ATTACHMENT 8- BENEFIT AND COST ANALYSIS

Project A:Joint Leak Detection & Repair Program

This analysis follows the DWR method. Because the project costs are less than $300,000, it meets the criteria for the cost-effectiveness analysis. We briefly describe the project, and then provide the information to meet the requirements outlined in Section D1. Table 11-1 is included as an attachment.Tables 19-1 and 19-1A, also attached, presents the costs of the project and the alternative to the project.

Project Description

The water districts of Fall River Valley Community Services District (FRVCSD), Bieber, and Burney have identified that leakage throughout their distribution systemsis a significant problem. For example, during some months, as much as 48 percent of the water pumped at the FRVCSD is lost. In addition to leaking distribution systems, water can be lost though old or inoperative water meters. The three water districts already have a meter replacement program which has helped reduce water loss.

Water distribution lines of the three districts are in two types of soil: clay or volcanic rock. Leaks in pipes that lay on a clay pan are easy to detect in the summer; water lost is surfacing. However, leaking pipes that lay in volcanic rock are almost impossible to detect, because the leaking water drains down into the volcanic rock; leaks may exist for years without being detected.Without any electronic leak detection equipment, leaks in volcanic strata are not detectible.

This project would provide for the purchase of equipment necessary to detect and repair leaks in three water districts. Once the leak is detected, the other equipment will be used to plug the leaks.

Question 1: Types of Benefits Provided

The purchase of leak detection and repair equipment would generate at least four types of benefits:

1. Leaks in the distribution system represent inefficient use of limited groundwater resources. By fixing leaks, less water needs to be pumped out of the aquifer to meet customer demands. More efficient use of groundwater improves the overall, long-term management of California's groundwater resources.
2. Reducing the amount of water pumped from the aquifer also reduces the districts costs required to pump more water than is actually needed to meet customer demands. Based on the best information available on current leak rates, detecting and repairing leaks would allow each district to save money on pumping water that

is not ultimately used by customers. Based on average pumping costs of $0.99 per 1,000 gallons (derived from the districts' electricity bills), FRVCSD would save $16,510 per year in pumping costs; Bieber would save $4,444 in pumping costs, and Burney would save $9,000 per year.

3. Providing equipment to system managers provides them with opportunities to learn to use the equipment and improve their techniques for detecting and repairing leaks, possibly generating cost savings and more efficient operations over time.
4. Leaks in the system represent weak points where contamination may enter the system. Plugging leaks may result in improved public health and less risk of system contamination.

Question 2: Alternative Methods

The only alternative to purchasing the leak detection and repair equipment that generates the same types and amounts of physical benefits is renting the equipment.Because leaks continue to develop throughout the system each year, and the current backlog of repairs is considerable, equipment would need to be rented each year for the foreseeable future.

Leak detection equipment is the only viable alternative to produce the same level of benefits as purchasing the equipment because it locates a leak much more accurately than visual surveys. When leaked water surfaces, it does NOT indicate where the leak is.Very often, leaked water "travels" underground and surfaces sometimes hundreds of feet from the leak. Leak detection equipment can pinpoint the leak. Visual surveys would not detect the same number of leaks, and would now allow the districts to repair the leaks as cost-effectively.

Renting the leak detection equipment in Redding, the closest location, costs $1,500 per day. Since much of this time is spent on travel, the FRVCSD always schedules several sections of water line to be surveyed for leaks.Equipment required to repair leaks is also needed. Since the FRVCSD backhoe is not reliable, the FRVCSD often have to rent the equipment at $225 per day.Finally, the hot tap machine allows us to put a permanent of temporary valve or plug in a live water line. This allows us to work on lines without having to shut of major portions of town, making much more viable to repair leaks throughout the system quickly.

Cost of Alternative. The net present value of the cost of the identified alternative, renting the leak detection equipment, in 2012 dollars, discounted at a rate of 6 percent over the equivalent lifespan of the proposed alternative, is $561,173. The assumptions used to generate this value include:

- Rental of leak detection company: 22 days @ $1,500 per day $33,000/yr
- Rental of backhoe: 90 days @ $225 per day $20,250/yr
- Rental of Hot-tap machine: 4 days @ $2,000 per day $8,000/yr

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- Total annual cost of renting leak detection and repair equipment $61,250/yr
- Equipment lifespan is assumed to be 15 years

- Labor and materials costs for leak detection and repair are assumed to be the same using “owned” or “rented” equipment.

The calculations for the costs of the alternative are presented in Table 19-1A.

Cost of Proposed Project. The net present value of the costs of the proposed alternative, purchasing leak detection and repair equipment, in 2012 dollars, discounted at a rate of 6 percent over the lifespan of the project, is $148,304. This cost includes initial capital costs of purchasing the equipment. It also includes administration, operations, and maintenance costs associated with owning the equipment. The assumptions used to generate this value include:

- Initial capital cost in 2014 (2012$): $135,750
- Administration: owning the equipment and allowing three districts to share it will require some administration costs, which we estimate at$1,000/yr, beginning in 2014
- Maintenance: owning the equipment will require maintaining it, which weestimate at $2,000/yr, beginning 2014
- Equipment lifespan is assumed to be 15 years
- Labor and materials costs for leak detection and repair are assumed to be the same using “owned” or “rented” equipment.

The calculations for the costs of the proposed project are presented in Table 19-1.

Table 11-1 – Statement of Cost-Effectiveness Project name: Joint Leak Detetion & Repair		
Question 1	Types of benefits provided: 1. ***Reduced water withdrawals and promote more efficient use of California's groundwater resources*** ***2. Reduced water pumping costs for three water districts,*** ***3. Improved operator training in leak detection and repair equipment so leaks can be repaired more efficiently*** ***4. Improved public health from reduced bacterial contamination associated with leaks.***	
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified? ***Yes***	
	If no, why?	
	If yes, list the methods (including the proposed project) and estimated costs:	
	Yes, the only viable alternative to achieve the same level of benefits is to rent the equipment needed to detect and repair leaks. See narrative for a more detailed description. These are the costs of this alternative:	
	Rental of Leak Detection company: 22 days @1,500 per day	*$ 33,000*
	Rental of Backhoe: 90 days @ $225	*$ 20,250*
	Rental of Hot-tap machine: 4 days @ 2000 per day	*$ 8,000*
	Total per year	***$ 61,250***
	Total Net Present Value over 16 years, discounted at 6 percent per year, in 2012 dollars	***$ 561,173***
	Labor and materials costs to repair leaks are assumed to be the same using "owned" or "rented" equipment	
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? ***The proposed project is the most cost effective. The difference between the proposed project cost ($148,304) and the alternative cost ($561,173) represents a cost savings to the districts of $412,869.***	
Comments: ***See narrative for more information about the proposed project and the alternative. Costs of the proposed project are presented in Table 19-1.***		

Table 19-1 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Joint Leak Detection										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	0		0		0			0	1.000	$ -
2013	0		0		0			0	0.943	$ -
2014	135,750		1,000		2,000			138,750	0.890	$ 123,488
2015			1,000		2,000			3,000	0.840	$ 2,520
2016			1,000		2,000			3,000	0.792	$ 2,376
2017			1,000		2,000			3,000	0.747	$ 2,241
2018			1,000		2,000			3,000	0.705	$ 2,115
2019			1,000		2,000			3,000	0.665	$ 1,995
2020			1,000		2,000			3,000	0.627	$ 1,881
2021			1,000		2,000			3,000	0.592	$ 1,776
2022			1,000		2,000			3,000	0.558	$ 1,674
2023			1,000		2,000			3,000	0.527	$ 1,581
2024			1,000		2,000			3,000	0.497	$ 1,491
2025			1,000		2,000			3,000	0.469	$ 1,407
2026			1,000		2,000			3,000	0.442	$ 1,326
2027			1,000		2,000			3,000	0.417	$ 1,251
2028			1,000		2,000			3,000	0.394	$ 1,182
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 148,304**
Comments: We describe the assumptions in more detail in the benefit-cost narrative.										
(1) If any, based on opportunity costs, sunk costs and associated costs										
(2) The incremental change in O&M costs attributable to the project										

Table 19-1A – Annual Costs of Project Alternative (All costs should be in 2012 Dollars) Project: Joint Leak Detection										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	0		0		0			0	1.000	$ -
2013	0		0		0			0	0.943	$ -
2014				61,250				61,250	0.890	$ 54,513
2015				61,250				61,250	0.840	$ 51,450
2016				61,250				61,250	0.792	$ 48,510
2017				61,250				61,250	0.747	$ 45,754
2018				61,250				61,250	0.705	$ 43,181
2019				61,250				61,250	0.665	$ 40,731
2020				61,250				61,250	0.627	$ 38,404
2021				61,250				61,250	0.592	$ 36,260
2022				61,250				61,250	0.558	$ 34,178
2023				61,250				61,250	0.527	$ 32,279
2024				61,250				61,250	0.497	$ 30,441
2025				61,250				61,250	0.469	$ 28,726
2026				61,250				61,250	0.442	$ 27,073
2027				61,250				61,250	0.417	$ 25,541
2028				61,250				61,250	0.394	$ 24,133
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 561,173**
Comments: This table is not required, but we provide it to demonstrate how we calculated the NPV of the cost of the alternative to purchasing the joint leak detection equipment. This alternative involves renting the equipment. We describe the assumptions in more detail in the benefit-cost narrative										
(1) If any, based on opportunity costs, sunk costs and associated costs										
(2) The incremental change in O&M costs attributable to the project										

Project B: McArthur Water Tank

This analysis follows the DWR benefit-cost analysis method. We briefly describe the project, and then summarize the non-monetized benefits, as outlined in Table 12 from Section D2. We then describe the assumptions used to calculate the avoided costs associated with the project, presented in Table 16-2. Table 19-2 presents the costs of the project.

Project Description (Conditions with and without the project)

The Fall River Valley Community Services District provides potable water to the communities of Fall River Mills and McArthur, California. The system pumps well water from McArthur into tanks in Fall River Mills, about 6 miles away, and distributes it to customers across the area. Storage capacity is short approximately 200,00 gallons, and equalizing storage is short abut 75,000 gallons, according to a recent engineering report (Exhibit 7B). The well pump maintains pressure in the system. Currently, the CSD can not maintain adequate water pressure and volume in case of a major fire in the town of McArthur. The McArthur Fire Department can not

adequately fight a major structural fire in the town of MacArthur because of the lack of water volume and pressure.

In addition to requiring constant pumping against a steep head pressure, which requires considerable power, the system design requires pumping from the well to the storage tank during the peak electricity rate times in the afternoon. Moreover, the system lacks telemetry to allow system managers to read and regulate the water quantities in the tanks by remotely operate valves and pumps. Without the telemetry equipment, crews visit the existing tanks in Fall River Mills and the well in McArthur several times each day to turn on/off the well and to check the elevation of the water in the tanks. Because of the lack of telemetry and the limited storage capacity, the system often overflows the tanks, wasting approximately 5 percent of pumped water.

The engineering report (Exhibit 7B) recommends building a new tank and adding telemetry to the system to remedy these problems. The project would also support an educational and communication outreach effort to customers about the water system, including conservation and home water safety tips.

Section D2. Non-Monetized Benefit Analysis

Table 12-2 identifies the non-monetized benefits the project would likely generate. The benefits marked with a "yes" response are described in more detail below the table, organized in order by their number in the table. Although these benefits are not monetizable given data available today, they represent real economic benefits that the project would generate for the customers of the water district and the people of California.

Table 12-2. Non-monetized Benefits Checklist–Project 1		
No.	Will the proposal…	Response
Community/Social Benefits		
1	Provide education or technology benefits?	Yes
2	Provide social recreation or access benefits?	No
3	Help avoid, reduce or resolve various public water resources conflicts?	No
4	Promote social health and safety?	Yes
5	Have other social benefits?	No
Environmental Stewardship Benefits		
6	Benefit wildlife or habitat in ways that were not quantified in Attachment 7?	No
7	Improve water quality in ways that were not quantified in Attachment 7?	No
8	Reduce net emissions in ways that were not quantified in Attachment 7?	Yes
9	Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?	No

Sustainability Benefits		
10	Improve the overall, long-term management of California groundwater resources?	Yes
11	Reduce demand for net diversions for the regions from the Delta?	No
12	Provide a long-term solution in place of a short-term one?	Yes
13	Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?	Yes
14	Improve water supply reliability in ways not quantified in Attachment 7?	Yes
15	Other (If the above listed categories do not apply, provide non-monetized benefit description)?	No

1. Education and Technology Benefits
Project includes funding of a newsletter and web site update to educate the community about this and other projects, water conservation, and tips on avoiding freezing pipes. Our web site is being read by over 9,000 people per month and has become an authority on water issues in the region. However, it needs an update format. We also want to provide a printed version to our customers.

4. Promote Social Health and Safety
The project will provide enough water pressure and volume to fight major structural fires in McArthur. Because of this lack of volume/pressure, ISO ratings are higher than they should be. A lower ISO rating will lower property insurance rates in McArthur. Consistent and adequate water pressure will benefit all McArthur residents. The lack of consistent pressure prevents residential landscaping to be watered at a consistent level; landscaping is either over watered or under watered, because the pressure is inconsistent.

8. Reduce Net Emissions in ways not quantified in Attachment 7
The project would reduce net emissions in two ways: it would reduce vehicle miles traveled by 9,344 each year, and it would reduce the emissions associated with electricity consumption. Both of these emissions reductions would include carbon dioxide, a greenhouse gas, as well as pollutants associated with electricity generation and gasoline combustion.

10. Improve the Overall Long-Term Management of California Groundwater Resources
The telemetry equipment would reduce the amount of water lost to tank overflows, reducing the overall amount of groundwater pumped from the aquifer. This would leave more water in the aquifer for future use, and reduce the likelihood that communities dependent on it would have to find alternate supplies in future.

12. Provide a Long-Term Solution In Place of a Short-Term One

Currently the district relies on the well pump in McArthur to maintain pressure in the system. The tank and booster pumps will be a permanent solution to this temporary reliance on the well pump. It should lengthen the overall life of the existing equipment.

13. Promote Energy Savings

The project would reduce electricity consumption by reducing the amount of water pumped and changing the system to require less energy to pump water.

14. Improve Water Supply Reliability In Ways Not Quantified in Attachment 7

The project would improve water supply reliability in at least two ways. First, it would improve the entire reliability and resiliency of the system during emergencies. As mentioned above, it would improve system pressure for fire flows, but the added capacity for fire flows would also improve reliability for customers when water is needed for fire protection. It would also provide additional flexibility to respond to a well outage or other water shortage at the water source.

The project would also improve the day-to-day reliability and system performance for customers in McArthur. Lack of a storage tank in McArthur leaves many McArthur residents with sub-standard water pressure in their homes. Consistent water pressure is something many water customers expect when they pay for water service. This project would improve the overall water pressure and ensure consistent pressure throughout the day for McArthur residents.

Section D3. Monetized Benefit Analysis

With the project, the district would save on electricity costs:

- With the new tank, the well pump need not pump during the peak electricity rate times in the afternoon. We are now using PG&E rate schedule A1, which can be changed to variable rate schedule VB. However, we will need to run a small booster pump in the afternoon as the tank will be on ground level. Total annual cost savings on electricity: $4,600
- By having a local tank in McArthur, the head pressure is reduced from 80 PSI to 50 PSI—at least for the water used in McArthur. This is an estimated annual cost savings of $4,409 in electricity.
- By eliminating the tank overflow with telemetry equipment and additional storage capacity, we can save 5% of our well electricity cost, or $1,102.

Adding the telemetry equipment would also save on labor and materials costs. Reducing trips between the well and the storage tanks to one trip each day would save $5,195 on wear and tear and gas for the trucks and $12,319 in labor per year.

Since the well pump in McArthur is the device that maintains pressure in the system, it comes on/off many times during the day. By providing water storage, and use small efficient booster

pumps designed for this application, the life of the well pump can be extended by 20%, or an annual savings of $4,000.

Total monetizable benefits, in the form of operations cost savingsare $31,626 per year, measured in 2012 dollars. The net present value of the monetizeable benefits in 2012 dollars, discounted at 6 percent over the project lifespan of 40 years is $448,931. These benefits would accrue to the district's rate payers, residents of the state of California. These monetizable benefits almost certainly underestimate the full economic benefit the project would provide to the citizens of California, as they do not reflect the value of the non-monetizable benefits described in Section D1.

Table 16-2 – Annual Costs of Avoided Projects

(All avoided costs should be in 2012 dollars)

Project: _____McArthur Tanks & Telemetry_____

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): Do not build tank Avoided Project Description:				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2012			0	0	1.000	**0**
2013			0	0	0.943	**0**
2014			$ 31,626	$ 31,626	0.890	**$ 28,147**
2015			$ 31,626	$ 31,626	0.840	**$ 26,566**
2016			$ 31,626	$ 31,626	0.792	**$ 25,048**
2017			$ 31,626	$ 31,626	0.747	**$ 23,625**
2018			$ 31,626	$ 31,626	0.705	**$ 22,296**
2019			$ 31,626	$ 31,626	0.665	**$ 21,031**
2020			$ 31,626	$ 31,626	0.627	**$ 19,830**
2021			$ 31,626	$ 31,626	0.592	**$ 18,723**
2022			$ 31,626	$ 31,626	0.558	**$ 17,647**
2023			$ 31,626	$ 31,626	0.527	**$ 16,667**
2024			$ 31,626	$ 31,626	0.497	**$ 15,718**
2025			$ 31,626	$ 31,626	0.469	**$ 14,833**
2026			$ 31,626	$ 31,626	0.442	**$ 13,979**
2027			$ 31,626	$ 31,626	0.417	**$ 13,188**
2028			$ 31,626	$ 31,626	0.394	**$ 12,461**
2029			$ 31,626	$ 31,626	0.371	**$ 11,733**
2030			$ 31,626	$ 31,626	0.350	**$ 11,069**
2031			$ 31,626	$ 31,626	0.331	**$ 10,468**
2032			$ 31,626	$ 31,626	0.312	**$ 9,867**
2033			$ 31,626	$ 31,626	0.294	**$ 9,298**
2034			$ 31,626	$ 31,626	0.278	**$ 8,792**
2035			$ 31,626	$ 31,626	0.262	**$ 8,286**
2036			$ 31,626	$ 31,626	0.247	**$ 7,812**
2037			$ 31,626	$ 31,626	0.233	**$ 7,369**
2038			$ 31,626	$ 31,626	0.220	**$ 6,958**
2039			$ 31,626	$ 31,626	0.207	**$ 6,547**
2040			$ 31,626	$ 31,626	0.196	**$ 6,199**
2041			$ 31,626	$ 31,626	0.185	**$ 5,851**
2042			$ 31,626	$ 31,626	0.174	**$ 5,503**
2043			$ 31,626	$ 31,626	0.164	**$ 5,187**
2044			$ 31,626	$ 31,626	0.155	**$ 4,902**
2045			$ 31,626	$ 31,626	0.146	**$ 4,617**
2046			$ 31,626	$ 31,626	0.138	**$ 4,364**
2047			$ 31,626	$ 31,626	0.130	**$ 4,111**
2048			$ 31,626	$ 31,626	0.123	**$ 3,890**
2049			$ 31,626	$ 31,626	0.116	**$ 3,669**
2050			$ 31,626	$ 31,626	0.109	**$ 3,447**
2051			$ 31,626	$ 31,626	0.103	**$ 3,257**
2052			$ 31,626	$ 31,626	0.097	**$ 3,068**
2053			$ 31,626	$ 31,626	0.092	**$ 2,910**
					Total Present Value of Discounted Costs (Sum of Column (g))	**$ 448,931**
					(%) Avoided Cost Claimed by Project	**100%**
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	**$ 448,931**

Comments: Includes annual avoided costs from reduced electricity, labor, and vehicle use, and reduced wear and tear on the main system pump. These cost savings are described in the narrative. Assumes that without the project, these costs would increase at the same rate as inflation--if costs would have increased annually at a rate greater than overall inflation without the project, we are underestimating the monetizable benefits

Cost of Project. The net present value of the cost of the proposed alternative, refurbishing the existing tank, in 2012 dollars, discounted at a rate of 6 percent over the 40-year lifespan of the project, is $1,417,635. The assumptions used to generate these values include:

- Initial capital expenditures of $1,545,000, which would occur in 2014.
- The new tank and telemetry would require some administration costs, which we estimate at $1,000/yr, beginning in 2014.
- The maintenance costs associated with the new telemetry equipment and tank which we estimate at $2,000/yr, beginning in 2014.

The calculations for the costs of the proposed project are presented in Table 19-2.

Table 19-2 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: McArthur Tank and Telemetry										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	0		0		0			0	1.000	$ -
2013	0		0		0			0	0.943	$ -
2014	1,545,000		1,000		2,000			1,548,000	0.890	$ 1,377,720
2015			1,000		2,000			3,000	0.840	$ 2,520
2016			1,000		2,000			3,000	0.792	$ 2,376
2017			1,000		2,000			3,000	0.747	$ 2,241
2018			1,000		2,000			3,000	0.705	$ 2,115
2019			1,000		2,000			3,000	0.665	$ 1,995
2020			1,000		2,000			3,000	0.627	$ 1,881
2021			1,000		2,000			3,000	0.592	$ 1,776
2022			1,000		2,000			3,000	0.558	$ 1,674
2023			1,000		2,000			3,000	0.527	$ 1,581
2024			1,000		2,000			3,000	0.497	$ 1,491
2025			1,000		2,000			3,000	0.469	$ 1,407
2026			1,000		2,000			3,000	0.442	$ 1,326
2027			1,000		2,000			3,000	0.417	$ 1,251
2028			1,000		2,000			3,000	0.394	$ 1,182
2029			1,000		2,000			3,000	0.371	$ 1,113
2030			1,000		2,000			3,000	0.350	$ 1,050
2031			1,000		2,000			3,000	0.331	$ 993
2032			1,000		2,000			3,000	0.312	$ 936
2033			1,000		2,000			3,000	0.294	$ 882
2034			1,000		2,000			3,000	0.278	$ 834
2035			1,000		2,000			3,000	0.262	$ 786
2036			1,000		2,000			3,000	0.247	$ 741
2037			1,000		2,000			3,000	0.233	$ 699
2038			1,000		2,000			3,000	0.220	$ 660
2039			1,000		2,000			3,000	0.207	$ 621
2040			1,000		2,000			3,000	0.196	$ 588
2041			1,000		2,000			3,000	0.185	$ 555
2042			1,000		2,000			3,000	0.174	$ 522
2043			1,000		2,000			3,000	0.164	$ 492
2044			1,000		2,000			3,000	0.155	$ 465
2045			1,000		2,000			3,000	0.146	$ 438
2046			1,000		2,000			3,000	0.138	$ 414
2047			1,000		2,000			3,000	0.130	$ 390
2048			1,000		2,000			3,000	0.123	$ 369
2049			1,000		2,000			3,000	0.116	$ 348
2050			1,000		2,000			3,000	0.109	$ 327
2051			1,000		2,000			3,000	0.103	$ 309
2052			1,000		2,000			3,000	0.097	$ 291
2053			1,000		2,000			3,000	0.092	$ 276
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 1,417,635**

Comments:

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

III. Bieber Tank Refurbishing

This analysis follows the DWR method. Because the project costs are less than $300,000, it meets the criteria for the cost-effectiveness analysis. We briefly describe the project, then provide the information to meet the requirements outlined in Section D1. Table 11-3 is included as an attachment. Tables 19-3 and 19-3A, also attached, presents the costs of the project and the alternative to the project.

Project Description

The Bieber water tower has not received much maintenance over the last 30 years. It has now deteriorated to where OSHA is concerned about the safety of the structure. Also the structure has no security fencing, which allows vandals to shoot at the tower, or climb the structure.

Question 1: Types of Benefits Provided

Refurbishing the Bieber water tower would generate several types of benefits:

1. Improve the reliability and efficiency of the Bieber water system by restoring the integrity of the water tower and extending its useful life.
2. Reduce the risk of accident or tank failure when work crews are maintaining the structure, allowing the district to comply with OSHA regulations.
3. Improve the security around the tower, reducing the risk of vandalism and reducing costs associated with making repairs of vandalized property (e.g., removing graffiti).
4. Promote health and safety by eliminating rust on the structure, which may contaminate the water supply, by making public access to the structure more difficult, resulting in less graffiti and lower risk that someone would injure themselves by climbing or playing around the tower.

Question 2: Alternative Methods

The only alternative to refurbishing the Bieber water tower that generates the same types and amounts of physical benefits is allowing the tower to deteriorate and replacing it with a new tower when it fails.

Cost of Alternative. The net present value of the cost of the identified alternative, allowing the existing tank to deteriorate then demolishing and replacing it when it fails, in 2012 dollars, discounted at a rate of 6 percent over the equivalent lifespan of the proposed alternative, is $1,459,313. The assumptions used to generate this value include:

- An engineer's estimate of $1,922,000 to replace the tower. The engineer's estimate is for a tower in McArthur, the next town over on 299. We assume the costs are the same in Bieber. We assume the existing tower would fail if not refurbished, requiring a

complete demolition and replacement within the next five years. We place the expected replacement cost in 2017.

- O&M costs to keep the deteriorating tower operational over the next few yearswould continue to escalate, from $5,000 in 2014, by 10 percent per year until the tank fails in 2017.
- The new tank would require additional O&M costs of $1,000 over its lifespan, beginning in 2018.
- The new tank likely would last longer than the refurbished tank, but these benefits would occur beyond the 30-year lifespan of the proposed project, so the value would be discounted significantly in today's terms, and would not change the overall conclusion of the analysis.
- Additional costs of the alternative not included in this analysis involve those associated with a catastrophic failure of the existing tank, should that occur before it is removed and replaced. Costs associated with a catastrophic failurecould include customer outages and purchase of bulk or bottled water during outage; loss of life or injury if a failure occurred while workers or trespassers were near the tank; and higher labor and materials costs associated with repairing and/or replacing the tank under emergency conditions.

The calculations for the costs of the alternative are presented in Table 19-3A.

Cost of Proposed Project. The net present value of the cost of the proposed alternative, refurbishing the existing tank, in 2012 dollars, discounted at a rate of 6 percent over the equivalent lifespan of the proposed alternative, is $203,236. The assumptions used to generate these values include:

- Refurbishment capital cost of $219,600, which would occur in 2014.
- Additional administration costs of $100 per year, beginning in year 2014.
- Additional O&M costs of $500 per year, beginning in year 2014.
- Assumed a 30-year lifespan of the tank after refurbishment with appropriate O&M (factored into the project costs).

The calculations for the costs of the proposed project are presented in Table 19-3.

Table 11-1 – Statement of Cost-Effectiveness Project name: Joint Leak Detetion & Repair			
Question 1	Types of benefits provided: ***1. Improved relibaility and efficiency of the Bieber water system operations*** ***2. Improved worker safety and better compliance with OSHA*** ***3. Improved security at the tank, reduced costs of repairs associated with vandalism, reduced risk of injury by tresspass***		
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified? ***Yes***		
	If no, why?		
	If yes, list the methods (including the proposed project) and estimated costs:		
	Yes, the only viable alternative to achieve the same level of benefits is to allow the existing tank to deteriorate, then replace the water tower with a new tower when it fails. These are the costs of this alternative:		
	Tank replacement in 2017 (estimated to fail within 5 years), based on engineer's estimate	*$*	*1,922,000*
	Annual O&M for failing tank (escalates in real terms at 10 percent per year for 3 years)	*$*	*5,000*
	O&M for new tank (escalates in real terms at 10 percent per year for lifespan)	*$*	*1,000*
	Total Net Present Value over 30 years, discounted at 6 percent per year, in 2012 dollars	***$***	***1,459,313***
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? ***The proposed project is the most cost effective. The difference between the proposed project cost ($203,236) and the alternative cost ($1,459,313) represents a cost savings to the districts of $1,256,077.***		
Comments: ***See narrative for more information about the proposed project and the alternative. Costs of the proposed project are presented in Table 19-3.***			

Table 19-3 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Bieber Tank Refurbishing										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	0		0		0			0	1.000	$ -
2013	0		0		0			0	0.943	$ -
2014	219,600		100		500			220,200	0.890	$ 195,978
2015			100		500			600	0.840	$ 504
2016			100		500			600	0.792	$ 475
2017			100		500			600	0.747	$ 448
2018			100		500			600	0.705	$ 423
2019			100		500			600	0.665	$ 399
2020			100		500			600	0.627	$ 376
2021			100		500			600	0.592	$ 355
2022			100		500			600	0.558	$ 335
2023			100		500			600	0.527	$ 316
2024			100		500			600	0.497	$ 298
2025			100		500			600	0.469	$ 281
2026			100		500			600	0.442	$ 265
2027			100		500			600	0.417	$ 250
2028			100		500			600	0.394	$ 236
2029			100		500			600	0.371	$ 223
2030			100		500			600	0.350	$ 210
2031			100		500			600	0.331	$ 199
2032			100		500			600	0.312	$ 187
2033			100		500			600	0.294	$ 176
2034			100		500			600	0.278	$ 167
2035			100		500			600	0.262	$ 157
2036			100		500			600	0.247	$ 148
2037			100		500			600	0.233	$ 140
2038			100		500			600	0.220	$ 132
2039			100		500			600	0.207	$ 124
2040			100		500			600	0.196	$ 118
2041			100		500			600	0.185	$ 111
2042			100		500			600	0.174	$ 104
2043			100		500			600	0.164	$ 98
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 203,236**

Comments: We describe the assumptions used to generate tehse costs in more detail in the benefit-cost narrative.

(1) If any, based on opportunity costs, sunk costs and associated costs

(2) The incremental change in O&M costs attributable to the project

Table 19-3A – Annual Costs of Project Alternative (All costs should be in 2012 Dollars) Project: Bieber Tank Refurbishing										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	0		0		0			0	1.000	$ -
2013	0		0		0			0	0.943	$ -
2014	0				5,000			5,000	0.890	$ 4,450
2015	0				5,500			5,500	0.840	$ 4,620
2016	0				6,050			6,050	0.792	$ 4,792
2017	1,922,000							1,922,000	0.747	$ 1,435,734
2018					1,000			1,000	0.705	$ 705
2019					1,000			1,000	0.665	$ 665
2020					1,000			1,000	0.627	$ 627
2021					1,000			1,000	0.592	$ 592
2022					1,000			1,000	0.558	$ 558
2023					1,000			1,000	0.527	$ 527
2024					1,000			1,000	0.497	$ 497
2025					1,000			1,000	0.469	$ 469
2026					1,000			1,000	0.442	$ 442
2027					1,000			1,000	0.417	$ 417
2028					1,000			1,000	0.394	$ 394
2029					1,000			1,000	0.371	$ 371
2030					1,000			1,000	0.350	$ 350
2031					1,000			1,000	0.331	$ 331
2032					1,000			1,000	0.312	$ 312
2033					1,000			1,000	0.294	$ 294
2034					1,000			1,000	0.278	$ 278
2035					1,000			1,000	0.262	$ 262
2036					1,000			1,000	0.247	$ 247
2037					1,000			1,000	0.233	$ 233
2038					1,000			1,000	0.220	$ 220
2039					1,000			1,000	0.207	$ 207
2040					1,000			1,000	0.196	$ 196
2041					1,000			1,000	0.185	$ 185
2042					1,000			1,000	0.174	$ 174
2043					1,000			1,000	0.164	$ 164
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 1,459,313**
Comments: This table is not required, but we provide it to demonstrate how we calculated the NPV of the cost of the alternative to refurbishing the Bieber Water Tank. This alternative involves allowing the tank to fail and replacing it with a new tank in 2017. We describe the assumptions in more detail in the benefit-cost narrative.										
(1) If any, based on opportunity costs, sunk costs and associated costs										
(2) The incremental change in O&M costs attributable to the project										

IV. Summary

Table 20 presents a summaryof the cost savings associated with projects I and III, compared to other alternatives and the net benefits, costs, and non-monetizable benefits associated with project II.

Project A: Joint Leak Detection would result in a cost savings of $412,869.

Project B: McArthur Tank would generate monetizable benefits of $448,931 (NPV in 2012$, 6% discount rate, over 30 years) and additional non-monetizable benefits from improved fire protection, improved water supply reliability, improved pressure and flow for water customers in McArthur, reduced greenhouse gas and other pollutant emissions, improved management of the groundwater resource, among other benefits detailed in Section D2. It would cost $1,417,635 (NPV in 2012$, 6% discount rate, over 30 years).

Project C: Bieber Tank would result in a cost savings of $1,256,077.

Table 20 – Proposal Benefits and Costs Summary

Proposal: Upper Pit River IRWMP

Agency: Nor-Cal Neva RCD

Project	Project Proponent	Total Present Value Project Costs (1)	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost of Alternative	From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
			From Section D3 – Monetized (2)	From Section D4 – Flood Damage Reduction (3)	Total			
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)		(g)	(h)
Joint Leak Detection	FRVCSD	$ 148,304	N/A	N/A	N/A	$ 561,173	$ 412,869	N/A
McArthur Tank	FRVCSD	$ 1,417,635	$ 448,931	N/A	$ 448,931	N/A	N/A	- Improved fire protection and lower fire insurance rates - Improved water supply reliability and resiliency - Improved pressure and flow for water customers in McArthur - Reduced greenhouse gas and other pollutant emissions - Improved management of the groundwater resource - Other benefits detailed in Section D2.
Bieber Tank	Lassen County Water District #1	$ 203,236	N/A	N/A	N/A	$ 1,459,313	$ 1,256,077	N/A

(1) From Table 19, or RWMG method

(2) From Table 15/16 or RWMG method

(3) From Table 18 or RWMG method