

## **APPENDIX H**

### **DETAILED COST ANALYSIS OF MITIGATION ALTERNATIVES**

**APPENDIX H  
TABLE OF CONTENTS**

**TABLES**

H.1	Alternative 1 Estimate of Costs
H.2	Alternative 2 Estimate of Costs
H.3	Alternative 3 Estimate of Costs
H.4	Alternative 4 Estimate of Costs
H.5	Alternative 5 Estimate of Costs
H.6	Summary of 2006 Interceptor Wellfield Operation and Maintenance Cost

**TABLE H.1  
Alternative 1 Estimate of Costs**

Alternative 1: IW Wellfield=4861gpm; FFS Wellfield= 3150-2400gpm; SC Wellfield=1500-750gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Land Access, Permitting, Surveying:</b>					
Project Management	140	hours @	140	19,600	
Archeological Survey				33,000	
Endangered Species Survey				40,000	
Well Drilling Permits	18	each @	150	2,700	
404 Survey				20,000	
404 Permitting				35,000	
Access ROW/Lease				90,000	
				<u>240,300</u>	\$ 240,300
<b>Engineering:</b>					
Principal	300	hours @	140	42,000	
Associate	650	hours @	110	71,500	
Project Professional II	1,600	hours @	85	136,000	
Staff Professional II	600	hours @	65	39,000	
Technician II	300	hours @	50	15,000	
CAD/Draftsperson	340	hours @	55	18,700	
Technical Editor	80	hours @	50	4,000	
Word Processing/Data Entry	80	hours @	40	3,200	
				<u>329,400</u>	\$ 329,400
<b>Construction &amp; Capital Costs (Year 2009):</b>					
<i>Well Drilling &amp; Construction:</i>					
Drill Rig Mob-demob				80,000	
Extraction Well Construction; 16 inch casing	8,685	feet @	400	3,474,000	
Observation Well Construction; 4 inch casing	8	each @	53000	424,000	
Well Development/Testing	10	each @	56000	560,000	
Rig Takedown/Setup	9	each @	12300	110,700	
Field Geologist	1,750	each @	75	131,250	
<i>300 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	1	each @	6500	6,500	
Discharge Head	1	each @	13000	13,000	
Driver; 150 HP, 460V	1	each @	17500	17,500	
Lineshaft Assembly	1	each @	65000	65,000	
Oil Drum/Stand/Solenoid; 55 gal	1	each @	2300	2,300	
Wellhead Fabrication	1	each @	4200	4,200	
Pump Installation	1	each @	8000	8,000	
<i>500 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	6	each @	7500	45,000	
Discharge Head	6	each @	15000	90,000	
Driver; 200 HP, 460V	6	each @	20000	120,000	
Lineshaft Assembly	6	each @	67000	402,000	
Oil Drum/Stand/Solenoid; 55 gal	6	each @	2300	13,800	
Wellhead Fabrication	6	each @	4200	25,200	
Pump Installation	6	each @	8000	48,000	
<i>600-700 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 11 stage	3	each @	9900	29,700	
Discharge Head; 20"x12" Type F	3	each @	17000	51,000	
Driver; 350HP, 460V, 389 FLA	3	each @	25000	75,000	
Lineshaft Assembly	3	each @	67000	201,000	
Oil Drum/Stand/Solenoid; 55 gal	3	each @	2300	6,900	
Wellhead Fabrication	3	each @	4200	12,600	
Pump Installation	3	each @	8000	24,000	

**TABLE H.1  
Alternative 1 Estimate of Costs**

Alternative 1: IW Wellfield=4861gpm; FFS Wellfield= 3150-2400gpm; SC Wellfield=1500-750gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<i>Electrical Equipment &amp; Installation:</i>					
Replacement Motors	3	each @	25000	75,000	
Power Supply & Distribution	16,800	feet @	21	352,800	
Transformer Sets; 500 kVA	3	each @	25000	75,000	
Transformer Sets; 250 kVA	7	each @	12500	87,500	
Wellhead Instrumentation	10	each @	11500	115,000	
Telemetry/Data Acquisition	10	each @	6500	65,000	
Sound Reduction Enclosure	6	each @	5000	30,000	
Wellhead Electrical w/ soft starts	10	each @	52000	520,000	
<i>Effluent Piping &amp; Installation:</i>					
8 inch HDPE, SDR-13.5	11,000	feet @	19.23	211,530	
12 inch HDPE, SDR-13.5	5,000	feet @	32.98	164,900	
14 inch HDPE, SDR-13.5	2,400	feet @	38.49	92,376	
20 inch HDPE, SDR-13.5	15,000	feet @	67.94	1,019,100	
22 inch HDPE, SDR-13.5	3,500	feet @	79.71	278,985	
24 inch HDPE, SDR-13.5	1,500	feet @	92.25	138,375	
26 inch HDPE, SDR-13.5	3,500	feet @	106.61	373,135	
8 inch HDPE, SDR-11 (distribution)	500	feet @	20.97	10,485	
Trenching and Backfilling	18,500	feet @	4	74,000	
Shipping				28,000	
<i>Miscellaneous:</i>					
Header Tie-Ins	5	each @	8800	44,000	
Distribution Piping Tie-Ins	10	each @	1650	16,500	
Air Relief Valves	53	each @	1200	63,600	
Drill Site Pads	18	each @	4850	87,300	
Access Roads	2.3	miles @	5625	12,938	
Pipeline Road Crossing	4	each @	9500	38,000	
Surveying				12,500	
Construction Management	1,400	hours @	75	105,000	
Project Management	473	hours @	140	66,150	
Operation & Maintenance Manual				4,500	
As-Built Documentation				20,000	
				<u>10,222,324</u>	\$ 10,222,324
<b>Annual Operation &amp; Maintenance (Years 2010-2042):</b>					
	<u>base rate</u>		<u>factor</u>		
Labor	114,000	factor @	0.48	54,720	
Supplies	35,000	factor @	0.48	16,800	
Electrical Power (excluding IW)	15,800,000	Kw hours @	0.07	1,106,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	2,200,000	Kw hours @	0.07	154,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-4650	-1,488,775	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>-13,615</u>	\$ (13,615)

**TABLE H.1  
Alternative 1 Estimate of Costs**

Alternative 1: IW Wellfield=4861gpm; FFS Wellfield= 3150-2400gpm; SC Wellfield=1500-750gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Annual Repair/Replacement (Years 2010-2042):</b>					
Labor/Materials/Equipment	210,000	factor @	0.78	163,800	
Pipeline/Headers	75,000	factor @	0.78	58,500	
Well/Pump/Motor	325,000	factor @	0.78	253,500	
Replacement Materials/Instruments	97,000	factor @	0.78	75,660	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>556,460</u>	\$ 556,460
<b>Annual Operation &amp; Maintenance (Years 2043-2058):</b>					
	<u>base rate</u>		<u>factor</u>		
Labor	114,000	factor @	0.48	54,720	
Supplies	35,000	factor @	0.48	16,800	
Electrical Power (excluding IW)	14,800,000	Kw hours @	0.07	1,036,000	
IW Electrical Power (w/ IW pump station)	8,500,000	Kw hours @	0.07	595,000	
Additional IW Pumping Station Electrical Power	2,100,000	Kw hours @	0.07	147,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0.9	134,100	
Groundwater Monitoring				50,000	
FICO Water Cost				150,000	
ADWR Water Fees	3.00	/AF	15100	45,301	
ADWR WQARF fee	2.12	/AF	15100	32,013	
Hydrologic Consultant				85,000	
				<u>2,354,574</u>	\$ 2,354,574
<b>Annual Repair/Replacement (Years 2043-2058):</b>					
Labor/Materials/Equipment	210,000	factor @	0.75	157,500	
Pipeline/Headers	75,000	factor @	0.75	56,250	
Well/Pump/Motor	325,000	factor @	0.75	243,750	
Replacement Materials/Instruments	97,000	factor @	0.75	72,750	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0.81	572,670	
Shipping				5,000	
				<u>1,107,920</u>	\$1,107,920
<b>Water Treatment Construction (Year 2042):</b>					
Pilot Scale Testing				175,000	
Telemetry to Mine Operations				150,000	
Power Supply & Distribution	10,600	feet @	21	222,600	
RO Treatment System (9361 gpm)	23,954,000	/6000 gpm	9,361	31,281,001	
				<u>31,828,601</u>	\$31,828,601

**TABLE H.1  
Alternative 1 Estimate of Costs**

Alternative 1: IW Wellfield=4861gpm; FFS Wellfield= 3150-2400gpm; SC Wellfield=1500-750gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Water Treatment Annual O&amp;M (Years 2043-2058):</b>					
RO Treatment System (9361 gpm)	0.73	/1000 gals	9,361	3,591,703	
				3,591,703	\$3,591,703

Alternative 1:		
	<b>Initial Pre-Construction Cost:</b>	<b>\$ 569,700</b>
	<b>Initial Construction Capital Costs:</b>	<b>\$ 10,222,324</b>
	<b>Annual Operation, Maintenance, Repair, Replacement Costs ( years 2010-2042 ):</b>	<b>\$ 542,845</b>
	<b>Annual Operation, Maintenance, Repair, Replacement Costs ( years 2043-2058 ):</b>	<b>\$ 7,054,197</b>
	<b>Total Pre-Construction, Capital, O&amp;M, Repair, Replacement Costs ( years 2009-2058 ):</b>	<b>\$ 173,401,667</b>
	<b>Pre-Construction, Capital, O&amp;M, Repair, Replacement Costs ( years 2009-2042 ):</b>	<b>\$ 28,705,909</b>
	<b>Pre-Construction, Capital, O&amp;M, Repair, Replacement Costs ( years 2043-2058 ):</b>	<b>\$ 144,695,759</b>
	<b>Extraction System Costs ( years 2043-2058 ):</b>	<b>\$ 55,399,904</b>
	<b>RO Treatment System Costs ( years 2043-2058 ):</b>	<b>\$ 89,295,855</b>
	<b>Groundwater Extraction System 50 Year Net Present Value =</b>	<b>\$ 25,174,380</b>
	<b>Groundwater RO Treatment System 50 Year Net Present Value =</b>	<b>\$ 11,941,177</b>
	<b>Total 50 Year Net Present Value =</b>	<b>\$ 37,115,556</b>

Assumptions:

- 1) IW pump station does not require upgrades for total flow (assumes 3-300hp)
- 2) O&M based on IW costs for 2006 proportional to 21 wells
- 3) Repair/Replacement based on IW costs for 2006 proportional to 6000gpm
- 4) Net Present Value is calculated over 50 years assuming a 7.8 percent discount rate minus a 2.4 percent escalation rate
- 5) Canoa Ranch water use off-set proportional to total 2007 well field O&M costs
- 6) Base Kw-hrs for IW pump station assumed at 3,800,000 at 6000gpm
- 7) 20"-26" line from west of Esperanza junction to IW pump station
- 8) All capital equipment sized for maximum flow rate
- 9) Flows @ years 2010-2042 = IW-4861gpm; FFS-3150gpm; SC-1500gpm
- 10) Flows @ years 2043-2058 = IW-4861gpm; FFS-3000gpm; SC-1500gpm
- 11) Canoa Ranch Well Field saving based on time period weighted-average flow, excluding IW

Abbreviations:

- ROW- right of way
- CAD-computer aided drafting
- HP-horse power
- gals-gallons
- V-volts
- FLA-full load amps
- A-amps
- kVA- kilo volt amps
- HDPE-high density polyethylene
- SDR-size dimension ratio
- IW- interceptor well field
- O&M- operation and maintenance
- gpm-gallons per minute
- Kw-kilo watts
- FICO-Farmers Investment \Co.
- WQARF-Water Quality Assurance Revolving Fund
- ADWR-Arizona Dept of Water Resources
- AF-acre-feet
- RO-reverse osmosis

**TABLE H.2  
Alternative 2 Estimate of Costs**

Alternative 2: IW Wellfield=4861gpm; FFS Wellfield=3100-2400gpm; SC Wellfield=1500-750gpm; PS Wellfield=2300-1500gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Land Access, Permitting, Surveying:</b>					
Project Management	160	hours @	140	22,400	
Archeological Survey				40,000	
Endangered Species Survey				50,000	
Well Drilling Permits	24	each @	150	3,600	
404 Survey				25,000	
404 Permitting				40,000	
Access ROW/Lease				120,000	
				<u>301,000</u>	\$ 301,000
<b>Engineering:</b>					
Principal	400	hours @	140	56,000	
Associate	800	hours @	110	88,000	
Project Professional II	3,000	hours @	85	255,000	
Staff Professional II	850	hours @	65	55,250	
Technician II	400	hours @	50	20,000	
CAD/Draftsperson	500	hours @	55	27,500	
Technical Editor	150	hours @	50	7,500	
Word Processing/Data Entry	100	hours @	40	4,000	
				<u>513,250</u>	\$ 513,250
<b>Construction &amp; Capital Costs (Year 2009):</b>					
<i>Well Drilling &amp; Construction:</i>					
Drill Rig Mob-demob				80,000	
Extraction Well Construction; 16 inch casing	12,459	feet @	400	4,983,600	
Observation Well Construction; 4 inch casing	10	each @	53000	530,000	
Well Development/Testing	14	each @	56000	784,000	
Rig Takedown/Setup	13	each @	12300	159,900	
Field Geologist	2,500	each @	75	187,500	
<i>300 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	1	each @	6500	6,500	
Discharge Head	1	each @	13000	13,000	
Driver; 150 HP, 460V	1	each @	17500	17,500	
Lineshaft Assembly	1	each @	65000	65,000	
Oil Drum/Stand/Solenoid; 55 gal	1	each @	2300	2,300	
Wellhead Fabrication	1	each @	4200	4,200	
Pump Installation	1	each @	8000	8,000	
<i>500 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	7	each @	7500	52,500	
Discharge Head	7	each @	15000	105,000	
Driver; 200 HP, 460V	7	each @	20000	140,000	
Lineshaft Assembly	7	each @	67000	469,000	
Oil Drum/Stand/Solenoid; 55 gal	7	each @	2300	16,100	
Wellhead Fabrication	7	each @	4200	29,400	
Pump Installation	7	each @	8000	56,000	
<i>600-700 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 11 stage	6	each @	9900	59,400	
Discharge Head; 20"x12" Type F	6	each @	17000	102,000	
Driver; 350HP, 460V, 389 FLA	6	each @	25000	150,000	
Lineshaft Assembly	6	each @	67000	402,000	
Oil Drum/Stand/Solenoid; 55 gal	6	each @	2300	13,800	
Wellhead Fabrication	6	each @	4200	25,200	
Pump Installation	6	each @	8000	48,000	

**TABLE H.2  
Alternative 2 Estimate of Costs**

Alternative 2: IW Wellfield=4861gpm; FFS Wellfield=3100-2400gpm; SC Wellfield=1500-750gpm; PS Wellfield=2300-1500gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<i>Electrical Equipment &amp; Installation:</i>					
Replacement Motors	3	each @	25000	75,000	
Power Supply & Distribution	24,500	feet @	21	514,500	
Transformer Sets; 500 kVA	6	each @	25000	150,000	
Transformer Sets; 250 kVA	8	each @	12500	100,000	
Wellhead Instrumentation	14	each @	11500	161,000	
Telemetry/Data Acquisition	14	each @	6500	91,000	
Sound Reduction Enclosure	14	each @	5000	70,000	
Wellhead Electrical w/ soft starts	14	each @	52000	728,000	
<i>Effluent Piping &amp; Installation:</i>					
8 inch HDPE, SDR-13.5	10,700	feet @	19.23	205,761	
12 inch HDPE, SDR-13.5	3,250	feet @	32.98	107,185	
14 inch HDPE, SDR-13.5	1,400	feet @	38.49	53,886	
16 inch HDPE, SDR-13.5	2,000	feet @	47.53	95,060	
20 inch HDPE, SDR-13.5	1,500	feet @	67.94	101,910	
22 inch HDPE, SDR-13.5	2,500	feet @	79.71	199,275	
24 inch HDPE, SDR-13.5	1,000	feet @	92.25	92,250	
28 inch HDPE, SDR-13.5	16,500	feet @	121.37	2,002,605	
30 inch HDPE, SDR-13.5	3,500	feet @	137.33	480,655	
32 inch HDPE, SDR-13.5	4,000	feet @	154.17	616,680	
8 inch HDPE, SDR-11 (distribution)	700	feet @	20.97	14,679	
Trenching and Backfilling	23,350	feet @	4	93,400	
Shipping				31,000	
<i>Miscellaneous:</i>					
IW Pump Station Upgrades				125,000	
Header Tie-Ins	6	each @	8800	52,800	
Distribution Piping Tie-Ins	14	each @	1650	23,100	
Air Relief Valves	56	each @	1200	67,200	
Drill Site Pads	24	each @	4850	116,400	
Access Roads	3.5	miles @	5625	19,688	
Pipeline Road Crossing	5	each @	9500	47,500	
Construction Management	1,500	hours @	75	112,500	
Project Management	600	hours @	140	84,000	
Operation & Maintenance Manual				6,500	
As-Built Documentation				30,000	
				<u>15,178,434</u>	\$ 15,178,434
<b>Annual Operation &amp; Maintenance</b>					
<b>(Years 2010-2042):</b>					
	<u>base rate</u>		<u>factor</u>		
Labor	114,000	factor @	0.67	76,380	
Supplies	35,000	factor @	0.67	23,450	
Electrical Power (excluding IW)	24,000,000	Kw hours @	0.07	1,680,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	3,600,000	Kw hours @	0.07	252,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-6706	-2,147,038	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>28,432</u>	\$ 28,432

**TABLE H.2  
Alternative 2 Estimate of Costs**

Alternative 2: IW Wellfield=4861gpm; FFS Wellfield=3100-2400gpm; SC Wellfield=1500-750gpm; PS Wellfield=2300-1500gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Annual Repair/Replacement (Years 2010-2042):</b>					
Labor/Materials/Equipment	210,000	factor @	1.15	241,500	
Pipeline/Headers	75,000	factor @	1.15	86,250	
Well/Pump/Motor	325,000	factor @	1.15	373,750	
Replacement Materials/Instruments	97,000	factor @	1.15	111,550	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>818,050</u>	\$ 818,050
<b>Annual Operation &amp; Maintenance (Years 2043-2058):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.67	76,380	
Supplies	35,000	factor @	0.67	23,450	
Electrical Power (excluding IW)	22,400,000	Kw hours @	0.07	1,568,000	
IW Electrical Power (w/ IW pump station)	8,500,000	Kw hours @	0.07	595,000	
Additional IW Pumping Station Electrical Power	3,100,000	Kw hours @	0.07	217,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0.9	134,100	
Groundwater Monitoring				50,000	
FICO Water Cost				150,000	
ADWR Water Fees	3.00	/AF	17681	53,044	
ADWR WQARF fee	2.12	/AF	17681	37,485	
Hydrologic Consultant				85,000	
				<u>2,998,099</u>	\$ 2,998,099
<b>Annual Repair/Replacement (Years 2043-2058):</b>					
Labor/Materials/Equipment	210,000	factor @	1.02	214,200	
Pipeline/Headers	75,000	factor @	1.02	76,500	
Well/Pump/Motor	325,000	factor @	1.02	331,500	
Replacement Materials/Instruments	97,000	factor @	1.02	98,940	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0.81	572,670	
Shipping				5,000	
				<u>1,298,810</u>	\$1,298,810
<b>Water Treatment Construction (Year 2042):</b>					
Pilot Scale Testing				175,000	
Telemetry to Mine Operations				150,000	
Power Supply & Distribution	10,600	feet @	21	222,600	
RO Treatment System (10961 gpm)	23,954,000	/6000 gpm	10,961	34,387,246	
				<u>34,934,846</u>	\$34,934,846

## TABLE H.2 Alternative 2 Estimate of Costs

Alternative 2: IW Wellfield=4861gpm; FFS Wellfield=3100-2400gpm; SC Wellfield=1500-750gpm; PS Wellfield=2300-1500gpm

Water Treatment Annual O&M (Years 2043-2058):	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
RO Treatment System (10961 gpm)	0.64	/1000 gals	10,961	3,687,105 <u>3,687,105</u>	\$3,687,105

Alternative 2:	Initial Pre-Construction Cost:	\$	814,250
	Initial Construction Capital Costs:	\$	15,178,434
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2010-2042 ):	\$	846,482
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2043-2058 ):	\$	7,984,014
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2058 ):	\$	206,605,666
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2042 ):	\$	43,926,601
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2043-2058 ):	\$	162,679,065
	Extraction System Costs ( years 2043-2058 ):	\$	68,750,538
	RO Treatment System Costs ( years 2043-2058 ):	\$	93,928,527
	Groundwater Extraction System 50 Year Net Present Value =	\$	36,477,114
	Groundwater RO Treatment System 50 Year Net Present Value =	\$	12,656,945
	Total 50 Year Net Present Value =	\$	49,134,059

Assumptions:

- 1) IW pump station does not require upgrades for total flow (assumes 3-300hp)
- 2) O&M based on IW costs for 2006 proportional to 21 wells
- 3) Repair/Replacement based on IW costs for 2006 proportional to 6000gpm
- 4) Net Present Value is calculated over 50 years assuming a 7.8 percent discount rate minus a 2.4 percent escalation rate
- 5) Canoa Ranch water use off-set proportional to total 2007 well field O&M costs
- 6) Base Kw-hrs for IW pump station assumed at 3,800,000 at 6000gpm
- 7) 28"-32" line from west of Esperanza junction to IW pump station
- 8) All capital equipment sized for maximum flow rate
- 9) Flows @ years 2010-2042 = IW-4861gpm; FFS-3100gpm; SC-1500gpm; PS-2300gpm
- 10) Flows @ years 2043-2058 = IW-4861gpm; FFS-3100gpm; SC-1500gpm; PS-1500gpm
- 11) Canoa Ranch Well Field saving based on time period weighted-average flow, excluding IW

Abbreviations:

- ROW- right of way
- CAD-computer aided drafting
- HP-horse power
- gals-gallons
- V-volts
- FLA-full load amps
- A-amps
- kVA- kilo volt amps
- HDPE-high density polyethylene
- SDR-size dimension ratio
- IW- interceptor well field
- O&M- operation and maintenance
- gpm-gallons per minute
- Kw-kilo watts
- FICO-Farmers Investment ICo.
- WQARF-Water Quality Assurance Revolving Fund
- ADWR-Arizona Dept of Water Resources
- AF-acre-feet
- RO-reverse osmosis

**TABLE H.3  
Alternative 3 Estimate of Costs**

Alternative 3: IW Wellfield=4861gpm; FFS Wellfield= 5450-2500gpm; SC Wellfield=1600-750gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Land Access, Permitting, Surveying:</b>					
Project Management	180	hours @	140	25,200	
Archeological Survey				45,000	
Endangered Species Survey				55,000	
Well Drilling Permits	28	each @	150	4,200	
404 Survey				30,000	
404 Permitting				45,000	
Access ROW/Lease				140,000	
				<u>344,400</u>	\$ 344,400
<b>Engineering:</b>					
Principal	650	hours @	140	91,000	
Associate	1,200	hours @	110	132,000	
Project Professional II	3,500	hours @	85	297,500	
Staff Professional II	1,200	hours @	65	78,000	
Technician II	500	hours @	50	25,000	
CAD/Draftsperson	600	hours @	55	33,000	
Technical Editor	200	hours @	50	10,000	
Word Processing/Data Entry	150	hours @	40	6,000	
				<u>672,500</u>	\$ 672,500
<b>Construction &amp; Capital Costs (Year 2009):</b>					
<i>Well Drilling &amp; Construction:</i>					
Drill Rig Mob-demob				80,000	
Extraction Well Construction; 16 inch casing	13,642	feet @	400	5,456,876	
Observation Well Construction; 4 inch casing	12	each @	53000	636,000	
Well Development/Testing	16	each @	56000	896,000	
Rig Takedown/Setup	15	each @	12300	184,500	
Field Geologist	2,750	each @	75	206,250	
<i>400- 500 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	5	each @	7500	37,500	
Discharge Head	5	each @	15000	75,000	
Driver; 200 HP, 460V	5	each @	20000	100,000	
Lineshaft Assembly	5	each @	67000	335,000	
Oil Drum/Stand/Solenoid; 55 gal	5	each @	2300	11,500	
Wellhead Fabrication	5	each @	4200	21,000	
Pump Installation	5	each @	8000	40,000	
<i>550-700 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 11 stage	3	each @	9900	29,700	
Discharge Head; 20"x12" Type F	3	each @	17000	51,000	
Driver; 350HP, 460V, 389 FLA	3	each @	25000	75,000	
Lineshaft Assembly	3	each @	67000	201,000	
Oil Drum/Stand/Solenoid; 55 gal	3	each @	2300	6,900	
Wellhead Fabrication	3	each @	4200	12,600	
Pump Installation	3	each @	8000	24,000	
<i>750-1000 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 13 stage	8	each @	22250	178,000	
Discharge Head; 25"x12" Type F	8	each @	18600	148,800	
Driver; 500HP, 2300V, 130 FLA	8	each @	30300	242,400	
Lineshaft Assembly	8	each @	136000	1,088,000	
Oil Drum/Stand/Solenoid; 55 gal	8	each @	2500	20,000	
Wellhead Fabrication	8	each @	5200	41,600	
Pump Installation	8	each @	8500	68,000	
<i>Electrical Equipment &amp; Installation:</i>					
Replacement Motors	3	each @	25000	75,000	
Power Supply & Distribution	24,500	feet @	21	514,500	

**TABLE H.3  
Alternative 3 Estimate of Costs**

Alternative 3: IW Wellfield=4861gpm; FFS Wellfield= 5450-2500gpm; SC Wellfield=1600-750gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Transformer Sets; 750 KVA	8	each @	37500	300,000	
Transformer Sets; 500 kVA	8	each @	25000	200,000	
Wellhead Instrumentation	16	each @	11500	184,000	
Telemetry/Data Acquisition	16	each @	6500	104,000	
Sound Reduction Enclosure	16	each @	5000	80,000	
Wellhead Electrical w/ soft starts	16	each @	52000	832,000	
<i>Effluent Piping &amp; Installation:</i>					
8 inch HDPE, SDR-13.5	7,000	feet @	19.23	134,610	
12 inch HDPE, SDR-13.5	7,500	feet @	32.98	247,350	
16 inch HDPE, SDR-13.5	2,000	feet @	47.53	95,060	
18 inch HDPE, SDR-13.5	3,700	feet @	57.39	212,343	
20 inch HDPE, SDR-13.5	2,000	feet @	67.94	135,880	
22 inch HDPE, SDR-13.5	2,300	feet @	79.71	183,333	
24 inch HDPE, SDR-13.5	3,900	feet @	92.25	359,775	
26 inch HDPE, SDR-13.5	1,000	feet @	106.61	106,610	
36 inch HDPE, SDR-13.5	23,500	feet @	189.34	4,449,490	
8 inch HDPE, SDR-11 (distribution)	800	feet @	20.97	16,776	
Trenching and Backfilling	27,600	feet @	5	138,000	
Shipping				38,000	
<i>Miscellaneous:</i>					
IW Pump Station Upgrades				250,000	
Header Tie-Ins	8	each @	8800	70,400	
Distribution Piping Tie-Ins	16	each @	1650	26,400	
Air Relief Valves	63	each @	1200	75,600	
Drill Site Pads	28	each @	4850	135,800	
Access Roads	3.5	miles @	5625	19,688	
Pipeline Road Crossing	7	each @	9500	66,500	
Construction Management	1,670	hours @	75	125,250	
Project Management	663	hours @	140	92,820	
Operation & Maintenance Manual				7,500	
As-Built Documentation				40,000	
				19,583,311	\$ 19,583,311
<b>Annual Operation &amp; Maintenance</b>					
<b>(Years 2010-2030):</b>					
	<u>base rate</u>		<u>factor</u>		
Labor	114,000	factor @	0.76	86,640	
Supplies	35,000	factor @	0.76	26,600	
Electrical Power (excluding IW)	39,700,000	Kw hours @	0.07	2,779,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	6,200,000	Kw hours @	0.07	434,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-10802	-3,458,440	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				11,440	\$ 11,440
<b>Annual Repair/Replacement</b>					
<b>(Years 2010-2030):</b>					
Labor/Materials/Equipment	210,000	factor @	1.81	380,100	
Pipeline/Headers	75,000	factor @	1.81	135,750	
Well/Pump/Motor	325,000	factor @	1.81	588,250	
Replacement Materials/Instruments	97,000	factor @	1.81	175,570	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				1,284,670	\$ 1,284,670

**TABLE H.3  
Alternative 3 Estimate of Costs**

Alternative 3: IW Wellfield=4861gpm; FFS Wellfield= 5450-2500gpm; SC Wellfield=1600-750gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Annual Operation &amp; Maintenance (Years 2031-2042):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.71	80,940	
Supplies	35,000	factor @	0.71	24,850	
Electrical Power (excluding IW)	34,900,000	Kw hours @	0.07	2,443,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	5,300,000	Kw hours @	0.07	371,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-9550	-3,057,592	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>5,838</u>	\$ 5,838
<b>Annual Repair/Replacement (Years 2031-2042):</b>					
Labor/Materials/Equipment	210,000	factor @	1.59	333,900	
Pipeline/Headers	75,000	factor @	1.59	119,250	
Well/Pump/Motor	325,000	factor @	1.59	516,750	
Replacement Materials/Instruments	97,000	factor @	1.59	154,230	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>1,129,130</u>	\$1,129,130
<b>Annual Operation &amp; Maintenance (Years 2043-2058):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.48	54,720	
Supplies	35,000	factor @	0.48	16,800	
Electrical Power (excluding IW)	16,500,000	Kw hours @	0.07	1,155,000	
IW Electrical Power (w/ IW pump station)	8,500,000	Kw hours @	0.07	595,000	
Additional IW Pumping Station Electrical Power	2,100,000	Kw hours @	0.07	147,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0.9	134,100	
Groundwater Monitoring				50,000	
FICO Water Cost				150,000	
ADWR Water Fees	3.00	/AF	15100	45,301	
ADWR WQARF fee	2.12	/AF	15100	32,013	
Hydrologic Consultant				85,000	
				<u>2,473,574</u>	\$ 2,473,574
<b>Annual Repair/Replacement (Years 2043-2058):</b>					
Labor/Materials/Equipment	210,000	factor @	0.75	157,500	
Pipeline/Headers	75,000	factor @	0.75	56,250	
Well/Pump/Motor	325,000	factor @	0.75	243,750	
Replacement Materials/Instruments	97,000	factor @	0.75	72,750	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0.81	572,670	
Shipping				5,000	
				<u>1,107,920</u>	\$1,107,920
<b>Water Treatment Construction (Year 2042):</b>					
Pilot Scale Testing				175,000	
Telemetry to Mine Operations				150,000	

**TABLE H.3  
Alternative 3 Estimate of Costs**

**Alternative 3: IW Wellfield=4861gpm; FFS Wellfield= 5450-2500gpm; SC Wellfield=1600-750gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm**

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Power Supply & Distribution	10,600	feet @	21	222,600	
RO Treatment System (9361 gpm)	23,954,000	/6000 gpm	9,361	31,281,001	
				31,828,601	\$31,828,601
<b>Water Treatment</b>					
<b>Annual O&amp;M</b>					
<b>(Years 2043-2058):</b>					
RO Treatment System (9361 gpm)	0.73	/1000 gals	9361	3,591,703	
				3,591,703	\$3,591,703

Alternative 3:	Initial Pre-Construction Cost:	\$	1,016,900
	Initial Construction Capital Costs:	\$	19,583,311
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2010-2030 ):	\$	1,296,110
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2031-2042 ):	\$	1,134,968
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2043-2058 ):	\$	7,173,197
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2058 ):	\$	208,037,892
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2042 ):	\$	61,438,134
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2043-2058 ):	\$	146,599,759
	Extraction System Costs ( years 2043-2058 ):	\$	57,303,904
	RO Treatment System Costs ( years 2043-2058 ):	\$	89,295,855
	Groundwater Extraction System 50 Year Net Present Value =	\$	46,052,496
	Groundwater RO Treatment System 50 Year Net Present Value =	\$	11,941,177
	Total 50 Year Net Present Value =	\$	57,993,672

Assumptions:

- 1) IW pump station will require upgrades for total flow (assumes 3-300hp)
- 2) O&M based on IW costs for 2006 proportional to 21 wells
- 3) Repair/Replacement based on IW costs for 2006 proportional to 6000gpm
- 4) Net Present Value is calculated over 50 years assuming a 7.8 percent discount rate minus a 2.4 percent escalation rate
- 5) Canoa Ranch water use off-set proportional to total 2007 well field O&M costs
- 6) Base Kw-hrs for IW pump station assumed at 3,800,000 at 6000gpm
- 7) 36" line from west of Esperanza junction to IW pump station
- 8) All capital equipment sized for maximum flow rate
- 9) Flows @ years 2010-2030 = IW-4861gpm; FFS-5450gpm; SC-1600gpm; PS-2300gpm; MC-1500gpm
- 10) Flows @ years 2031-2042 = IW-4861gpm; FFS-5450gpm; SC-1500gpm; PS-2000gpm; MC-600gpm
- 11) Flows @ years 2043-2058 = IW-4861gpm; FFS-3000gpm; SC-1500gpm; PS-0gpm; MC-0gpm
- 12) Canoa Ranch Well Field saving based on time period weighted-average flow, excluding IW

Abbreviations:

- ROW- right of way
- CAD-computer aided drafting
- HP-horse power
- gals-gallons
- V-volts
- FLA-full load amps
- A-amps
- kVA- kilo volt amps
- HDPE-high density polyethylene
- SDR-size dimension ratio
- IW- interceptor well field
- O&M- operation and maintenance
- gpm-gallons per minute
- Kw-kilo watts
- FICO-Farmers Investment \Co.
- WQARF-Water Quality Assurance Revolving Fund
- ADWR-Arizona Dept of Water Resources
- AF-acre-feet
- RO-reverse osmosis

**TABLE H.4  
Alternative 4 Estimate of Costs**

Alternative 4: IW Wellfield =4861-1658gpm; FFS Wellfield= 3100-900gpm; SC Wellfield=1500-100gpm; PS Wellfield=2300-1400gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Land Access, Permitting, Surveying:</b>					
Project Management	160	hours @	140	22,400	
Archeological Survey				40,000	
Endangered Species Survey				50,000	
Well Drilling Permits	24	each @	150	3,600	
404 Survey				25,000	
404 Permitting				40,000	
Access ROW/Lease				120,000	
				<u>301,000</u>	\$ 301,000
<b>Engineering:</b>					
Principal	400	hours @	140	56,000	
Associate	800	hours @	110	88,000	
Project Professional II	3,000	hours @	85	255,000	
Staff Professional II	850	hours @	65	55,250	
Technician II	400	hours @	50	20,000	
CAD/Draftsperson	500	hours @	55	27,500	
Technical Editor	150	hours @	50	7,500	
Word Processing/Data Entry	100	hours @	40	4,000	
				<u>513,250</u>	\$ 513,250
<b>Construction &amp; Capital Costs (Year 2009):</b>					
<i>Well Drilling &amp; Construction:</i>					
Drill Rig Mob-demob				80,000	
Extraction Well Construction; 16 inch casing	12,459	feet @	400	4,983,600	
Observation Well Construction; 4 inch casing	10	each @	53000	530,000	
Well Development/Testing	14	each @	56000	784,000	
Rig Takedown/Setup	13	each @	12300	159,900	
Field Geologist	2,500	each @	75	187,500	
<i>300 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	1	each @	6500	6,500	
Discharge Head	1	each @	13000	13,000	
Driver; 150 HP, 460V	1	each @	17500	17,500	
Lineshaft Assembly	1	each @	65000	65,000	
Oil Drum/Stand/Solenoid; 55 gal	1	each @	2300	2,300	
Wellhead Fabrication	1	each @	4200	4,200	
Pump Installation	1	each @	8000	8,000	
<i>500 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	7	each @	7500	52,500	
Discharge Head	7	each @	15000	105,000	
Driver; 200 HP, 460V	7	each @	20000	140,000	
Lineshaft Assembly	7	each @	67000	469,000	
Oil Drum/Stand/Solenoid; 55 gal	7	each @	2300	16,100	
Wellhead Fabrication	7	each @	4200	29,400	
Pump Installation	7	each @	8000	56,000	
<i>600-700 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 11 stage	6	each @	9900	59,400	
Discharge Head; 20"x12" Type F	6	each @	17000	102,000	
Driver; 350HP, 460V, 389 FLA	6	each @	25000	150,000	
Lineshaft Assembly	6	each @	67000	402,000	
Oil Drum/Stand/Solenoid; 55 gal	6	each @	2300	13,800	
Wellhead Fabrication	6	each @	4200	25,200	
Pump Installation	6	each @	8000	48,000	
<i>Electrical Equipment &amp; Installation:</i>					
Replacement Motors	3	each @	25000	75,000	
Power Supply & Distribution	24,500	feet @	21	514,500	

**TABLE H.4  
Alternative 4 Estimate of Costs**

Alternative 4: IW Wellfield =4861-1658gpm; FFS Wellfield= 3100-900gpm; SC Wellfield=1500-100gpm; PS Wellfield=2300-1400gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Transformer Sets; 500 kVA	6	each @	25000	150,000	
Transformer Sets; 250 kVA	8	each @	12500	100,000	
Wellhead Instrumentation	14	each @	11500	161,000	
Telemetry/Data Acquisition	14	each @	6500	91,000	
Sound Reduction Enclosure	14	each @	5000	70,000	
Wellhead Electrical w/ soft starts	14	each @	52000	728,000	
<i>Effluent Piping &amp; Installation:</i>					
8 inch HDPE, SDR-13.5	10,700	feet @	19.23	205,761	
12 inch HDPE, SDR-13.5	3,250	feet @	32.98	107,185	
14 inch HDPE, SDR-13.5	1,400	feet @	38.49	53,886	
16 inch HDPE, SDR-13.5	2,000	feet @	47.53	95,060	
20 inch HDPE, SDR-13.5	1,500	feet @	67.94	101,910	
22 inch HDPE, SDR-13.5	2,500	feet @	79.71	199,275	
24 inch HDPE, SDR-13.5	1,000	feet @	92.25	92,250	
28 inch HDPE, SDR-13.5	16,500	feet @	121.37	2,002,605	
30 inch HDPE, SDR-13.5	3,500	feet @	137.33	480,655	
32 inch HDPE, SDR-13.5	4,000	feet @	154.17	616,680	
8 inch HDPE, SDR-11 (distribution)	700	feet @	20.97	14,679	
Trenching and Backfilling	23,350	feet @	4	93,400	
Shipping				31,000	
<i>Miscellaneous:</i>					
IW Pump Station Upgrades				125,000	
Header Tie-Ins	6	each @	8800	52,800	
Distribution Piping Tie-Ins	14	each @	1650	23,100	
Air Relief Valves	56	each @	1200	67,200	
Drill Site Pads	24	each @	4850	116,400	
Access Roads	3.5	miles @	5625	19,688	
Pipeline Road Crossing	5	each @	9500	47,500	
Construction Management	1,500	hours @	75	112,500	
Project Management	600	hours @	140	84,000	
Operation & Maintenance Manual				6,500	
As-Built Documentation				30,000	
				15,178,434	\$ 15,178,434
<b>Annual Operation &amp; Maintenance</b>					
<b>(Years 2010-2030):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.67	76,380	
Supplies	35,000	factor @	0.67	23,450	
Electrical Power (excluding IW)	24,000,000	Kw hours @	0.07	1,680,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	3,600,000	Kw hours @	0.07	252,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-6429	-2,058,352	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				117,119	\$ 117,119
<b>Annual Repair/Replacement</b>					
<b>(Years 2010-2030):</b>					
Labor/Materials/Equipment	210,000	factor @	1.15	241,500	
Pipeline/Headers	75,000	factor @	1.15	86,250	
Well/Pump/Motor	325,000	factor @	1.15	373,750	
Replacement Materials/Instruments	97,000	factor @	1.15	111,550	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				818,050	\$ 818,050

**TABLE H.4  
Alternative 4 Estimate of Costs**

Alternative 4: IW Wellfield =4861-1658gpm; FFS Wellfield= 3100-900gpm; SC Wellfield=1500-100gpm; PS Wellfield=2300-1400gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Annual Operation &amp; Maintenance (Years 2031-2042):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.62	70,680	
Supplies	35,000	factor @	0.62	21,700	
Electrical Power (excluding IW)	16,200,000	Kw hours @	0.07	1,134,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	2,300,000	Kw hours @	0.07	161,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-4567	-1,462,201	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>68,819</u>	\$ 68,819
<b>Annual Repair/Replacement (Years 2031-2042):</b>					
Labor/Materials/Equipment	210,000	factor @	0.8	168,000	
Pipeline/Headers	75,000	factor @	0.8	60,000	
Well/Pump/Motor	325,000	factor @	0.8	260,000	
Replacement Materials/Instruments	97,000	factor @	0.8	77,600	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>570,600</u>	\$570,600
<b>Annual Operation &amp; Maintenance (Years 2043-2058):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.43	49,020	
Supplies	35,000	factor @	0.43	15,050	
Electrical Power (excluding IW)	8,100,000	Kw hours @	0.07	567,000	
IW Electrical Power (w/ IW pump station)	2,900,000	Kw hours @	0.07	203,000	
Additional IW Pumping Station Electrical Power	0	Kw hours @	0.07	0	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0.86	128,140	
Groundwater Monitoring				50,000	
FICO Water Cost				150,000	
ADWR Water Fees	3.00	/AF	6546	19,638	
ADWR WQARF fee	2.12	/AF	6546	13,878	
Hydrologic Consultant				85,000	
				<u>1,289,366</u>	\$ 1,289,366
<b>Annual Repair/Replacement (Years 2043-2058):</b>					
Labor/Materials/Equipment	210,000	factor @	0.4	84,000	
Pipeline/Headers	75,000	factor @	0.4	30,000	
Well/Pump/Motor	325,000	factor @	0.4	130,000	
Replacement Materials/Instruments	97,000	factor @	0.4	38,800	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0.28	197,960	
Shipping				5,000	
				<u>485,760</u>	\$485,760
<b>Water Treatment Construction (Year 2042):</b>					
Pilot Scale Testing				0	
Telemetry to Mine Operations				0	

**TABLE H.4  
Alternative 4 Estimate of Costs**

**Alternative 4: IW Wellfield =4861-1658gpm; FFS Wellfield= 3100-900gpm; SC Wellfield=1500-100gpm; PS Wellfield=2300-1400gpm**

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Power Supply & Distribution	10,600	feet @	21	0	
RO Treatment System (4058 gpm)	16,905,000	/4000 gpm	0	0	\$0
				0	
<b>Water Treatment Annual O&amp;M (Years 2043-2058):</b>					
RO Treatment System (4058 gpm)	1.06	/1000 gals	0	0	\$0
				0	

Alternative 4:	Initial Pre-Construction Cost:	\$ 814,250
	Initial Construction Capital Costs:	\$ 15,178,434
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2010-2030 ):	\$ 935,169
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2031-2042 ):	\$ 639,419
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2043-2058 ):	\$ 1,775,126
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2058 ):	\$ 71,706,259
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2042 ):	\$ 43,304,248
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2043-2058 ):	\$ 28,402,011
	Extraction System Costs ( years 2043-2058 ):	\$ 28,402,011

**Groundwater Extraction System 50 Year Net Present Value = \$ 32,442,228**  
**Total 50 Year Net Present Value = \$ 32,442,228**

Assumptions:

- 1) IW pump station will require upgrades for total flow (assumes 3-300hp)
- 2) O&M based on IW costs for 2006 proportional to 21 wells
- 3) Repair/Replacement based on IW costs for 2006 proportional to 6000gpm
- 4) Net Present Value is calculated over 50 years assuming a 7.8 percent discount rate minus a 2.4 percent escalation rate
- 5) Canoa Ranch water use off-set proportional to total 2007 well field O&M costs
- 6) Base Kw-hrs for IW pump station assumed at 3,800,000 at 6000gpm
- 7) 32"-28" line from west of Esperanza junction to IW pump station
- 8) All capital equipment sized for maximum flow rate
- 9) Flows @ years 2010-2030 = IW-4861gpm; FFS-3100gpm; SC-1500gpm; PS-2300gpm
- 10) Flows @ years 2031-2042 = IW-4861gpm; FFS-2000gpm; SC-750gpm; PS-2050gpm
- 11) Flows @ years 2043-2058 = IW-1658gpm; FFS-900gpm; SC-100gpm; PS-1400gpm
- 12) Canoa Ranch Well Field saving based on time period weighted-average flow, excluding IW

Abbreviations:

- ROW- right of way
- CAD-computer aided drafting
- HP-horse power
- gals-gallons
- V-volts
- FLA-full load amps
- A-amps
- kVA- kilo volt amps
- HDPE-high density polyethylene
- SDR-size dimension ratio
- IW- interceptor well field
- O&M- operation and maintenance
- gpm-gallons per minute
- Kw-kilo watts
- FICO-Farmers Investment \Co.
- WQARF-Water Quality Assurance Revolving Fund
- ADWR-Arizona Dept of Water Resources
- AF-acre-feet
- RO-reverse osmosis

**TABLE H.5  
Alternative 5 Estimate of Costs**

Alternative 5: IW Wellfield=4861-1555gpm; FFS Wellfield= 5450-900gpm; SC Wellfield=1600-100gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Land Access, Permitting, Surveying:</b>					
Project Management	180	hours @	140	25,200	
Archeological Survey				45,000	
Endangered Species Survey				55,000	
Well Drilling Permits	28	each @	150	4,200	
404 Survey				30,000	
404 Permitting				45,000	
Access ROW/Lease				140,000	
				<u>344,400</u>	\$ 344,400
<b>Engineering:</b>					
Principal	650	hours @	140	91,000	
Associate	1,200	hours @	110	132,000	
Project Professional II	3,500	hours @	85	297,500	
Staff Professional II	1,200	hours @	65	78,000	
Technician II	500	hours @	50	25,000	
CAD/Draftsperson	600	hours @	55	33,000	
Technical Editor	200	hours @	50	10,000	
Word Processing/Data Entry	150	hours @	40	6,000	
				<u>672,500</u>	\$ 672,500
<b>Construction &amp; Capital Costs (Year 2009):</b>					
<i>Well Drilling &amp; Construction:</i>					
Drill Rig Mob-demob				80,000	
Extraction Well Construction; 16 inch casing	13,642	feet @	400	5,456,876	
Observation Well Construction; 4 inch casing	12	each @	53000	636,000	
Well Development/Testing	16	each @	56000	896,000	
Rig Takedown/Setup	15	each @	12300	184,500	
Field Geologist	2,750	each @	75	206,250	
<i>400- 500 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly	5	each @	7500	37,500	
Discharge Head	5	each @	15000	75,000	
Driver; 200 HP, 460V	5	each @	20000	100,000	
Lineshaft Assembly	5	each @	67000	335,000	
Oil Drum/Stand/Solenoid; 55 gal	5	each @	2300	11,500	
Wellhead Fabrication	5	each @	4200	21,000	
Pump Installation	5	each @	8000	40,000	
<i>550-700 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 11 stage	3	each @	9900	29,700	
Discharge Head; 20"x12" Type F	3	each @	17000	51,000	
Driver; 350HP, 460V, 389 FLA	3	each @	25000	75,000	
Lineshaft Assembly	3	each @	67000	201,000	
Oil Drum/Stand/Solenoid; 55 gal	3	each @	2300	6,900	
Wellhead Fabrication	3	each @	4200	12,600	
Pump Installation	3	each @	8000	24,000	
<i>750-1000 GPM Pump Assembly &amp; Installation:</i>					
Bowl Assembly; 13 stage	8	each @	22250	178,000	
Discharge Head; 25"x12" Type F	8	each @	18600	148,800	
Driver; 500HP, 2300V, 130 FLA	8	each @	30300	242,400	
Lineshaft Assembly	8	each @	136000	1,088,000	
Oil Drum/Stand/Solenoid; 55 gal	8	each @	2500	20,000	
Wellhead Fabrication	8	each @	5200	41,600	
Pump Installation	8	each @	8500	68,000	
<i>Electrical Equipment &amp; Installation:</i>					
Replacement Motors	3	each @	25000	75,000	
Power Supply & Distribution	24,500	feet @	21	514,500	

**TABLE H.5  
Alternative 5 Estimate of Costs**

Alternative 5: IW Wellfield=4861-1555gpm; FFS Wellfield= 5450-900gpm; SC Wellfield=1600-100gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Transformer Sets; 750 KVA	8	each @	37500	300,000	
Transformer Sets; 500 kVA	8	each @	25000	200,000	
Wellhead Instrumentation	16	each @	11500	184,000	
Telemetry/Data Acquisition	16	each @	6500	104,000	
Sound Reduction Enclosure	16	each @	5000	80,000	
Wellhead Electrical w/ soft starts	16	each @	52000	832,000	
<i>Effluent Piping &amp; Installation:</i>					
8 inch HDPE, SDR-13.5	7,000	feet @	19.23	134,610	
12 inch HDPE, SDR-13.5	7,500	feet @	32.98	247,350	
16 inch HDPE, SDR-13.5	2,000	feet @	47.53	95,060	
18 inch HDPE, SDR-13.5	3,700	feet @	57.39	212,343	
20 inch HDPE, SDR-13.5	2,000	feet @	67.94	135,880	
22 inch HDPE, SDR-13.5	2,300	feet @	79.71	183,333	
24 inch HDPE, SDR-13.5	3,900	feet @	92.25	359,775	
26 inch HDPE, SDR-13.5	1,000	feet @	106.61	106,610	
36 inch HDPE, SDR-13.5	23,500	feet @	189.34	4,449,490	
52,900 8 inch HDPE, SDR-11 (distribution)	800	feet @	20.97	16,776	
Trenching and Backfilling	27,600	feet @	5	138,000	
Shipping				38,000	
<i>Miscellaneous:</i>					
IW Pump Station Upgrades				250,000	
Header Tie-Ins	8	each @	8800	70,400	
Distribution Piping Tie-Ins	16	each @	1650	26,400	
Air Relief Valves	63	each @	1200	75,600	
Drill Site Pads	28	each @	4850	135,800	
Access Roads	3.5	miles @	5625	19,688	
Pipeline Road Crossing	7	each @	9500	66,500	
Construction Management	1,670	hours @	75	125,250	
Project Management	663	hours @	140	92,820	
Operation & Maintenance Manual				7,500	
As-Built Documentation				40,000	
				<u>19,583,311</u>	\$ 19,583,311
<b>Annual Operation &amp; Maintenance (Years 2010-2030):</b>					
	<u>base rate</u>		<u>factor</u>		
Labor	114,000	factor @	0.76	86,640	
Supplies	35,000	factor @	0.76	26,600	
Electrical Power (excluding IW)	39,700,000	Kw hours @	0.07	2,779,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	6,200,000	Kw hours @	0.07	434,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-10552	-3,378,399	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>91,481</u>	\$ 91,481
<b>Annual Repair/Replacement (Years 2010-2030):</b>					
Labor/Materials/Equipment	210,000	factor @	1.81	380,100	
Pipeline/Headers	75,000	factor @	1.81	135,750	
Well/Pump/Motor	325,000	factor @	1.81	588,250	
Replacement Materials/Instruments	97,000	factor @	1.81	175,570	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>1,284,670</u>	\$ 1,284,670

**TABLE H.5  
Alternative 5 Estimate of Costs**

Alternative 5: IW Wellfield=4861-1555gpm; FFS Wellfield= 5450-900gpm; SC Wellfield=1600-100gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
<b>Annual Operation &amp; Maintenance (Years 2031-2042):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.67	76,380	
Supplies	35,000	factor @	0.67	23,450	
Electrical Power (excluding IW)	28,500,000	Kw hours @	0.07	1,995,000	
IW Electrical Power (w/ IW pump station)	10,530,000	Kw hours @	0	0	
Additional IW Pumping Station Electrical Power	4,200,000	Kw hours @	0.07	294,000	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0	0	
Canoa Ranch Water Use Savings (2007)	3,842,000		-7596	-2,431,986	
Groundwater Monitoring				50,000	
Hydrologic Consultant				85,000	
				<u>100,484</u>	\$ 100,484
<b>Annual Repair/Replacement (Years 2031-2042):</b>					
Labor/Materials/Equipment	210,000	factor @	1.3	273,000	
Pipeline/Headers	75,000	factor @	1.3	97,500	
Well/Pump/Motor	325,000	factor @	1.3	422,500	
Replacement Materials/Instruments	97,000	factor @	1.3	126,100	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0	0	
Shipping				5,000	
				<u>924,100</u>	\$924,100
<b>Annual Operation &amp; Maintenance (Years 2043-2058):</b>					
	<i>base rate</i>		<i>factor</i>		
Labor	114,000	factor @	0.24	27,360	
Supplies	35,000	factor @	0.24	8,400	
Electrical Power (excluding IW)	3,700,000	Kw hours @	0.07	259,000	
IW Electrical Power (w/ IW pump station)	2,700,000	Kw hours @	0.07	189,000	
Additional IW Pumping Station Electrical Power	0	Kw hours @	0.07	0	
Service Vehicle	12	months	720	8,640	
Inter. Well Field O&M (2006)	149,000	factor @	0.81	120,690	
Groundwater Monitoring				50,000	
FICO Water Cost				150,000	
ADWR Water Fees	3.00	/AF	4122	12,365	
ADWR WQARF fee	2.12	/AF	4122	8,738	
Hydrologic Consultant				85,000	
				<u>919,192</u>	\$ 919,192
<b>Annual Repair/Replacement (Years 2043-2058):</b>					
Labor/Materials/Equipment	210,000	factor @	0.17	35,700	
Pipeline/Headers	75,000	factor @	0.17	12,750	
Well/Pump/Motor	325,000	factor @	0.17	55,250	
Replacement Materials/Instruments	97,000	factor @	0.17	16,490	
Inter. Well Field Repair/Replacement (2006)	707,000	factor @	0.26	183,820	
Shipping				5,000	
				<u>309,010</u>	\$309,010
<b>Water Treatment Construction (Year 2042):</b>					
Pilot Scale Testing				0	
Telemetry to Mine Operations				0	

**TABLE H.5  
Alternative 5 Estimate of Costs**

Alternative 5: IW Wellfield=4861-1555gpm; FFS Wellfield= 5450-900gpm; SC Wellfield=1600-100gpm; PS Wellfield=2300-0gpm; MC Wellfield=1500-0gpm

	Quantity	Unit	Unit Cost	Extended Cost	Subtotal
Power Supply & Distribution	10,600	feet @	21	0	
RO Treatment System (2555 gpm)	10,176,000	/2000 gpm	0	0	\$0
				0	
<b>Water Treatment Annual O&amp;M (Years 2043-2058):</b>					
RO Treatment System (2555 gpm)	1.34	/1000 gals	0	0	\$0
				0	

Alternative 5:	Initial Pre-Construction Cost:	\$ 1,016,900
	Initial Construction Capital Costs:	\$ 19,583,311
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2010-2030 ):	\$ 1,376,151
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2031-2042 ):	\$ 1,024,584
	Annual Operation, Maintenance, Repair, Replacement Costs ( years 2043-2058 ):	\$ 1,228,202
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2058 ):	\$ 81,445,631
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2009-2042 ):	\$ 61,794,397
	Total Pre-Construction, Capital, O&M, Repair, Replacement Costs ( years 2043-2058 ):	\$ 19,651,234
	Extraction System Costs ( years 2043-2058 ):	\$ 19,651,234
	<b>Groundwater Extraction System 50 Year Net Present Value =</b>	<b>\$ 42,595,514</b>
	<b>Total 50 Year Net Present Value =</b>	<b>\$ 42,595,514</b>

Assumptions:

- 1) IW pump station will require upgrades for total flow (assumes 3-300hp)
- 2) O&M based on IW costs for 2006 proportional to 21 wells
- 3) Repair/Replacement based on IW costs for 2006 proportional to 6000gpm
- 4) Net Present Value is calculated over 50 years assuming a 7.8 percent discount rate minus a 2.4 percent escalation rate
- 5) Canoa Ranch water use off-set proportional to total 2007 well field O&M costs
- 6) Base Kw-hrs for IW pump station assumed at 3,800,000 at 6000gpm
- 7) 36" line from west of Esperanza junction to IW pump station
- 8) All capital equipment sized for maximum flow rate
- 9) Flows @ years 2010-2030 = IW-4861gpm; FFS-5450gpm; SC-1600gpm; PS-2300gpm; MC-1500gpm
- 10) Flows @ years 2031-2042 = IW-4861gpm; FFS-4900gpm; SC-1200gpm; PS-1700gpm; MC-0gpm
- 11) Flows @ years 2043-2058 = IW-1555gpm; FFS-900gpm; SC-100gpm; PS-0gpm; MS-0gpm
- 12) Canoa Ranch Well Field saving based on time period weighted-average flow, excluding IW

Abbreviations:

- ROW- right of way
- CAD-computer aided drafting
- HP-horse power
- gals-gallons
- V-volts
- FLA-full load amps
- A-amps
- kVA- kilo volt amps
- HDPE-high density polyethylene
- SDR-size dimension ratio
- IW- interceptor well field
- O&M- operation and maintenance
- gpm-gallons per minute
- Kw-kilo watts
- FICO-Farmers Investment \Co.
- WQARF-Water Quality Assurance Revolving Fund
- ADWR-Arizona Dept of Water Resources
- AF-acre-feet
- RO-reverse osmosis

**TABLE H.6**  
**Summary of 2006 Interceptor Wellfield Operation and Maintenance Cost**

Total Labor-	\$114,052
Operating Supplies-	\$34,821
<b>Total Operating Labor &amp; Supplies-</b>	<b>\$148,873</b>
Repair/Replace Equipment, Materials, Instruments-	\$97,357
Well & Pump Repair/ Replacement-	\$325,447
Additional Fabrication-	\$75,039
M&R Labor and Equipment-	\$209,822
<b>Total Materials, Equipment, Labor Repair/Replacement-</b>	<b>\$707,664</b>
Electrical Power-	\$727,361
Hydrogeologic Consulting-	\$56,110
<b>TOTAL-</b>	<b>\$1,640,008</b>

Notes:

*Basis = 21 wells*