Agua Fria River and are more likely to be developed. Therefore 54 percent of those benefits will be linked to the continuation of the dairy industry.

3) Long Term effects are multiplied by 54 percent and this modified Long Term effect continues from year 3 until for the life of the project.

4) Re-Employment of displaced workers is assumed to be 40 percent in year 1, 20 percent in year 2 and Zero for the remainder of the analysis period.

5) All other assumptions not modified are the same as Alternative 1.

A Table showing the Present Values-Benefits and Costs are of Alternative Two is shown on page 16.

Alternative 3:

1) This alternative is the same as Alternative 2 except that Total Effects are used in the financial analysis instead of only direct effects.

2) All other assumptions not modified are the same as Alternative 1.

A tables showing the Present Values-Benefits and Costs of Alternative Three is shown on page 17.

Conclusion

Easily calculated methodologies to measure the direct impacts of environmental quality improvements are not currently available to NRCS field economists. The IMPLAN model, under some circumstances, may permit the economist to measure the regional impacts when the agricultural economy is affected by some action (or non-action) in the agriculture/natural resources sector. Although it may be necessary to make many assumptions, this is appropriate where general agreement on those assumptions can be obtained from natural resource specialists and project sponsors. Two other alternatives are analyzed and the amortization shows that assumptions made have a significant effect of the final benefit-cost ratio. Even with these fast redevelopment and short re-employment assumptions, net benefits of the project were still positive.

TABLE 3: SHORT AND LONG TERM EFFECT ADJUSTED FOR ECONOMIC ASSUMPTIONS FOR THE WEST MARICOPA WATERSHED

ECONOMIC ACTIVITY	DIRECT	MULTIPLIER EFFECTS	TOTAL EFFECTS
BACKWARD LINKED INDUSTRIES			
Final Demand	713,000	518,000	1,231,000
Total Industry Output	713,000	719,000	1,432,000
Total Value Added	543,000	458,000	1,001,000
Income (Wages)	0	0	0
Jobs	17	11	28
DAIRY INDUSTRY			
Jobs	11	11	22
Total Jobs	27	22	49
SHORT-TERM EFFECTS (60% of the benefits to the watershed)			
BACKWARD LINKED INDUSTRIES			
Final Demand	427,800	310,800	738,600
Total Industry Output	427,800	431,400	859,200
Total Value Added	325,800	274,800	600,600
Jobs	11	11	21
DAIRY INDUSTRY			
Jobs	8	8	16
Total Jobs	19	19	37
LONG-TERM EFFECTS (50% of the benefits in the short-term)			
BACKWARD LINKED INDUSTRIES			
Final Demand	213,900	155,400	369,300
Total Industry Output	213,900	215,700	429,600
Total Value Added	162,900	137,400	300,300
Jobs	6	6	10
DAIRY INDUSTRY			
Jobs	4	4	8
Total Jobs	10	10	18
SHORT-TERM			
OUTPUT	427,800	431,400	859,200
VALUE ADDED	325,800	274,800	600,600
TOTAL	753,600	706,200	1,459,800
LONG-TERM			
OUTPUT	213,900	215,700	429,600
VALUE ADDED	162,900	137,400	300,300
TOTAL	376,800	353,100	729,900

Alterantive 1

PRESENT VALUES--BENEFITS AND COSTS
WEST MARICOPA WATERSHED COSTS/BENEFITS

0.07375 Percent (Discount Rate)
25 Years (Period of Analysis)

YEARS	PV FACTOR	COSTS	PV COSTS	OM&R	PV OM&R	BENEFITS	PV BENEFITS
1	0.93132	2492000	2320838		0	753600	701839
2	0.86735	0	0	85000	73725	706500	612782
3	0.80778	0	0	85000	68661	659400	532647
4	0.75229	0	0	85000	63945	612300	460629
5	0.70062	0	0	85000	59553	565200	395992
6	0.65250	0	0	85000	55463	518100	338061
7	0.60768	0	0	85000	51653	471000	286219
8	0.56595	0	0	85000	48105	423900	239904
9	0.52707	0	0	85000	44801	376800	198601
10	0.49087	0	0	85000	41724	376800	184961
11	0.45716	0	0	85000	38858	376800	172257
12	0.42576	0	0	85000	36189	376800	160425
13	0.39651	0	0	85000	33704	376800	149407
14	0.36928	0	0	85000	31389	376800	139145
15	0.34392	0	0	85000	29233	376800	129588
16	0.32029	0	0	85000	27225	376800	120687
17	0.29830	0	0	85000	25355	376800	112398
18	0.27781	0	0	85000	23614	376800	104678
19	0.25873	0	0	85000	21992	376800	97488
20	0.24096	0	0	85000	20481	376800	90792
21	0.22441	0	0	85000	19074	376800	84556
22	0.20899	0	0	85000	17764	376800	78748
23	0.19464	0	0	85000	16544	376800	73339
24	0.18127	0	0	85000	15408	376800	68302
25	0.16882	0	0	85000	14350	376800	63611
26	0.15722	0	0	85000	13364	0	0
27	0.14642	0	0	0	0	0	0
28	0.13637	0	0	0	0	0	0
29	0.12700	0	0	0	0	0	0
30	0.11828	0	0	0	0	0	0

SUM OF PRESENT VALUES	2320838	892173.8	5597054
AVERAGE ANNUAL EQUIVALENT	205926	79161.82	496621.8
BENEFIT-COST RATIO	1.741996		

Alterantive 2

PRESENT VALUES--BENEFITS AND COSTS
WEST MARICOPA WATERSHED COSTS/BENEFITS

0.07375 Percent (Discount Rate)
25 Years (Period of Analysis)

YEARS	PV FACTOR	COSTS	PV COSTS	OM&R	PV OM&R	BENEFITS	PV BENEFITS
1	0.93132	2492000	2320838		0	791350	736997
2	0.86735	0	0	85000	73725	772500	670027
3	0.80778	0	0	85000	68661	753600	608739
4	0.75229	0	0	85000	63945	203500	153092
5	0.70062	0	0	85000	59553	203500	142577
6	0.65250	0	0	85000	55463	203500	132784
7	0.60768	0	0	85000	51653	203500	123664
8	0.56595	0	0	85000	48105	203500	115170
9	0.52707	0	0	85000	44801	203500	107260
10	0.49087	0	0	85000	41724	203500	99892
11	0.45716	0	0	85000	38858	203500	93031
12	0.42576	0	0	85000	36189	203500	86642
13	0.39651	0	0	85000	33704	203500	80691
14	0.36928	0	0	85000	31389	203500	75148
15	0.34392	0	0	85000	29233	203500	69987
16	0.32029	0	0	85000	27225	203500	65180
17	0.29830	0	0	85000	25355	203500	60703
18	0.27781	0	0	85000	23614	203500	56534
19	0.25873	0	0	85000	21992	203500	52651
20	0.24096	0	0	85000	20481	203500	49034
21	0.22441	0	0	85000	19074	203500	45666
22	0.20899	0	0	85000	17764	203500	42530
23	0.19464	0	0	85000	16544	203500	39609
24	0.18127	0	0	85000	15408	203500	36888
25	0.16882	0	0	85000	14350	203500	34355
26	0.15722	0	0	85000	13364	0	0
27	0.14642	0	0	0	0	0	0
28	0.13637	0	0	0	0	0	0
29	0.12700	0	0	0	0	0	0
30	0.11828	0	0	0	0	0	0

SUM OF PRESENT VALUES	2320838	892173.8	3778849
AVERAGE ANNUAL EQUIVALENT	205926	79161.82	335294
BENEFIT-COST RATIO	1.176108		

Alternative 3

PRESENT VALUES--BENEFITS AND COSTS
WEST MARICOPA WATERSHED COSTS/BENEFITS

0.07375 Percent (Discount Rate)
25 Years (Period of Analysis)

YEARS	PV FACTOR	COSTS	PV COSTS	OM&R	PV OM&R	BENEFITS	PV BENEFITS
1	0.93132	2492000	2320838		0	1564000	1456577
2	0.86735	0	0	85000	73725	1519900	1318283
3	0.80778	0	0	85000	68661	1459800	1179190
4	0.75229	0	0	85000	63945	394200	296554
5	0.70062	0	0	85000	59553	394200	276185
6	0.65250	0	0	85000	55463	394200	257216
7	0.60768	0	0	85000	51653	394200	239549
8	0.56595	0	0	85000	48105	394200	223096
9	0.52707	0	0	85000	44801	394200	207772
10	0.49087	0	0	85000	41724	394200	193502
11	0.45716	0	0	85000	38858	394200	180211
12	0.42576	0	0	85000	36189	394200	167833
13	0.39651	0	0	85000	33704	394200	156306
14	0.36928	0	0	85000	31389	394200	145570
15	0.34392	0	0	85000	29233	394200	135572
16	0.32029	0	0	85000	27225	394200	126260
17	0.29830	0	0	85000	25355	394200	117588
18	0.27781	0	0	85000	23614	394200	109511
19	0.25873	0	0	85000	21992	394200	101990
20	0.24096	0	0	85000	20481	394200	94985
21	0.22441	0	0	85000	19074	394200	88461
22	0.20899	0	0	85000	17764	394200	82385
23	0.19464	0	0	85000	16544	394200	76726
24	0.18127	0	0	85000	15408	394200	71456
25	0.16882	0	0	85000	14350	394200	66548
26	0.15722	0	0	85000	13364	0	0
27	0.14642	0	0	0	0	0	0
28	0.13637	0	0	0	0	0	0
29	0.12700	0	0	0	0	0	0
30	0.11828	0	0	0	0	0	0

SUM OF PRESENT VALUES	2320838	892173.8	7369327
AVERAGE ANNUAL EQUIVALENT	205926	79161.82	653874
BENEFIT-COST RATIO	2.293588		