



**Subregional Long-Term Wastewater Project**

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# **ALTERNATIVE PROJECTS CONSTRUCTION COST ESTIMATE**

*November 1995*

*Prepared by*

**PARSONS ENGINEERING SCIENCE, INC.**  
**PLANNING • DESIGN • CONSTRUCTION MANAGEMENT**  
**1301 MARINA VILLAGE PARKWAY, ALAMEDA, CA 94501 • 510/769-0100**  
**OFFICES IN PRINCIPAL CITIES**  
**94-12/723129**

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# ALTERNATIVE PROJECTS CONSTRUCTION COST ESTIMATE

## SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

*Prepared for*

City of Santa Rosa  
and  
U.S. Army Corps of Engineers

*November 1995*

*Prepared by*

**PARSONS ENGINEERING SCIENCE, INC.**  
PLANNING • DESIGN • CONSTRUCTION MANAGEMENT  
1301 MARINA VILLAGE PARKWAY, ALAMEDA, CA 94501 • 510/769-0100  
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723129/94-12

*for*

**HARLAND BARTHOLOMEW & ASSOCIATES, INC.**

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# TABLE OF CONTENTS

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## 1 INTRODUCTION.....

### COST TABLES

Table 1	Alternative Projects Cost Estimate Summary .....
Table 2	Summary Table - Main Facilities And Components .....
Table 3	Reservoirs - Summary .....
Table 3.1	Reservoirs, Sitework .....
Table 3.2	Reservoir Dams, Earthwork .....
Table 3.5	Reservoir Spillway And Outlet Works .....
Table 3.5.1	Reservoir Spillways .....
Table 3.5.2	Reservoir Outlet Works .....
Table 3.6	Reservoir Stormwater Runoff Diversion Structures .....
Table 3.7	Reservoir Access Roads .....
Table 3.8	Reservoir Mitigation Measures .....
Table 3.8.1	Reservoir Cultural Resources Mitigation .....
Table 3.8.2	Reservoir Wetland Mitigation .....
Table 4	Pipelines, Summary .....
Table 4.1	Pipelines, Agricultural Irrigation Transmission And Distribution Pipelines - South County Alternatives.....
Table 4.1.1	South County Projects, Series 1 (All Agricultural Irrigation Areas) Transmission And Distribution Pipelines (In Public Rights- Of-Way).....
Table 4.2	Pipelines, Agricultural Irrigation Transmission And Distribution Pipelines - West County Alternatives.....
Table 4.2.1	West County Irrigation Pipelines, Summary .....
Table 4.2.1.1	West County Projects, Series 1 (Stemple Creek Agricultural Irrigation Area) Transmission And Distribution Pipelines (In Public Rights-Of-Way) .....
Table 4.2.1.2	West County Projects, Series 2 (Americano Creek Agricultural Irrigation Area) Transmission And Distribution Pipelines (In Public Rights-Of-Way).....
Table 4.3	Agricultural Irrigation Transmission And Distribution Pipelines - Sebastopol Area.....
Table 4.4	ASR Well Distribution Pipelines .....
Table 4.5	Direct River Discharge Pipeline.....
Table 4.6	Geysers Transmission Pipeline.....
Table 4.7	Urban Irrigation Pipelines .....
Table 4.8	Pipeline Installation Unit Costs .....
Table 5	Pump Stations, Summary .....
Table 5.1	Pump Stations .....
Table 5.2	Electrical Sub Stations for Pump Stations.....
Table 6	Agricultural Irrigation Areas.....
Table 6.1	Agricultural Areas Irrigation Systems .....
Table 6.2	Agricultural Areas Development.....
Table 7	Urban Irrigation Projects .....
Table 8	ASR System.....

## TABLE OF CONTENTS (continued)

---

Table 8.1 ASR Well Stations .....	
Table 9 Direct Discharge System.....	
Table 10 Utility Services.....	
Table 11 Headworks Improvements .....	
Table 12 Land Costs .....	
Table 20 Operations & Maintenance Costs - Summary.....	
Table 20.1 Annual Reservoir O&M Costs .....	
Table 20.2 Annual Pipelines O&M Costs .....	
Table 20.3 Annual Pump Stations O&M Costs .....	
Table 20.5 Annual ASR Well Stations O&M Costs .....	
Table 20.7 Annual Pumping Energy O&M Costs .....	
Table 30 Contingency Plan Operations Costs .....	

## APPENDIX

Table 3.3 Reservoir Backdams And Saddle Dams .....	
Table 4.2.1.1.1 West County Reclamation System Piping, Kypipe Model Results, Stemple Creek Watershed .....	
Table 4.2.1.2.1 South County Reclamation System Piping, Kypipe Model Results, Americano Creek Watershed .....	
Table 4.8.1 Pipeline Excavation, Bedding, Backfill And Spoil Materials Volumes .....	
Table 4.9 Pipeline Installation Unit Costs Used In Pipeline Cost Estimates .....	
Table 10.1 Cost By Alternative Project For PG&E Electrical Service To Pump Stations.....	
Table 10.2 PG&E Cost For Electrical Service To Pump Stations .....	
Table ROW-1 Reservoir Outlet Works Design .....	
Table RSW-1 Reservoir Spillway Design.....	
Table RDS-2 Reservoir Runoff Diversion Structures, Tolay A .....	
Table RDS-3 Reservoir Runoff Diversion Structures, Adobe Road.....	
Table RDS-4 Reservoir Runoff Diversion Structures, Tolay C .....	
Table RDS-5 Reservoir Runoff Diversion Structures, Sears Point .....	
Backup Data For Table 3.2 .....	
Backup Data For Table 3.5 .....	
Backup Data For Table 3.6 .....	
Backup Data For Table 3.8 .....	
Backup Data For Table 3.8.1 .....	
Backup Data For Table 4 .....	
Backup Data For Table 4.6 .....	
Backup Data For Table 4.7 .....	
Backup Data For Table 5.1 .....	
Backup Data For Table 5.2 .....	
Backup Data For Table 6.1 .....	
Backup Data For Table 6.2 .....	
Backup Data For Table 8 .....	
Backup Data For Table 9 .....	
Backup Data for Table 12 .....	
Backup Data for Table 20.7 .....	
Backup Data for Table 30 .....	

# **1 INTRODUCTION**

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This estimate of construction costs and operations and maintenance costs for the alternative projects was prepared at a planning level of detail to identify the major costs associated with these alternative projects and to allow a relative cost comparison between the alternative projects. Because of the level of uncertainty at this time about the final scope and design detail for any of the projects, the cost estimate should be considered preliminary and subject to revision in the future once a project is selected for actual design and construction.

Because of the level of uncertainty at this time, the cost estimate includes a 25 percent contingency adder to account for several minor costs items, unforeseen project components, or for components which could not be completely evaluated at this time.

The total project costs also include a 15 percent adder for construction contractors' overhead and profit, which is within the range of normal costs for projects of this magnitude.

An additional cost adder of 15 percent is included to account for professional fees for engineering and geotechnical, legal and administrative services, and other minor technical services which would be necessary for the design, property acquisitions, and contract administration necessary for any of the projects.

The cost estimate includes both construction costs and annual operations and maintenance costs projected to a present worth value based on annual cost of borrowed money at 6.5 percent interest over a period of 20 years.

The cost estimate is based on several other assumptions which are listed as footnotes in the various tables or are included in the appendix. Several of the more significant assumptions are included below for convenient reference:

- The cost estimate for Alternatives 2 and 3 is based on components formulated for the 1 percent of Russian River flow discharge project. The cost estimate for Alternative 5 is based on the 20 percent of river flow discharge project.
- Costs are based on the project components and facilities identified on the project drawings prepared by Parsons Engineering Science, Inc., dated September 1995, and as described in the project description.
- Costs for development and management (including the services of agricultural specialists), over a five-year startup period, for the agricultural irrigation areas in the West County or South County are included, as proposed by Questa Engineering. Otherwise, labor costs for current and additional City personnel who

would regularly operate and maintain the project facilities are not included in this cost estimate.

- Costs for extraction, import and placement of earth materials for construction of earthen embankments for the reservoirs are included as prepared by RUST Environment and Infrastructure.
- The estimated purchase cost of land for construction of several project components is included, as prepared by Economic & Planning Systems.
- The cost estimate is based on unit costs for construction labor and materials as of the third quarter of 1995.
- Costs for mitigation of wetland acres lost due to reservoir construction are based on very preliminary estimates of affected acres as of November 1995. The ratio of required mitigation acres versus proposed wetland acres lost is tentative, pending determination by the Corps of Engineers and the Department of Fish and Game, and other applicable agencies.
- For construction of the reservoir embankments substantial quantities of earthen materials and rock would need to be imported to the site from available quarries, as sufficient quantities of suitable materials do not exist at any of the reservoir sites.
- Pipelines are assumed to be installed along the shoulder of public rights-of-way to the maximum extent possible. Cross country alignments on private land have been assumed only where existing roads are unavailable.
- Electrical service costs for operation of the various pump stations are based on an average unit power cost of \$0.055/kilowatt-hour, based on transformation by PG&E to primary service voltage and based on "curtailable" level of service.
- No incentive payments to South County or West County farmers to take reclaimed water are included in the cost estimate, except for contingency plan winter irrigation.
- Projects 2E and 3F are based on developing reservoirs with a gross storage capacity of 2,000 MG less than full capacity reservoirs due to the development of an equivalent storage volume in ASR aquifer sites.
- The addition of nitrogen removal water treatment facilities is included in the cost estimate for the ASR component and for both direct discharge subalternatives.
- The urban irrigation component included in the cost estimate are the Fountaingrove area project and the East Santa Rosa/Bennett Valley area project as proposed in the 1992 memorandum by CH2M Hill, "Santa Rosa Subregional

Water Reclamation System Preliminary Environmental Assessment of Urban Landscape Reuse Projects.” The urban irrigation component is proposed for project Alternatives 2A through 3F only.

- The cost estimate includes no off-setting revenue income from sale of reclaimed water or from the value of electrical power produced at the Geysers due to injections of reclaimed water.

Table 1 provides an overall summary of the construction cost and the annual cost for operations and maintenance for each of the projects, along with the projected land purchase costs and the engineering and administrative costs, and a total equivalent present worth project cost. Also, the non-recurring operations costs for Contingency Plan implementation is included.

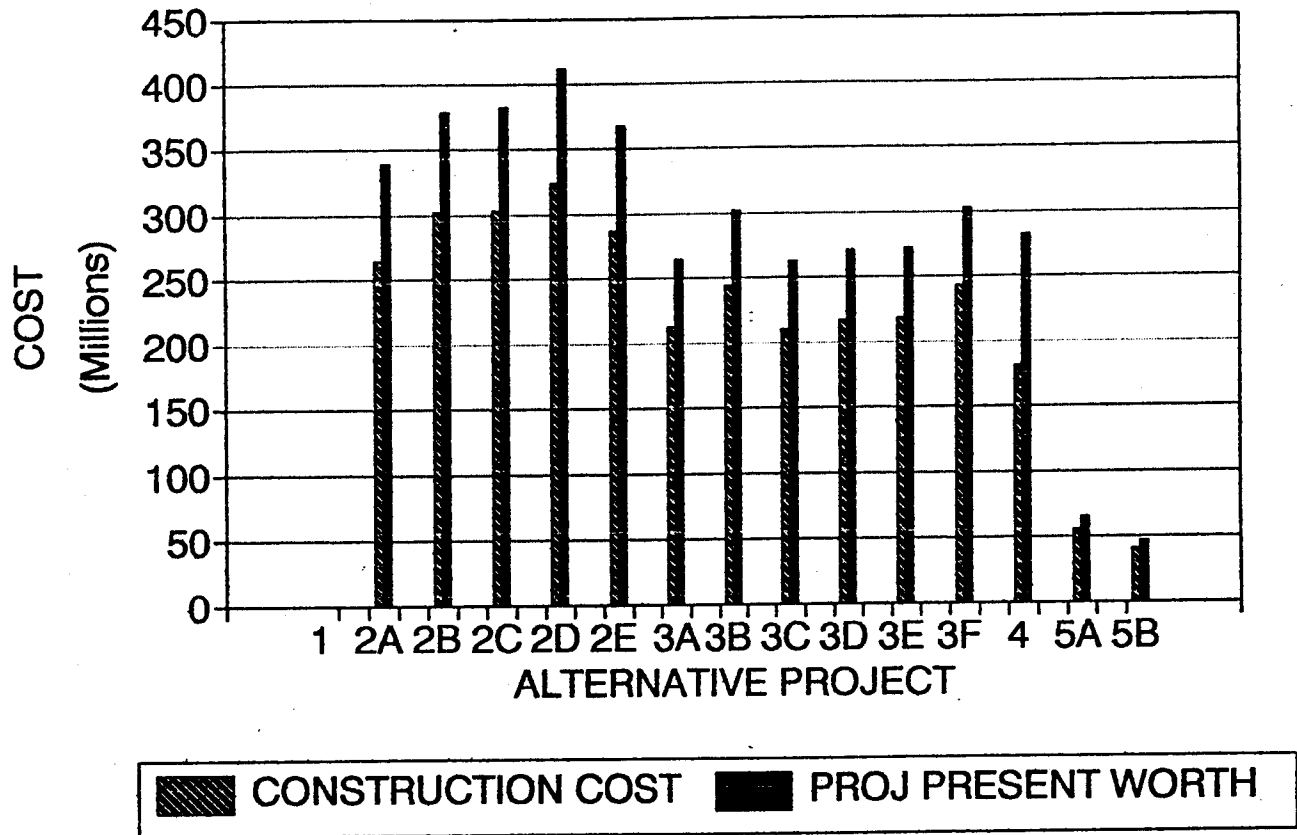
Table 2 provides a cost summary of the major components associated with construction of each of the projects.

Table 20 provides a summary of the projected annual operations and maintenance costs for each alternative project.

The other tables, and the separately bound appendix, provide details and backup for these summary tables.

# FIGURE 1

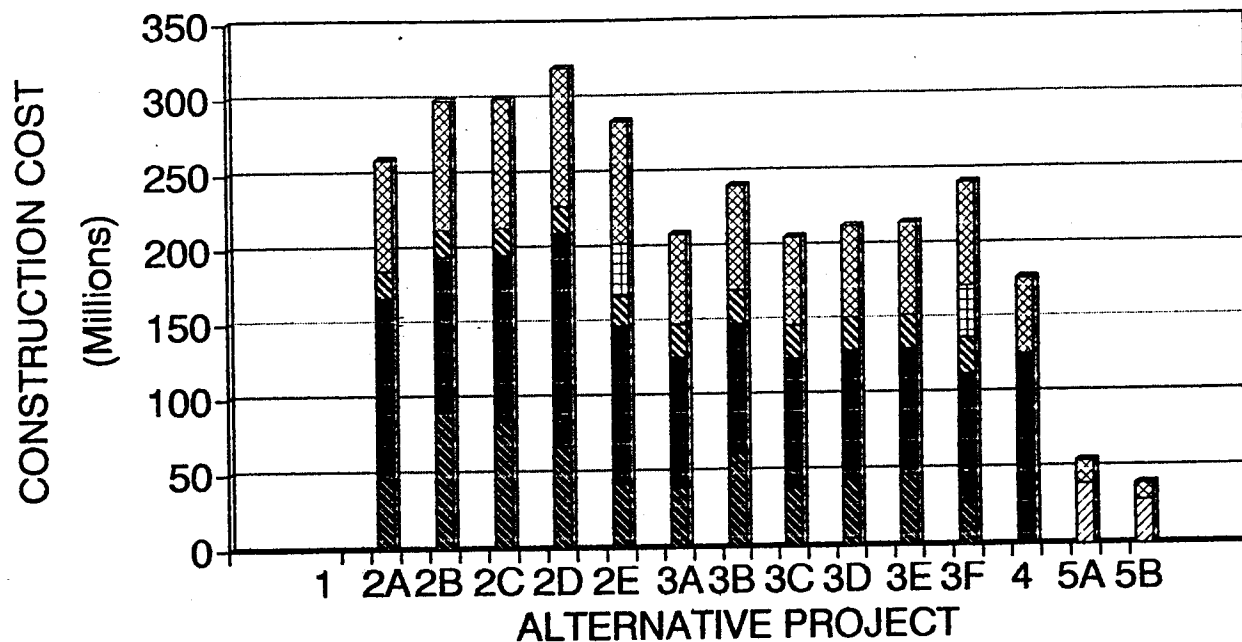
## PROJECT COST COMPARISON





# FIGURE 2

## CONSTRUCTION COST COMPARISON



RESERVOIRS  
ASR SYSTEM

PIPES & PUMP STA.  
DIR. DISCHARGE

AG & URBAN IRRIG  
CONT'CY & OH&P

TABLE 1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 ALTERNATIVE PROJECTS COST ESTIMATE - SUMMARY  
 NOV 27, 1995

ALTERNATIVE PROJECT	CONSTRUCTION COST (TABLE 2) (\$1,000)	ENGINEERING, ADMIN., LEGAL (15% OF CONST. COST) (\$1,000)	LAND PURCHASE COST (TABLE 12) (\$1,000)	PROJECT CAPITAL COST (CONSTR. + ENGR. + LAND) (\$1,000)	ANNUAL OPERATIONS AND MAINT. COST (TABLE 20) (\$1,000)	TOTAL PROJECT PRESENT WORTH COST (1)(2)(3) (\$1,000)	CONTINGENCY PLAN OPERATIONS EXPENSE (TABLE 30) (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$264,208	\$39,631	\$8,487	\$312,326	\$2,513	\$340,014	\$433
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$302,158	\$45,324	\$4,734	\$352,216	\$2,411	\$378,780	\$437
2C - TOLAY C	\$303,517	\$45,528	\$4,242	\$353,287	\$2,627	\$382,231	\$438
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$324,206	\$48,631	\$3,883	\$376,720	\$3,153	\$411,480	\$558
2E - ASR + SMALLER TOLAY	\$286,768	\$43,015	\$8,491	\$338,272	\$2,730	\$368,351	\$437
3A - TWO ROCK	\$212,554	\$31,883	\$1,973	\$246,410	\$1,648	\$264,568	\$297
3B - BLOOMFIELD	\$244,175	\$36,626	\$1,858	\$282,659	\$1,745	\$301,888	\$297
3C - CARROLL ROAD	\$210,043	\$31,506	\$1,907	\$243,456	\$1,753	\$262,771	\$297
3D - VALLEY FORD	\$218,888	\$32,533	\$2,057	\$251,478	\$1,785	\$271,145	\$297
3E - HUNTLEY	\$218,739	\$32,811	\$2,354	\$253,904	\$1,713	\$272,778	\$298
3F - ASR + SMALLER TWO ROCK	\$243,470	\$36,521	\$1,972	\$281,963	\$1,908	\$302,963	\$308
4 - GEYSERS RECHARGE	\$180,907	\$27,136	\$208	\$208,252	\$8,683	\$281,885	\$0
5A - DIRECT DISCHARGE TO TO RUSSIAN RIVER	\$55,583	\$8,337	\$33	\$63,953	\$97	\$65,022	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$40,308	\$6,048	\$0	\$46,352	\$0	\$46,352	\$0

(1) ANNUAL O&M CAPITALIZED @ 6.5% INTEREST OVER 20 YEARS; PWF = 11.018

(2) DOES NOT INCLUDE CREDIT FOR ANNUAL REVENUE INCOME FROM SALE OF RECLAIMED WATER, OR VALUE OF CROPS PRODUCED DUE TO ALTERNATIVES 2A THROUGH 3F, OR VALUE OF SIGNIFICANT ELECTRICAL ENERGY PRODUCED DUE TO ALTERNATIVE 4.

(3) ASSUMES UNIFORM PUMPING ENERGY CONSUMPTION (AT DESIGN YEAR VALUE) AND ENERGY COST FOR 20 YEARS.

QCOSTTAB.1

PARSONS ENGINEERING SCIENCE, INC.

TABLE 2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONSTRUCTION COST ESTIMATE - SUMMARY TABLE  
MAIN FACILITIES AND COMPONENTS  
NOV 27, 1995

ALTERNATIVE PROJECT	RESERVOIRS (TABLE 3) (\$1,000)	PIPELINES (TABLE 4) (\$1,000)	PUMP STATIONS (TABLE 5) (\$1,000)	AGRICULTURAL IRRIGATION AREAS (TABLE 6) (\$1,000)	URBAN IRRIGATION (TABLE 7) (\$1,000)	ASR SYSTEM (TABLE 8) (\$1,000)	DIRECT DISCHARGE (TABLE 9) (\$1,000)	UTILITY SERVICES (TABLE 10) (\$1,000)	HEADWORKS IMPROVEMENTS (TABLE 11) (\$1,000)	SUBTOTAL CONSTRUCTION COST (\$1,000)	CONSTRUCTION CONTINGENCY (25% OF SUBTOTAL) (\$1,000)	CONTRACTOR'S EXPENSES, OH&P (18% OF SUBTOTAL) (\$1,000)	TOTAL PROJECT CONSTRUCTION COST (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
2A - TOLAY A	\$48,364	\$86,482	\$36,820	\$8,362	\$12,812	\$0	\$0	\$17,090	\$790	\$188,720	\$47,180	\$26,308	\$264,
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$71,078 \$19,184	\$62,604	\$38,066	\$8,362	\$12,812	\$0	\$0	\$12,082	\$790	\$215,827	\$53,957	\$32,374	\$302,
2C - TOLAY C	\$84,159	\$80,226	\$38,306	\$8,362	\$12,812	\$0	\$0	\$12,151	\$790	\$216,798	\$54,200	\$32,520	\$303,
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$47,649 \$19,184	\$68,348	\$52,400	\$8,362	\$12,812	\$0	\$0	\$22,058	\$790	\$231,576	\$57,894	\$34,738	\$324,
2E - ASR + SMALLER TOLAY	\$42,242	\$68,041	\$34,848	\$8,362	\$12,812	\$35,764	\$0	\$12,186	\$790	\$204,833	\$51,208	\$30,725	\$286,
3A - TWO ROCK	\$39,684	\$61,280	\$28,025	\$12,152	\$12,812	\$0	\$0	\$7,081	\$790	\$151,824	\$37,956	\$22,774	\$212,
3B - BLOOMFIELD	\$82,231	\$48,030	\$30,326	\$12,152	\$12,812	\$0	\$0	\$7,071	\$790	\$174,411	\$43,603	\$26,182	\$244,
3C - CARROLL ROAD	\$38,418	\$48,335	\$30,492	\$12,152	\$12,812	\$0	\$0	\$7,032	\$790	\$150,031	\$37,508	\$22,805	\$210,
3D - VALLEY FORD	\$43,288	\$47,852	\$30,992	\$12,152	\$12,812	\$0	\$0	\$7,034	\$790	\$154,920	\$38,730	\$23,238	\$216,
3E - HUNTLEY	\$46,883	\$46,590	\$30,016	\$12,152	\$12,812	\$0	\$0	\$7,027	\$790	\$155,242	\$38,811	\$23,438	\$216,
3F - ASR + SMALLER TWO ROCK	\$28,583	\$48,656	\$30,080	\$12,152	\$12,812	\$35,764	\$0	\$7,081	\$790	\$173,907	\$43,477	\$28,088	\$243,
4 - GEYSERS RECHARGE	\$0	\$76,399	\$36,965	\$0	\$0	\$0	\$0	\$15,045	\$790	\$129,219	\$32,305	\$19,383	\$180,
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0		\$0	\$0	\$0	\$0	\$38,912	\$0	\$790	\$39,702	\$9,926	\$6,055	\$55,
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0	\$28,000	\$0	\$790	\$28,790	\$7,198	\$4,319	\$40,

COSTS BASIS IS SEPT 1995 ENR CONSTRUCTION COST (SAN FRANCISCO) INDEX = APPROX 8500.

QCOSTTAB.2

PARSONS ENGINEERING SCIENCE, INC.

TABLE 3

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIRS, SUMMARY  
 NOV 22, 1995

ALTERNATIVE PROJECT	SITE WORK (TABLE 3.1) (\$1,000)	DAM EARTHWORK (1) (TABLE 3.2) (\$1,000)	SPILLWAY & OUTLET WORKS (TABLE 3.5) (\$1,000)	RUNOFF DIVERSION STRUCTURES (TABLE 3.6) (\$1,000)	ACCESS ROAD (TABLE 3.7) (\$1,000)	MITIGATION MEASURES (TABLE 3.8) (\$1,000)	TOTAL CONSTRUCTION COST (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$190	\$18,608	\$5,332	\$15,220	\$269	\$6,745	\$46,364
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$119 \$86	\$58,005 \$16,106	\$4,382 \$2,235	\$6,738 \$0	\$174 \$172	\$1,660 \$565	\$71,078 \$19,164
2C - TOLAY C	\$135	\$62,544	\$4,805	\$13,795	\$255	\$2,625	\$84,159
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$107 \$86	\$25,566 \$16,106	\$7,758 \$2,235	\$11,266 \$0	\$222 \$172	\$2,730 \$565	\$47,649 \$19,164
2E - ASR + SMALLER TOLAY	\$190	\$15,000	\$4,818	\$15,220	\$269	\$6,745	\$42,242
3A - TWO ROCK	\$111	\$32,188	\$4,178	\$0	\$267	\$2,940	\$39,684
3B - BLOOMFIELD	\$114	\$56,528	\$3,749	\$0	\$240	\$1,600	\$62,231
3C - CARROLL ROAD	\$131	\$31,270	\$4,602	\$0	\$90	\$2,325	\$38,418
3D - VALLEY FORD	\$126	\$36,004	\$4,214	\$0	\$169	\$2,775	\$43,288
3E - HUNTLEY	\$120	\$40,784	\$4,328	\$0	\$161	\$1,460	\$46,853
3F - ASR + SMALLER TWO ROCK	\$111	\$20,000	\$3,245	\$0	\$267	\$2,940	\$26,563
4 - GEYSERS RECHARGE	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0	\$0

(1) FROM TABLE 3.2; INCLUDES COST OF MAIN DAM, BACKDAM, AND SADDLE DAMS AND LIMITED IMPERVIOUS LINING OF RESERVOIR FLOOR.

QCOSTTAB.3

TABLE 3.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIRS, SITEWORK  
 NOV 22, 1995

ALTERNATIVE PROJECT	DEMOLITION COST (1)	FENCING COST (2)	TOTAL CONSTRUCTION COST
1 - NO PROJECT	\$0	\$0	\$0
2A - TOLAY A	\$40,000	\$150,272	\$190,272
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$50,000 \$20,000	\$89,272 \$68,144	\$119,272 \$88,144
2C - TOLAY C	\$30,000	\$104,920	\$134,920
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$20,000 \$20,000	\$87,300 \$68,144	\$107,300 \$88,144
2E - ASR + SMALLER TOLAY	\$40,000	\$150,272	\$190,272
3A - TWO ROCK	\$30,000	\$80,578	\$110,578
3B - BLOOMFIELD	\$40,000	\$74,182	\$114,182
3C - CARROLL ROAD	\$50,000	\$81,444	\$131,444
3D - VALLEY FORD	\$40,000	\$85,688	\$125,688
3E - HUNTLEY	\$50,000	\$70,284	\$120,284
3F - ASR + SMALLER TWO ROCK	\$30,000	\$80,578	\$110,578
4 - GEYSERS RECHARGE	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO TO RUSSIAN RIVER	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0

(1) INCLUDES REMOVAL OF EXISTING STRUCTURES, UTILITIES, FENCES, AND SEALING OF DOMESTIC WELLS.  
 COST IS ESTIMATE BASED ON OBSERVED NUMBER OF EXISTING IMPROVEMENTS ON SITE.  
 REMOVAL OF TREES AND BRUSH FROM RESERVOIR AREA IS INCLUDED AS RESERVOIR CLEARING IN TABLES 3.2.1, ETC.

(2) BARBED WIRE FENCING ASSUMED AROUND RESERVOIR PROPERTY.  
 ESTIMATE FENCING LENGTH =  $6 \times ((0.75 \times \text{RESERVOIR WATER SURFACE AREA}) \text{ TO } 1/2 \text{ POWER})$   
 FOR EQUIVALENT RECTANGULAR FENCED AREA: WITH FENCED AREA =  $1.5 \times \text{WATER SURFACE AREA}$ , AND  $L=2W$ .  
 ESTIMATE COST OF BARBED WIRE FENCING @ \$4/LF, INCL GATES.

TABLE 3.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIRS DAMS, EARTHWORK  
 NOV 22, 1995

ALTERNATIVE PROJECT	MAIN DAM (1) (\$)	BACKDAM (1) (\$)	SADDLE DAMS (1) (\$)	TOTAL CONSTRUCTION COST (\$)
1 - NO PROJECT	\$0	\$0	\$0	\$0
2A - TOLAY A	\$15,928,000	\$2,196,000	\$484,000	\$18,608,000
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$57,498,000 \$18,108,000	\$0 \$0	\$506,000 \$0	\$58,005,000 \$18,108,000
2C - TOLAY C	\$27,434,000	\$35,110,000	\$0	\$62,544,000
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$23,288,000 \$18,108,000	\$0 \$0	\$2,300,000 \$0	\$25,588,000 \$18,108,000
2E - ASR + SMALLER TOLAY (2)	\$13,300,000	\$1,500,000	\$200,000	\$15,000,000
3A - TWO ROCK	\$32,188,000	\$0	\$0	\$32,188,000
3B - BLOOMFIELD	\$56,528,000	\$0	\$0	\$56,528,000
3C - CARROLL ROAD	\$31,270,000	\$0	\$0	\$31,270,000
3D - VALLEY FORD	\$38,004,000	\$0	\$0	\$38,004,000
3E - HUNTLEY	\$40,287,000	\$0	\$517,000	\$40,784,000
3F - ASR + SMALLER TWO ROCK (2)	\$20,000,000	\$0	\$0	\$20,000,000
4 - GEYSERS RECHARGE	\$0	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0

(1) COSTS ARE FOR EXTRACTION/IMPORT AND PLACEMENT OF EARTH MATERIALS FOR DAM EMBANKMENTS, AND LIMITED IMPERVIOUS LINING OF RESERVOIR FLOOR: FROM COST TABLES IN RUST E&I GEOTECHNICAL REPORT. SEE COPY OF TABLES IN COST ESTIMATE APPENDIX.

(2) COST FOR RESERVOIR INTERPOLATED FROM COST CURVES FOR RESERVOIR WITH CAPACITY EQUAL TO 2,000 MG LESS THAN FULL STORAGE CAPACITY (DUE TO REPLACEMENT WITH ASR AQUIFER STORAGE).

TABLE 3.5

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 RESERVOIR SPILLWAY AND OUTLET WORKS COST ESTIMATE  
 OCT 16, 1995

RESERVOIR	SPILLWAY COST	OUTLET WORKS COST	TOTAL COST
	(1) (\$1,000)	(2) (\$1,000)	(\$1,000)
TOLAY A	\$4,399	\$933	\$5,332
TOLAY C	\$3,755	\$1,050	\$4,805
SEARS POINT	\$6,741	\$1,017	\$7,758
ADOBE ROAD	\$2,987	\$1,395	\$4,382
LAKEVILLE	\$1,507	\$728	\$2,235
TWO ROCK	\$2,603	\$1,575	\$4,178
BLOOMFIELD	\$2,349	\$1,400	\$3,749
CARROLL ROAD	\$3,200	\$1,402	\$4,602
VALLEY FORD	\$2,988	\$1,226	\$4,214
HUNTLEY	\$2,935	\$1,393	\$4,328
SMALLER TOLAY (3)	\$4,160	\$658	\$4,818
SMALLER TWO ROCK (3)	\$2,271	\$974	\$3,245

(1) FROM TABLE 3.5.1

(2) FROM TABLE 3.5.2

(3) FOR RESERVOIR W/ 2,000 MG LESS STORAGE VOLUME

TABLE 3.5.1

(SW-2)

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
COST ESTIMATE - RESERVOIR SPILLWAY  
SEPT 9, 1995

RESERVOIR	COST ELEMENTS							TOTAL COST
	EXCAVATION TO "BEDROCK"	PRESSURE GROUT WEIR SECTION	CONCRETE WEIR STRUCTURE	ROADWAY BRIDGE	CONCRETE CHUTE CHANNEL	STILLING BASIN/ENERGY DISSIPATOR	NATURAL CHANNEL RIPRAP	
	(1) (\$1,000)	(2) (\$1,000)	(3) (\$1,000)	(4) (\$1,000)	(5) (\$1,000)	(6) (\$1,000)	(7) (\$1,000)	
TOLAY A	145	65	200	210	2,450	1,260	69	\$4,399
TOLAY C	113	51	180	180	2,211	990	50	\$3,755
SEARS POINT	199	90	300	300	3,417	2,295	140	\$8,741
ADOBE ROAD	93	42	80	120	2,090	540	22	\$2,987
LAKEVILLE	38	17	40	80	1,168	180	6	\$1,507
TWO ROCK	76	34	60	90	1,970	360	13	\$2,603
BLOOMFIELD	66	30	50	75	1,849	270	9	\$2,349
CARROLL ROAD	101	45	70	105	2,412	450	17	\$3,200
VALLEY FORD	93	42	70	105	2,211	450	17	\$2,988
HUNTLEY	80	36	40	60	2,533	180	6	\$2,935
SMALLER TOLAY (8)	132	59	200	210	2,230	1,260	69	\$4,160
SMALLER TWO ROCK (9)	64	28	60	90	1,855	380	13	\$2,271

THE FOLLOWING RELATIONSHIPS ARE ESTIMATIONS USED IN THIS TABLE:

- (1)  $\text{COST} = (\text{SPILLWAY FACE AREA} \times 15')/27 \times \$4/\text{CY} = \$2.22 \times \text{FA}$   
WHERE FACE AREA =  $1.1 \times W \times L$ , AND EXCAVATION MATERIAL IS USED IN DAM EMBANKMENT
- (2)  $\text{COST} = \$10/\text{SF} \times 0.1 \times \text{FA} = \$1 \times \text{FA}$   
TO SEAL WEIR SECTION OF SPILLWAY AREA AGAINST LEAKAGE
- (3)  $\text{COST} = \text{WEIR LENGTH} \times \$2,000/\text{LF} = \$2,000 \times \text{WL}$
- (4)  $\text{COST} = \text{CHANNEL WIDTH} \times \$5,000/\text{LF} = \$3,000 \times W$   
FOR 16' WIDE ROADWAY TO CROSS SPILLWAY AT DAM CREST
- (5)  $\text{COST} = \$400 \times \text{VOLUME OF SPILLWAY CHUTE}$   
 $= \$400 \times \text{VOL (PER FIGURE SW-1)}$
- (6)  $\text{COST} = \$450 \times \text{VOLUME OF STILLING BASIN}$   
 $= \$450 \times \text{VOL (PER FIGURE SW-2)}$
- (7)  $\text{COST} = (\$25/\text{CY} \times \text{CHANNEL WIDTH} \times (5 \times \text{CHANNEL WIDTH}) \times 3 \text{ FT ROCK})/27$   
 $= \$14 \times W \times W$
- (8) FOR TOLAY RESERVOIR W/ 2,000 MG LESS STORAGE, DAM = 8' LOWER; SPILLWAY LENGTH = 0.91 OF TOLAY A
- (9) FOR TWO ROCK RESERVOIR W/ 2,000 MG LESS STORAGE, DAM = 35' LOWER; SPILLWAY LENGTH = 0.84 OF TWO ROCK



TABLE 3.5.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIR OUTLET WORKS  
 SEPT 29, 1995

RESERVOIR	COST ELEMENTS					TOTAL COST
	EXCAVATION	CREEK DIVERSION AND RESERVOIR OUTLET CONDUIT	OUTLET TOWER, GATE, AND TRASHRACK STRUCTURE	NATURAL CHANNEL RIPRAP AT OUTLET	PIPE BRANCH TO IRRIG. PUMP STA.	
	(1) (\$1,000)	(2) (\$1,000)	(3) (\$1,000)	(4) (\$1,000)	(5) (\$1,000)	
TOLAY A	28	648	225	25	7	933
TOLAY C	34	759	225	25	7	1,050
SEARS POINT	30	730	225	25	7	1,017
ADOBE ROAD	43	1,095	225	25	7	1,395
LAKEVILLE	15	456	225	25	7	728
TWO ROCK	54	1,264	225	25	7	1,575
BLOOMFIELD	47	1,096	225	25	7	1,400
CARROLL ROAD	49	1,096	225	25	7	1,402
VALLEY FORD	42	927	225	25	7	1,226
HUNTLEY	46	1,090	225	25	7	1,393
SMALLER TOLAY (6)	15	386	225	25	7	658
SMALLER TWO ROCK (7)	25	692	225	25	7	974

(1) COST = 4 X CONDUIT PIPE AREA X CONDUIT LENGTH X \$5/CY = \$0.74 X CONDUIT (AREA X LENGTH)  
 TO ACCOUNT FOR OVEREXCAVATION TO SET CONDUIT INVERT AT BASE OF DAM FOUNDATION CUTOFF TRENCH  
 CONDUIT SIZE FROM TABLE ROW-1

(2) COST = CONDUIT PIPE COST + PIPE ENCASEMENT COST (PER FIGURE ROW-3)  
 = \$ PIPE UNIT COST (PER SCHEDULE BELOW) X PIPE LENGTH (PER TABLE ROW-1) + \$500(1/2 X PIPE AREA X PIPE LENGTH)  
 COVERS COST OF CREEK DIVERSION INLET STRUCTURE AND GATE AND OPERATOR FOR END OF OUTLET CONDUIT

(3) COST = TRASHRACK, 15' X 40' @ \$50/SF = \$30,000, PLUS  
 + OUTLET TOWER SHAFT CONDUIT @ \$500/LF X 30 LF = \$15,000, PLUS  
 + GATE SUPPORT C.I.P. STRUCTURE, \$500/CY X 200 CY = \$100,000  
 + WHEELED GATE, 10'X 10' @ \$40,000, PLUS  
 + HYDRAULIC GATE OPERATOR AND CONTROLS @ \$25,000, PLUS  
 + GATE CONTROL STATION ON DAM CREST @ \$5,000, PLUS  
 + PLUG DIVERSION CONDUIT @ \$10,000  
 = \$ 225,000

## PIPE SCHEDULE

54" DIA	\$212/LF
72"	\$290/LF
78"	\$310/LF
90"	\$360/LF
96"	\$380/LF
102"	\$425/LF

(4) COST = \$25/CY X 25' X 150' X 2'DEEP LARGE DIA RIPRAP = \$7,000

(5) COST = \$250/LF X 100 LF FOR 54" STEEL PIPE FROM OUTLET BOX CONDUIT TO PUMP STATION = \$25,000

(6) FOR RESERVOIR W/2,000 MG LESS STORAGE, DAM = 8' LOWER; OUTLET CONDUIT SMALLER AND SHORTER

(7) FOR RESERVOIR W/2,000 MG LESS STORAGE, DAM = 35' LOWER; OUTLET CONDUIT SMALLER AND SHORTER

TABLE 3.6 (RDS-1)

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIR STORMWATER RUNOFF DIVERSION STRUCTURES (1)  
 NOV 21, 1995

RESERVOIR	RUNOFF DIVERSION PIPELINE	RUNOFF DETENTION BASIN	STORMWATER PUMP STA (6)	ELECTRICAL SUBSTATION (TABLE 5.2)	PUMPED DISCHARGE PIPELINE	GRAVITY FLOW DIVERSION BOX CONDUIT	GRAVITY FLOW OPEN CHANNEL	TOTAL COST
TOLAY A (2)	\$0	\$360,000	\$3,900,000	\$438,000	\$317,800	\$10,204,000	\$0	\$15,219,800
ADOBE ROAD (3)	\$398,800	\$30,000	\$4,650,000	\$438,000	\$31,800	\$1,189,000	\$0	\$6,737,600
TOLAY C (4)	\$0	\$1,332,000	\$6,700,000	\$500,000	\$213,300	\$5,050,000	\$0	\$13,795,300
SEARS POINT (5)	\$0	\$133,000	\$0	\$0	\$0	\$0	\$11,133,000	\$11,266,000

(1) STRUCTURES BASED ON RECOMMENDATIONS IN TECHNICAL MEMORANDUM R-4

(2) FROM TABLE RDS-2

(3) FROM TABLE RDS-3

(4) FROM TABLE RDS-4

(5) FROM TABLE RDS-5

(6) PUMP STATIONS COSTS DEVELOPED BY PARSONS ES, AS NOMOGRAPH BASED ON SEVERAL PUMP STATION PROJECT BIDS.

TABLE 3.7

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIR ACCESS ROADS  
 OCT 16, 1995

RESERVOIR	LENGTH OF NEW PAVED ROADS	LENGTH OF NEW GRAVEL ROADS	CUT & FILL FOR ROADS, INCL. BASEROCK FOR ROADS		EXTRA FOR ROCK EXCAV. FOR ROADS			A.C PAVEMENT OF ROADS		TOTAL COST
	(FT) (1)	(FT) (2)	(CY) (3)	COST @ \$3/CY (\$1,000)	(%)	(CY)	COST @ \$6/CY (\$1,000)	(SQ FT) (4)	COST @ \$2.50/SF (\$1,000)	
TOLAY A	5,600	3,750	14,025	\$42	5%	468	\$3	89,600	\$224	\$269
TOLAY C	5,700	0	8,550	\$26	5%	285	\$2	91,200	\$228	\$255
ADOBE ROAD	3,500	2,500	9,000	\$27	20%	1,200	\$7	56,000	\$140	\$174
SEARS POINT	4,800	1,000	8,700	\$26	10%	580	\$3	76,800	\$192	\$222
LAKEVILLE	3,850	0	5,775	\$17	5%	193	\$1	61,600	\$154	\$172
TWO ROCK	5,700	0	8,550	\$26	40%	2,280	\$14	91,200	\$228	\$267
BLOOMFIELD	5,250	0	7,875	\$24	20%	1,050	\$6	84,000	\$210	\$240
CARROLL ROAD	2,000	0	3,000	\$9	10%	200	\$1	32,000	\$80	\$90
VALLEY FORD	3,750	0	5,625	\$17	10%	375	\$2	60,000	\$150	\$169
HUNTLEY	3,450	500	5,925	\$18	20%	790	\$5	55,200	\$138	\$161

(1) FROM RESERVOIR DRAWINGS RES-1 THRU RES-9,  
 FOR ACCESS TO DAM AND TO PUMP STATIONS

(2) FOR ACCESS TO SADDLE DAMS

(3) BASED ON 24' WIDE GRADED ALIGNMENT. ASSUME BALANCED CUT AND FILL  
 EXCAVATION, NATIVE MATERIAL ONLY, MAX. SLOPES = 2:1,  
 @ APPROX. 1.5 CY/LF ROADBED.

(3) ESTIMATED FROM RESERVOIR TOPOGRAPHIC DRAWINGS

(4) BASED ON PAVEMENT OF 16' WIDE ROAD ALIGNMENT

TABLE 3.8

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIR MITIGATION MEASURES  
 NOV 22, 1995

RESERVOIR	MITIGATION OF LOSS OF WETLANDS			CULTURAL RESOURCES SITES		TOTAL COST (\$)
	RESERVOIR WETLANDS		COST (\$) (2)	NUMBER (3)	COST (\$) (3)	
	ACRES LOST (ACRES) (1)	MITIGATION AREA ACRES REQUIRED (ACRES) (1)				
TOLAY A	242	254	\$6,350,000	16	\$395,000	\$6,745,000
TOLAY C	82	94	\$2,350,000	11	\$275,000	\$2,625,000
ADOBE ROAD	32	61	\$1,525,000	4	\$135,000	\$1,660,000
SEARS POINT	56	105	\$2,625,000	6	\$105,000	\$2,730,000
LAKEVILLE	17	22	\$550,000	1	\$15,000	\$565,000
TWO ROCK	59	106	\$2,650,000	11	\$290,000	\$2,940,000
BLOOMFIELD	54	63	\$1,575,000	2	\$25,000	\$1,600,000
CARROLL ROAD	63	89	\$2,225,000	6	\$100,000	\$2,325,000
VALLEY FORD	98	110	\$2,750,000	2	\$25,000	\$2,775,000
HUNTLEY	47	53	\$1,325,000	5	\$135,000	\$1,460,000

(1) FROM TABLE 3.8.2.

(2) COST ESTIMATED AT \$25,000/ACRE TO PURCHASE PROPERTY AND DEVELOP WETLANDS.  
 DOES NOT INCLUDE PURCHASE COST OF RESERVOIR WETLANDS PROPERTY ITSELF; SEE TABLE 12.

(3) FROM TABLE 3.8.1.

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TABLE 3.8.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - RESERVOIR CULTURAL RESOURCES MITIGATION  
 NOV 21, 1995

RESERVOIR	PREHISTORIC/HISTORIC ARCHAEOLOGICAL SITES						ARCHITECTURAL SITES		HISTORIC VERNACULAR LANDSCAPES		TOTAL COST
	SMALL		MEDIUM		LARGE						
	QTY	COST@ \$15,000	QTY	COST@ \$35,000	QTY	COST@ \$50,000	QTY	COST@ \$10,000	QTY	COST@ \$15,000	
TOLAY A	3	\$45,000	7	\$245,000	1	\$50,000	4	\$40,000	1	\$15,000	\$395,000
TOLAY C	2	\$30,000	6	\$210,000	0	\$0	2	\$20,000	1	\$15,000	\$275,000
ADOBE ROAD	0	\$0	2	\$70,000	1	\$50,000	0	\$0	1	\$15,000	\$135,000
SEARS POINT	3	\$45,000	1	\$35,000	0	\$0	1	\$10,000	1	\$15,000	\$105,000
LAKEVILLE	1	\$15,000	0	\$0	0	\$0	0	\$0	0	\$0	\$15,000
TWO ROCK	6	\$90,000	1	\$35,000	3	\$150,000	0	\$0	1	\$15,000	\$290,000
BLOOMFIELD	0	\$0	0	\$0	0	\$0	1	\$10,000	1	\$15,000	\$25,000
CARROLL ROA	2	\$30,000	1	\$35,000	0	\$0	2	\$20,000	1	\$15,000	\$100,000
VALLEY FORD	0	\$0	0	\$0	0	\$0	1	\$10,000	1	\$15,000	\$25,000
HUNTLEY	0	\$0	0	\$0	2	\$100,000	2	\$20,000	1	\$15,000	\$135,000

NOTE: THIS DATA IS BASED ON MEMORANDUM "PRELIMINARY ESTIMATE OF SITES AND UNIT COSTS", PREPARED BY HBA 9/13/95.  
 COSTS INCLUDE ESTIMATES FOR PROJECTED FIELD INVESTIGATIONS AND RELOCATION/PRESERVATION OF FOUND ARTIFACTS.

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TABLE 3.8.2

SANTA ROSA SUBREGIONAL LONG TERM WASTEWATER PROJECT  
 COST ESTIMATE - MITIGATION OF WETLAND ACREAGE LOST TO RESERVOIR CONSTRUCTION  
 NOV 22, 1995

RESERVOIR	ACRES OF WETLAND OR VEGETATED AREA IMPACTED BY RESERVOIR CONSTRUCTION (1)															IMPACTED OR LOST AREA (ACRES)	REQUIRED MITIGATION (ACRES)
	TYPE WETLAND OR VEGETATION (AND REQUIRED RATIO OF MITIGATION ACREAGE TO LOST ACREAGE) (2)																
	OW 3:1	FM 3:1	FS 3:1	WR 3:1	MR 3:1	NG 2:1	ANG 1:1	CROP 1:1	FP 1:1	SW 1:1	NWR 1:1	EUC 1:1	BUC 1:1	POP 1:1			
TOLAY A	0	0	0	1.3	2.39	4.92	52.34	157.59	2.48	1.47	19.21	0	0	0	242	254	
TOLAY C	0	0	0	1.27	2.39	4.65	27.17	33.6	0	1.37	11.92	0	0	0	82	94	
SEARS POINT	1.04	0	0	6.92	16.17	0	24.93	0	0	0.71	3.15	3.36	0	0	56	105	
LAKEVILLE	0	0	0.3	1.99	0	0.14	9.36	0	0.12	0	4.9	0.54	0	0.09	17	22	
ADOBE ROAD	1.4	0	0	0	13.28	0	13.91	0	3.03	0	0	0	0	0	32	61	
TWO ROCK	1.83	0	12.52	4.38	5.04	0.01	29.11	0	3.82	0	1.8	0	0	0	59	106	
BLOOMFIELD	0.13	0	0	3.8	0.92	0	41.35	0	0.25	0	6.6	0.7	0	0	54	63	
CARROLL ROAD	0	0	0.03	12.98	0	0.35	44.58	0	1.62	0	2.7	0.55	0	0	63	89	
VALLEY FORD	0	0	0.4	5.59	0	0	54.23	0	4.16	31.8	0.79	0.56	0	0	98	110	
HUNTLEY	0	0	0.08	1.88	1.05	0.03	40.43	0	0.57	0.44	1.72	1.04	0.04	0	47	53	

(1) ACRES DERIVED FROM FIELD INVESTIGATIONS BY PARSONS ENGINEERING SCIENCE, INC. AND HBA, INC.

(2) WETLAND AND VEGETATION CODES ARE AS FOLLOWS: OW = OAK WOODLAND, ANG = ANNUAL GRASSLAND, NG = NATIVE GRASSLAND, CROP = CROPLAND, FP = FRESHWATER POND, FM = FRESHWATER MARSH, SW = SEASONAL WETLAND, FS = FRESHWATER SEEP, NWR = NON-WOODED RIPARIAN, WR = WILLOW RIPARIAN, MR = MIXED RIPARIAN, BUC = BUCKEYE, POP = POPLAR, EUC = EUCALYPTUS

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TABLE 4

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONSTRUCTION COST ESTIMATE - PIPELINES, SUMMARY  
OCT 24, 1995

ALTERNATIVE PROJECT	TRANSMISSION AND DIST. LINES TO AGRIC. AREAS CONSTRUCTION COST (1)	DISTRIBUTION/COLLECTION LINES TO/FROM ASR WELLS CONSTRUCTION COST (2)	TRANSMISSION LINE TO DIRECT RIVER DISCHARGE CONSTRUCTION COST (3)	TRANSMISSION LINE TO GEYSERS DIST. TANK CONSTRUCTION COST (4)	DIST. LINES TO THE GEYSERS INJECTION WELLS CONSTRUCTION COST (5)	URBAN IRRIGATION LINES CONSTRUCTION CO (6)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$66,492,000	\$0	\$0	\$0	\$0	\$5,812,000
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$52,504,000	\$0	\$0	\$0	\$0	\$5,812,000
2C - TOLAY C	\$60,228,000	\$0	\$0	\$0	\$0	\$5,812,000
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$68,348,000	\$0	\$0	\$0	\$0	\$5,812,000
2E - ASR + SMALLER TOLAY	\$58,041,000	\$2,124,000	\$0	\$0	\$0	\$5,812,000
3A - TWO ROCK	\$51,280,000	\$0	\$0	\$0	\$0	\$5,812,000
3B - BLOOMFIELD	\$49,030,000	\$0	\$0	\$0	\$0	\$5,812,000
3C - CARROLL ROAD	\$48,335,000	\$0	\$0	\$0	\$0	\$5,812,000
3D - VALLEY FORD	\$47,852,000	\$0	\$0	\$0	\$0	\$5,812,000
3E - HUNTLEY	\$46,590,000	\$0	\$0	\$0	\$0	\$5,812,000
3F - ASR + SMALLER TWO ROCK	\$45,795,000	\$2,124,000	\$0	\$0	\$0	\$5,812,000
4 - GEYSERS RECHARGE	\$0	\$0	\$0	\$59,199,000	\$17,200,000	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$10,777,000	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0

(1) COSTS FROM TABLE 4.1, 4.2 AND 4.3, INCL. PIPING TO SEBASTOPOL IRRIGATION AREAS.

(2) FROM TABLE 4.4

(3) FROM TABLE 4.5

(4) FROM TABLE 4.6

(5) COSTS FOR DISTRIBUTION TANKS, PIPING, AND INJECTION WELLS FROM UNOCAL CORPORATION 9/22/95; INCLUDED IN ALTERNATIVE 4 COST TOTAL IN TABLE 2.

(6) FROM TABLE 4.7

TABLE 4.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 CONSTRUCTION COST ESTIMATE - AGRICULTURAL IRRIGATION TRANSMISSION AND DISTRIBUTION PIPELINES - SOUTH COUNTY ALTERNATIVES  
 OCT 16, 1995

ITEM	UNIT	UNIT COST	ALT. 2A		ALT. 2B		ALT. 2C		ALT. 2D		ALT. 2E	
			QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST
				(\$1,000)		(\$1,000)		(\$1,000)		(\$1,000)		(\$1,000)
		(\$/UNIT)										
PIPING (TABLE 4.1.1)	LF	VARIES	302,760	\$50,830	274,980	\$39,302	280,840	\$44,869	314,620	\$52,521	315,490	\$42,250
PIPING TUNNEL TO/FROM RESERVOIR (3)	LF	\$1,100	1900	\$2,090	0	\$0	1900	\$2,090	1900	\$2,090	1900	\$2,090
ISOLATION VALVE STAS. (1)												
48"	EA	\$30,000	10	\$300	9	\$270	9	\$270	10	\$300	10	\$300
24"	EA	\$7,500	15	\$113	14	\$105	14	\$105	15	\$113	15	\$113
12"	EA	\$3,500	15	\$53	14	\$49	14	\$49	15	\$53	15	\$53
AIR RELEASE VALVES	EA	\$5,000	166	\$830	155	\$775	157	\$785	171	\$855	169	\$845
FLUSHING VALVE STAS.	EA	\$4,000	106	\$424	100	\$400	101	\$404	108	\$432	106	\$424
CREEK CROSSINGS (OPEN CUT)	EA	\$5,000	25	\$125	25	\$125	25	\$125	26	\$130	25	\$125
CREEK CROSSINGS (BORE AND JACK)	EA	\$20,000	9	\$180	9	\$180	9	\$180	10	\$200	9	\$180
HIGHWAY OR RR CROSSINGS (BORE AND JACK)	EA	\$25,000	5	\$125	5	\$125	5	\$125	5	\$125	5	\$125
	EA	\$60,000	5	\$300	5	\$300	5	\$300	5	\$300	5	\$300
ROAD PAVEMENT RESTORATION (2)	SY	\$18	151,380	\$2,725	137,490	\$2,475	140,420	\$2,528	157,310	\$2,832	157,745	\$2,839
TOTAL CONSTRUCTION COST				\$58,094		\$44,106		\$51,830		\$59,950		\$49,643
TOTAL CONSTRUCTION COST INCL. SEBASTOPOL (FROM TABLE 4.3)				\$66,492		\$52,504		\$60,228		\$68,348		\$58,041

- (1) ISOLATION VALVES ASSUMED @ 10,000 LF SPACING, BUTTERFLY VALVES IN VA  
 NUMBER OF STAS. EQUALLY DIST. AMONG THREE MOST COMMON PIPE SIZES FROM MODELING RESULTS.
- (2) PAVEMENT WIDTH ESTIMATED = (AVG PIPE WIDTH + 6 FT)/2 = 4.5 FT,  
 ASSUMING 1/2 TRENCH WIDTH DAMAGES EXISTING PAVEMENT (IE, CL PIPE TRENCH IS AT  
 EDGE OF EXISTING PAVEMENT, AND NEARLY 100% OF PIPE LENGTH IS ALONG EXISTING PAVED ROADS.
- (3) PER TECHNICAL MEMORANDUM TM-P-4, "TRANSMISSION PIPELINES TO STORAGE, TUNNEL LENGTH OPTIMIZATION ANALYSIS", 21 JULY, 1995;  
 USING TUNNEL CONSTRUCTION UNIT COST OF \$1,100/LF FOR 8 FT DIA. TUNNEL



TABLE 4.1.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 SOUTH COUNTY PROJECTS, SERIES 1 (ALL AGRICULTURAL IRRIGATION AREAS)  
 COST ESTIMATE - TRANSMISSION AND DISTRIBUTION PIPING (IN PUBLIC RIGHTS-OF-WAY)  
 SEPT 23, 1995

ITEM	PVC PIPING							WSP, CML/C PIPING										TOTAL PIPE LENGTH (FT)	TOTAL COST (\$1,000)
PIPE DIAMETER (IN)	6"	8"	10"	12"	14"	16"	18"	20"	21"	24"	27"	30"	36"	42"	48"	54"	60"		
UNIT COST (\$/LF) (1)	23.05	29.23	37.58	46.88	52.02	62.89	75.30	79.10	81.05	93.01	106.60	115.29	146.29	178.61	231.31	268.13	324.18		
ALTERNATIVE 2A																			
PIPE LENGTH (FT) (2)	0	14,100	11,300	15,900	14,800	8,120	9,700	18,800	0	6,500	0	16,600	7,300	12,400	152,320	10,900	6,020	302,780	
PIPE COST (\$1,000)	0	412	425	745	770	511	730	1,329	0	605	0	1,914	1,068	2,215	35,233	2,923	1,952		50,830
ALTERNATIVE 2B																			
PIPE LENGTH (FT) (2)	0	15,300	9,800	8,900	11,000	14,300	14,100	9,520	0	16,400	0	52,100	5,800	16,600	101,360	0	0	274,980	
PIPE COST (\$1,000)	0	447	361	417	572	898	1,082	753	0	1,525	0	6,007	848	2,965	23,446	0	0		39,302
ALTERNATIVE 2C																			
PIPE LENGTH (FT) (2)	0	3,600	8,200	14,100	0	26,400	25,600	0	9,900	21,800	3,000	19,500	9,100	12,400	107,520	0	18,720	280,840	
PIPE COST (\$1,000)	0	105	308	661	0	1,680	1,828	0	802	2,028	320	2,248	1,331	2,215	24,870	0	6,393		44,889
ALTERNATIVE 2D																			
PIPE LENGTH (FT) (2)	0	3,700	8,200	11,900	0	17,700	25,600	0	6,700	22,100	3,000	15,100	40,800	5,300	122,220	32,300	0	314,620	
PIPE COST (\$1,000)	0	108	308	558	0	1,113	1,828	0	543	2,058	320	1,741	5,969	947	28,271	8,661	0		52,521
ALTERNATIVE 2E																			
PIPE LENGTH (FT) (2)	0	4,600	8,200	20,300	0	22,800	28,010	0	6,100	39,040	3,000	18,000	26,000	108,520	26,900	6,020	0	315,490	
PIPE COST (\$1,000)	0	134	308	951	0	1,434	2,109	0	494	3,631	320	1,845	3,804	19,383	6,222	1,614	0		42,250
SEBASTOPOL																			
PIPE LENGTH (FT) (2)	0	59,270	14,500	3,900	11,200	3,500	13,700	6,100	0	11,500	0	2,300	14,820	0	0	0	0	140,590	
PIPE COST (\$1,000)	0	1,732	545	183	563	220	1,032	483	0	1,070	0	265	2,139	0	0	0	0		8,251

(1) UNIT COSTS FROM TABLE 4.8

(2) PIPE LENGTHS FROM RESULTS OF KYPIPE MODEL RUNS

QSCPIPE.411

TABLE 4.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 CONSTRUCTION COST ESTIMATE - AGRICULTURAL IRRIGATION TRANSMISSION AND DISTRIBUTION PIPELINES - WEST COUNTY ALTERNATIVES  
 SEPT 24, 1995

ITEM	UNIT	UNIT COST	ALT. 3A		ALT. 3B		ALT. 3C		ALT. 3D		ALT. 3E		ALT. 3F	
			QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST
				(\$1,000)		(\$1,000)		(\$1,000)		(\$1,000)		(\$1,000)		(\$1,000)
PIPING (TABLE 4.2.1)	LF	VARIES	312,350	\$35,042	337,450	\$35,410	309,450	\$35,009	308,050	\$34,527	311,800	\$33,237	311,970	\$32,420
PIPING TUNNEL TO/FROM RESERVOIR (3)	LF	\$1,300	2,200	\$2,860	0	\$0	0	\$0	0	\$0	0	\$0	2,200	0
ISOLATION VALVE STAS. (1)														
48"	EA	\$30,000	10	\$300	10	\$300	10	\$300	10	\$300	10	\$300	10	\$300
12"	EA	\$3,500	15	\$53	15	\$53	15	\$53	15	\$53	15	\$53	15	\$53
8"	EA	\$2,500	15	\$38	15	\$38	15	\$38	15	\$38	15	\$38	15	\$38
AIR RELEASE VALVE STAS.	EA	\$5,000	166	\$830	176	\$880	165	\$825	164	\$820	166	\$830	166	\$830
FLUSHING VALVE STAS.	EA	\$4,000	104	\$416	106	\$432	103	\$412	102	\$408	104	\$416	104	\$416
CREEK CROSSINGS (OPEN CUT)	EA	\$5,000	16	\$80	15	\$75	16	\$80	16	\$80	16	\$80	16	\$80
CREEK CROSSINGS (BORE AND JACK)	EA	\$20,000	17	\$340	16	\$320	16	\$320	17	\$340	16	\$320	17	\$340
HIGHWAY OR RR CROSSINGS (BORE AND JACK)	EA	\$25,000	5	\$125	5	\$125	5	\$125	5	\$125	5	\$125	5	\$125
	EA	\$60,000	5	\$300	5	\$300	5	\$300	5	\$300	5	\$300	5	\$300
ROAD PAVEMENT RESTORATION (2)	SY	\$18	138,822	\$2,499	149,978	\$2,700	137,533	\$2,476	136,911	\$2,464	138,578	\$2,494	138,653	\$2,496
TOTAL CONSTRUCTION COST				\$42,682		\$40,632		\$39,937		\$39,454		\$38,192		\$37,397
TOTAL CONSTRUCTION COST INCL. SEBASTOPOL (FROM TABLE 4.3)				\$51,280		\$49,030		\$48,335		\$47,852		\$46,590		\$45,795

(1) ISOLATION VALVES ASSUMED @ 10,000 LF SPACING, BUTTERFLY VALVES IN VALVE BOX,  
 NUMBER OF STAS. DISTRIBUTED EQUALLY AMONG THREE MOST COMMON PIPE SIZES FROM MODEL RESULTS.

(2) PAVEMENT WIDTH ESTIMATED = (AVG. PIPE WIDTH + 6 FT)/2 = 4 FT,  
 ASSUMING 1/2 OF TRENCH WIDTH DAMAGES EXISTING PAVEMENT (IE, CL PIPE TRENCH IS AT  
 EDGE OF EXISTING PAVEMENT, AND NEARLY 100% OF PIPE LENGTH IS ALONG EXISTING PAVED ROADS.

(3) PER TECHNICAL MEMORANDUM TM-P-4, "TRANSMISSION PIPELINE TO STORAGE, TUNNEL LENGTH OPTIMIZATION ANALYSIS", 21 JULY, 1995;  
 USING TUNNEL CONSTRUCTION UNIT COST OF \$1,300/LF FOR 8 FT DIA. TUNNEL.

TABLE 4.2.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - WEST COUNTY IRRIGATION PIPELINES, SUMMARY  
 SEPT 23, 1995

ALTERNATIVE	TOTAL PIPELINES LENGTH			TOTAL PIPELINES COST		
	SERIES 1 (STEMPLE WATERSHED) (FT)	SERIES 2 (AMERICANO WATERSHED) (FT)	TOTAL LENGTH (FT)	SERIES 1 (STEMPLE WATERSHED) (\$)	SERIES 2 (AMERICANO WATERSHED) (\$)	TOTAL COST (\$)
3A	225,600	86,650	312,250	\$29,574,000	\$5,468,000	\$35,042,000
3B	225,050	112,400	337,450	\$28,842,000	\$6,568,000	\$35,410,000
3C	235,600	73,850	309,450	\$30,477,000	\$4,532,000	\$35,009,000
3D	238,100	69,950	308,050	\$31,055,000	\$3,472,000	\$34,527,000
3E	224,850	86,950	311,800	\$27,725,000	\$5,512,000	\$33,237,000
3F	220,170	91,800	311,970	\$25,564,000	\$6,856,000	\$32,420,000

THIS TABLE REFLECTS THE COMBINATION OF KYPIPE MODEL RUNS RESULTS FOR EACH ALTERNATIVE SERVING THE TWO WEST COUNTY WATERSHEDS INDEPENDENTLY; IE, SERIES 1 AND SERIES 2 MODEL RUNS. COMMON PIPES WERE COUNTED ONLY ONCE, AND THE LARGER SIZE FOR ANY GIVEN PIPE SECTION (USUALLY FROM THE SERIES 1 RUNS) WERE USED WHEN COMBINING RUNS FOR A GIVEN ALTERNATIVE. THIS RESULTS IN THE APPROXIMATE CORRECT TOTAL PIPE LENGTHS AND COSTS FOR THE WEST COUNTY ALTERNATIVES ASSUMING THAT, IN FACT, ANY WEST COUNTY PROJECT WOULD BE BUILT TO SERVE AT LEAST PART OF BOTH WATERSHEDS.

QWCSUM.421

TABLE 4.2.1.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 WEST COUNTY PROJECTS, SERIES 1 (STEMPLE CREEK AGRICULTURAL IRRIGATION AREA)  
 COST ESTIMATE - TRANSMISSION AND DISTRIBUTION PIPING (IN PUBLIC RIGHTS-OF WAY)  
 SEPT 23, 1995

ITEM	PVC PIPING							WSP, CML/C PIPING										TOTAL PIPE LENGTH (FT)	TOTAL COST (\$1,000)
PIPE DIAMETER (IN)	6"	8"	10"	12"	14"	16"	18"	20"	21"	24"	27"	30"	36"	42"	48"	54"	60"		
UNIT COST (\$/LF) (1)	23.05	29.23	37.58	46.86	52.02	62.89	75.30	79.10	81.05	83.01	106.60	115.29	146.29	178.61	231.31	268.13	324.18		
ALTERNATIVE 3A																			
PIPE LENGTH (FT) (2)	0	25,500	22,050	24,450	0	12,100	12,250	0	9,700	12,850	0	17,900	1,200	0	80,200	0	7,400	225,600	
PIPE COST (\$1,000)	0	745	829	1,146	0	781	922	0	786	1,195	0	2,064	178	0	18,551	0	2,399		29,574
ALTERNATIVE 3B																			
PIPE LENGTH (FT) (2)	0	31,700	18,950	25,250	4,000	8,800	11,700	3,350	6,350	12,850	0	17,900	1,200	6,000	42,200	34,800	0	225,050	
PIPE COST (\$1,000)	0	927	712	1,183	208	553	881	285	515	1,195	0	2,064	178	1,072	9,781	9,331	0		28,842
ALTERNATIVE 3C																			
PIPE LENGTH (FT) (2)	0	26,400	22,250	27,250	0	12,100	12,400	0	9,700	12,850	0	17,900	1,200	37,000	35,150	0	21,400	235,600	
PIPE COST (\$1,000)	0	772	636	1,277	0	781	934	0	786	1,195	0	2,064	178	6,609	8,131	0	6,937		30,477
ALTERNATIVE 3D																			
PIPE LENGTH (FT) (2)	0	26,400	22,250	27,250	0	12,100	12,400	0	9,700	12,850	0	17,900	1,200	37,000	37,650	0	21,400	238,100	
PIPE COST (\$1,000)	0	772	636	1,277	0	781	934	0	786	1,195	0	2,064	178	6,609	8,709	0	6,937		31,055
ALTERNATIVE 3E																			
PIPE LENGTH (FT) (2)	0	30,100	16,400	27,250	0	12,100	11,700	0	5,100	9,650	0	8,700	28,300	16,150	61,400	0	0	224,850	
PIPE COST (\$1,000)	0	880	618	1,277	0	781	881	0	413	898	0	772	4,140	2,885	14,202	0	0		27,725
ALTERNATIVE 3F																			
PIPE LENGTH (FT) (2)	0	30,600	16,950	24,450	0	12,100	12,400	0	9,700	12,850	0	17,900	1,200	51,000	23,620	0	7,400	220,170	
PIPE COST (\$1,000)	0	894	637	1,146	0	781	934	0	786	1,195	0	2,064	178	9,109	5,484	0	2,399		25,684

(1) UNIT COSTS FROM TABLE 4.8

(2) PIPE LENGTHS FROM RESULTS OF KYPIPE MODEL RUNS; SEE NOTE ON TABLE 4.2.1.

QWCSPIPE.4211

TABLE 4.2.1.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 WEST COUNTY PROJECTS, SERIES 2 (AMERICAN CREEK AGRICULTURAL IRRIGATION AREA)  
 COST ESTIMATE - TRANSMISSION AND DISTRIBUTION PIPING (IN PUBLIC RIGHTS-OF-WAY)  
 SEPT 23, 1985

ITEM	PVC PIPING							WSP, CML/C PIPING										TOTAL PIPE LENGTH (FT)	TOTAL COST (\$1,000)
	6"	8"	10"	12"	14"	16"	18"	20"	21"	24"	27"	30"	36"	42"	48"	54"	60"		
PIPE DIAMETER (IN)	6"	8"	10"	12"	14"	16"	18"	20"	21"	24"	27"	30"	36"	42"	48"	54"	60"		
UNIT COST (\$/LF) (1)	23.05	28.23	37.58	46.86	52.02	62.89	75.30	79.10	81.05	93.01	106.60	115.29	148.28	178.81	231.31	268.13	324.18		
ALTERNATIVE 3A																			
PIPE LENGTH (FT) (2)	0	13,500	25,800	14,850	1,850	3,350	2,300	2,300	0	7,500	0	7,000	8,900	0	0	0	0	88,650	
PIPE COST (\$1,000)	0	395	962	688	96	211	173	182	0	698	0	807	1,258	0	0	0	0		5,488
ALTERNATIVE 3B																			
PIPE LENGTH (FT) (2)	0	13,500	28,400	17,000	5,750	13,850	8,700	2,300	7,800	10,150	0	8,950	0	0	0	0	0	112,400	
PIPE COST (\$1,000)	0	395	962	797	299	871	855	182	832	944	0	801	0	0	0	0	0		6,568
ALTERNATIVE 3C																			
PIPE LENGTH (FT) (2)	0	8,200	25,800	10,750	5,750	3,350	2,300	2,300	0	7,500	0	5,250	0	0	2,850	0	0	73,850	
PIPE COST (\$1,000)	0	240	962	504	298	211	173	182	0	698	0	605	0	0	859	0	0		4,532
ALTERNATIVE 3D																			
PIPE LENGTH (FT) (2)	0	13,500	25,800	8,950	7,550	3,350	2,300	2,300	0	0	0	8,400	0	0	0	0	0	89,950	
PIPE COST (\$1,000)	0	395	962	419	393	211	173	182	0	0	0	738	0	0	0	0	0		3,472
ALTERNATIVE 3E																			
PIPE LENGTH (FT) (2)	0	13,500	25,800	14,850	1,850	3,350	2,300	2,300	0	7,500	0	7,000	8,900	0	0	0	0	88,950	
PIPE COST (\$1,000)	0	395	962	688	96	211	173	182	0	698	0	807	1,302	0	0	0	0		5,512
ALTERNATIVE 3F																			
PIPE LENGTH (FT) (2)	0	13,500	25,800	14,850	1,850	3,350	2,300	2,300	0	7,500	0	6,950	8,800	0	0	5,200	0	91,800	
PIPE COST (\$1,000)	0	395	962	688	96	211	173	182	0	698	0	801	1,258	0	0	1,394	0		6,858

(1) UNIT COSTS FROM TABLE 4.8

(2) PIPE LENGTHS FROM RESULTS OF KYPIPE MODEL RUNS; SEE NOTE ON TABLE 4.2.1.

QWCAPIPE.4212

TABLE 4.3

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 CONSTRUCTION COST ESTIMATE - AGRICULTURAL IRRIGATION TRANSMISSION AND DISTRIBUTION PIPELINES - SEBASTOP  
 OCT 16, 1995

ITEM	UNIT	UNIT COST	SEBASTOPOL	
			QTY	COST
		(\$/UNIT)		(\$1,000)
PIPING (TABLE 4.1.1)	LF	VARIES	140,590	\$8,251
ISOLATION VALVE STAS. (1)				
36"	EA	\$15,000	5	\$75
18"	EA	\$4,500	10	\$45
8"	EA	2500	10	\$25
ARV STAS.	EA	\$5,000	71	\$355
FLUSHING VALVE STAS.	EA	\$4,000	43	\$172
CREEK CROSSINGS (OPEN CUT)	EA	\$5,000	6	\$30
CREEK CROSSINGS (BORE AND JACK)	EA	\$20,000	5	\$100
HIGHWAY OR RR CROSSINGS	EA	\$25,000	2	\$50
(BORE AND JACK)	EA	\$60,000	2	\$120
ROAD PAVEMENT RESTORATION (2)	SY	\$18	46,863	\$844
TOTAL CONSTRUCTION COST				\$10,067

(1) ISOLATION VALVES ASSUMED @ 10,000 LF SPACING BUTTERFLY VALVES IN VALVE BOX,  
 NUMBER OF STAS. EQUALLY DIST. AMONG THREE MOST COMMON PIPE SIZES FROM MODELING RESULTS.

(2) PAVEMENT WIDTH ESTIMATED = (AVG. PIPE WIDTH + 6 FT)/2 = 3.5 FT.  
 ASSUMING 1/2 OF TRENCH WIDTH DAMAGES EXISTING PAVEMENT (IE, CL PIPE TRENCH IS AT  
 EDGE OF EXISTING PAVEMENT), AND NEARLY 100% OF PIPE LENGTH IS ALONG EXISTING PAVED ROADS.

TABLE 4.4

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONSTRUCTION COST ESTIMATE - ASR WELL DISTRIBUTION PIPELINES  
SEPT 24, 1995

ITEM	QTY	UNIT	UNIT COST (\$/UNIT)	COST (\$)
DISTRIBUTION PIPING (1)	7,000	FT	\$29	\$203,000
COLLECTIONS MAINS (2)	20,000	FT	\$75	\$1,500,000
PIPING CONNECTIONS @ EXST. PIPING	4	EA	\$5,000	\$20,000
PIPING MODIFS. @ EXST. PUMP STAS. PS "S" AND PS "PONCIA"	2	EA	\$25,000	\$50,000
ISOLATION VALVE STAS. @2 CONN EA ASR AREA + 2 EA MID-ISOL.	8	EA	\$5,000	\$40,000
AIR RELEASE VALVE STAS.	14	EA	\$4,000	\$56,000
FLUSHING VALVE STAS.	18	EA	\$3,000	\$54,000
CREEK CROSSINGS (OPEN CUT)	2	EA	\$5,000	\$10,000
CREEK CROSSINGS (BORE AND JACK)	2	EA	\$20,000	\$40,000
HIGHWAY OR RR CROSSINGS (BORE AND JACK)	4	EA	\$25,000	\$100,000
ROAD PAVEMENT RESTORATION @ 17,000/2 X 36" AVG WIDTH	2,830	SY	\$16	\$50,940
TOTAL CONSTRUCTION COST				\$2,123,940

(1) ASSUME 7 WELLS PER ASR STUDY AREAS 1 AND 2,  
1,000 FT OF 8" DISTRIBUTION PIPING PER WELL, AWWA C900 CL150 PVC

(2) ASSUME 10,000 FT OF 18" COLLECTION MAIN PER ASR AREA, AWWA C905 CL150 PVC

QPIPCOST.44

TABLE 4.5

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 CONSTRUCTION COST ESTIMATE - DIRECT RIVER DISCHARGE PIPELINE  
 SEPT 24, 1995

ITEM	QTY	UNIT	UNIT COST	COST
			(\$/UNIT)	(\$)
PIPING, 48" WSCML/C	13,000	FT	\$231	\$3,003,000
PIPING, 54" WSCML/C	26,000	FT	\$268	\$6,968,000
PIPING CONNECTIONS @ EXIST. PIPING @ PS "D" AND "DS"	2	EA	\$25,000	\$50,000
PIPING MODIFS. @ EXIST. PUMP STAS.	0	EA	\$0	\$0
ISOLATION VALVE STAS. @ 10,000 LF SPACING (BUTTERFLY VALVES, MAN. OPER. IN VALVE BOX)	3	EA	\$25,000	\$75,000
AIR RELEASE VALVE STAS.	18	EA	\$5,000	\$90,000
FLUSHING VALVE STAS.	26	EA	\$4,000	\$104,000
CREEK CROSSINGS (OPEN CUT)	4	EA	\$5,000	\$20,000
CREEK CROSSINGS (BORE AND JACK)	2	EA	\$20,000	\$40,000
HIGHWAY CROSSINGS (BORE AND JACK)	2	EA	\$25,000	\$50,000
	2	EA	\$60,000	\$120,000
ROAD PAVEMENT RESTORATION @ 21,500 LF X 72" W @ 3" AC OVER 8" AGG. BASE	14,300	SY	\$18	\$257,400
TOTAL CONSTRUCTION COST				\$10,777,400

QPIPCOST.45



TABLE 4.6

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 CONSTRUCTION COST ESTIMATE - GEYSERS TRANSMISSION PIPELINE  
 OCT 24, 1995

ITEM	QTY	UNIT	UNIT COST	COST
			(\$/UNIT)	(\$)
PIPELINE, 48" CL 250 WSCML/C	47,000	FT	\$284	\$13,348,000
PIPELINE, 48" CL 150 WSCML/C	70,000	FT	\$231	\$16,170,000
PIPELINE, 42" CL 600 WSCML/C (1)	20,000	FT	\$353	\$7,060,000
PIPELINE, 42" CL 250 WSCML/C (1)	20,000	FT	\$276	\$5,520,000
PIPELINE, 42" CL 150 WSCML/C (1)	30,000	FT	\$197	\$5,910,000
ISOLATION VALVE STAS. @ 2 FAULT XINGS AND @ 10,000 LF SPACING	20	EA	\$25,000	\$500,000
AIR RELEASE VALVE STAS.	74	EA	\$5,000	\$370,000
FLUSHING VALVE STAS.	110	EA	\$4,000	\$440,000
CREEK CROSSINGS (OPEN CUT)	30	EA	\$5,000	\$150,000
CREEK CROSSINGS (BORE AND JACK)	2	EA	\$20,000	\$40,000
HIGHWAY OR RR CROSSINGS (BORE AND JACK)	5	EA	\$60,000	\$300,000
ROAD PAVEMENT RESTORATION @ 116,000 LF X 72" W	77,300	SY	\$18	\$1,391,400
PINE FLAT ROAD RECONSTRUCTION (WIDENING AND STABILIZATION FOR PIPELINE	40,000	FT	\$200	\$8,000,000
TOTAL CONSTRUCTION COST				\$59,199,400

(1) UNIT COSTS BOOSTED 10% TO ACCOUNT FOR NUMEROUS BENDS AND  
 MORE DIFFICULT CONSTRUCTION ALONG PINE FLAT ROAD.

TABLE 4.7

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONSTRUCTION COST ESTIMATE - URBAN IRRIGATION PIPELINES  
OCT 24, 1995

ITEM	FOUNTAIN GROVE LINE				E. SANTA ROSA/BENNETT VALLEY LINES			
	QTY	UNIT	UNIT COST	COST	QTY	UNIT	UNIT COST	COST
			(\$/UNIT)	(\$)			(\$/UNIT)	(\$)
PIPELINE, 18", AWWA C800, CL 150 PVC	0	FT	\$75	\$0	22,000	FT	\$75	\$1,650,000
PIPELINE, 16", AWWA C800, CL 150 PVC	19,000	FT	\$83	\$1,197,000	0	FT	\$83	\$0
PIPELINE, 12", AWWA C800, CL 150 PVC	7,000	FT	\$47	\$329,000	13,000	FT	\$47	\$611,000
PIPELINE, 10", AWWA C800, CL 150 PVC	0	FT	\$38	\$0	9,000	FT	\$38	\$342,000
PIPELINE, 8", AWWA C800, CL 150 PVC	1,000	FT	\$23	\$23,000	6,000	FT	\$23	\$138,000
ISOLATION VALVE STAS. @ 2,500 LF SPACING	10	EA	\$5,000	\$50,000	20	EA	\$5,000	\$100,000
AIR RELEASE VALVE STAS.	14	EA	\$4,000	\$56,000	26	EA	\$4,000	\$104,000
FLUSHING VALVE STAS.	19	EA	\$3,000	\$57,000	36	EA	\$3,000	\$108,000
CREEK CROSSINGS (OPEN CUT)	1	EA	\$5,000	\$5,000	0	EA	\$5,000	\$0
BRIDGE CROSSINGS (SUSPENDED MOUNTING)	0	EA	\$8,000	\$0	3	EA	\$8,000	\$18,000
CREEK CROSSINGS (BORE AND JACK)	2	EA	\$20,000	\$40,000	3	EA	\$20,000	\$60,000
HIGHWAY OR RR CROSSINGS (BORE AND JACK)	6	EA	\$25,000	\$150,000	10	EA	\$25,000	\$250,000
ROAD PAVEMENT RESTORATION 48" AVG WIDTH	7,300 (18,500 LF)	SY	\$18	\$131,400	21,800 (49,000 LF)	SY	\$18	\$392,400
TOTAL CONSTRUCTION COST				\$2,038,400				\$3,773,400
TOTAL CONSTRUCTION COST TO BOTH AREAS								\$5,811,800

(1) THIS ESTIMATE IS BASED ON THE URBAN IRRIGATION PROJECTS IDENTIFIED IN THE APRIL, 1992 MEMORANDUM BY CH2M-HILL, TITLED "SANTA ROSA SUBREGIONAL WATER RECLAMATION SYSTEM PRELIMINARY ENVIRONMENTAL ASSESSMENT OF URBAN LANDSCAPE REUSE PROJECTS".

TABLE 4.8

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - PIPELINE INSTALLATION UNIT COSTS  
 SEPT 24, 1995

ITEM	UNIT COST	PIPELINE COST (\$/LF)							WSP, CML/C (1)										
		6"	8"	10"	12"	14"	16"	18"	20"	21"	24"	27"	30"	36"	42"	48"	54"	60"	
SAWCUT EXISTING PAVING (5)	\$1.10/LF	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	\$1.10	
EXCAVATION (6)	\$2.80/CY	\$2.00	\$2.10	\$2.24	\$2.41	\$2.58	\$2.72	\$2.88	\$3.05	\$3.25	\$3.44	\$3.85	\$4.20	\$4.68	\$5.30	\$6.13	\$6.53	\$7.38	
PIPE AND FITTINGS, MAT'L (2)(3)	-	\$4.70	\$8.00	\$12.20	\$17.20	\$19.40	\$25.00	\$31.80	\$30.00	\$30.00	\$35.00	\$40.00	\$40.00	\$55.00	\$85.00	\$95.00	\$110.00	\$140.00	
INSTALLATION	-	\$3.00	\$5.20	\$7.80	\$10.20	\$11.70	\$15.10	\$18.80	\$20.00	\$20.00	\$25.00	\$30.00	\$35.00	\$45.00	\$80.00	\$75.00	\$90.00	\$110.00	
BACKFILL AND COMPACTION (4)(6)	-	\$7.80	\$8.00	\$8.83	\$9.51	\$10.11	\$10.88	\$11.57	\$12.45	\$13.30	\$13.83	\$15.25	\$18.54	\$19.18	\$21.81	\$24.69	\$27.80	\$29.03	
TESTING	-	\$0.50	\$0.70	\$1.10	\$1.35	\$1.55	\$1.85	\$2.40	\$2.70	\$3.10	\$3.50	\$4.10	\$4.75	\$5.80	\$7.00	\$8.10	\$9.20	\$10.30	
TRAFFIC CONTROL/SAFETY MEASURES	-	\$1.00	\$1.00	\$1.00	\$1.10	\$1.10	\$1.20	\$1.20	\$1.30	\$1.30	\$1.40	\$1.40	\$1.40	\$1.70	\$2.00	\$2.30	\$2.60	\$2.80	
REMOVE SPOIL MATERIAL (6)	\$12.10/CY	\$2.95	\$3.13	\$3.51	\$3.99	\$4.48	\$4.98	\$5.45	\$8.00	\$8.50	\$7.14	\$8.40	\$9.70	\$11.13	\$13.60	\$18.09	\$18.10	\$20.39	
CORROSION PROTECTION	-	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.50	\$2.50	\$2.50	\$2.50	\$2.60	\$2.70	\$2.80	\$2.90	\$3.00	\$3.10	
SUBTOTAL CONSTRUCTION UNIT COST		\$23.05	\$29.23	\$37.58	\$48.88	\$52.02	\$62.89	\$75.30	\$79.10	\$81.05	\$93.01	\$108.80	\$115.29	\$146.29	\$178.61	\$231.31	\$268.13	\$324.18	

(1) BASED ON PVC PIPE PER AWWA-C900 AND 905 STDS., CL 150, FOR PIPELINES 6" TO 18" ; WELDED STEEL PIPE; CEMENT MORTAR LINED AND COATED FOR SIZES LARGER THAN 18".

(2) COSTS INCLUDE NOMINAL ALLOWANCE FOR FITTINGS AND RESTRAINED JOINTS.

(3) COSTS DO NOT INCLUDE VALVES OR PAVING; INCLUDED ON TABLES 4.1 THRU 4.7.

(4) BASED ON BEDDING COST = \$27.30/CY AND NATIVE BACKFILL AT \$3.00/CY.

(5) ASSUME SAWCUT ONE SIDE OF TRENCH ONLY.

(6) FOR VOLUMES OF EXCAVATION, BEDDING & BACKFILL, AND SPOIL MATERIAL SEE TABLE 4.8.1.

TABLE 5

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
COST ESTIMATE - PUMP STATIONS, SUMMARY  
NOV 21, 1995

ALTERNATIVE PROJECT	PUMP STATION BASIC COSTS (TABLE 5.1) (1) (\$1,000)	SURGE ARRESTING SYSTEM (2) (7) (\$1,000)	STORAGE/WET WEL TANK (3) (7) (\$1,000)	ELECTRICAL SUBSTATION (TABLE 5.2) (4) (\$1,000)	STAND-BY POWER (5) (7) (\$1,000)	TELEMETRY SYSTEM (6) (\$1,000)	TOTAL CONSTRUCTION COST (8) (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$32,300	\$200	\$0	\$2,700	\$1,500	\$120	\$36,820
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$33,950	\$250	\$0	\$3,200	\$1,500	\$185	\$39,065
2C - TOLAY C	\$33,700	\$200	\$0	\$2,728	\$1,500	\$180	\$38,308
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$48,000	\$350	\$0	\$4,388	\$1,500	\$185	\$52,403
2E - ASR + SMALLER TOLAY	\$29,700	\$200	\$0	\$3,088	\$1,500	\$158	\$34,646
3A - TWO ROCK	\$24,440	\$200	\$0	\$1,750	\$1,500	\$135	\$28,025
3B - BLOOMFIELD	\$28,240	\$200	\$0	\$2,250	\$1,500	\$135	\$30,325
3C - CARROLL ROAD	\$26,400	\$200	\$0	\$2,250	\$1,500	\$142	\$30,492
3D - VALLEY FORD	\$28,900	\$200	\$0	\$2,250	\$1,500	\$142	\$30,992
3E - HUNTLEY	\$25,940	\$200	\$0	\$2,250	\$1,500	\$128	\$30,018
3F - ASR + SMALLER TWO ROCK	\$28,400	\$250	\$0	\$1,750	\$1,500	\$180	\$30,080
4 - GEYSERS RECHARGE	\$32,750	\$300	\$900	\$2,975	\$0	\$80	\$36,985
5A - DIRECT DISCHARGE TO TO RUSSIAN RIVER	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0	\$0

(1) BASIC PUMP STATION COSTS INCLUDE SITE WORK, BUILDING, MECHANICAL AND  
AND ELECTRICAL EQUIPMENT, PIPING, INSTRUMENTATION, AND PAINTING.

(2) BASED ON \$50,000 PER PUMP STATION, \$100,000 PER GEYSERS PUMP STATION.

(3) BASED ON \$300,000 EACH FOR 500,000 GALS GROUND-MOUNTED STEEL WATER TANK.

(4) BASED ON STEPPING DOWN PRIMARY SERVICE VOLTAGE TO STATION VOLTAGE.

(5) BASED ON DIESEL GENERATOR STATION SUFFICIENT FOR TWO 750 HP PUMPS AT PS 'S'.

(6) BASED ON A RADIO TELEMETRY ALARM SYSTEM, REPORTING TO A CENTRAL PC BASED  
MONITORING SYSTEM AT THE LAGUNA PLANT, LIMITED NUMBER OF I/O POINTS;  
BASED ON \$7,500 PER PUMP STATION FOR HARDWARE AND SOFTWARE.

(7) PUMP STATION FEATURES ARE LISTED IN THE PUMP STATIONS CHARACTERISTICS TABLE.

(8) PUMP STATIONS NOT INCLUDED IN THIS TABLE:  
FOR ASR BOOSTER PUMP STATION 'ASR-2' SEE TABLE 8,  
FOR URBAN IRRIGATION PUMP STATIONS 'FGS, FGB, BVS, AND BV3' SEE TABLE 7,  
FOR RESERVOIR STORMWATER PUMP STATIONS 'TASW, TCSW, AND ARSW' SEE TABLE 3.6.

TABLE E.1

SANTA ROSA SUBREGIONAL LONG TERM WASTEWATER PROJECT  
COST ESTIMATE - PUMP STATIONS, SUMMARY  
NOV 21, 1995

ALTERNATIVE PROJECT	PUMP STATIONS CODE (PS- )... (COST in \$1,000) (2), (3), (4), (5)																							
	S	TASW	TCSW	ARSW	T	SP	L	AR	TR	B	CR	VF	H	ASR-2	SEB	FGS	FGB	BVS	EVB	G1	G2	G3	G4	D
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$8,500	\$3,750	\$0	\$0	\$7,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
2B	\$8,500	\$0	\$0	\$4,500	\$0	\$0	\$3,250	\$4,500	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
2C	\$8,500	\$0	\$6,500	\$0	\$8,800	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
2D	\$8,500	\$0	\$0	\$0	\$0	\$7,500	\$3,250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
2E	\$8,500	\$3,750	\$0	\$0	\$3,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,000	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3A	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,200	\$0	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3B	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000	\$0	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3C	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000	\$0	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3D	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$0	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3E	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,750	\$0	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
3F	\$8,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,500	\$0	\$0	\$0	\$0	\$2,000	\$4,500	\$1,800	\$1,500	\$2,800	\$1,100	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,500	\$8,500	\$8,000	\$8,750	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(EXISTING)

QPSTAB.51

SEE PAGE 3 FOR ASSUMPTIONS.

1 OF 3

	PUMP STATIONS CODE (PS- )... (COST in \$1,000) (2), (3), (4), (5)																	
ALTERNATIVE PROJECT	(SBPS-1)			(SBPS-4)	(SBPS-5)	(SBPS-6)							(SBPS-13)	SBPS-14	SBPS-15	SBPS-16	SBPS-17	SBPS-18)
	SBPS-2	SBPS-3					SBPS-7	SBPS-8	SBPS-9	SBPS-10	SBPS-11	SBPS-12						
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$0	\$0	\$900	\$0	\$0	\$0	\$0	\$1,600	\$0	\$8,250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,700
2B	\$0	\$0	\$900	\$0	\$0	\$0	\$0	\$1,600	\$0	\$8,250	\$900	\$0	\$5,000	\$0	\$700	\$260	\$3,500	\$1,700
2C	\$0	\$700	\$900	\$700	\$160	\$260	\$0	\$1,600	\$0	\$8,250	\$900	\$0	\$0	\$3,200	\$700	\$260	\$3,500	\$0
2D	\$0	\$0	\$900	\$0	\$0	\$260	\$3,600	\$1,600	\$450	\$8,250	\$900	\$5,000	\$0	\$0	\$0	\$260	\$3,500	\$0
2E	\$260	\$0	\$900	\$700	\$0	\$0	\$0	\$1,600	\$0	\$8,250	\$900	\$0	\$380	\$0	\$0	\$0	\$0	\$1,700
3A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3C	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3D	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3E	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3F	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

ALTERNATIVE PROJECT	PUMP STATIONS CODE (PS- )... (COST in \$1,000) (2), (3), (4), (5)																			GRAND TOTAL	TOTAL (1) AG. IRRG. ONLY	
	(WBPS-2)										(WBPS-14 WBPS-15)											
	WBPS-1	WBPS-3	WBPS-4	WBPS-5	WBPS-6	WBPS-7	WBPS-8	WBPS-9	WBPS-10	WBPS-11	WBPS-12	WBPS-13	WBPS-16	LBPS-1	LBPS-2	LBPS-3	LBPS-4					
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$43,050	\$32,300	
2B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$45,450	\$33,950	
2C	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$47,200	\$33,700	
2D	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$53,000	\$46,000	
2E	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$42,450	\$29,700	
3A	\$50	\$2,000	\$280	\$1,500	\$4,800	\$380	\$700	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$31,440	\$24,440	
3B	\$50	\$2,000	\$280	\$1,500	\$4,800	\$380	\$700	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$33,240	\$26,240	
3C	\$50	\$2,000	\$280	\$1,500	\$4,800	\$380	\$700	\$160	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$33,400	\$26,400	
3D	\$50	\$2,000	\$280	\$1,500	\$4,800	\$380	\$700	\$160	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$33,900	\$26,900	
3E	\$0	\$2,000	\$280	\$1,500	\$4,800	\$380	\$700	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50	\$2,300	\$800	\$800	\$32,940	\$25,940	
3F	\$50	\$2,000	\$280	\$1,500	\$4,800	\$0	\$700	\$0	\$50	\$800	\$180	\$50	\$1,800	\$800	\$800	\$380	\$50	\$2,300	\$800	\$800	\$35,400	\$26,400
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$32,780	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

3 OF 3

(1) Without ASR, Urban Irrigation, Geysers, or Reservoir Stormwater Pumping Stations

(2) See the Pump Stations Characteristics Table, PS-1.1, for pump station capacity and features.

(3) Pump station costs estimated from Parsons ES nomograph, based on several pump station project bids.

(4) Pump station code numbers in parentheses were deleted from final project description, and are not included in cost totals.

(5) Pump station codes are as follows: S is Storage PS to be located at the Laguna Plant; TASW, TCSW, and ARSW are stormwater PS to be located at reservoirs Toley A, Toley C, and Adobe Road; T through H are irrigation PSs to be located below respective reservoir dam; ASR-2 is ASR well booster PS located along Petaluma Hill Road; SEB is Sebastopol Irrigation PS to be located at Delta Pond; FGS, FGB, BVS, and BVB are PSs for urban irrigation extensions to Fountaingrove and to Bennett Valley areas; G1 through G4 are Geysers PSs; D is existing PS at Delta Pond to supply direct discharge pipeline; SBPSs, WBPSs, and LBPSs are irrigation booster PSs for the south county, west county and Sebastopol irrigation areas, respectively.

QPSTAB.61

TABLE 5.2

SANTA ROSA SUBREGIONAL LONG TERM WASTEWATER PROJECT  
 COST ESTIMATE - PUMP STATIONS' ELECTRICAL SUBSTATIONS COSTS, SUMMARY  
 NOV 21, 1985

ALTERNATIVE PROJECT	PUMP STATIONS CODE (P2- ) (COST in \$1,000) (2, (3), (4), (5)																							
	S	TASW	TCBW	ARSW	T	SP	L	AR	TR	B	CR	VF	H	ASR-2	SEB	FGS	FGB	BVS	BVB	G1	G2	G3	G4	D
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$750	\$438	\$0	\$0	\$552	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2B	\$750	\$0	\$0	\$438	\$0	\$0	\$500	\$552	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2C	\$750	\$0	\$500	\$0	\$558	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2D	\$750	\$0	\$0	\$0	\$0	\$750	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2E	\$750	\$438	\$0	\$0	\$550	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3A	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3B	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3C	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3D	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3E	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3F	\$750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$825	\$825	\$825	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(EXISTING)

QPSTAB.52

SEE PAGE 3 FOR ASSUMPTIONS.

1 OF 3



ALTERNATIVE PROJECT	PUMP STATIONS CODE (PS- )... (COST in \$1,000) (2), (3), (4), (5)																	
	(SBPS-1)	(SBPS-4)		(SBPS-5)	(SBPS-6)	(SBPS-13						SBPS-14	SBPS-15	SBPS-16	SBPS-17	SBPS-18)		
	SBPS-2	SBPS-3				SBPS-7	SBPS-8	SBPS-9	SBPS-10	SBPS-11	SBPS-12							
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$888	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$888	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2C	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$888	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2D	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$888	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0
2E	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$888	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3C	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3D	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3E	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3F	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

ALTERNATIVE PROJECT	PUMP STATIONS CODE (PS- )... (COST in \$1,000) (2), (3), (4), (5)																				GRAND TOTAL (1)
	(WBPS-2)										(WBPS-14 WBPS-15)										
	WBPS-1	WBPS-3	WBPS-4	WBPS-5	WBPS-6	WBPS-7	WBPS-8	WBPS-9	WBPS-10	WBPS-11	WBPS-12	WBPS-13	WBPS-14	WBPS-15	WBPS-16	LBPS-1	LBPS-2	LBPS-3	LBPS-4		
1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2C	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2D	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2E	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3A	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3B	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3C	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3D	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3E	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3F	\$0	\$0	\$0	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5A	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5B	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

3 OF 3

(1) Does not include substations for Reservoir Stormwater Pumping Stations (See Table 3.6).

(2) See the Pump Stations Characteristics Table, PS-1.1, for pump station capacity and features.

(3) Substation costs estimated by Parsons EG based on previous pump station design projects and inquiries to electrical equipment manufacturers.

(4) Pump station code numbers in parentheses were deleted from final project description, and are not included in cost totals.

(5) Pump station codes are as follows: S is Storage PS to be located at the Laguna Plant; TASW, TCSW, and ARSW are stormwater PS to be located at reservoirs Toley A, Toley C, and Adobe Road; T through H are irrigation PSs to be located below respective reservoir dam; ASR-2 is ASR well booster PS located along Petaluma Hill Road; SEB is Sebastopol irrigation PS to be located at Delta Pond; FGS, FGB, BVS, and BVB are PSs for urban irrigation extensions to Fountaingrove and to Bennett Valley areas; G1 through G4 are Geysers PSs; D is existing PS at Delta Pond to supply direct discharge pipeline; SBPSs, WBPSs, and LBPSs are irrigation booster PSs for the south county, west county and Sebastopol irrigation areas, respectively.

TABLE 6

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
COST ESTIMATE - AGRICULTURAL IRRIGATION AREAS  
OCT 18, 1985

ALTERNATIVE PROJECT	IRRIGATION AREA SPRINKLER SYSTEMS AND MAINLINES (TABLE 6.1) (1) (\$1,000)	IRRIGATION SYSTEM PLANNING AND CAPITAL COSTS (TABLE 6.2) (2) (\$1,000)	SPECIAL ESTEROS IMPACT STUDIES FOR WEST COUNTY ALTERNATIVES (3) (\$1,000)	SUBTOTAL CONSTRUCTION COST (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0
2A - TOLAY A	\$6,016	\$3,336	\$0	\$9,352
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$6,016	\$3,336	\$0	\$9,352
2C - TOLAY C	\$6,016	\$3,336	\$0	\$9,352
2D - BEARS POINT AND LAKEVILLE HILLSIDE	\$6,016	\$3,336	\$0	\$9,352
2E - ASR + SMALLER TOLAY	\$6,016	\$3,336	\$0	\$9,352
3A - TWO ROCK	\$6,646	\$4,506	\$2,000	\$12,152
3B - BLOOMFIELD	\$6,646	\$4,506	\$2,000	\$12,152
3C - CARROLL ROAD	\$6,646	\$4,506	\$2,000	\$12,152
3D - VALLEY FORD	\$6,646	\$4,506	\$2,000	\$12,152
3E - HUNTLEY	\$6,646	\$4,506	\$2,000	\$12,152
3F - ASR + SMALLER TWO ROCK	\$6,646	\$4,506	\$2,000	\$12,152
4 - GEYERS RECHARGE	\$0	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0

(1) BASED ON 1% DISCHARGE RATE ALTERNATIVE, SEBASTOPOL AGRICULTURAL IRRIGATION AREA INCLUDED, MEDIUM TECH. CROPPING SCENARIO AS PRESENTED IN THE IRRIGATION MANAGEMENT PLAN, AND COMBINATION OF WHEEL-LINE, HAND-SET, AND DRIP IRRIGATION SYSTEMS, (DETERMINED BY CROP TYPE), FOR 4,800 IRRIGATED ACRES FOR SOUTH COUNTY AND 8,800 ACRES FOR WEST COUNTY. COST INCLUDES BURIED INSTALLATION OF SINGLE 6" MAINLINE, AND SINGLE WHEEL-SET, PER 40 ACRE IRRIGATED AREA. COST OF ON-FARM BOOSTER PUMP STATION (IF NEEDED) IS NOT INCLUDED.

(2) BASED ON QUESTA ENGINEERING ESTIMATE OF 8 YEAR ANNUAL EXPENSES FOR SYSTEM-WIDE PLANNING, FARM LEVEL PLANNING, AND IMPLEMENTATION AND WATERSHED ENHANCEMENT. THESE 8-YEAR ANNUAL COSTS PRESENTED AS EQUIVALENT PRESENT WORTH AT 6% INTEREST.

(3) DOES NOT INCLUDE COST FOR MORE AGRICULTURAL IRRIGATION ACRES TO REPLACE EXISTING LAGUNA IRRIGATION ACRES WHICH MAY BE LOST TO VINEYARDS OR OTHER DEVELOPMENT.

(4) COST OF SPECIAL STUDIES TO ASSESS IMPACT ON WATER QUALITY, SPECIES AND HABITAT IMPACT ESTIMATED BY HBA, INC.

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TABLE 6.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - AGRICULTURAL AREAS IRRIGATION SYSTEMS  
 SEPT 29, 1995

## SOUTH COUNTY AREA W/ SEBASTOPOL

LAND USE TYPE	IRRIGATION TYPE (1)	ACRES (1)	COST/ACRE (2)	TOTAL COST
VINEYARDS (NEW)	DRIP	250	\$1,300	\$325,000
APPLES (EXISTING)	DRIP/MINI-SPRAY	1,600	\$1,300	\$2,080,000
VINEYARDS (EXISTING)	DRIP	600	\$1,300	\$780,000
SPECIALTY CROPS	DRIP	200	\$1,300	\$260,000
VEGETABLE CROPS	DRIP	600	\$1,300	\$780,000
FORAGE/HAY/SILAGE	WHEEL-LINE	1,100	\$510	\$561,000
IRRIGATED PASTURE	HAND-SET	450	\$510	\$229,500
		4,800		\$5,015,500

## WEST COUNTY AREA W/ SEBASTOPOL

LAND USE TYPE	IRRIGATION TYPE	ACRES	COST/ACRE	TOTAL COST
VINEYARDS (NEW)	DRIP	0	\$1,300	\$0
APPLES (EXISTING)	DRIP/MINI-SPRAY	1,600	\$1,300	\$2,080,000
VINEYARDS (EXISTING)	DRIP	600	\$1,300	\$780,000
SPECIALTY CROPS	DRIP	300	\$1,300	\$390,000
VEGETABLE CROPS	DRIP	450	\$1,300	\$585,000
FORAGE/HAY/SILAGE	WHEEL-LINE	2,000	\$510	\$1,020,000
IRRIGATED PASTURE	HAND-SET	1,550	\$510	\$790,500
		6,500		\$5,645,500

(1) IRRIGATION TYPE AND NUMBER OF ACRES PER QUESTA ENGINEERING, FOR 1% RIVER DISCHARGE RATE PROJECT AND MEDIUM TECH. AGRICULTURAL CROPPING SCENARIO.

(2) IRRIGATION SYSTEMS COST PER ACRE PER PARSONS ES (SLC) AGRICULTURAL PROJECTS HI INCLUDES COST FOR BURIED MAINLINES.  
 COST FOR ON-FARM BOOSTER PUMP STATIONS IS NOT INCLUDED.

TABLE 6.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - AGRICULTURAL AREAS DEVELOPMENT  
 SEPT 29, 1995

CAPITAL COSTS ITEM	RECURRING ANNUAL COSTS FOR FIRST FIVE YEARS	EQUIVALENT PRESENT WORTH COST (1)	TOTAL PRESENT WORTH COST
SYSTEM-WIDE PLANNING	\$180,000		
FARM-LEVEL PLANNING	\$105,000		
IMPLEMENTATION, WEST COUNTY	\$686,640		
IMPLEMENTATION, SOUTH COUNTY	\$441,710		
WATERSHED ENHANCEMENT, WEST CO.	\$160,000		
WATERSHED ENHANCEMENT, SOUTH CO.	\$112,000		
TOTAL WEST COUNTY COST	\$1,111,640	\$4,438,778	\$4,505,778
TOTAL SOUTH COUNTY COST	\$818,710	\$3,269,109	\$3,336,109
		\$67,000	

(1) 5 YEAR PRESENT WORTH FACTOR = 3.993

ANNUAL OPERATIONS AND MAINTENANCE COST ITEM	COSTS
OPERATIONS AND MAINTENANCE	\$90,000
MONITORING	\$115,000
TOTAL ANNUAL O&M COST	\$205,000

THIS TABLE IS BASED ON COST ESTIMATE PROVIDED BY QUESTA ENGINEERING, MEMORANDUM, DATED 9/27/95.

TABLE 7

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - URBAN IRRIGATION PROJECTS  
 SEPT 25, 1995

ALTERNATIVE PROJECT	PIPELINES (TABLE 4.7)	PUMP STATIONS (TABLE 5.1)	SUBTOTAL CONSTRUCTION COST (\$1,000)
	(\$1,000)	(1) (\$1,000)	
1 - NO PROJECT	\$0	\$0	\$0
2A - TOLAY A	\$5,812	\$7,000	\$12,812
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$5,812	\$7,000	\$12,812
2C - TOLAY C	\$5,812	\$7,000	\$12,812
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$5,812	\$7,000	\$12,812
2E - ASR + SMALLER TOLAY	\$5,812	\$7,000	\$12,812
3A - TWO ROCK	\$5,812	\$7,000	\$12,812
3B - BLOOMFIELD	\$5,812	\$7,000	\$12,812
3C - CARROLL ROAD	\$5,812	\$7,000	\$12,812
3D - VALLEY FORD	\$5,812	\$7,000	\$12,812
3E - HUNTLEY	\$5,812	\$7,000	\$12,812
3F - ASR + SMALLER TWO ROCK	\$5,812	\$7,000	\$12,812
4 - GEYSERS RECHARGE	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO TO RUSSIAN RIVER	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0

(1) URBAN IRRIGATION PUMP STATIONS ARE DESIGNATED "FGS, FGB, BVS, BVB" ON TABLE 5.1.

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TABLE 6

ALTERNATIVE PROJECTS  
COST ESTIMATE - ASR SYSTEM  
SEPT 25, 1985

ALTERNATIVE PROJECT	ASR WELLS (TABLE 8.1) (1) (\$1,000)	COLLECTION/DIST. PIPING (TABLE 4.4) (\$1,000)	ASR BOOSTER PUMP STATION ASR-2 (TABLE 5.1) (\$1,000)	NITROGEN REMOVAL WATER TREATMENT (2) (\$1,000)	SUBTOTAL CONSTRUCTION COST COST (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$0	\$0	\$0	\$0	\$0
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$0	\$0	\$0	\$0	\$0
2C - TOLAY C	\$0	\$0	\$0	\$0	\$0
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$0	\$0	\$0	\$0	\$0
2E - ASR + SMALLER TOLAY	\$3,640	\$2,124	\$2,000	\$28,000	\$35,764
3A - TWO ROCK	\$0	\$0	\$0	\$0	\$0
3B - BLOOMFIELD	\$0	\$0	\$0	\$0	\$0
3C - CARROLL ROAD	\$0	\$0	\$0	\$0	\$0
3D - VALLEY FORD	\$0	\$0	\$0	\$0	\$0
3E - HUNTLEY	\$0	\$0	\$0	\$0	\$0
3F - ASR + SMALLER TWO ROCK	\$3,640	\$2,124	\$2,000	\$28,000	\$35,764
4 - GEYSERS RECHARGE	\$0	\$0	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0

(1) BASED ON 7 ASR WELLS PER STUDY AREA, INJECTION/EXTRACTION CAPACITY OF EACH WELL = 700 GPM.  
GIVING 1,000 GALS STORAGE OVER 180 DAY INJECTION SEASON WITH 6 WELLS OPERATING AND ONE STAND-BY.

(2) ESTIMATE FROM CH2MHILL FOR 25 MGD DENITRIFICATION SYSTEM ADDITIONS TO LAGUNA PLANT EFFLUENT.

TABLE 8.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - ASR WELL STATIONS  
 SEPT 20, 1995

ITEM	CONSTRUCTION COST	
	WELL AREA NO. 1	WELL AREA NO. 2
WELL DRILLING/DEVELOPMENT/PUMP (1)	\$240,000	\$80,000
STATION PIPING	\$25,000	\$25,000
SUBSTATION AND ELECTRICAL SERVICE	\$50,000	\$40,000
INSTRUMENTATION AND CONTROLS	\$20,000	\$20,000
HOUSING. 10' X 10' CMU BLDG.	\$10,000	\$10,000
<b>SUBTOTAL PER WELL</b>	<b>\$345,000</b>	<b>\$175,000</b>
TOTAL FOR 7 WELLS PER ASR AREA	\$2,415,000	\$1,225,000
ASR WELL STATIONS TOTAL		\$3,640,000

(1) BASED ON RECENT WELL DEVELOPMENT EXPERIENCE AT PARSONS (LOS ROBLES);  
 AREA 1 WELLS: 1000 GPM EACH, 800 FEET DEEP, 16" CASING, 12" BOWL, 300 HP,  
 AREA 2 WELLS" 1000 GPM EACH, 200 FEET DEEP, 14" CASING, 12" BOWL, 100 HP.

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TABLE 9

SANTA ROSA SUBREGIONAL LONG-TRM WASTEWATER PROJECT  
 COST ESTIMATE - DIRECT DISCHARGE SYSTEM  
 SEPT 25, 1995

ITEM	CONSTRUCTION COST			SUBTOTAL CONSTRUCTION COST
	PIPELINES	RIVER OUTFALL STRUCTURE	NITROGEN REMOVAL WATER TREATMENT	
	(TABLE 4.5) (1)	(2)	(3)	
PIPELINES	\$10,777,000			
SITE WORK		\$10,000		
BAFFLED C.I.P. DISCHARGE STRUCTURE, W/FLAP GATE		\$30,000		
BACKPRESSURE VALVE BOX, C.I.P. STRUCTURE		\$20,000		
TWO 24" BACKPRESSURE VALVES & ISOLATION VALVES		\$50,000		
PIPING, 54" & 24" CONNECTIONS AND TRANSITION		\$25,000		
DENITRIFICATION PROCESS ADDITIONS TO LAGUNA PLANT			\$28,000,000	
SUBTOTAL CONSTRUCTION COST	\$10,777,000	\$135,000	\$28,000,000	\$38,912,000

(1) FROM PS "D" AT DELTA POND TO OUTFALL STRUCTURE AT RUSSIAN RIVER

(2) BASED ON BACKPRESSURE VALVE STATION UPSTREAM OF OUTFALL STRUCTURE TO MAINTAIN PIPE FLOWS FULL FROM ELEVATION DROP DOWN TO THE RIVER TO AVOID LOUD AIR ENTRAINMENT NOISE DURING OPERATION IF, INSTEAD, USE OPEN VENT PIPE AT TOP OF GRADE.

(3) BASED ON DRAFT TECHNICAL MEMORANDUM BY CH2MHILL, DATED AUG 30, 1995, FOR ESTIMATE OF FACILITIES AND COST TO PROVIDE DENITRIFICATION TREATMENT ADDITIONS TO REDUCE NITROGEN LEVEL IN LAGUNA PLANT EFFLUENT TO 3 MG/L.

TABLE 10

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - UTILITY SERVICES  
 OCT 24, 1995

ALTERNATIVE PROJECT	FEES TO PG&E FOR NEW ELECTRICAL SERVICE (TABLE 10.1) (1)	PG&E TRANSMISSION INTERCONNECTION AND DISTRIBUTION STUDIES (TABLE 10.2)	TOTAL SERVICE COSTS
1 - NO PROJECT	\$0	\$0	\$0
2A - TOLAY A	\$17,045,000	\$45,000	\$17,090,000
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$12,032,000	\$30,000	\$12,062,000
2C - TOLAY C	\$12,121,000	\$30,000	\$12,151,000
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$22,013,000	\$45,000	\$22,058,000
2E - ASR + SMALLER TOLAY	\$12,156,000	\$30,000	\$12,186,000
3A - TWO ROCK	\$7,066,000	\$15,000	\$7,081,000
3B - BLOOMFIELD	\$7,056,000	\$15,000	\$7,071,000
3C - CARROLL ROAD	\$7,017,000	\$15,000	\$7,032,000
3D - VALLEY FORD	\$7,019,000	\$15,000	\$7,034,000
3E - HUNTLEY	\$7,012,000	\$15,000	\$7,027,000
3F - ASR + SMALLER TWO ROCK	\$7,076,000	\$15,000	\$7,091,000
4 - GEYSERS RECHARGE	\$15,000,000	\$45,000	\$15,045,000
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0

(1) SOME OF THESE COSTS MAY BE WAIVED BY PG&E BECAUSE OF EXPECTED REVENUE FROM OPERATION OF PUMP STATIONS.

TABLE 11

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - HEADWORKS IMPROVEMENTS  
 SEPT 22, 1995

ITEM (1)	CONSTRUCTION COST			
	QTY	UNIT	UNIT COST (\$/UNIT) (2)	COST (\$)
<b>PUMPS</b>				
REPLACE EXISTING 7.5 MGD PUMPS WITH NEW 18 MGD PUMPS, 200 HP MOTORS	2	EA	\$30,000	\$60,000
REPLACE EXISTING 15 MGD PUMPS WITH NEW 18 MGD PUMPS, 200 HP MOTORS	4	EA	\$30,000	\$120,000
<b>VARIABLE SPEED DRIVES</b>	4	EA	\$40,000	\$160,000
<b>ELECTRICAL</b>				
NEW PANELBOARD FOR SCREENS AND CONVEYORS	1	LOT	\$10,000	\$10,000
NEW 800 AMP FEEDERS TO 6 PUMPS	3	EA	\$40,000	\$120,000
NEW MCC	2	EA	\$60,000	\$120,000
<b>INSTRUMENTS AND CONTROLS AND WIRING</b>	1	LOT	\$100,000	\$100,000
<b>MOBILIZATION, BONDS &amp; INSURANCE, MISC.</b>	1	LOT	\$100,000	\$100,000
<b>SUBTOTAL CONSTRUCTION COST</b>				<b>\$790,000</b>

(1) THESE PROPOSED IMPROVEMENTS TO THE EXISTING HEADWORKS AT THE LAGUNA PLANT ARE FROM THE JAN 4, 1993 PREDESIGN REPORT BY CH2MHILL, "ADVANCED TREATMENT UPGRADE AND FIRST STAGE EXPANSION, TECHNICAL MEMORANDUM NO.3."

NOTE: THE MECHANICAL BARI SCREENS ALSO RECOMMENDED IN THIS REPORT ARE CURRENTLY BEING INSTALLED AND WILL NOT BE INCLUDED IN THE LONG-TERM PROJECT.

(2) THIS ESTIMATE PREPARED BY PARSONS ES; IN SUBSTANTIAL AGREEMENT WITH DEC 1992 ESTIMATE BY CH2MHILL.

TABLE 12

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONSTRUCTION COST ESTIMATE - LAND COSTS  
NOV 20, 1985

ALTERNATIVE PROJECT	RESERVOIR SITE PURCHASE (1) (\$1,000)	PUMP STATION SITES PURCHASE (2) (\$1,000)	GEYSERS TANK SITE AND PIPELINE EASEMENT PURCHASE (3) (\$1,000)	DIRECT DISCHARGE SITE AT RUSSIAN RIVER AND EASEMENT PURCHASE (4) (\$1,000)	ASR WELL SITES PURCHASE (5) (\$1,000)	PIPELINE TUNNEL EASEMENT AND PORTAL SITES PURCHASE (6) (\$1,000)	TOTAL LAND AND EASEMENT COSTS (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$8,481	\$7	\$0	\$0	\$0	\$19	\$8,487
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$4,727	\$7	\$0	\$0	\$0	\$0	\$4,734
2C - TOLAY C	\$4,215	\$6	\$0	\$0	\$0	\$19	\$4,242
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$3,853	\$11	\$0	\$0	\$0	\$19	\$3,883
2E - ASR + SMALLER TOLAY	\$8,481	\$8	\$0	\$0	\$3	\$19	\$8,491
3A - TWO ROCK	\$1,945	\$9	\$0	\$0	\$0	\$19	\$1,973
3B - BLOOMFIELD	\$1,855	\$3	\$0	\$0	\$0	\$0	\$1,858
3C - CARROLL ROAD	\$1,903	\$4	\$0	\$0	\$0	\$0	\$1,907
3D - VALLEY FORD	\$2,053	\$4	\$0	\$0	\$0	\$0	\$2,057
3E - HUNTLEY	\$2,351	\$3	\$0	\$0	\$0	\$0	\$2,354
3F - ASR + SMALLER TWO ROCK	\$1,945	\$5	\$0	\$0	\$3	\$19	\$1,972
4 - GEYSERS RECHARGE	\$0	\$68	\$141	\$0	\$0	\$0	\$209
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$33	\$0	\$0	\$33
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0	\$0
REF. DRAWINGS	RES-1 TO -8	E-2A TO H-1D, PA-1 TO -7	PA-1	E-3	F-2	H-1A, RES-2 RES-6	

(1) PROPERTY SIZE ASSUMED EQUAL TO 1.5 TIMES RESERVOIR WATER SURFACE.

(2) PROPERTY SIZE ASSUMED EQUAL TO 1.5 TIMES SUGGESTED AREA ON "PUMP STATIONS CHARACTERISTICS TABLE".

(3) TANK SITE PROPERTY SIZE REQUIRED ASSUMED EQUAL TO 7 ACRES; ACCESS ROAD EASEMENT 25 FT WIDE X 2,500 FT LONG; PIPELINE EASEMENT 25 FT WIDE X 1,800 FT LONG.

(4) SITE FOR DD STRUCTURE ASSUMED 6,000 SQ FT; PIPELINE EASEMENT TO STRUCTURE 25 FT WIDE X 3,500 FT LONG.

(5) ASSUME 7 ASR WELL SITES EACH PER STUDY AREAS 1 AND 2; EACH SITE 1,000 SQ FT AND ADJACENT TO PUBLIC ACCESS.

(6) TOLAY TUNNEL EASEMENT 2,000 FT LONG; TWO ROCK TUNNEL EASEMENT 2,300 FT LONG; TUNNEL PORTAL SITES 2,000 SQ FT EACH.

NOTE - ALL LAND COSTS IDENTIFIED BY ECONOMIC & PLANNING SYSTEMS BASED ON ABOVE ASSUMPTIONS.

SEE COST ESTIMATE APPENDIX AND EPS MEMORANDUM "LAND VALUE ESTIMATES FOR SANTA ROSA SUBREGIONAL LONG TERM WASTEWATER PROJECT". DATED NOVEMBER 7, 1985.

TABLE 20

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 OPERATIONS AND MAINTENANCE COSTS - SUMMARY  
 NOV 28, 1988

ALTERNATIVE PROJECT	RESERVOIR MAINTENANCE COSTS (TABLE 20.1) (\$1,000)	PIPELINE MAINTENANCE COSTS (TABLE 20.2) (\$1,000)	PUMPING EQUIPMENT MAINTENANCE COSTS (TABLE 20.3) (\$1,000)	IRRIGATION AREAS O&M AND MONITORING COSTS (TABLE 6.2) (\$1,000) (1) (2) (3)	ASR WELLS MAINTENANCE COSTS (TABLE 20.5) (\$1,000)	PUMPING POWER ANNUAL COSTS (TABLE 20.7) (\$1,000)	TOTAL ANNUAL O&M COSTS (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2A - TOLAY A	\$22	\$67	\$130	\$205	\$0	\$2,098	\$2,513
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$42	\$65	\$178	\$205	\$0	\$1,931	\$2,411
2C - TOLAY C	\$22	\$68	\$194	\$205	\$0	\$2,150	\$2,627
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$42	\$68	\$178	\$205	\$0	\$2,670	\$3,153
2E - ASR + 8 SMALLER TOLAY	\$22	\$80	\$170	\$205	\$113	\$2,180	\$2,730
3A - TWO ROCK	\$20	\$68	\$146	\$205	\$0	\$1,219	\$1,648
3B - BLOOMFIELD	\$20	\$80	\$146	\$205	\$0	\$1,314	\$1,745
3C - CARROLL ROAD	\$20	\$68	\$154	\$205	\$0	\$1,316	\$1,753
3D - VALLEY FORD	\$20	\$68	\$154	\$205	\$0	\$1,348	\$1,785
3E - HUNTLEY	\$20	\$68	\$138	\$205	\$0	\$1,292	\$1,713
3F - ASR + 8 SMALLER TWO ROCK	\$20	\$80	\$211	\$205	\$113	\$1,297	\$1,906
4 - GEYSERS RECHARGE	\$0	\$31	\$69	\$0	\$0	\$6,583	\$6,683 (6)
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$20	\$8	\$0	\$0	\$99	\$97
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0	\$0	\$0	\$0

(1) BASED ON QUESTA ENGINEERING ESTIMATE OF ANNUAL OPERATIONS COSTS.  
 COSTS FOR FIRST FIVE YEARS OF IRRIGATION SYSTEM IMPLEMENTATION AND DEVELOPMENT  
 ARE INCLUDED IN TABLE 6 AS CAPITAL COSTS.

(2) INCLUDES NO INCENTIVE PAYMENTS TO FARMERS TO TAKE RECLAIMED WATER.

(3) ASSUMES NO ANNUAL COSTS FOR REPLACEMENT OF ON-FARM IRRIGATION PIPING.

(4) ASSUMES URBAN IRRIGATION PROJECTS FOR ALTERNATIVES 2A THRU 3F ONLY.

(5) ANNUAL COST IF IGNORE VALUE OF INCREASED GEYSERS ENERGY PRODUCTION. SEE TABLE 20.7.

TABLE 20.1

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
COST ESTIMATE - ANNUAL RESERVOIR O&M COSTS  
SEPT 25, 1995

ITEM	PROJECT														
	1	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	3F	4	5A	5B
CHECK OPERATION OF OUTLET GATE, AND SERVICE GATE AND OPERATOR	\$0	\$1,500	\$3,000	\$1,500	\$3,000	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$0	\$0	\$0
CLEAR SHORELINE GROWTHS	\$0	\$2,500	\$5,000	\$2,500	\$5,000	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$0	\$0	\$0
RUNOFF DIVERSION PUMP STATION: CLEAR DEBRIS FROM DETENTION BASIN AND BAR RACKS	\$0	\$500	\$500	\$500	\$0	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
INSPECT CONDITION OF DAM, LEAKAGE AND DOWNSTREAM CHANNEL EROSION	\$0	\$1,000	\$2,000	\$1,000	\$2,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$0	\$0	\$0
CLEAR DEBRIS FROM RUNOFF DIVERSION CHANNELS AND CONDUITS	\$0	\$1,500	\$1,500	\$1,500	\$2,500	\$1,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
INSPECT RESERVOIR SHORELINE FOR LANDSLIDES	\$0	\$1,500	\$3,000	\$1,500	\$3,000	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$0	\$0	\$0
STABILIZE SHORELINE LANDSLIDES	\$0	\$10,000	\$20,000	\$10,000	\$20,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$0	\$0	\$0
SAMPLE MONITORING WELLS FOR RESERVOIR IMPACT ON GROUNDWATER GRADIENT AND WATER QUALITY	\$0	\$3,000	\$6,000	\$3,000	\$6,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$0	\$0	\$0
OCCASIONALLY RUN LEVEL CHECK ON DAM LEVEL AND POSITION MONUMENTS	\$0	\$500	\$1,000	\$500	\$1,000	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$0	\$0	\$0
TOTAL ANNUAL O&M COSTS	\$0	\$22,000	\$42,000	\$22,000	\$42,500	\$22,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$0	\$0	\$0

THESE COSTS DO NOT INCLUDE NORMAL OPERATIONS STAFF SALARIES.

GOMCOST.201

TABLE 20.2

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - ANNUAL PIPELINES O&M COSTS  
 SEPT 25, 1995

ITEM	PROJECT														
	1	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	3F	4	5A	5B
TOTAL LENGTH OF PIPELINES (1,000LF)	0	520	493	498	532	560	530	555	527	528	529	558	117	39	0
CHECK OPERATION OF ALL ISOLATION VALVES AND AIR RELEASE VALVES (200 TO 210 TOTAL) @ \$50/VALVE	\$0	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$0
PERIODICALLY OPERATE BLOW-OFF VALVES TO FLUSH SOLIDS FROM LINES (100 TOTAL) @ \$50/VALVE	\$0	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$0
DRIVE ALL LINES TO VISUALLY CHECK FOR LEAKAGE OR SETTLEMENT, PARTICULARLY AFTER SEISMIC EVENTS @ \$5/MILE	\$0	\$492	\$487	\$472	\$504	\$530	\$502	\$526	\$499	\$498	\$501	\$527	\$177	\$37	\$0
REPAIR OCCASIONAL PIPE BREAK @ 1 BREAK/25 MILES X \$10,000/BREAK	\$0	\$39,394	\$37,348	\$37,727	\$40,303	\$42,424	\$40,152	\$42,045	\$39,924	\$38,848	\$40,076	\$42,121	\$14,187	\$2,955	\$0
PERIODICALLY CHECK ETS STATIONS TO MONITOR FOR PIPELINE CORROSION @ 50 STAS./YEAR @ \$50/STA	\$0	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$0
TOTAL ANNUAL O&M COSTS	\$0	\$57,388	\$55,315	\$55,699	\$58,307	\$60,455	\$58,153	\$60,071	\$57,923	\$57,847	\$58,077	\$60,146	\$31,844	\$20,491	\$0

THESE COSTS DO NOT INCLUDE NORMAL OPERATIONS STAFF SALARIES.

QOMCOST.202

TABLE 20.3

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - ANNUAL PUMP STATIONS O&M COSTS  
 SEPT 25, 1995

ITEM	PROJECT														
	1	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	3F	4	5A	5B
NUMBER OF PUMP STATIONS (1)	0	18	22	24	22	21	18	18	19	19	17	26	8	1	0
REPLACE SOME PUMP SEALS AND BEARINGS @ \$1,000/PS	\$0	\$18,000	\$22,000	\$24,000	\$22,000	\$21,000	\$18,000	\$18,000	\$19,000	\$19,000	\$17,000	\$26,000	\$8,000	\$1,000	\$0
REPLACE MINOR ITEMS IN MCC AND DISTRIBUTION, AND CONTROL PANELS @ \$1,000/PS	\$0	\$18,000	\$22,000	\$24,000	\$22,000	\$21,000	\$18,000	\$18,000	\$19,000	\$19,000	\$17,000	\$26,000	\$8,000	\$1,000	\$0
OCCASIONAL PUMP IMPELLER REPLACEMENT @ \$100/PS	\$0	\$1,800	\$2,200	\$2,400	\$2,200	\$2,100	\$1,800	\$1,800	\$1,900	\$1,900	\$1,700	\$2,600	\$800	\$100	\$0
OCCASIONAL PUMP MOTOR REPLACEMENT @ \$5,000/PS	\$0	\$80,000	\$110,000	\$120,000	\$110,000	\$105,000	\$90,000	\$90,000	\$95,000	\$95,000	\$85,000	\$130,000	\$40,000	\$5,000	\$0
PERIODIC INSPECTION OF STORAGE TANK INTERIOR @ \$1,500/PS W/ STORAGE TANK	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,500	\$0	\$0
SERVICE INSTRUMENTS AND RECALIBRATE @ \$1,000/PS	\$0	\$18,000	\$22,000	\$24,000	\$22,000	\$21,000	\$18,000	\$18,000	\$19,000	\$19,000	\$17,000	\$26,000	\$8,000	\$1,000	\$0
TOTAL ANNUAL O&M COSTS	\$0	\$129,800	\$178,200	\$194,400	\$178,200	\$170,100	\$145,800	\$145,800	\$153,900	\$153,900	\$137,700	\$210,600	\$69,300	\$8,100	\$0

THESE COSTS DO NOT INCLUDE NORMAL OPERATIONS STAFF SALARIES.

(1) ASSUMES URBAN IRRIGATION PROJECT INCLUDED IN ALTERNATIVES 2A THRU 3F ONLY.

QOMCOST.203



TABLE 20.5

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - ANNUAL ASR WELL STATIONS O&M COSTS  
 SEPT 25, 1995

ITEM	PROJECT															
	1	2A	2B	2C	2D	2E	3A	3B	3C	3D	3E	3F	4	5A	5B	
NUMBER OF PUMP STATIONS	0	0	0	0	0	14	0	0	0	0	0	14	0	0	0	
REPLACE SOME PUMP SEALS AND BEARING3S @ \$1,000/PS	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	
REPLACE MINOR ITEMS IN MCC AND DISTRIBUTION, AND CONTROL PANELS @ \$1,000/PS	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	
OCCASIONAL PUMP IMPELLER REPLACEMENT @ \$100/PS	\$0	\$0	\$0	\$0	\$0	\$1,400	\$0	\$0	\$0	\$0	\$0	\$1,400	\$0	\$0	\$0	
OCCASIONAL PUMP MOTOR REPLACEMENT @ \$5,000/PS	\$0	\$0	\$0	\$0	\$0	\$70,000	\$0	\$0	\$0	\$0	\$0	\$70,000	\$0	\$0	\$0	
SERVICE INSTRUMENTS AND RECALIBRATE @ \$1,000/PS	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	\$0	\$0	\$14,000	\$0	\$0	\$0	
TOTAL ANNUAL O&M COSTS	\$0	\$0	\$0	\$0	\$0	\$113,400	\$0	\$0	\$0	\$0	\$0	\$113,400	\$0	\$0	\$0	

THESE COSTS DO NOT INCLUDE NORMAL OPERATIONS STAFF SALARIES.

QOMCOST.205

TABLE 20.7

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
 COST ESTIMATE - ANNUAL PUMPING ENERGY COST  
 NOV 28, 1995

ALTERNATIVE PROJECT	ANNUAL ADDITIONAL TOTAL KILOWATT-HOURS/YEAR (1) (FROM TM-E-1) (1,000 KW-HR)	ANNUAL ADDITIONAL PUMPING COST (1)(2) (@ \$0.055/KW-HR) (\$1,000)	
1 - NO PROJECT	0	\$0	
2A - TOLAY A	36,196	\$2,099	
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	35,105	\$1,931	
2C - TOLAY C	36,098	\$2,150	
2D - BEARS POINT AND LAKEVILLE HILLSIDE	48,549	\$2,670	
2E - ASR + SMALLER TOLAY	36,257	\$2,160	
3A - TWO ROCK	22,167	\$1,219	
3B - BLOOMFIELD	23,895	\$1,314	
3C - CARROLL ROAD	23,921	\$1,316	
3D - VALLEY FORD	24,504	\$1,348	
3E - HUNTLEY	23,493	\$1,292	
3F - ASR + SMALLER TWO ROCK	23,573	\$1,297	
4 - GEYSERS RECHARGE	119,691	\$6,583	(3)
	293,109	\$16,121	(4)
5A - DIRECT DISCHARGE TO TO RUSSIAN RIVER	1,250	\$69	(5)
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	0	\$0	

(1) VALUE AT DESIGN CAPACITY YEAR; FROM TECHNICAL MEMORANDUM TM-E-1,  
 "ENERGY DEMAND OF ALTERNATIVE PROJECTS".

(2) VALUE AT DESIGN CAPACITY YEAR.

(3) ENERGY CONSUMPTION (FOR PUMPING) ONLY. DOES NOT TAKE INTO ACCOUNT INCREASED  
 ENERGY PRODUCTION AT THE GEYSERS DUE TO INJECTION OF RECLAIMED WATER.

(4) NET ENERGY PRODUCTION AND VALUE (INCREASED ENERGY PRODUCTION MINUS PUMPING ENERGY CONSUMPTION)  
 DUE TO INCREASED STEAM GENERATION AT THE GEYSERS DUE TO INJECTED RECLAIMED WATER.

(5) COST OF OPERATING EXISTING PUMP STATION 'D' AT DELTA POND ASSUMES  
 CONTINUOUS OPERATION FOR THREE MONTHS OF TWO 350 HP AND ONE 75 HP PUMPS.

QERGOCST.207

TABLE 30

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT  
CONTINGENCY PLAN OPERATIONS COSTS - SUMMARY  
NOV 27, 1995

ALTERNATIVE PROJECT	IRRIGATION PUMP STATIONS OPERATIONS COST (6) (\$1,000)	PRIVATE IRRIGATION INCENTIVE PAYMENTS (7) (\$1,000)	EMERGENCY CONSERVATION ADVERTISEMENT COSTS (8) (\$1,000)	TOTAL CONTINGENCY PLAN COST (\$1,000)
1 - NO PROJECT	\$0	\$0	\$0	\$0
2A - TOLAY A	\$208	\$220	\$5	\$433
2B - ADOBE ROAD AND LAKEVILLE HILLSIDE	\$212	\$220	\$5	\$437
2C - TOLAY C	\$213	\$220	\$5	\$438
2D - SEARS POINT AND LAKEVILLE HILLSIDE	\$338	\$220	\$5	\$558
2E - ASR + SMALLER TOLAY	\$212	\$220	\$5	\$437
3A - TWO ROCK	\$72	\$220	\$5	\$297
3B - BLOOMFIELD	\$72	\$220	\$5	\$297
3C - CARROLL ROAD	\$72	\$220	\$5	\$297
3D - VALLEY FORD	\$72	\$220	\$5	\$297
3E - HUNTLEY	\$71	\$220	\$5	\$296
3F - ASR + SMALLER TWO ROCK	\$81	\$220	\$5	\$306
4 - GEYSERS RECHARGE	\$0	\$0	\$0	\$0
5A - DIRECT DISCHARGE TO RUSSIAN RIVER	\$0	\$0	\$0	\$0
5B - DIRECT DISCHARGE TO LAGUNA CREEKS	\$0	\$0	\$0	\$0

## NOTES:

- (1) CONTINGENCY PROGRAM WOULD CONSIST OF (IN THE ORDER OF IMPLEMENTATION):  
(A) WINTER IRRIGATION, (B) EMERGENCY CONSERVATION, AND (C) INCREASED RIVER DISCHARGE.
- (2) COSTS ASSOCIATED WITH THE CONTINGENCY PROGRAM ARE PRIMARILY FOR WINTER IRRIGATION; SPECIFICALLY, FOR OPERATION OF IRRIGATION BOOSTER PUMP STATIONS TO DELIVER WATER TO THE AGRICULTURAL IRRIGATION FIELDS, AND FOR PAYMENTS TO THE PRIVATE PROPERTY OWNERS FOR SETTING UP AND OPERATING THEIR IRRIGATION SYSTEMS.
- (3) WINTER IRRIGATION IS ASSUMED TO INCLUDE CONTINUED USE OF PRIVATE PROPERTIES IN THE LAGUNA AS WELL AS PRIVATE PROPERTIES IN EITHER THE SOUTH COUNTY OR WEST COUNTY AREA. SEBASTOPOL IRRIGATION WOULD NOT BE INCLUDED IN THE WINTER IRRIGATION PROGRAM. NORMAL YEAR-AROUND URBAN IRRIGATION IS NOT CONSIDERED PART OF CONTINGENCY WINTER IRRIGATION.
- (4) WINTER IRRIGATION IS ASSUMED AT AN AVERAGE RATE OF 1.5 INCHES PER ACRE.
- (5) FIGURES BASED ON THE MAXIMUM WINTER IRRIGATION DISPOSAL REQUIREMENT: 330 MG/MONTH FOR THE 1% PROJECT, 2 MONTH WINTER IRRIGATION SEASON, SOUTH COUNTY IRRIGATION, WITHOUT SEBASTOPOL IRRIGATION; AS PROJECTED IN TECHNICAL MEMORANDUM TM-CP-1. THIS MAXIMUM COST CONDITION OCCURED ONCE IN 70 YEAR PERIOD OF STUDY. AVERAGE CONTINGENCY VOLUME, AND WINTER IRRIGATION COST, OF THE 2% CONTINGENCY DISCHARGE OCCURANCES OVER THIS SAME PERIOD WOULD BE 38% OF MAXIMUM CONDITION.
- (6) FROM TABLE P8-E-1.1. FOR 2 MONTH OPERATION OF IRRIGATION BOOSTER PUMP STATIONS.
- (7) INCENTIVE PAYMENTS COST = REQUIRED ACRES X 1.5 IN/MONTH X 2 MONTHS X \$10/ACRE-IN  
= 7348 ACRES X 1.5 X 2 X 10  
= \$220,000  
REQUIRED ACRES = 300 MG/MONTH X 1 ACRE-IN/27,225 GALS X 1 ACRE-MONTH/1.5 ACRE-IN  
= 7348 ACRES TOTAL (LAGUNA, AND SOUTH OR WEST COUNTY)
- (8) ASSUMED. EMERGENCY CONSERVATION CAN REDUCE RECLAIMED WATER GENERATION BY 31 MG/MONTH.

The Appendix to this document is filed as exhibit D-30