2004 Water Use Efficiency Proposal

Project Information Form

Applying for: ❑ Urban **X Agricultural**

1. (Section A) **Urban or Agricultural Water Use Efficiency Implementation Project**
   - ❑ (a) implementation of Urban Best Management Practice, #_____
   - ❑ (b) implementation of Agricultural Efficient Water Management Practice, #_____
   - ❑ (c) implementation of other projects to meet California Bay-Delta Program objectives, Targeted Benefit # or Quantifiable Objective #, if applicable _____
   - ❑ (d) Specify other: _____

2. (Section B) **Urban or Agricultural Research and Development; Feasibility Studies, Pilot, or Demonstration Projects; Training, Education or Public Information; Technical Assistance**
   - **X (e) research and development, feasibility studies, pilot, or demonstration projects**
   - ❑ (f) training, education or public information programs with statewide application
   - ❑ (g) technical assistance
   - ❑ (h) other

3. Principal applicant (Organization or affiliation): **Anderson-Cottonwood Irrigation District**

4. Project Title: **ACID Water Balance Study and Sprinkler Evaluation**

5. Person authorized to sign and submit proposal and contract:

Name, title	**Dee Swearingen** Anderson-Cottonwood Irrigation District
Mailing address	2810 Silver Street Anderson, CA 96007-4297
Telephone	(530) 365.7329
Fax.	(530) 365-7623
E-mail	**acidwater@sbcglobal.net**

6. Contact person (if different): Name, title

Mailing address

Telephone

Fax.

E-mail

7. Grant funds requested (dollar amount): **$200,000**

(from Table C-1, column VI)

8. Applicant funds pledged (dollar amount): **$100,000**

9.Total project costs (dollar amount): **$300,000**

(from Table C-1, column IV, row n)

10. Percent of State share requested (%) **67%**

(from Table C-1)

11. Percent of local share as match (%) **33%**

(from Table C-1)

12. Is your project locally cost effective?

Locally cost effective means that the benefits to an entity (in dollar terms) of implementing a program exceed the costs of that program within the boundaries of that entity.

(If yes, provide information that the project in addition to Bay-Delta benefit meets one of the following conditions: broad transferable benefits, overcome implementation barriers, or accelerate implementation.)

❑ (a) yes

X (b) no

11. Is your project required by regulation, law or contract?
If no, your project is eligible.

If yes, your project may be eligible only if there will be accelerated implementation to fulfill a future requirement and is not currently required.

Provide a description of the regulation, law or contract and an explanation of why the project is not currently required.

❑ (a) yes
X (b) no

12. Duration of project (month/year to month/year): **12/05 to 12/06**

13. State Assembly District where the project is to be conducted: **2nd**

14. State Senate District where the project is to be conducted: **4th**

15. Congressional district(s) where the project is to be conducted: **2nd**

16. County where the project is to be conducted: **Shasta**

17. Location of project (longitude and latitude) **Longitude -122.33 W Latitude 40.46 N**

18. How many service connections in your service area (urban)? **n/a**

19. How many acre-feet of water per year does your agency serve? **110,000 AF**

20. Type of applicant (select one):

❑ (a) City
❑ (b) County
❑ (c) City and County
❑ (d) Joint Powers Authority
X (e) Public Water District
❑ (f) Tribe
❑ (g) Non Profit Organization
❑ (h) University, College

❑ (i) State Agency

❑ (j) Federal Agency

❑ (k) Other

❑ (i) Investor-Owned Utility

❑ (ii) Incorporated Mutual Water Co.

❑ (iii) Specify _____

21. Is applicant a disadvantaged community? If 'yes' include annual median household income.

    (Provide supporting documentation.)

❑ (a) yes, _____ median household income

X (b) no

2004 Water Use Efficiency Proposal
Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the proposal;

The individual signing the form has the legal authority to submit the proposal on behalf of the applicant;

There is no pending litigation that may impact the financial condition of the applicant or its ability to complete the proposed project;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant;

The applicant will comply with all terms and conditions identified in this PSP if selected for funding; and

The applicant has legal authority to enter into a contract with the State.

	Dee E. Swearingen	
_____	General Manager_____	_1-10-05_
Signature	Name and title	Date

ACID Water Balance Study and Sprinkler Evaluation

Statement of Work

Section One: Relevance and Importance

This proposal is for the Irrigation Training and Research Center (ITRC) to conduct a *Modernization Feasibility Study of Anderson-Cottonwood Irrigation District* (ACID) and to provide cost share for the implementation of on-farm irrigation conversion from inefficient border strips to a certain sprinkler setup specially suited to this area. The proposed study would directly address the actions that ACID needs to take in order to make quantified contributions towards meeting CALFED quantifiable objectives (QOs) for the region. The ITRC will determine the technical feasibility, ease of adoption, risk, and benefit and cost ratio of modernization alternatives identified through a comprehensive analysis of the district's infrastructure and management, as well as on-farm irrigation systems.

Need for Project

ACID is actively pursuing modernization efforts but needs specialized, technical assistance to enhance its traditional in-house engineering expertise. The critical first step for ACID is to develop a comprehensive strategy for identifying, quantifying, and linking quantifiable objectives (QOs) with practical and cost effective modernization actions that can be implemented at the levels of both the district conveyance and control facilities and on-farm irrigation systems.

In addition, the potential contributions related to water quantity, quality, and in-stream flow or timing resulting from modernization projects must be quantified. The ability to quantify the amount of potentially available water from improvements in management and hardware will be critical to understanding and measuring the benefits directly associated with individual modernization projects. The proposed feasibility study is aimed at providing the tools necessary for ACID to select and implement appropriate modernization options, while at the same time being able to assess the resulting benefits to the environment, local economics and district operations.

Background

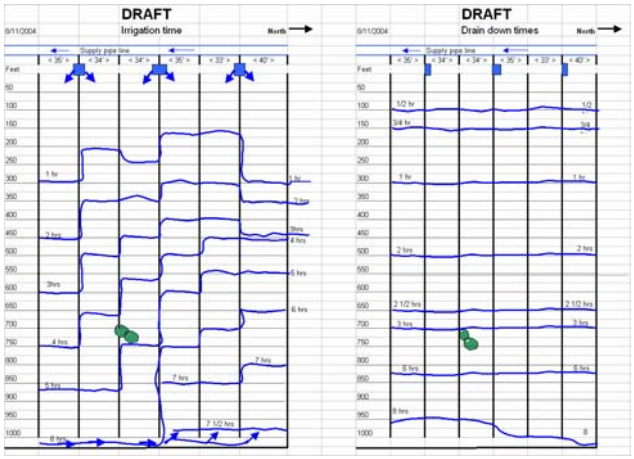
The Anderson-Cottonwood Irrigation District (ACID or District) supplies about 110,000 acre-feet of irrigation water annually for various agricultural needs throughout southern Shasta and northern Tehama Counties in California. The District encompasses about 32,000 acres, and its distribution system includes approximately 35 miles of Main Canal with many laterals and field turnouts. The Churn Creek Lateral is one of the largest lateral systems used to convey irrigation water within the District, serving about 1,000 acres on deliveries of about 20,000 acre-feet annually (roughly 20 af/a).

The original construction of the Churn Creek Lateral was completed prior to 1920, and included an earthen canal with an elevated flume over the Sacramento River. When originally constructed, the canal enabled ACID to convey water from the ACID Main Canal to irrigation users on the west side of the Sacramento River and in the Churn Creek Bottom on the east side. After the flume was washed out in a major flood in 1937, a new river diversion and pump station were constructed on the east bank of the Sacramento River immediately downstream of the present-day South Bonnyview Road Bridge. The Bonnyview Diversion (also called the Churn Creek Pumping Plant) had an original capacity of 75 cubic feet per second (cfs), consistent with historical demands and deliveries on the east side of the river. However, because of refurbishment, the current Churn Creek Pumping Plant has a maximum capacity of about 60 cfs.

The high water requirement in the Churn Creek Lateral area prompted the district to request the Cal Poly Irrigation Training and Research Center (ITRC) to perform a Rapid Appraisal Process (RAP). The following were the recommendations based on an evaluation of the potential for water conservation in the Churn Creek Lateral area.

- **Getting the board "on board" for changes required**
- **Training of operators - a higher level of professionalism**
- **Extensive use of SCADA and Automation**
- **New and better flow measurement of difficult conditions.**
- **Better water control structures**
- **Improved methods of water ordering and scheduling of deliveries.**
- **Increased usage of storage for flexibility of both deliveries and power consumption.**
- **Evaluate pipe lining options**
- **Modify pumping plant operations (VFD)**
- **Improve on-farm operations – allow growers to switch to updated irrigation techniques - sprinklers**

There were two meetings held in the Fall of 2004 to discuss the findings with the ACID Board of Directors and the farmers. It was obvious that there was a pressing need to evaluate new irrigation methods (last bullet from above). The district growers were using primarily border strip irrigation on pastures (see below for a typical irrigation). In order to reduce the water deliveries, growers need to make drastic changes in the method of irrigation.



However, another more pressing need for the district is that there is tremendous pressure on the district in the evaluation of water use. The district is being targeted by outside agencies that are evaluating the water use and water destinations within the district boundaries. The data and evaluation is not complete and thorough. It is imperative that the district direct an independent water balance within their boundaries to identify the water coming into the district, but also the water being discharged from the district.

This is a 2-part proposal. The first part is to perform a Water Balance. The second part is to perform an evaluation of a conversion to a new on-farm irrigation method.

Section Two: Technical/Scientific Merit, Feasibility

The project will be a comprehensive *Modernization Feasibility Study* to support the implementation of agricultural water conservation capital outlay projects that will improve water use efficiency and project performance. It is also part of this proposal to provide cost share to assist farmers who currently irrigate very sandy fields with border strips to convert to a sprinkler system.

The modernization study will be conducted with the cooperation and technical assistance of the Irrigation Training and Research Center (ITRC) of California Polytechnic State University, San Luis Obispo. Specifically, the ITRC will determine the technical feasibility, ease of adoption, risk, and benefit and cost ratio of modernization alternatives identified through a comprehensive analysis of the district's infrastructure and management, as well as on-farm irrigation systems.

The proposed feasibility study will include

- Development of a water balance for the district, conveyance system, and farms
- An assessment of the internal processes of farm irrigation
- An assessment of the internal processes of water conveyance and control
- An assessment of the local farm and district economics
- An evaluation of alternatives for improving on-farm irrigation efficiency and water conveyance and control, for the dual purpose of (1) identifying and meeting quantifiable objectives (QOs) in the region, and (2) improving the economic sustainability of the district and its farmers.

Using the information and recommendations from the feasibility study, the district will be able to target specific actions for improving water use efficiency and quantify the amount of water potentially available. It is anticipated that the modernization options to consider will include agricultural water conservation capital outlay projects that address the following:

(i) facilitation of capital improvements for on-farm irrigation
(ii) automation of canal structures and pumping facilities
(iii) increasing flexibility in water ordering and delivery
(iv) implementing modified operation of re-regulating reservoirs
(v) continued implementation of an appropriate flow measurement program
(vi) lining or piping ditches (if appropriate)
(vii) increasing on-farm irrigation efficiency

Scope of the Project: Task A - ACID Modernization Feasibility Study

The ITRC will provide independent technical expertise for the specific tasks summarized below. Upon completion of the study, the information and recommendations for modernization alternatives will be available to support implementation of the most efficient and beneficial mix of management and infrastructure elements. The work plan for the modernization feasibility study is broken down into the following main tasks.

Task 1- Background Data Collection and Organization
Task 2- Rapid Appraisal Process (RAP) for the Entire District
Task 3- Development of Water Balance
Task 4- Initial Evaluation of Modernization Components
Task 5- Final Report and Recommendation

Task 1- Background Data Collection and Organization

Task 1A: Irrigation District Water Assessment Survey. The first step to evaluating options for ACID is to target the main factors that influence the performance of the structures and operational procedures used to convey and distribute irrigation water. This begins with a request for information from the district. Information such as crop types, irrigated acreages, flow rates into the system, weather data, budgets, staffing levels, existing water conservation programs, and pumping records must be assembled and then reviewed with operations staff and management during a site visit to the project. This background information is compiled using a tool called the *Irrigation District Water Assessment Survey*. The Water Assessment Survey includes over 200 questions that form the basis of the present state of service provided by ACID and areas for improvement.

The following is a general outline of the issues that are covered during the Water Assessment Survey:

- General Irrigation District Characteristics; general project conditions, reservoirs, drainage, groundwater, crops, water supply, water use

- Irrigation District Operations; water delivery system characteristics, flexibility (frequency, rate, duration), flexibility from water suppliers, flow measurement at farm turnouts, facilities and upgrades
- Irrigation District and Farm Economics; district-level economics, water billing, farm economics
- Status and Needs of Modernization Programs; water delivery service, on-farm improvements, canal improvements, water conservation programs, SCADA, training and education

This task will utilize GIS and remote image processing techniques to assess current and historical conditions, and to identify any significant constraints that must be addressed during the development of specific modernization recommendations.

Task 1B: Grower Water Use Survey and In-Field Checks. In order to obtain better information about farm irrigation practices in the ACID service area, a *Grower Water Use Survey* will be conducted among district board members and selected growers. The survey will be performed to determine the particular irrigation management practices for each major crop during a typical year. For each major crop, the grower will be asked to discuss topics including:

- Irrigation methods
- Irrigation scheduling
- Timing of irrigation events
- Amount of water applied during each irrigation event

The grower survey will attempt to determine present irrigation conditions such as the amount of water applied during each irrigation event for a particular crop, typical soil surface drying time during different times in the year, and the typical soil dryness at the time the previous crop was harvested. Growers will also be asked about the predominate soil types and the degree of soil variability on their farm. In addition, the information obtained from these surveys will be used to refine estimates of actual crop water use. The grower survey will be accompanied by a rapid in-field check of farm irrigation equipment

Task 2- Rapid Appraisal Process (RAP)

The ITRC has pioneered work on the Rapid Appraisal Process (RAP) approach for irrigation district modernization. In general, the RAP is a quick and focused examination of irrigation systems and projects that can give a reasonably accurate and pragmatic description of the status of irrigation performance and provide a basis for making specific recommendations related to hardware and management practices. The RAP approach will provide an important assessment of the internal processes of water conveyance and control used by the ACID.

ACID has unique hydrologic, engineering, operational, and agronomic conditions, which affect its ability to contribute to specific quantifiable objectives. However, the RAP approach does utilize a uniform methodology based on substantial successful experiences with dozens of irrigation districts in the western U.S. In general, the RAP approach is a systematic procedure that can be used to determine the following:

- Is water potentially available from an irrigation district to meet a quantifiable objective?
- What are the affected flow paths related to the potentially available water?
- What are the specific causes of the potentially available water?
- What are possible solutions for meeting the quantifiable objective?

The RAP will be performed by professional engineering staff from the ITRC with technical expertise and experience in irrigation district modernization. It is anticipated that the rapid appraisal can be conducted over 4–8 days of field time and 5–10 days of office time.

Using this information about the hardware and management strategies being used by the ACID, the ITRC will be able to make specific recommendations for the selection and design of structures for improving flow measurement and flow control, drainage and irrigation water recirculation, and water delivery service at the farm level.

Task 3- Development of a Water Balance

A major component of the feasibility study for ACID will be the development of a detailed water balance for the district service area, conveyance systems and representative farms. A water balance that accounts for all the inflow and outflow components and makes use of confidence intervals, as described below, is fundamental to understanding and quantifying the amount of water that will be available from the implementation of modernization options. The water balance will be representative of conditions in normal, dry and wet years and based on the best data available.

A synthesis of the water balance accounting, recognizing uncertainties, with an understanding of the internal processes allows one to quantify the realistic potential for meeting objectives, in addition to prioritizing investments at different levels in the system, including project facilities and on-farm programs. This allows one to identify specific actions that can be taken while taking into consideration the resulting effects to the rest of the system.

The RAP procedures described in Task 2 are often done at irrigation districts in the U.S. in preparation for a water balance study. A detailed water balance is not done as part of the rapid appraisal itself due to the complexities of the computations involved with a properly done water balance and the amount of data that must be analyzed. However, a water balance is essential for making meaningful decisions regarding the quantity of water potentially available from various options for water conservation plans and strategies for improving water management. The water balance done for this study will be done on a monthly basis in order to properly combine information from water quantity and quality data.

The water balance developed for the ACID as part of the feasibility study will provide the district with the analytical tools necessary to determine irrigation performance measures such as irrigation efficiency and irrigation sagacity, both of which require a water balance. The computations used in the water balance will benefit from the precision of the crop evapotranspiration model used by the ITRC in previous water balance studies.

Task 4- Initial Evaluation of Modernization Components

The ITRC will determine the technical feasibility, ease of adoption, risk, and benefit and cost ratio of modernization alternatives identified through a comprehensive analysis of the district's infrastructure and management, as well as on-farm irrigation systems.

The information determined from the grower water use surveys and in-field irrigation checks in Task 1 along with the farm water balance computed in Task 3 will be used to generate a prioritized list of water conservation capital outlay projects at the farm level which may include the following:

- Tailwater return systems
- Modification to irrigation scheduling practices
- Improvements to existing hardware such as gated pipe
- Improvements to maintenance practices
- Conversion to different irrigation methods, including drip and sprinkler systems

Importantly, the recommendation for converting to alternate irrigation methods will consider factors outlined in the ASCE On-Farm Irrigation Committee publication "Selection of Irrigation Methods for Agriculture" (2000) including economic, social and environmental goals that are consistent with regional water use objectives.

Based on the information compiled during Tasks 1 through 3, a list of modernization options will be compiled and presented to the district. The anticipated water conservation capital outlay projects may include the following:

- Better water level control in the canals
- Supervisory Control and Data Acquisition (SCADA) system improvements
- Improved water ordering procedures
- Improved flow measurement at key points in the district
- Additional flow measurement at deliveries to farm turnouts
- Modified operation of re-regulating reservoirs to take advantage of operational flexibility

Maintaining constant water levels will allow the district to provide a constant flow rate through the turnouts. This concept has been mentioned in previous evaluations of the Water Measurement Program. Maintaining constant water levels in the canals provides some clear benefits:

- constant flow rates minimize the need to make multiple flow rate measurements during an irrigation event
- stable canal water levels improve the safety of the canals
- the irrigation "service" provided to the growers is improved with constant flow rates
- growers can improve the efficiency of their on-farm irrigations if the service provided is improved

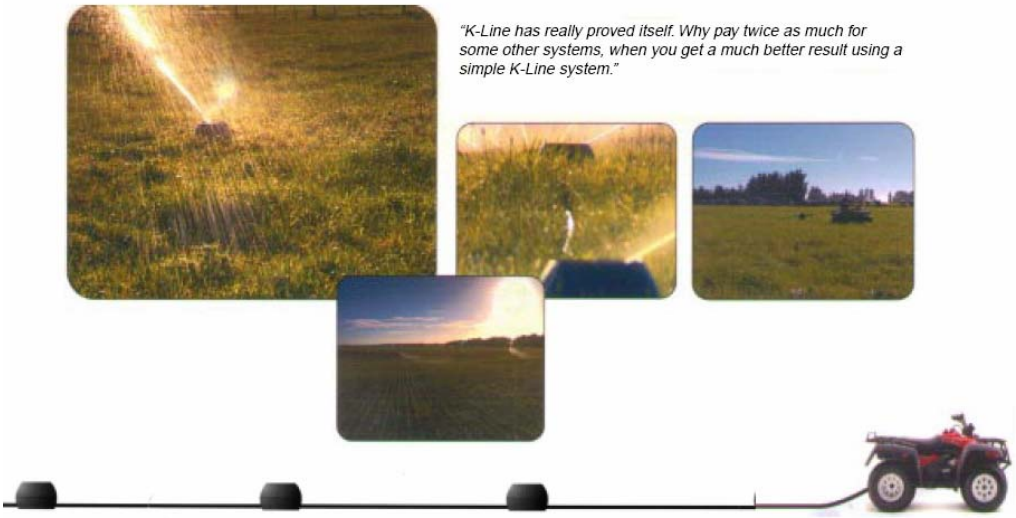
Task 5- Final Report and Recommendations

Task 5 will include writing, editing and reproducing the Modernization Feasibility Study Draft and Final Reports. The draft and final reports will incorporate the data, analysis, findings and recommendations from Tasks 1 through 4, and will provide the basis for decision-making and implementation of agricultural water conservation capital outlay projects in ACID.

Scope of the Project: Task B - Sprinkler Conversion

ACID is in need of new technology for the on-farm delivery of water. Current practices are border strip irrigation on light soils for pastures. Sprinklers are an obvious solution but there are problems with the animals destroying the sprinklers.

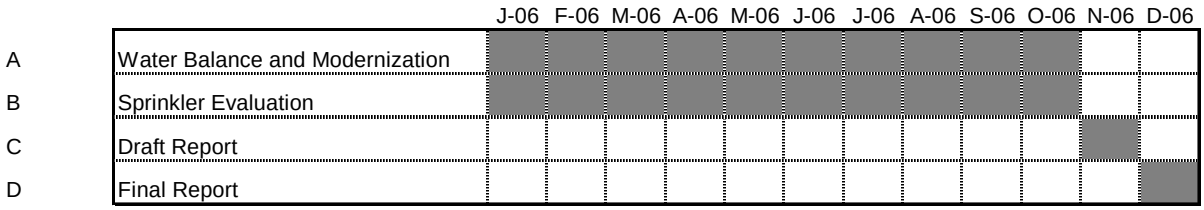
K-Line is a new flexible hose line sprinkler irrigation system designed to reduce the time and money spent on irrigation. At the heart of the system is a series of small, tough plastic pods protecting a small sprinkler firmly attached to special K-Line low density poly pipe (the pipe is manufactured in the US). The system can be run on low pressure and is designed to distribute water on a slow absorption method for up to a 24 hour period. Stock can also continue to use the pastures being irrigated. Each pasture has its own sprinkler line, customized to suit the size and shape of the pasture, and is run simultaneously depending on water supply. The small, flexible, strong, lightweight lines can be shifted in only minutes by a 4 wheeled motor bike, by simply driving across the pasture. The figure below is from the manufacturer's brochure.



This task will include the installation of at least 4 demonstration plots that will be used to document the issues associated with the conversion to the new sprinkler system. All aspects of the costs, water savings, and problems will be documented for potential future conversions within the district.

Schedule

The following is a simple bar chart for the proposed program.



Section Three: Monitoring and Assessment

The irrigation water balances computed as part of the proposed study would provide the most detailed information available for identifying the timing and quantity of flows internally throughout the system as well as water supplies entering and leaving the district's boundaries. A comprehensive organization of this information would allow managers and stakeholders the type of information necessary to reasonably assess long-term water management strategies for the area.

Further, as part of enhancing the management capacity of the district much of the information that forms the baseline description of existing operations could be updated by the districts periodically using the same methodologies laid out in the study to determine the future impact of different modernization alternatives. This proposal would fund the difficult and technically complex analysis necessary to evaluate the quality of the various data and to establish meaningful frameworks for analysis. This would include specifying indicators of performance. Many irrigation districts often lack a real precise knowledge of the impact any changes they would make to operations because the data has not been organized in a way that they can easily make sense of or have confidence in. This study would be helpful to decision makers in this regard.

The ITRC would assign confidence intervals to the measurements used in the water balances based on actual field visits to inspect the equipment and site conditions.

The reported findings of the ITRC would specify the priority and costs for each of the recommended actions. This would permit the district and agencies providing cost-sharing or other material support to schedule projects and to determine the appropriate levels of investment in various terms of modernization.

Qualifications of the Applicants and Cooperators

Resume *(of the project manager)*

The resume for Dee Swearingen is in Attachment A.

External Cooperators
Others who will be participating in the demonstration project will be staff from the Cal Poly Irrigation Training and Research Center.

Previous water use efficiency grant projects
Phase 1 Feasibility Study, Churn Creek Lateral Improvement Project,
CALFED Consolidated Water Use Efficiency 2002 Program
Phase 1b Feasibility Study, Main Canal Modernization,
CALFED Consolidated Water Use Efficiency 2002 Program

Outreach, Community Involvement and Acceptance

Outreach and Information Dissemination

In addition to providing information on specific tasks, the district will disseminate information to the other growers in the district on the findings of the demonstration project. The community outreach will be a key component of this project. The district will need to work with cooperators who will in turn share the information with neighbors on this new irrigation technology.

The water balance component of this proposal will allow ACID to determine were they are and help map future water conservation strategies.

Innovation

The proposed evaluation of the K-Line irrigation approach will provide a unique opportunity to demonstrate an emerging technology for the region. This type of irrigation technique was developed in New Zealand and is just starting to be introduced into the US marketplace.

Benefits and Costs

Project Implementation Costs (Budget).

Table C-1: Project Costs (Budget) in Dollars)

	Category (I)	Project Costs $ (II)	Contingency % (ex. 5 or 10)[2] (III)	Project Cost + Contingency $ (IV)	Applicant Share $ (V)	State Share Grant $ (VI)	Life of investment (years) (VII	Capital Recovery Factor (VIII)	Annualized Costs $ (IX)
	Administration[1]								
	Salaries, wages	$54,443	0	$54,443	$0	$54,443	0	0.0000	$0
	Fringe benefits	$19,631	0	$19,631	$0	$19,631	0	0.0000	$0
	Supplies	$125,926	0	$125,926	$100,000	$25,926	0	0.0000	$0
	Equipment	$0	0	$0	$0	$0	0	0.0000	$0
	Consulting services	$100,000	0	$100,000	$0	$100,000	0	0.0000	$0
	Travel	$0	0	$0	$0	$0	0	0.0000	$0
	Costs)		0	$0	$0	$0	0	0.0000	$0
(a)	Total Administration Costs	$300,000		$300,000	$100,000	$200,000			$0
(b)	Planning/Design/ Engineering	$0	0	$0	$0	$0	0	0.0000	$0
(c)	Equipment Purchases/Rentals/ Rebates/Vouchers	$0	0	$0	$0	$0	10	0.0000	$0
(d)	Materials/Installation/ Implementation	$0	0	$0	$0	$0	0	0.0000	$0
(e)	Implementation Verification	$0	0	$0	$0	$0	0	0.0000	$0
(f)	Project Legal/License Fees	$0	0	$0	$0	$0	0	0.0000	$0
(g)	Structures	$0	0	$0	$0	$0	0	0.0000	$0
(h)	Land Purchase/Easement	$0	0	$0	$0	$0	0	0.0000	$0
(i)	Environmental Compliance/Mitigation/ Enhancement	$0	0	$0	$0	$0	0	0.0000	$0
(j)	Construction	$0	0	$0	$0	$0	0	0.0000	$0
(k)	Other (Specify)	$0	0	$0	$0	$0	0	0.0000	$0
(l)	Assessment	$0	0	$0	$0	$0	0	0.0000	$0
(m)	Report Preparation	$0	5	$0	$0	$0	0	0.0000	$0
(n)	**TOTAL**	$300,000		$300,000	$100,000	$200,000			$0
(o)	Cost Share -Percentage				33	67			

1- excludes administration O&M.

Provide a brief explanation for the labor costs (including consultants), equipment, supplies, and travel included in the budget.

SALARIES AND WAGES: The salary rates are based on the ACID's established salary rates paid during the 2004-2005 year (July 1 – June 30). The rates shown are for budgetary purposes; the actual rates in effect at the time the work is performed will be charged to the project.

FRINGE BENEFITS: Fringe benefits include a benefit package consisting of FICA, State Unemployment Insurance (SUI), Worker's Compensation, non-industrial leave, medical, dental, and life insurance benefits, and retirement benefits. Rates vary with the number of dependents and type of coverage. An historic average of 34% - 57% is used for budgetary purposes and is determined by the work the employees are doing and the environment in

which they do their work. Only actual rates in effect for each individual at the time the work is performed will be charged to the sponsor.

OPERATING EXPENSES: Materials and supplies in support of this project include but are not limited to various items such as sprinklers, pipe, and pump units. Other materials and supplies in support of this project include general office supplies and site visit supplies and materials. Printing, photocopying and color copying expenses in support of this project include copies of existing reports and copies of the final report.

EQUIPMENT: There is no equipment identified for this project.

CONSULTING SERVICES: The Irrigation Training and Research Center will provide technical support on this demonstration project.

COST SHARE: The amount of cost share that will be received during the performance period of this proposal is $25,000. This is through a contract with the U.S. Bureau of Reclamation.

Describe the potential benefits and information to be gained in terms of water use efficiency.

Two studies are proposed for ACID. A water balance study will help the district determine how to best utilize resources to improve district operation and meet quantifiable objectives. The second study involves the feasibility of water users to convert to sprinkler irrigation. If feasible, water users would be able to improve the distribution uniformity of applied irrigation water resulting in direct water savings. Both studies potentially impact all targeted benefits (1-8) in QO Region 1.

Quantifiable Objective Region #1 - Redding Basin

1. ERPP: Augment flow in Battle Creek by 25 to 50 cfs.
   QO: TBD
   – TBD

2. ERPP: Augment flow in Bear Creek by 10 to 20 cfs.
   QO:TBD
   – TBD

3. ERPP: Increase flow in Clear Creek to 150 to 200 cfs from October 1 to June 1 and to 100 to 150 cfs from June 1 to September 30.
   QO: TBD
   – TBD

4. ERPP: In Cottonwood Creek during summer and fall, more closely emulate the seasonal streamflow pattern, so that flows are sufficient for chinook salmon holding and spawning in most year types by providing up to 20 to 50 cfs. These flows can mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession
   QO: TBD
   – TBD

5. ERPP: Increase flow in Cow Creek by 25 to 50 cfs, corresponding to the natural seasonal runoff pattern, and maintain 25 to 75 cfs during October.
   QO: TBD
   – TBD

6. ERPP: More closely emulate seasonal streamflow patterns in dry and normal year- types by allowing a late winter or early-spring flow event of approximately 8,000 to10,000 cfs in dry years and 15,000 to 20,000 cfs in below normal water-years to occur below Keswick Dam; Maintain base flows of 6,000 to 8,000 cfs during fall.
   QO: 44 - 180 TAF per year
   – Improve farm irrigation management (such as irrigation scheduling) and more uniform irrigation methods (such as shorter furrows, sprinkler, or drip).
   – Reduction in operational spill through improved management, canal automation or regulatory storage.
   – Reduction in canal seepage through canal lining or piping.

7. Core: Reduce unwanted ET by _____ acre-feet per year.
   QO: 6.5 TAF per year plus additional water generated through reduction in application through improved irrigation systems
   – Reduce ET flows using improved irrigation methods, such as drip irrigation, and planting densities.

8. Core: Enhance the effectiveness of potential conjunctive use programs by reducing flows to groundwater to _____ acre feet per year during periods of shortage; and increasing flows to groundwater to _____ acre feet per year during periods of excess.
   QO: TBD
   – TBD

Compare the potential benefits and anticipated information to be gained to the anticipated costs.

Based on the experience from other projects, it is anticipated that at least 1,000 AF of savings could be realized and documented with this $300,000 project. In addition, the water balance study will help the district determine how much water may be available for water conservation in the future.

Table C-5 Project Annual Physical Benefits (Quantitative and Qualitative Description of Benefits)

	Qualitative Description - Required of all applicants[1]				**Quantitative Benefits - where data are available [2]**
	Description of physical benefits (in-stream flow and timing, water quantity and water quality) for:	Time pattern and Location of Benefit	Project Life: Duration of Benefits	State Why Project Bay Delta benefit is Direct[3] Indirect [4] or Both	Quantified Benefits (in-stream flow and timing, water quantity and water quality)
Bay Delta	Reduction in water diversions	Water Season	Permanent	Direct	1,000
Local	Reduction in water diversions	Water Season	Permanent	**Not applicable.**	0

[1] The qualitative benefits should be provided in a narrative description. Use additional sheet.
[2] Direct benefits are project outcomes that contribute to a CALFED objective within the Bay-Delta system during the life of the project.
[3] Indirect benefits are project outcomes that help to reduce dependency on the Bay-Delta system. Indirect benefits may be realized over time.
[4] The project benefits that can be quantified (i.e. volume of water saved or mass of constituents reduced) should be provided.

Attachment A
Resume of Dee Swearingen