

Option 1 & Option 5
PRELIMINARY
KIF Wet Ash in Pond & Gypsum on Peninsula (Wet ash in Dredge Cell/Ph1, and Phase 2. Phase 3 not constructed. Gypsum on Peninsula)

ITEM	DESCRIPTION	UNITS	QUANTITY	T-1 Spec	Comments/Assumptions
1.000	Erosion Controls/Sediment Pond				
1.010	Erect silt fence	lf	1000	571	Place at NE Corner of Dredge Cell
1.020					
1.030	Geotextile Erosion Protection Channel	sy	4300		Non woven
1.040	D50 9" Riprap	ton	5215		18" Riprap Layer Stage A & B
1.050	3" stone, 1' thick to prevent erosion (assume 105 pcf)	ton	2004		Erosion protection channel for Gypsum
1.060	Stage 1-6 CMP Metal Spillway	ea	4		2 Gypsum ponds @ 2 per pond
1.070	Cut	bcy	43		Excavation for placement of 48" half-pipe
1.080	Fill with 1032 crushed stone	ton	93		Compacted until a stable base is achieved.
1.090	1/2 of 48" riser stand pipe	lf	512		Fully bituminous coated & 14 gage thickness
1.100	30" dia CMP	lf	1000		Fully bituminous coated & 14 gage thickness
1.110	Bedding for 30" CMP	ton	135		6" Thick up to half pipe dia.
1.120	30" dia CMP stand pipe	lf	720		4 pipes at 6 stages with 30' per stage
1.130	D50 9" riprap outlet for metal spillway	ton	53		Minimum
1.140	Galvanized corrugated metal anti-seep collar	ea	16		Min. 2 per dike
2.000	Seed/Mulch				
2.001	Seed/Mulch disturbed areas	ac	26		5600 ft x 200 ft (wide swale between toe of new earthen dike and existing dike)
3.000	South Access Road (gravel)				assume existing road upgrade
3.010	1032 crushed stone base 6" depth	ton	3520	305	Assume 1.5 miles of roadway (8000 lf); road is 16 ft wide
4.000	Perimeter Road				
4.010	1032 crushed stone	ton	6885		Add 6" crushed stone base & compact
4.020	Roller compact	sy	22667		
5.000	Install Drains for Swan Pond Road				Incorporate in Dredge Cell Cost
5.001	6" dia Pipe Bollards	ea	24		Four for each monitoring well
5.002	PVC Monitoring Wells	ea	6		Outer steel casing w/ latch & padlock concrete pad
5.003	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 772)	lf	474		
5.004	Crushed stone, bedding 6" depth	ton	16		1081
5.005	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 780)	lf	520		
5.006	Crushed stone, bedding 6" depth	ton	18		1081
5.007	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 792)	lf	491		

5.008	Crushed stone, bedding 6" depth	ton	17	1081	
5.009	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 810)	lf	1282		
5.010	Crushed stone, bedding 6" depth	ton	43	1081	
5.011	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 817)	lf	1218		
5.012	Crushed stone, bedding 6" depth	ton	41	1081	
5.013	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 825)	lf	1180		
5.014	Crushed stone, bedding 6" depth	ton	40	1081	
5.015	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 832)	lf	1160		
5.016	Crushed stone, bedding 6" depth	ton	39	1081	
5.017	Cut For 6" dia Non-Perforated HDPE	bcy	17658	El. 763, 772, 780, 792, 810, 817, 825, 832	
5.018	Backfill for 6" dia Non-Perforated HDPE	bcy	12361	El. 763, 772, 780, 792, 810, 817, 825, 832	
5.019	Cut For 6" dia Perforated HDPE	bcy	18186	El. 763, 772, 780, 792, 810, 817, 825, 832	
5.020	Backfill for 6" dia Perforated HDPE	bcy	12730	El. 763, 772, 780, 792, 810, 817, 825, 832	
5.021	6" dia Perforated HDPE perimeter underdrain (El. 763)	lf	2000		
5.022	1081 crushed stone	ton	378		
5.023	Geotextile woven monofilament	sy	1556	Trench, Mirafi HP 370	
5.024	6" dia Perforated HDPE perimeter underdrain (El. 772)	lf	3790		
5.025	1081 crushed stone	ton	716		
5.026	Geotextile woven monofilament	sy	2948	Trench, Mirafi HP 370	
5.027	6" dia Perforated HDPE perimeter underdrain (El. 780)	lf	4160		
5.028	1081 crushed stone	ton	786		
5.029	Geotextile woven monofilament	sy	3236	Trench, Mirafi HP 370	
5.030	6" dia Perforated HDPE perimeter underdrain (El. 792)	lf	3925		
5.031	1081 crushed stone	ton	742		
5.032	Geotextile woven monofilament	sy	3053	Trench, Mirafi HP 370	
5.033	6" dia Perforated HDPE perimeter underdrain (El. 810)	lf	6410		
5.034	1081 crushed stone	ton	1211		
5.035	Geotextile woven monofilament	sy	4986	Trench, Mirafi HP 370	
5.036	6" dia Perforated HDPE perimeter underdrain (El. 817)	lf	6090		
5.037	1081 crushed stone	ton	1151		
5.038	Geotextile woven monofilament	sy	4737	Trench, Mirafi HP 370	
5.039	6" dia Perforated HDPE perimeter underdrain (El. 825)	lf	5900		
5.040	1081 crushed stone	ton	1115		
5.041	Geotextile woven monofilament	sy	4589	Trench, Mirafi HP 370	
5.042	6" dia Perforated HDPE perimeter underdrain (El. 832)	lf	5800		

5.043	1081 crushed stone	ton	1096		
5.044	Geotextile woven monofilament	sy	4511		Trench, Mirafi HP 370
5.045	12" dia Force Main HDPE perimeter underdrain (El. 763)	lf	2580		
5.046	1081 crushed stone	ton	575		
5.047	Submersible pumping station equipment package	ls	5000		Delivered but not installed
5.048	48' Dia precast concrete manhole	ls	3000		
5.049	Geotextile woven monofilament	sy	2293		Trench, Mirafi HP 370
5.050	Grout seal SD - 24"	cy	54		Mixture of fly ash, cement, bentonite clay
5.051	1/4" thick A36 steel plate	ea	2		Seal weld
5.052	Grout seal SD - 24"	cy	53		Mixture of fly ash, cement, bentonite clay
5.053	1/4" thick A36 steel plate	ea	2		Seal weld
5.054					
5.055	Grout seal SD - 24"	cy	23		Mixture of fly ash, cement, bentonite clay
5.056	1/4" thick A36 steel plate	ea	2		Seal weld
5.057					
5.058	CMP SD - 24"	lf	38		10W425-43
5.059	Excavation for 24"	bcy	21		
5.060	Backfill for 24"	bcy	15		
5.061	Bedding for the 24" culvert	ton	4		
5.062					
5.063	CMP SD - 36"	lf	72		10W425-55
5.064	Excavation for 36"	bcy	67		
5.065	Backfill for 36"	bcy	47		
5.066	Bedding for the 36" culvert	ton	9		
5.067	Anchor Trench	bcy	8650		10W425-69 Excavate into Bottom Ash
5.068	Upper & Lower LLDPE Geomembrane	sy	110688		10W425-69
5.069	Sediment Trap	bcy	3630		For erosion controls intake area during installation of
6.000	Dredge Cell/Phase 1 Operational Cost				
6.001	El. 810 to El. 866				
6.002	Bottom Ash Dike Fill	cy	622416		Dredge Cell/Phase 1 (EL. 810-844 in D.C.)
6.003	Dredge Quantities	cy	4853654		
6.004	Wet Dip and Slack	cy	678848		El. 844 to El. 866 in Dredge Cell
6.005	Disposal Life (Assume dike & dredge ash)	yr	12.9		Ash Production rate 475600 cy per year
7.00	Gypsum Stack Peninsula (7:00 through 16:02)				
7.01	Clear and Grub				
7.02	Clear and grub	ac	90		
7.03	Strip 1 ft vegetation and topsoil - spoil at stockpile	bcy	129,000		
8.00	Erosion Controls				
8.01	Erect silt fence	lf	4,900		6 ft post spacing, trench bottom of fence, 10% hay bales
8.02	cut for stormwater runoff pond	bcy	2000		2 ponds, assume 2.5 ac ft and 4.5 ac-ft; 0.5 ac and 0.9 ac

8.03	fill for stormwater runoff pond	bcy	12,000		
8.04	riprap for stormwater runoff pond	ton	4,300		Combined - 1 ft deep
8.05	72 in dia cmp for outlet structure	lf	6		
8.06	48 in dia cmp for riser for outlet structure	lf	7		
8.07	cut holes in riser	ea	3		
8.08	48 in dia cmp outlet pipe (principle spillway)	lf	150		
8.09	Concrete for riser base (assume 7ft x 7 ft x 2 ft)	cy	4		
8.10	Anti-seep collars (assume concrete)	ea	7		
8.11	pipe bedding	ton	20		
8.12	clean out stormwater runoff pond	bcy	2,300		Assume 1 ft deep @ 1.4 ac
9.00	Roads				
9.01	South Access Road (gravel)				Assume 1.5 miles of roadway (8000 lf); road is 16 ft wide
9.02	Bottom Ash	bcy	2400		Assume 6 in bottom ash
9.03	crushed stone base	ton	2,900		Assume 4 inch stone (1032)
9.04					
9.05	Permanent Parking Lot (paved stone)				
9.06					
9.07	crushed stone base	ton	340		Assume 100 x 100 ft w/ 6 in crushed stone
9.08					
10.00	Fencing				
10.01	New fencing (including grounding)	lf	200		Assume fence to block road only - no perimeter fence
10.02	Gates, swinging	ea	1		personnel
10.03	Gates, sliding, w/ motorized operator	ea	1		20 ft wide
10.04					
11.00	Seed/Mulch				
11.01	Seed/Mulch disturbed areas	ac	25		Areas outside dike
12.00	Borrow area development				
12.01	Add some costs for future borrow area development				By estimator
12.02					
13.00	Gypsum Disposal Facility				
13.01	Disposal facility construction				
13.01	Earthwork cut	bcy	310,553		
13.02	Earthwork fill	bcy	189,719		
13.03	Spoil select cut for future 1 ft clay layer in final cover	bcy	112,933		Spoil at nearby location - assume clearing and grubbing,
13.04	Additional spoil material	bcy	7,900		Spoil separately at 1 ac site
13.05	Ditch riprap	ton	23,500		assume 2 ft deep riprap, 7300 lf ditch
13.06	geotextile (if riprap is used)	sy	19,500		assume ditch has 24 ft top width
13.07	Perimeter road surfacing - bottom ash	cy	2,400		
13.08	Perimeter road surfacing - crushed stone	ton	2,900		6 in bottom ash topped w/ 4 in stone - 1.5 mi of roadway
13.09	Compacted clay liner	bcy	339,000		Omit in option 1 and include in option 5 (Built in 6 lifts)

13.10	Drainage layer (1 ft thick) for liner (No 57 stone)	ton	168,000		Unit wt = 110 pcf
13.11	Geotextile for underdrain	sy	5,700		Wrapped around pipe
13.12	Perimeter underdrain pipe	lf	6,400		8 in dia HDPE, SDR = 17, perforated
13.13	Fittings for underdrain piping	ea	50		
13.14	Concrete anchors for underdrain piping	ea	85		Assume 75 ft spacing
13.15	Proofroll subgrade	ac	70		
14.00	Gyp on Peninsula Disposal Cost				
14.01	Fill for Underdrain system	cy	4,407		
14.02	6" dia perforated HDPE underdrains	lf	59,491		Elevations 770 to 850
14.03	Fill for Underdrain system	cy	3,525		
14.04	6" depth 1081 crushed stone (110 pcf)	ton	3,272		
14.05	Cut for Lateral outlet pipes	cy	551		
14.06	6" dia non-perforated HDPE Lateral outlet pipes	lf	7,436		Lateral pipe located every 200' on center
14.07	Fill for Lateral outlet pipes	cy	441		
14.08	6" depth 1081 crushed stone (110 pcf)	ton	409		
14.09	Gypsum Disposal Stack (wet sluice)	cy	5535853		Option 1A 3:1 slope w/ 15 ft bench
14.10	Wet cast Gyp Dike	cy	1011347		Elevations 770 to 850
14.11	Cut Rim Ditches	cy	114575		
14.12	Life of Gypsum Disposal Stack	cy	20.0		Assume 327360 cubic yards per year (@ 84 pcf)
14.13	Allowance for karst geologic features	ls	240,000		Based on % of Gypsum Disp cost
14.14	Addition geotechnical investigation	ls	100000		Groundwater elevations, monitoring wells, & determination of soft clayey soil underlying the site
14.15					
15.00	Construction: parking				
15.01	silt fence	lf	1,000		
15.02	Earthwork cut	bcy	1,000		
15.03	Earthwork fill	bcy	500		
15.04	Crushed stone base	ton	1,400		assume 100 x 100 ft x 6 in thick crushed stone base
16.00	Engineering				
16.01	Engineering				Use a 10 percentage of const costs
16.02					
17.000	Phase 2 Base Construction: (Phase 2 only)				
17.001	Base Layers				
17.002	Cut for dredge cell	bcy	268500		Dredge for Pond for additional F.W.V.
17.003	Compacted Fly Ash base (Fill)	cy	573650		Added 2' for consolidation
17.004	Proofroll subgrade	sy	177100		Fill from stock pile soil for final cover
17.005	2.5' Thick Bottom Ash Layer	cy	152717		El. 767
17.006	0.5' Thick Fly Ash Filter Layer	cy	30543		El. 767
	18" dia Coarse Bottom Ash Drain Columns (Haut 2 mi				

Item ID	Description	Unit	Quantity	Notes
17.007	1100 bcy)	If	16920	564 columns (3 rows) average of drilled depth to clay layer of 30'. \$20 per lf installed. (SUBCONTRACTED)
17.008	Roto till Fly Ash Layer	sy	177100	
17.009	Bottom Ash Dike Fill	cy	163614	
17.010	1' Layer of Bottom Ash	cy	61087	Omit for option 1 but include in option 5
17.011	Geosynthetic Clay Liner	sy	183260	Omit for option 1 but include in option 5
17.012	4" dia. Perforated PVC Pipe (underdrains) SDR 17.5	lf	26082	
17.013	Trenching for the drain system (4" dia. underdrains)	bcy	966	
17.014	Strip existing 1' soil cover (Phase 1 expansion)	bcy	19133	Cut will be used as Fill
17.015	Anchor Trench Cut	cy	1306	El. 795, 810, & 845
17.016	Anchor Trench Fill & Compact	cy	1242	95% Standard Proctor Density
17.017				
17.018	2' Thick Bottom Ash Blanket Drain	cy	24640	
17.019	1' Thick Filter Drain Ash Layer	cy	12320	
17.020	Geomembrane	sy	36960	
17.021	Perforated Pipe ADS Drain Tube 6" Dia	lf	4946	
17.022	Geotextile for underdrain	sy	4121	
17.023	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1001	
17.024	Solid Outlet Pipe ADS Drain 6" Dia	lf	1236	
17.025	#57 Stone for outlet pipe bedding (135 pcf)	ton	250	
17.026	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 760)	lf	302	10W425-29
17.027	1081 crushed stone, bedding 6" depth	ton	10	
17.028	6" dia Perforated HDPE Drain (El. 760)	lf	1512	10W425-68
17.029	1081 crushed stone	ton	286	
17.030	Geotextile woven monofilament	sy	1176	Trench
17.031	Cut for underdrain system	cy	224	
17.032	Back Fill for underdrain system	cy	168	
17.012	Certification	ls	31500	
17.013	QA/QC for construction of disposal facility	ls	457884	2 F.T.E. during construction at \$40,000 per year & 5 week each years of operation, 4 weeks a year for engineering, & 10000 per year for testing
18.000	Temporary slope protection (5' wide)			
18.001	Cut for ditch	bcy	5815	
18.002	9" D50 Riprap	ton	4239	
18.003	Seed ditch	sy	6978	581
18.004	Jute Matting	sy	6978	North American Green S150 or Synthetic Industries Land
19.000	Riprap Stilling Basin			
19.001	Riprap D50 size 9"	ton	2344	
19.002	Cut for basin	bcy	3582	3' average depth of cut

20.000	Phase 2 Initial Construction											
20.001	Dredge Ash Quantities		cy	451295								Phase 2 only (prorated based on areas)
20.002	Initial Disposal Life		yr	0.9								475600 cy Dredged ash annual rate (Disposal life excludes Bottom ash layer, fly ash filter layer, dikes, etc)
20.003	Perforated Pipe ADS Drain Tube 6" Dia		lf	7370								Elevations 770, 780
20.004	Geotextile for underdrain		sy	6142								Woven Monofilament (Mirafi HP 370)
20.005	#57 Stone for underdrain pipe bedding (135 pcf)		ton	1492								
20.006	Outlet Pipe ADS Drain 6" Dia		lf	1658								
20.007	#57 Stone for outlet pipe bedding (135 pcf)		ton	336								
21.000	Rim Ditches											
21.001	Cut		bcy	0							130	No Rim Ditching in Phase 2
22.000	Phase 2 Operational Cost											
22.001	Stage 1 (3 to 1 side slopes)											
22.002	Compacted Ash Dike Fill (50% F.A. & 50% B.A.)		cy	255189								Excavate ash from Bottom Ash Pond & compact in 6" layers
22.003	Dredge Ash Quantities		cy	1334496								Phase 2 only
22.004	Stage 1 Disposal Life (Assume dike & dredge ash)		yr	3.3								475600 cy ash annual rate
22.005	Perforated Pipe ADS Drain Tube 6" Dia		lf	11495								Elevations 790, 800, 810
22.006	Geotextile for underdrain		sy	9579								Woven Monofilament
22.007	#57 Stone for underdrain pipe bedding (135 pcf)		ton	2328								
22.008	Solid Outlet Pipe ADS Drain 6" Dia		lf	2586								
22.009	#57 Stone for outlet pipe bedding (135 pcf)		ton	524								
23.000	Phase 2 Operational Cost											
23.001	Stage 2 (3 to 1 side slopes)											
23.002	Compacted Ash Dike Fill (50% F.A. & 50% B.A.)		cy	263403								Excavate ash from Bottom Ash Pond & compact in 6" layers
23.003	Dredge Ash Quantities		cy	1509673								
23.004	Stage 2 Disposal Life (Assume dike & dredge ash)		yr	3.7								475600 cy ash annual rate
23.005	Perforated Pipe ADS Drain Tube 6" Dia		lf	11865								Elevations 820, 830, 840
23.006	Geotextile for underdrain		sy	9888								Woven Monofilament
23.007	#57 Stone for underdrain pipe bedding (135 pcf)		ton	2403								
23.008	Solid Outlet Pipe ADS Drain 6" Dia		lf	2670								
23.009	#57 Stone for outlet pipe bedding (135 pcf)		ton	541								
24.000	Phase 2 Operational Cost											
24.001	Stage 3 (3 to 1 side slopes) up to Elevation 860											
24.002	Compacted Ash Dike Fill (50% F.A. & 50% B.A.)		cy	227106								Excavate ash from Bottom Ash Pond & compact in 6" layers
24.003	Dredge Ash Quantities		cy	1344916								
24.004	Stage 3 Disposal Life (Assume dike & dredge ash)		yr	3.3								475600 cy ash annual rate
24.005	Perforated Pipe ADS Drain Tube 6" Dia		lf	10230								Elevations 840, 850, 860

24.005	Geotextile for underdrain								
24.007	#37 Stone for underdrain pipe bedding (135 pcf)		3025	ton	3025				Move/ Manifestment
24.008	Solid Outlet Pipe ABS Drain 6" Dia		2072	ton	2072				
24.009	#17 Stone for outlet pipe bedding (135 pcf)		2302	ton	2302				
24.009	#17 Stone for outlet pipe bedding (135 pcf)		456	ton	456				
25.000	Phase 2 Operational Cost								
25.001	Stage 4 (3 to 1 side slopes)								
25.002	Compacted Ash/Dike Fill (60% A, 40% B, A)								Excavate ash from Bottom Ash Pond & compact in 6' lifts
25.003	Dredge Ash Quantities								
25.004	Stage 4 Disposal Life (Assume dike 5' Sluce ash & 50%)								47,850 (307,447 annual total)
25.005	Perforated Pipe ABS Drain Tubing Dia								Excavate (135 pcf) 830,400
25.006	Geotextile for Underdrain								Excavate (135 pcf) 830,400
25.007	#17 Stone for underdrain pipe bedding (135 pcf)								Excavate (135 pcf) 830,400
25.008	Solid Outlet Pipe ABS Drain 6" Dia								
25.009	#17 Stone for outlet pipe bedding (135 pcf)								
26.000	Phase 3 Operational Cost								
26.001	Stage 5 (3 to 1 side slopes)								
26.002	Compacted Ash/Dike Fill (50% A, 50% B, A)								Excavate ash from Bottom Ash Pond & compact in 6' lifts
26.003	Dredge Ash Quantities								
26.004	Stage 5 Disposal Life (Assume dike 2' sluce ash)								Excavate (135 pcf) 830,400
26.005	Perforated Pipe ABS Drain Tubing Dia								Excavate (135 pcf) 830,400
26.006	Geotextile for Underdrain								Excavate (135 pcf) 830,400
26.007	#17 Stone for underdrain pipe bedding (135 pcf)								Excavate (135 pcf) 830,400
26.008	Solid Outlet Pipe ABS Drain 6" Dia								
26.009	#17 Stone for outlet pipe bedding (135 pcf)								
26.000	Phase 3 Initial Construction								
26.001	Wet Sluce Sedimented Gypsum Quantities								Phase 3 only (307,447 annual total)
26.002	Disposal Life (Assume dike 2' sluce (W))								20,240 (135 pcf) annual total
26.003	Perforated Pipe ABS Drain Tubing 6" Dia								
26.004	Geotextile for Underdrain								
26.005	#17 Stone for underdrain pipe bedding (135 pcf)								
26.006	Solid Outlet Pipe ABS Drain 6" Dia								
26.007	#17 Stone for outlet pipe bedding (135 pcf)								
27.000	Phase 3 Operational Cost								
27.001	Stage 1 (3 to 1 side slopes)								
27.002	Wet Sluce Gypsum Dike Fill								
27.003	Wet Sluce Gypsum & Ash Quantities								
27.004	Stage 1 Disposal Life (Assume dike 3' sluce ash & 100% GYP)								

Item ID	Description	Unit	Quantity	Rate	Amount	Notes
27.006	Entrenched Pipe ADS Drain (1.5' dia)	lin	100	100	10000	
27.007	Castable for underdrain	cu	500	100	50000	
27.008	7.5' Stone for underdrain pipe bedding (1.5' dia)	cu	100	100	10000	
27.009	Solid Outlet Pipe ADS Drain (1.5' dia)	lin	100	100	10000	
27.010	#7 Stone for outlet pipe bedding (1.5' dia)	cu	100	100	10000	
28.000	Phase 3 Operational Cost					
28.001	Stage 1 (3 to 1 side 30 yrs)					
28.002	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
28.003	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
28.004	Stage 2 (2 to 1 side 30 yrs)					
28.005	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
28.006	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
28.007	Stage 3 (1 to 1 side 30 yrs)					
28.008	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
28.009	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
29.000	Phase 3 Operational Cost					
29.001	Stage 1 (3 to 1 side 30 yrs)					
29.002	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
29.003	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
29.004	Stage 2 (2 to 1 side 30 yrs)					
29.005	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
29.006	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
29.007	Stage 3 (1 to 1 side 30 yrs)					
29.008	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
29.009	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
30.000	Phase 3 Operational Cost					
30.001	Stage 1 (3 to 1 side 30 yrs)					
30.002	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
30.003	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
30.004	Stage 2 (2 to 1 side 30 yrs)					
30.005	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
30.006	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
30.007	Stage 3 (1 to 1 side 30 yrs)					
30.008	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
30.009	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
31.000	Phase 3 Operational Cost					
31.001	Stage 1 (3 to 1 side 30 yrs)					
31.002	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
31.003	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
31.004	Stage 2 (2 to 1 side 30 yrs)					
31.005	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
31.006	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	
31.007	Stage 3 (1 to 1 side 30 yrs)					
31.008	Wet Cell Gypsum (1.5' dia)	cu	100	100	10000	
31.009	Wet Sludge Gypsum & Ash Quantities	cu	100	100	10000	

31002	Mid-Cast Gypsum Dike								
31003	Mid-Slice Gypsum & Ash Transition								
31004	Stage 5 Disposal Life Assumptions (fly ash & dredge ash)								
31005	Perforated Pipe ADS Drain (total life)								
31006	Geotextile for Underdrain								
31007	Perforated Pipe ADS Drain (total life)								
31008	Sum of Underdrain ADS Drain (total life)								
31009	Fly Stora for end of life (total life)								
32001	Phase 2 & Phase 3 Operational Cost								
32002	Phase 4 (3 to 6) Site Slopes								
32003	Field Layer & bottom ash drainage layer 2' thick								
32004	DY Stack Overlays								
32005	Stage 5 Disposal Life Assumptions (fly ash & dredge ash)								

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Assumptions

- (1) All earthwork quantities are in bank cubic yards (bcy) - no shrink or swell factors applied
- (2) Closure costs not included.
- (3) Liner is not required for option 1, but is required for option 5.
- (4) Bottom ash columns are subject to change with final design.
- (5) Engineering (inc. TVA over sight, subcontracts, and additional geotechnical investigation) - Assume 10% of construction costs.
- (6) Assuming a disposal rate of 475,000 cy annually (including bottom and fly ash) & Gypsum/Ash Generation 327,000 cy annually.
- (7) Simple Phase power is assumed for pump installed for dredge Call seepage retrofit. 3-phase power is assumed to not be required.