RECLAMATION

Managing Water in the West

San Luis Drainage Feature Re-evaluation

Feasibility Report

Appendix I

Computer Modeling for Northerly Area Evaporation Basin

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

November 2007

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

San Luis Drainage Feature Re-evaluation

Feasibility Report

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Computer Modeling for Northerly Area Evaporation Basin

H-1 No Seepage

H-2 Leakage ≈ 1 ft/yr and 90 percent collection

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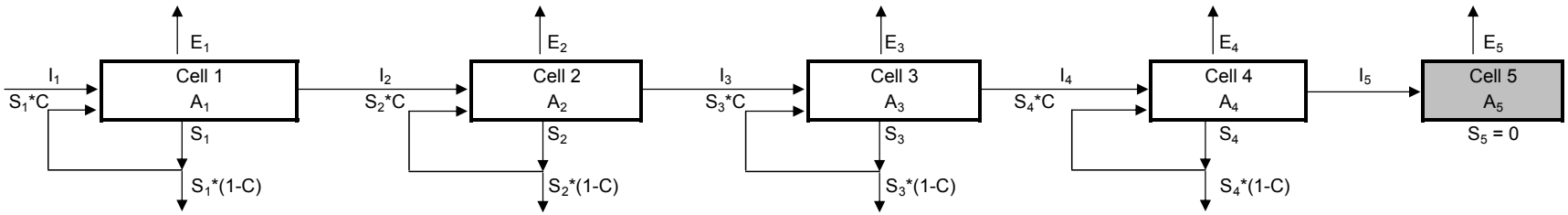
Computer Modeling for Northerly Area Evaporation Basin

I-1 No Seepage

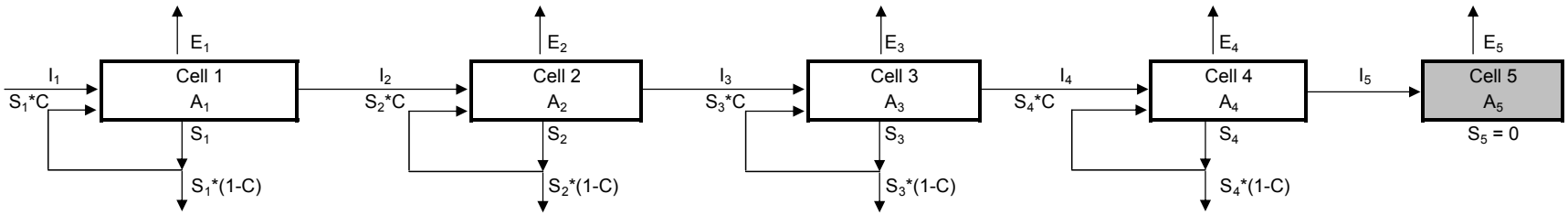


Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

USER INPUTS: (In Yellow)

Annual evaporation rate:		E_v =	4.3	ft/yr		
					Conversion	
					1 mg/l =	2.719 lbs/af
Leakage rate			0.00E+00	cm/s		
Leakage rate:		L =	0.00E+00	ft/day	=	0.000 ft/yr
Collection factor:		C =	1			
Inflow to pond system:		I_1 =	4758	af/yr		
Brine factors:					Calc Brine Factors	
	Cell 1	B_{f1} =	0.9771		0.9771	
	Cell 2	B_{f2} =	0.9580		0.9580	
	Cell 3	B_{f3} =	0.9082		0.9082	
	Cell 4	B_{f4} =	0.7790		0.7790	
	Cell 5	B_{f5} =	0.6000			
Cell #5 (terminus) salt density:			105.00	lbs/ft3		
Terminus cell maximum salt depth:			5.5	ft		
Salinity of feed water:			12,421	mg/l	33,777.22 lbs/af	
Number years to fill up terminus cell:			12.5	years		
Number of terminus cells:		T =	4			
Project life:			50	years		
Ending salt storage in cell 5:			2.01E+09	lbs		
Ending salt storage in cell 5:			439.22	af		
Terminus cell size:			79.86	acres		



Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

SYSTEM EQUATIONS:

Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

Evaporation Equations:

$E_1 = A_1 * E_v * B_{f1}$	2746	af
$E_2 = A_2 * E_v * B_{f2}$	1077	af
$E_3 = A_3 * E_v * B_{f3}$	510	af
$E_4 = A_4 * E_v * B_{f4}$	219	af
$E_5 = A_5 * E_v * B_{f5}$	206	af
Total Evaporation =	4758	af

Seepage Equations:

$S_1 = A_1 * L$	0	af
$S_2 = A_2 * L$	0	af
$S_3 = A_3 * L$	0	af
$S_4 = A_4 * L$	0	af
$S_5 = 0$	0	af

Lost Seepage Equations:

Cell 1 = $A_1 * L * (1-C)$	0	af
Cell 2 = $A_2 * L * (1-C)$	0	af
Cell 3 = $A_3 * L * (1-C)$	0	af
Cell 4 = $A_4 * L * (1-C)$	0	af
Cell 5 = 0	0	af
Total Lost Seepage =	0	af
Total System Loss	4758	af

Area Factors:

$A_2 = A_{f2} * A_1$

$A_3 = A_{f3} * A_1$

$A_4 = A_{f4} * A_1$

A_{f2} =	0.4
A_{f3} =	0.2
A_{f4} =	0.1

CALCULATIONS:

Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

Expanded Mass Balance Equation:

$$I_1 = ((A_1*E_v*B_{f1}) + (A_2*E_v*B_{f2}) + (A_3*E_v*B_{f3}) + (A_4*E_v*B_{f4}) + (A_5*E_v*B_{f5})) + ((A_1*L) + (A_2*L) + (A_3*L) + (A_4*L))*(1-C)$$

Substituting Area Equations:

$$I_1 = ((A_1*E_v*B_{f1}) + (A_{f2}*A_1*E_v*B_{f2}) + (A_{f3}*A_1*E_v*B_{f3}) + (A_{f4}*A_1*E_v*B_{f4}) + (A_5*E_v*B_{f5})) + ((A_1*L) + (A_{f2}*A_1*L) + (A_{f3}*A_1*L) + (A_{f4}*A_1*L))*(1-C)$$

Solving For A_1:

$$A_1 = (I_1 - (A_5*E_v*B_{f5})) / ((E_v*B_{f1} + A_{f2}*E_v*B_{f2} + A_{f3}*E_v*B_{f3} + A_{f4}*E_v*B_{f4}) + ((L + A_{f2}*L + A_{f3}*L + A_{f4}*L) * (1 - C)))$$

Calulating for A_1

A_1 =	(I_1	- (A_5*Ev*B_{f5}))	/ ((E_v*B_{f1} + A_{f2}*E_v*B_{f2} + A_{f3}*E_v*B_{f3} + A_{f4}*E_v*B_{f4})	+ ((L + A_{f2}*L + A_{f3}*L + A_{f4}*L)	* (1 - C)
A_1 =	4758	-206.03	6.97	0.00	0
A_1 =	653.5	acres			

Calulating for other areas:

A_2 =	A_{f2} * A_1 =	261.4	acres
A_3 =	A_{f3} * A_1 =	130.7	acres
A_4 =	A_{f4} * A_1 =	65.4	acres

Calculating Total Evaporative Area:

A_e =	A_1	+ A_2	+ A_3	+ A_4	+ A_5
A_e =	653.5	261.4	130.7	65.4	79.9

A_e = 1190.8 acres

Calculating Total Required Area:

A_t =	A_1	+ A_2	+ A_3	+ A_4	+ (A_5 * T)
A_t =	653.5	261.4	130.7	65.4	319.4

A_t = 1430.4 acres

SALINITY CALCULATIONS FOR CONCENTRATING CELLS:

Assumed concentrating cell operating depth: D = 7.0 ft

Calculated cell areas (from previous calculations):

A_1 =	653.5	acres
A_2 =	261.4	acres
A_3 =	130.7	acres
A_4 =	65.4	acres
A_5 =	79.9	acres

Conversions

1 acft =	1,233,482	liters
1 ton =	9.07E+08	mg

Calculated concentrating cell volumes (using assumed operating depth):

V_1 =	A_1 * D =	4575	af
V_2 =	A_2 * D =	1830	af
V_3 =	A_3 * D =	915	af
V_4 =	A_4 * D =	457	af

Inter-cell flow calculations:

I_1 =	user input =	4758	af
I_2 =	I_1 - E_1 - S_1 * (1-C) =	2012	af
I_3 =	I_2 - E_2 - S_2 * (1-C) =	935	af
I_4 =	I_3 - E_3 - S_3 * (1-C) =	425	af
I_5 =	I_4 - E_4 - S_4 * (1-C) =	206	af

Iterative approach to finding steady state salinity in concentrating cells:

- assume each pond is initially filled to operating depth with RO reject water (iteration 0)

- total salt in a given cell for each iteration is equal to:

  + total salt in cell from previous iteration
  + salt inflow from previous cell (volume of inflow * salinity of previous cell)
  - salt outflow to next cell (volume of outflow * cell salinity)
  - salt lost to seepage

- cell salinity equals total salt in cell divided by assumed volume of cell

- salt lost per year to seepage (per cell) equals volume of water lost to seepage multiplied by cell salinity

	Cell Salinity (mg/l)				Total Salt in Cell (mg)				Salt Lost Per Year from Seepage (mg)				
Iteration	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1	Cell 2	Cell 3	Cell 4	Total
0	12,421	12,421	12,421	12,421	7.01E+13	2.80E+13	1.40E+13	7.01E+12	0	0	0	0	0
1	19,876	19,731	19,351	18,365	1.12E+14	4.45E+13	2.18E+13	1.04E+13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	24,052	31,502	30,535	28,069	1.36E+14	7.11E+13	3.45E+13	1.58E+13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	26,391	41,848	48,559	43,791	1.49E+14	9.45E+13	5.48E+13	2.47E+13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
98	29,370	63,182	139,075	286,842	1.66E+14	1.43E+14	1.57E+14	1.62E+14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
99	29,370	63,182	139,075	286,842	1.66E+14	1.43E+14	1.57E+14	1.62E+14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
100	29,370	63,182	139,075	286,842	1.66E+14	1.43E+14	1.57E+14	1.62E+14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

STEADY STATE CONCENTRATING CELL CONDITIONS:

	TDS	SG	B_f
Cell 1	29,370	1.032	0.9771
Cell 2	63,182	1.050	0.9580
Cell 3	139,075	1.094	0.9082
Cell 4	286,842	1.193	0.7790

Annual salt loss due to seepage:

Cell 1	0	tons
Cell 2	0	tons
Cell 3	0	tons
Cell 4	0	tons
Total	0	tons

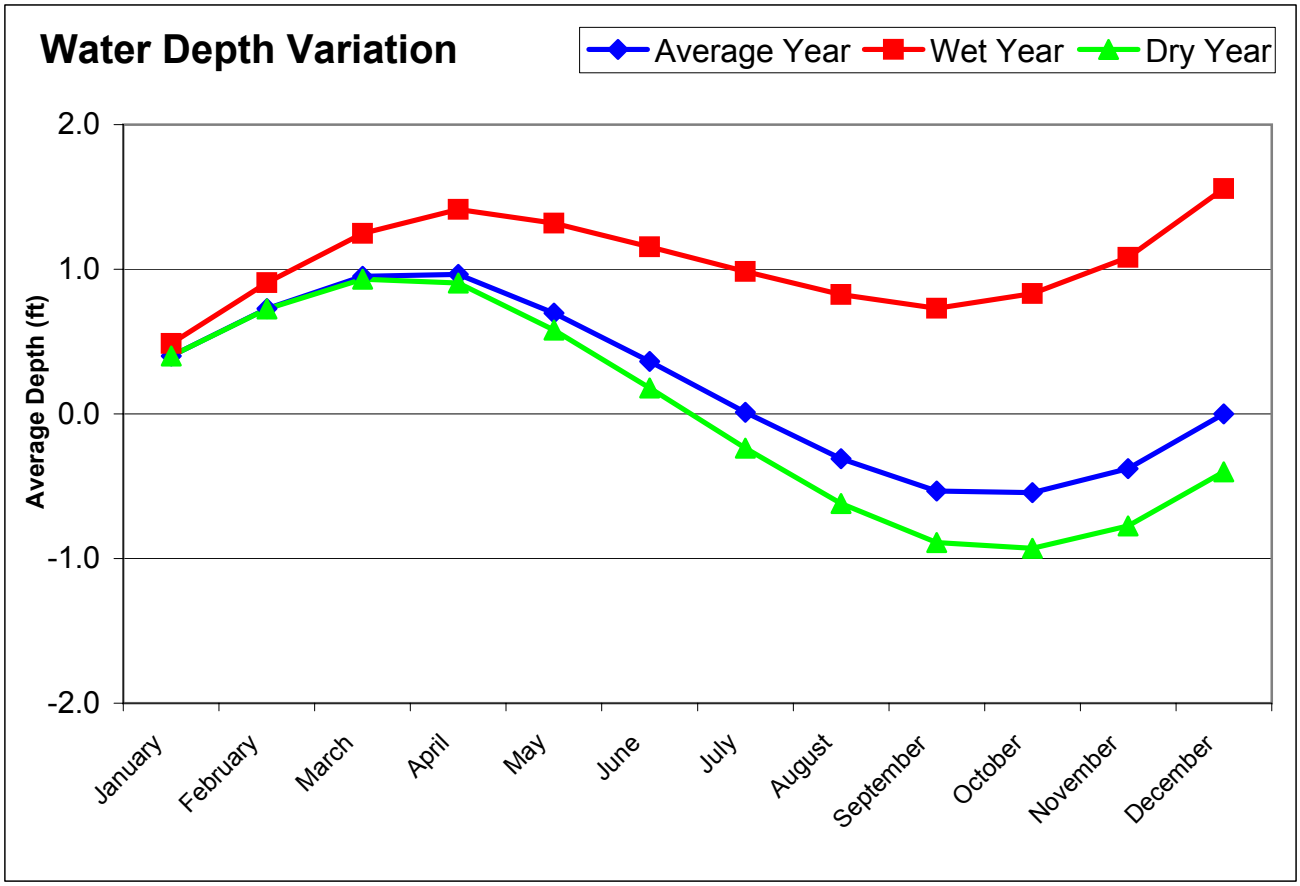
MONTHLY CELL DEPTH VARIATION CALCULATIONS:

Average Yearly Flow:	4758	af/yr
Average Yearly Seepage:	0	af/yr
Average Yearly Evaporation:	4758	af/yr
Total Evaporative Area:	1190.8	ac

AVERAGE YEAR FLOW CONDITIONS:

Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.3%	-13.7	0.0	9.7%	462.6	0.40
February	1.1%	51.9	0.0	9.3%	442.6	0.73
March	4.1%	197.2	0.0	9.7%	463.4	0.95
April	9.7%	461.2	0.0	10.0%	476.4	0.96
May	14.9%	708.4	0.0	8.2%	391.0	0.70
June	16.0%	763.4	0.0	7.6%	363.9	0.36
July	16.7%	795.1	0.0	7.9%	377.5	0.01
August	15.2%	722.4	0.0	7.1%	339.4	-0.31
September	11.5%	546.1	0.0	5.9%	280.1	-0.53
October	7.4%	354.1	0.0	7.2%	341.0	-0.54
November	2.9%	138.2	0.0	7.1%	335.9	-0.38
December	0.7%	33.6	0.0	10.2%	484.0	0.00
Total	100.0%	4758.0	0.0	100.0%	4758.0	

Lowest point below average depth:	-0.54	ft
Highest point above average depth:	0.96	ft
Annual gain/loss in aveage depth:	0.00	ft



WET YEAR FLOW CONDITIONS:

Wet year evaporation (compared to average year):	84%
Wet year flow (compared to average year):	123%

Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.2%	-11.5	0.0	12.0%	569.0	0.49
February	0.9%	43.6	0.0	11.4%	544.5	0.91
March	3.5%	165.7	0.0	12.0%	570.0	1.25
April	8.1%	387.4	0.0	12.3%	586.0	1.41
May	12.5%	595.1	0.0	10.1%	481.0	1.32
June	13.5%	641.2	0.0	9.4%	447.6	1.16
July	14.0%	667.8	0.0	9.8%	464.4	0.99
August	12.8%	606.8	0.0	8.8%	417.5	0.83
September	9.6%	458.7	0.0	7.2%	344.5	0.73
October	6.3%	297.4	0.0	8.8%	419.5	0.83
November	2.4%	116.1	0.0	8.7%	413.2	1.08
December	0.6%	28.2	0.0	12.5%	595.3	1.56
Total	84.0%	3996.7	0.0	123.0%	5852.3	

Lowest point below average depth:	0.49	ft
Highest point above average depth:	1.56	ft
Annual gain/loss in aveage depth:	1.56	ft

DRY YEAR FLOW CONDITIONS:

Dry year evaporation (compared to average year):	110%
Dry year flow (compared to average year):	100%

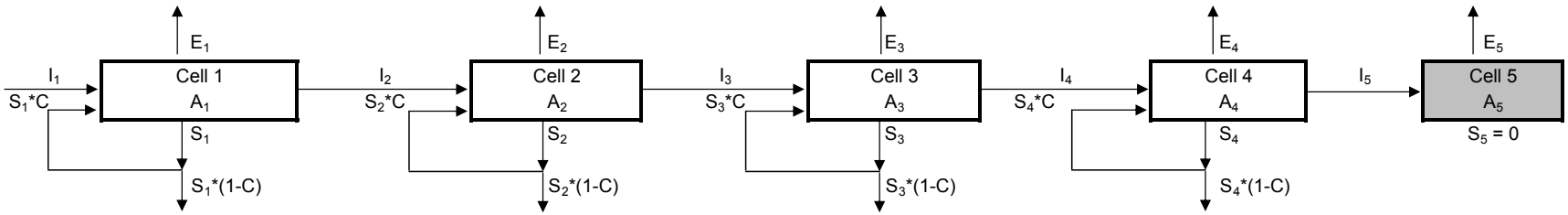
Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.3%	-15.1	0.0	9.7%	462.6	0.40
February	1.2%	57.1	0.0	9.3%	442.6	0.72
March	4.6%	216.9	0.0	9.7%	463.4	0.93
April	10.7%	507.3	0.0	10.0%	476.4	0.91
May	16.4%	779.3	0.0	8.2%	391.0	0.58
June	17.6%	839.7	0.0	7.6%	363.9	0.18
July	18.4%	874.6	0.0	7.9%	377.5	-0.24
August	16.7%	794.7	0.0	7.1%	339.4	-0.62
September	12.6%	600.7	0.0	5.9%	280.1	-0.89
October	8.2%	389.5	0.0	7.2%	341.0	-0.93
November	3.2%	152.1	0.0	7.1%	335.9	-0.77
December	0.8%	37.0	0.0	10.2%	484.0	-0.40
	110.0%	5233.8	0.0	100.0%	4758.0	

Lowest point below average depth:	-0.93	ft
Highest point above average depth:	0.93	ft
Annual gain/loss in aveage depth:	-0.40	ft

Appendix I

Computer Modeling for Northerly Area Evaporation Basin

I-2 Leakage ≈ 1 ft/yr and 90 percent collection)

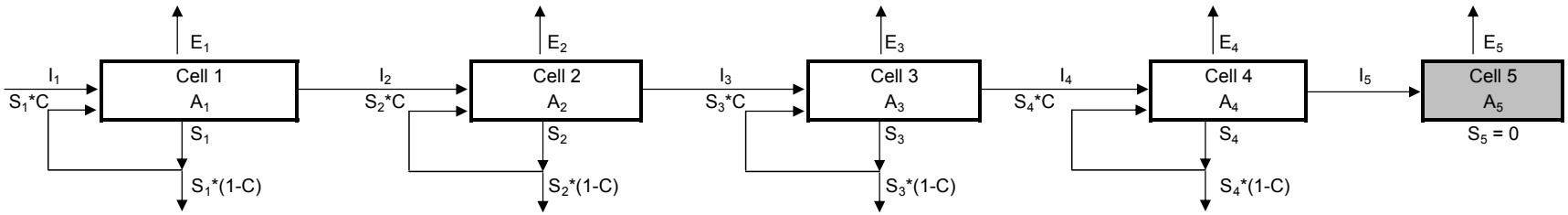


Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

USER INPUTS: (In Yellow)

Annual evaporation rate:		E_v =	4.3	ft/yr		
					Conversion	
					1 mg/l =	2.719 lbs/af
Leakage rate			1.00E-06	cm/s		
Leakage rate:		L =	2.83E-03	ft/day	= 1.035	ft/yr
Collection factor:		C =	0.9			
Inflow to pond system:		I_1 =	4758	af/yr		
Brine factors:					Calc Brine Factors	
	Cell 1	B_{f1} =	0.9777		0.9777	
	Cell 2	B_{f2} =	0.9606		0.9606	
	Cell 3	B_{f3} =	0.9186		0.9186	
	Cell 4	B_{f4} =	0.8116		0.8116	
	Cell 5	B_{f5} =	0.6000			
Cell #5 (terminus) salt density:			105.00	lbs/ft3		
Terminus cell maximum salt depth:			5.5	ft		
Salinity of feed water:			12,421	mg/l	33,777.22	lbs/af
Number years to fill up terminus cell:			12.5	years		
Number of terminus cells:		T =	4			
Project life:			50	years		
Ending salt storage in cell 5:			2.01E+09	lbs		
Ending salt storage in cell 5:			439.22	af		
Terminus cell size:			79.86	acres		



Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

SYSTEM EQUATIONS:

Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

Evaporation Equations:

$E_1 = A_1 * E_v * B_{f1}$	2669	af
$E_2 = A_2 * E_v * B_{f2}$	1049	af
$E_3 = A_3 * E_v * B_{f3}$	501	af
$E_4 = A_4 * E_v * B_{f4}$	222	af
$E_5 = A_5 * E_v * B_{f5}$	206	af
Total Evaporation =	4646	af

Seepage Equations:

$S_1 = A_1 * L$	657	af
$S_2 = A_2 * L$	263	af
$S_3 = A_3 * L$	131	af
$S_4 = A_4 * L$	66	af
$S_5 = 0$	0	af

Lost Seepage Equations:

Cell 1 = $A_1 * L * (1-C)$	66	af
Cell 2 = $A_2 * L * (1-C)$	26	af
Cell 3 = $A_3 * L * (1-C)$	13	af
Cell 4 = $A_4 * L * (1-C)$	7	af
Cell 5 = 0	0	af
Total Lost Seepage =	112	af
Total System Loss	4758	af

Area Factors:

$A_2 = A_{f2} * A_1$

$A_3 = A_{f3} * A_1$

$A_4 = A_{f4} * A_1$

A_{f2} =	0.4
A_{f3} =	0.2
A_{f4} =	0.1

CALCULATIONS:

Mass Balance Equation:

$$I_1 = (E_1 + E_2 + E_3 + E_4 + E_5) + (S_1 + S_2 + S_3 + S_4)*(1-C)$$

Expanded Mass Balance Equation:

$$I_1 = ((A_1*E_v*B_{f1}) + (A_2*E_v*B_{f2}) + (A_3*E_v*B_{f3}) + (A_4*E_v*B_{f4}) + (A_5*E_v*B_{f5})) + ((A_1*L) + (A_2*L) + (A_3*L) + (A_4*L))*(1-C)$$

Substituting Area Equations:

$$I_1 = ((A_1*E_v*B_{f1}) + (A_{f2}*A_1*E_v*B_{f2}) + (A_{f3}*A_1*E_v*B_{f3}) + (A_{f4}*A_1*E_v*B_{f4}) + (A_5*E_v*B_{f5})) + ((A_1*L) + (A_{f2}*A_1*L) + (A_{f3}*A_1*L) + (A_{f4}*A_1*L))*(1-C)$$

Solving For A_1:

$$A_1 = (I_1 - (A_5*E_v*B_{f5})) / ((E_v*B_{f1} + A_{f2}*E_v*B_{f2} + A_{f3}*E_v*B_{f3} + A_{f4}*E_v*B_{f4}) + ((L + A_{f2}*L + A_{f3}*L + A_{f4}*L) * (1 - C)))$$

Calulating for A_1

A_1 =	(I_1	- (A_5*Ev*B_{f5}))	/ ((E_v*B_{f1} + A_{f2}*E_v*B_{f2} + A_{f3}*E_v*B_{f3} + A_{f4}*E_v*B_{f4})	+ ((L + A_{f2}*L + A_{f3}*L + A_{f4}*L)	* (1 - C)
A_1 =	4758	-206.03	7.00	1.76	0.1
A_1 =	634.8	acres			

Calulating for other areas:

A_2 =	A_{f2} * A_1 =	253.9	acres
A_3 =	A_{f3} * A_1 =	127.0	acres
A_4 =	A_{f4} * A_1 =	63.5	acres

Calculating Total Evaporative Area:

A_e =	A_1	+ A_2	+ A_3	+ A_4	+ A_5
A_e =	634.8	253.9	127.0	63.5	79.9

A_e =	1158.9	acres

Calculating Total Required Area:

A_t =	A_1	+ A_2	+ A_3	+ A_4	+ (A_5 * T)
A_t =	634.8	253.9	127.0	63.5	319.4

A_t =	1398.5	acres

SALINITY CALCULATIONS FOR CONCENTRATING CELLS:

Assumed concentrating cell operating depth: D = 7.0 ft

Calculated cell areas (from previous calculations):

A_1 =	634.8	acres
A_2 =	253.9	acres
A_3 =	127.0	acres
A_4 =	63.5	acres
A_5 =	79.9	acres

Conversions

1 acft	=	1,233,482	liters
1 ton	=	9.07E+08	mg

Calculated concentrating cell volumes (using assumed operating depth):

V_1 =	A_1 * D =	4443	af
V_2 =	A_2 * D =	1777	af
V_3 =	A_3 * D =	889	af
V_4 =	A_4 * D =	444	af

Inter-cell flow calculations:

I_1 =	user input =	4758	af
I_2 =	I_1 - E_1 - S_1 * (1-C) =	2024	af
I_3 =	I_2 - E_2 - S_2 * (1-C) =	949	af
I_4 =	I_3 - E_3 - S_3 * (1-C) =	434	af
I_5 =	I_4 - E_4 - S_4 * (1-C) =	206	af

Iterative approach to finding steady state salinity in concentrating cells:

- assume each pond is initially filled to operating depth with RO reject water (iteration 0)

- total salt in a given cell for each iteration is equal to:

  + total salt in cell from previous iteration
  + salt inflow from previous cell (volume of inflow * salinity of previous cell)
  - salt outflow to next cell (volume of outflow * cell salinity)
  - salt lost to seepage

- cell salinity equals total salt in cell divided by assumed volume of cell

- salt lost per year to seepage (per cell) equals volume of water lost to seepage multiplied by cell salinity

	Cell Salinity (mg/l)				Total Salt in Cell (mg)				Salt Lost Per Year from Seepage (mg)				
Iteration	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1	Cell 2	Cell 3	Cell 4	Cell 1	Cell 2	Cell 3	Cell 4	Total
0	12,421	12,421	12,421	12,421	6.81E+13	2.72E+13	1.36E+13	6.81E+12	0	0	0	0	0
1	19,881	19,750	19,430	18,614	1.09E+14	4.33E+13	2.13E+13	1.02E+13	1.01E+12	4.02E+11	2.01E+11	1.01E+11	1.71E+12
2	23,833	31,553	30,736	28,691	1.31E+14	6.92E+13	3.37E+13	1.57E+13	1.61E+12	6.40E+11	3.15E+11	1.51E+11	2.72E+12
3	25,926	41,381	48,952	44,993	1.42E+14	9.07E+13	5.37E+13	2.47E+13	1.93E+12	1.02E+12	4.98E+11	2.32E+11	3.68E+12
98	28,285	58,710	124,535	254,295	1.55E+14	1.29E+14	1.37E+14	1.39E+14	2.29E+12	1.90E+12	2.02E+12	2.06E+12	8.27E+12
99	28,285	58,710	124,535	254,295	1.55E+14	1.29E+14	1.37E+14	1.39E+14	2.29E+12	1.90E+12	2.02E+12	2.06E+12	8.27E+12
100	28,285	58,710	124,535	254,295	1.55E+14	1.29E+14	1.37E+14	1.39E+14	2.29E+12	1.90E+12	2.02E+12	2.06E+12	8.27E+12

STEADY STATE CONCENTRATING CELL CONDITIONS:

	TDS	SG	B_f
Cell 1	28,285	1.031	0.9777
Cell 2	58,710	1.048	0.9606
Cell 3	124,535	1.085	0.9186
Cell 4	254,295	1.170	0.8116

Annual salt loss due to seepage:

Cell 1	2,526	tons
Cell 2	2,097	tons
Cell 3	2,224	tons
Cell 4	2,271	tons
Total	9,118	tons

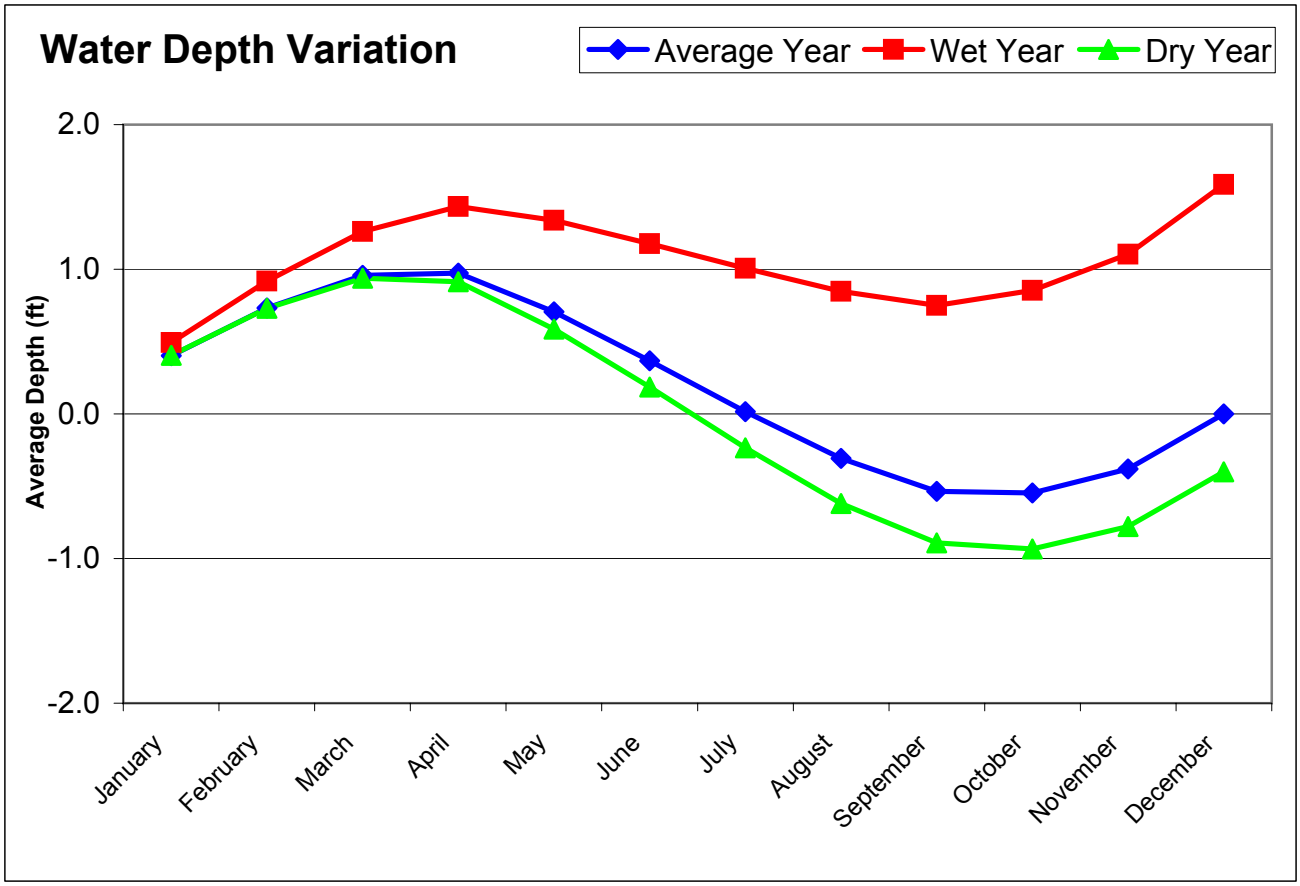
MONTHLY CELL DEPTH VARIATION CALCULATIONS:

Average Yearly Flow:	4758	af/yr
Average Yearly Seepage:	112	af/yr
Average Yearly Evaporation:	4646	af/yr
Total Evaporative Area:	1158.9	ac

AVERAGE YEAR FLOW CONDITIONS:

Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.3%	-13.4	9.3	9.7%	462.6	0.40
February	1.1%	50.7	9.3	9.3%	442.6	0.73
March	4.1%	192.6	9.3	9.7%	463.4	0.96
April	9.7%	450.4	9.3	10.0%	476.4	0.97
May	14.9%	691.8	9.3	8.2%	391.0	0.71
June	16.0%	745.5	9.3	7.6%	363.9	0.37
July	16.7%	776.4	9.3	7.9%	377.5	0.02
August	15.2%	705.5	9.3	7.1%	339.4	-0.31
September	11.5%	533.3	9.3	5.9%	280.1	-0.53
October	7.4%	345.8	9.3	7.2%	341.0	-0.55
November	2.9%	135.0	9.3	7.1%	335.9	-0.38
December	0.7%	32.8	9.3	10.2%	484.0	0.00
Total	100.0%	4646.4	111.6	100.0%	4758.0	

Lowest point below average depth:	-0.55	ft
Highest point above average depth:	0.97	ft
Annual gain/loss in aveage depth:	0.00	ft



WET YEAR FLOW CONDITIONS:

Wet year evaporation (compared to average year):	84%
Wet year flow (compared to average year):	123%

Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.2%	-11.3	9.3	12.0%	569.0	0.49
February	0.9%	42.6	9.3	11.4%	544.5	0.92
March	3.5%	161.8	9.3	12.0%	570.0	1.26
April	8.1%	378.3	9.3	12.3%	586.0	1.43
May	12.5%	581.1	9.3	10.1%	481.0	1.34
June	13.5%	626.2	9.3	9.4%	447.6	1.18
July	14.0%	652.2	9.3	9.8%	464.4	1.01
August	12.8%	592.6	9.3	8.8%	417.5	0.85
September	9.6%	448.0	9.3	7.2%	344.5	0.75
October	6.3%	290.5	9.3	8.8%	419.5	0.85
November	2.4%	113.4	9.3	8.7%	413.2	1.10
December	0.6%	27.6	9.3	12.5%	595.3	1.59
Total	84.0%	3902.9	111.6	123.0%	5852.3	

Lowest point below average depth:	0.49	ft
Highest point above average depth:	1.59	ft
Annual gain/loss in aveage depth:	1.59	ft

DRY YEAR FLOW CONDITIONS:

Dry year evaporation (compared to average year):	110%
Dry year flow (compared to average year):	100%

Month	% Yearly Evap	Evap (af)	Seepage (af)	% Yearly Flow	Flow (af)	+/- Avg (ft)
January	-0.3%	-14.7	9.3	9.7%	462.6	0.40
February	1.2%	55.8	9.3	9.3%	442.6	0.73
March	4.6%	211.9	9.3	9.7%	463.4	0.94
April	10.7%	495.4	9.3	10.0%	476.4	0.91
May	16.4%	761.0	9.3	8.2%	391.0	0.59
June	17.6%	820.0	9.3	7.6%	363.9	0.19
July	18.4%	854.0	9.3	7.9%	377.5	-0.23
August	16.7%	776.0	9.3	7.1%	339.4	-0.62
September	12.6%	586.6	9.3	5.9%	280.1	-0.89
October	8.2%	380.4	9.3	7.2%	341.0	-0.93
November	3.2%	148.5	9.3	7.1%	335.9	-0.78
December	0.8%	36.1	9.3	10.2%	484.0	-0.40
	110.0%	5111.0	111.6	100.0%	4758.0	

Lowest point below average depth:	-0.93	ft
Highest point above average depth:	0.94	ft
Annual gain/loss in aveage depth:	-0.40	ft