Chapter 3

Costs of the Alternatives

Costs included in this report are comparative costs. They should only be used to compare the relative differences in costs among the alternatives.

The costs shown as construction field costs were based on estimated quantities. Minor items were handled by adding a percentage (15 percent) of the overall cost. The total construction field cost also includes contingencies of 25 percent.

The costs do not include the expense of purchasing water to be delivered to the Salton Sea. A cost may be charged for water other than ocean water. Pumping plant costs (capital and OM&R) were determined using computer programs and equations developed for planning estimates. Program input included head (pressure), discharge flow, and other factors.

The alternative designs assumed the presence of electrical transmission lines and energy prices typical of the local area. These are current energy costs and not marginal energy costs. The rate used was $0.0725 per kilowatthour (kWh), which is an average of the following rates:

Winter:
 Offpeak: $0.037 per kWh (37 mills)
 Onpeak: $0.103 per kWh (103 mills)

Summer:
 Offpeak: $0.037 per kWh (37 mills)
 Onpeak: $0.113 per kWh (113 mills)

Operation, maintenance, and replacement (OM&R) costs include those for operating and maintaining the pumping plants and replacing components as required. OM&R costs do not include energy costs.

Present worth calculations are based on a project life of 100 years and annual interest of 7.125 percent. The design assumes that salt removal is an ongoing event throughout the project life. The estimator assumed that trucks would haul the salt to the ocean. Salt trucked to the ocean would be mixed with ocean water, dissolved, and discharged through a dispersion pipe into the ocean; therefore, the salt would not stockpile over the 100-year period.

Table 2.—Preappraisal costs for the Salton Sea restoration

Pump-out / Pump-in Alternatives

1.346 M ac-ft/yr Drainage inflow -- Reach 40 ppt salinity in 15 years

No.	Pump-out Discharge (k ac-ft/yr)	Pump-out To	Pump-in Discharge (k ac-ft/yr)	Pump-in From	Construction Field Cost ($M)	Energy Costs Annual ($M)	Other OM&R Annual ($M)	Total OMR&E Annual ($M)	Total Present Worth ($M)
1	700	Camp Pendleton	600	Camp Pendleton	3,500	478	8	486	10,314
2	700	Gulf of California	600	Gulf of California	3,300	42	0.7	43	3,902
3	700	Hyperion	600	Hyperion	4,700	359	6	365	9,813
4	250	Point Loma	153	Point Loma	1,500	153	5	158	3,717
5	250	Hyperion	153	Hyperion	1,850	117	4	121	3,548
6	250	Gulf of California	153	Yuma [3]	1,150	12	0.5	13	1,328
7	250	Palen Lake	153	Point Loma	2,682	119	678	797	13,859
8	250	Palen Lake	153	Hyperion	2,852	116	678	795	13,992
9	250	Gulf of California	153	Point Loma	1,450	70	3	73	2,468
10	250	Gulf of California	153	Hyperion	1,550	56	2	59	2,370
1.346 M ac-ft/yr Drainage inflow -- Reach 40 ppt salinity in 30 years									
11	400	Camp Pendleton	303	Camp Pendleton	2,100	262	6	268	5,861
12	400	Gulf of California	303	Gulf of California	2,100	26	0.6	26	2,466
13	400	Hyperion	303	Hyperion	2,800	199	5	203	5,653
14	170	Point Loma	73	Point Loma	1,050	94	5	99	2,437
15	170	Hyperion	73	Hyperion	1,250	73	4	77	2,326
16	170	Gulf of California	73	Yuma [3]	800	9	0.4	10	935
17	170	Palen Lake	73	Point Loma	1,807	71	462	533	9,277
18	170	Palen Lake	73	Hyperion	1,887	65	462	526	9,264
19	170	Gulf of California	73	Point Loma	980	38	2	40	1,546
20	170	Gulf of California	73	Hyperion	1,050	32	2	34	1,522
1.346 M ac-ft/yr Drainage inflow -- Reach 43 ppt salinity in 90 years									
21	100	Camp Pendleton			420	39	2	41	1,001
22	100	Gulf of California			470	6	0.4	7	564
1.000 M acre-ft/yr Drainage inflow -- Reach 40 ppt salinity in 30 years									
23	205/120	Gulf of California	405/345	Yuma [3]	1,300	7	0.3	8	1,406

Desalinization Plants and Solar Pond

1.346 M ac-ft/yr Drainage inflow -- Reach 40 ppt salinity in 30 years

No.	Discharge	Description	Construction Field Cost ($M)	Energy Costs Annual ($M)	Other OM&R Annual ($M)	Total OMR&E Annual ($M)	Total Present Worth ($M)
24	110	Desalt plant & brackish pipe to the Gulf	932	47	17	64	1,822
25	94	Solar pond, desalt plant & brackish pipe to Gulf	1,006	14	18	32	1,453

Dikes

No.	1997 Report Alternative No.	Surface Area Of Dike (mi^2)	Description	Construction Field Cost ($M)	Energy Costs Annual ($M)	Other OM&R Annual ($M)	Total OMR&E Annual ($M)	Total Present Worth ($M)
26	1	50	Dike	840	9.7	352	361	5,908 [2]
27	2	40	Dike	660	9.7	351	361	5,722 [2]
28	3	127	Dike	700	9.7	796	806	11,996 [2]
29	4	47 Total	Two Ponds	1,100	9.7	352	361	6,167 [2]
30	5	25/127	East / North Ponds	1,250	9.7	797	806	12,555 [2]
31	2*	40	Earthquake Design [1]	1,950	9.7	351	361	7,012
32	6	30	Dike only	610	- -	- -	-	610 [2]
33	7	30	Dike only	610	- -	- -	-	610 [2]

New Combination Alternatives

No.	Description	Construction Field Cost ($M)	Energy Costs Annual ($M)	Other OM&R Annual ($M)	Total OMR&E Annual ($M)	Total Present Worth ($M)
34	Salt Pond / Shipping Channel / Canals / Desalting Facility					
35	Gulf of California Pump-in / Pump-out / Diking / Treating Inflows					
36	Phased Approach -- Ph.1: Salt Stabilized, Ph.2: Pump-in					
37	In-Sea Concentrator / Pipeline	1,748	64	3	67	2,690
38	Out-of-Sea Concentrator / Pipeline					

Costs do not include cost of obtaining water or cost reductions for pumping cut backs..

[1] Similar to No. 2 but designed to withstand earthquakes.

[2] Costs do not include cost of repairing dike failures caused by earthquakes.

[3] See Chapter 5, "Pump-in Sources" for availability of water.

Table 2 shows the costs of the alternatives that were determined to meet the three evaluation criteria previously discussed. The table includes not only construction costs but also energy, operation, maintenance, and replacement costs. Chapters 4, 5, and 6 describe the items included in these costs and their derivation. Please remember the designs and costs are for relative comparison among the alternatives.

As stated, table 2 shows the costs for complete pipeline systems. Figure 2 illustrates field costs as a function of discharge. It shows individual pipelines flowing in only one direction.

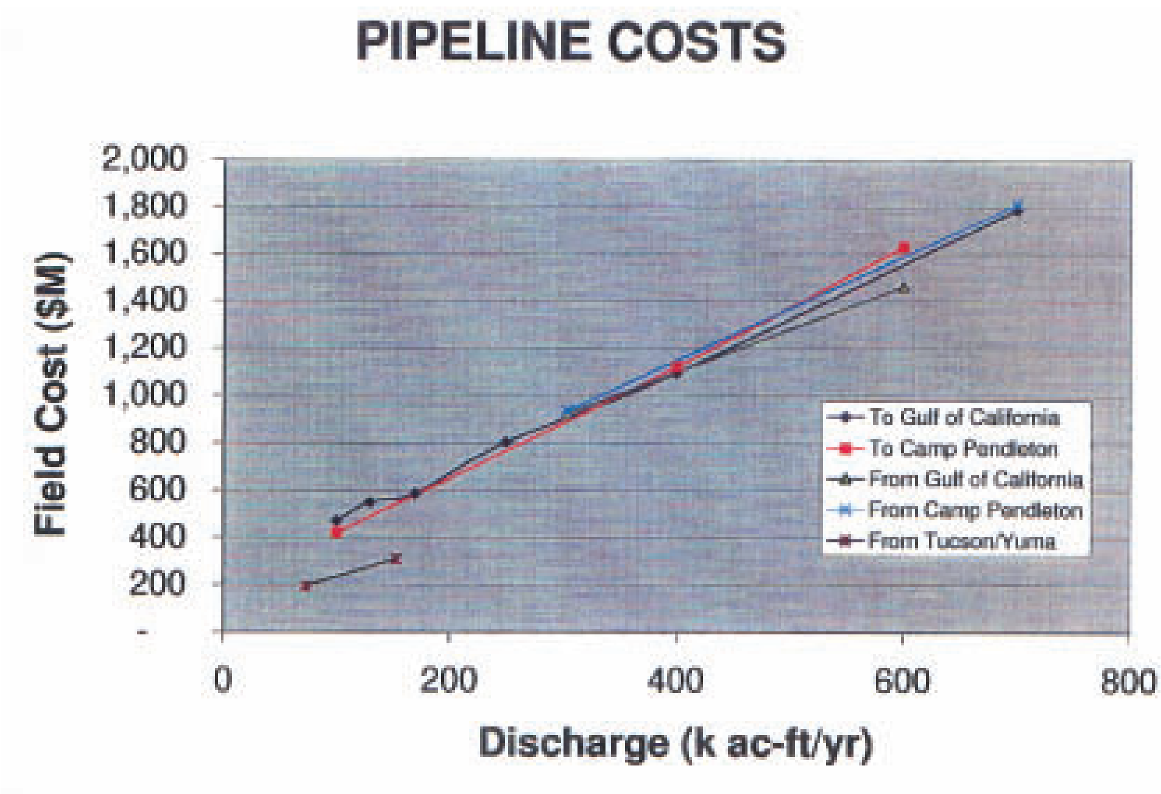

Figure 2.—Pipeline field costs as a function of discharge flowing in one direction.

It may be difficult to understand how the costs of a particular alternative (from table 2) compare with other alternatives. Figure 3 shows all alternatives' complete costs—field costs versus annual costs. Figure 4 shows the same information, but only for the alternatives with lower costs.

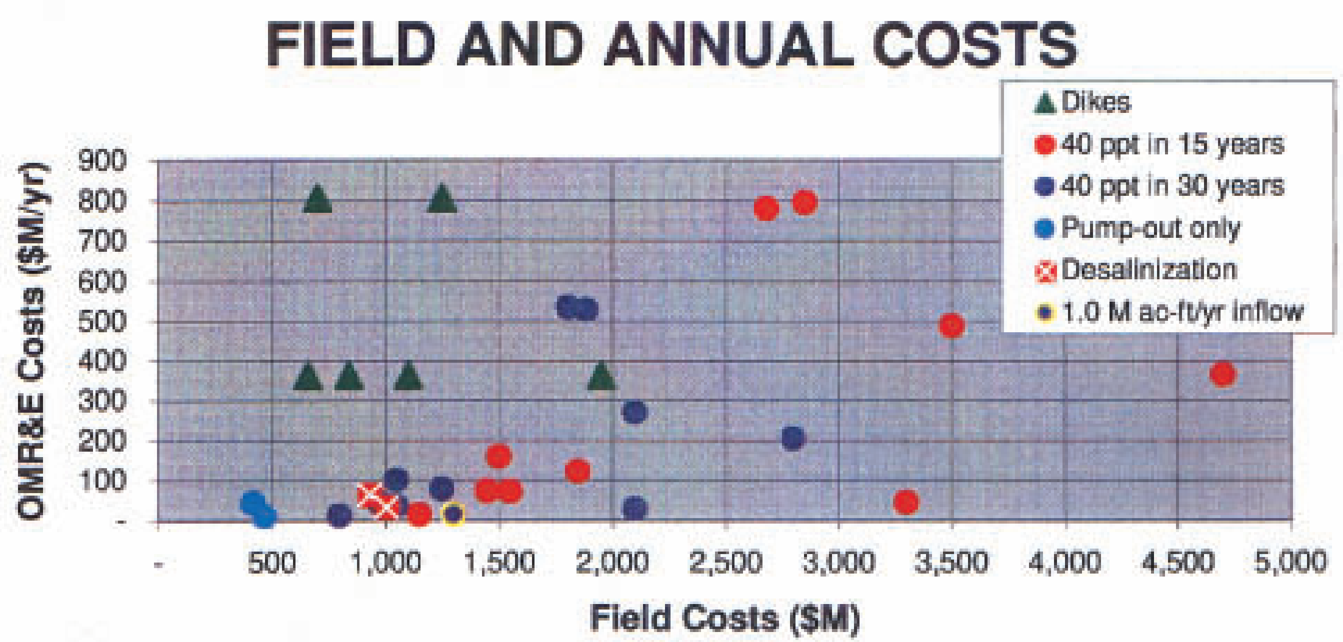

Figure 3.—Construction field costs are displayed on the horizontal axis and the annual costs of operation, maintenance, repair, and energy on the vertical axis. Pump-out/pump-in pipelines are shown as circular dots.

Comparing pump-out/pump-in alternative Nos. 1 through 10 and Nos. 11 through 20 allows the reader to understand the effect of reaching a salinity of 40 ppt in two different timeframes.

Figure 5 (Cost of Salinity) compares the cost of reaching various salinity concentrations in 30 years. This curve is based on inflow of 1 million acre-feet per year, 2.8-inch-per-year precipitation, and a pump-in salinity of 4 ppt.

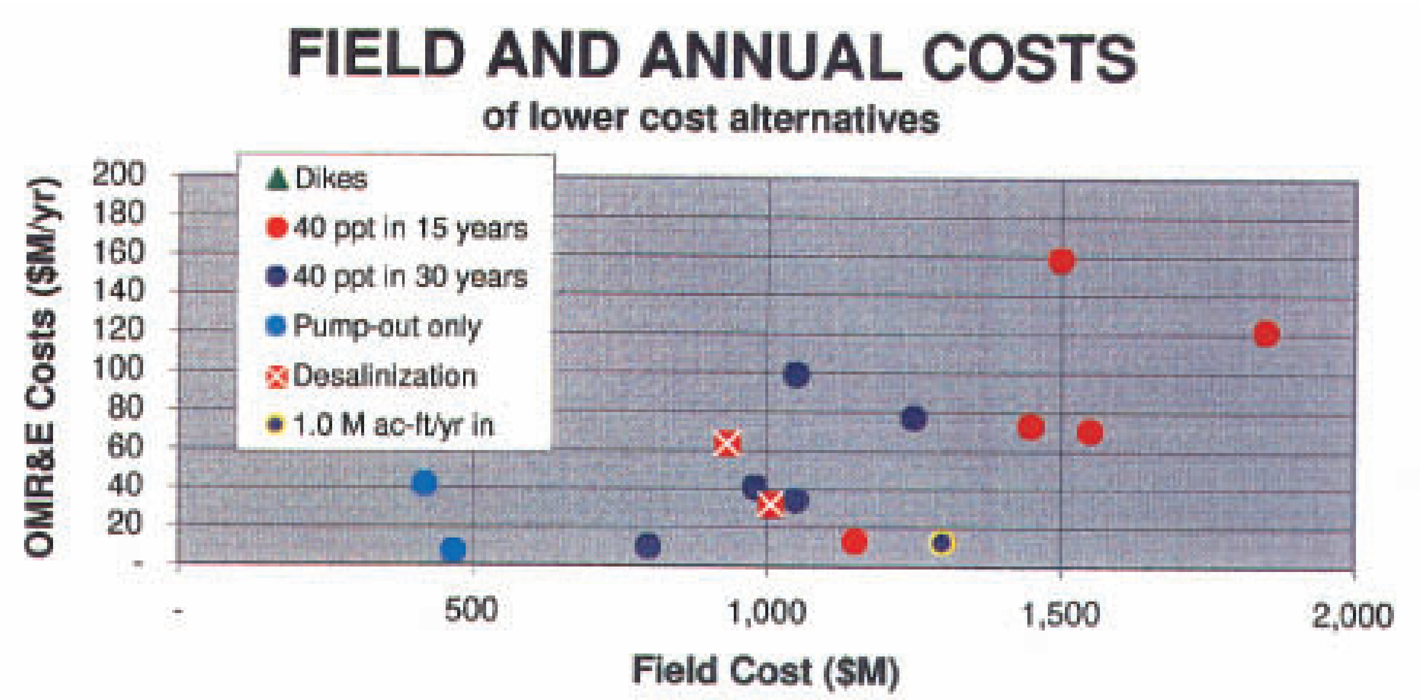

Figure 4.—The same field costs and operation, maintenance, replacement, and energy costs as in figure 3 are displayed on the horizontal and vertical axis, but only for the lower cost alternatives—a small portion of those in figure 3.

The curve is also based on a pipeline going to and from either Camp Pendleton or the Gulf of California. The costs are approximate but accurate enough to portray the cost of reaching various salinity levels in 30 years from the end of construction. The lower the salinity concentration to be achieved, the higher the cost would be to achieve that level of salinity under these circumstances.

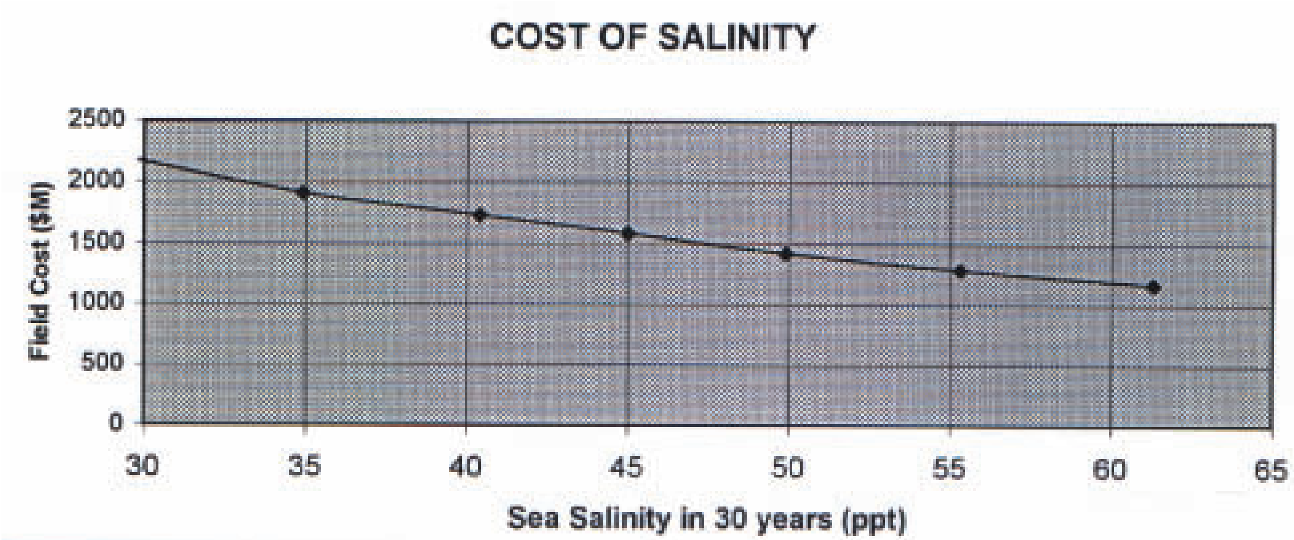

Figure 5.—The construction field cost decreases as the target salinity increases. This illustrates the relationship based on a fictitious pipeline going to and from the Gulf of California or Camp Pendleton. Other parameters are discussed in the text.