

PRELIMINARY

Option 4 & Option 8

KIF Dry Ash in Pond & Gypsum in Pond

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					
1.150	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 assume existing road upgrade
3.000	South Access Road (gravel)				
3.010	1032 crushed stone base 6" depth	ton	3520	305	Assume 1.5 miles of roadway (8000 lf); road is 16 ft
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				Omit for Options 4 & 8
6.000	Dredge Cell/Phase 1 Operational Cost				
6.001	EI. 810 to EI. 866				
6.002	Dry Ash Stack Quantities	cy	5476070		EI. 810 to EI. 866 in Dredge Cell
6.003	Wet Dip and Stack Bottom Ash Only	cy	678848		EI. 810 to EI. 866 in Dredge Cell
6.004	Disposal Life (Assume dike & dredge ash)	yr	12.9		Ash Production rate 475600 cy per year
6.005	Haul Distance	yr	0.5		Round trip from the preceptors
7.000	Phase 2 Base Construction				

7.001	Base Layers					
7.002	Cut for dredge cell	bcy	0			Pond not Req. for dry stacking ash
7.003	Compacted Fly Ash base (Fill)	cy	910556			Added 2' for consolidation
7.004	Proofroll subgrade	sy	281111			Fill from stock pile soil for final cover
7.005	2.5' Thick Bottom Ash Layer	cy	242407			El. 767
7.006	0.5' Thick Fly Ash Filter Layer	cy	48481			El. 767
7.007	18" dia Coarse Bottom Ash Drain Columns (Haul 2 mi, 1100 bcy)	lf	16920			564 columns (3 rows) average of drilled depth to clay layer of 30'. \$20 per lf installed. (SUBCONTRACTED)
7.008	Roto till Fly Ash Layer	sy	281111			
7.009	Bottom Ash Dike Fill	cy	163614			
7.010	1' Layer of Bottom Ash	cy	96963			Omit for option 4 but include in option 8
7.011	Geosynthetic Clay Liner	sy	290889			Omit for option 4 but include in option 8
7.012	4" dia. Perforated PVC Pipe (underdrains) SDR 17.5	lf	41400			
7.013	Trenching for the drain system (4"dia. underdrains)	bcy	1533			
7.014	Strip existing 1' soil cover (Phase 1 expansion)	bcy	19133			Cut will be used as Fill
7.015	Anchor Trench Cut	cy	2073			El. 795, 810, & 845
7.016	Anchor Trench Fill & Compact	cy	1971			95% Standard Proctor Density
7.017						
7.018	2' Thick Bottom Ash Blanket Drain	cy	39111			
7.019	1' Thick Filter Drain Ash Layer	cy	19556			
7.020	Geomembrane	sy	58667			
7.021	Perforated Pipe ADS Drain Tube 6" Dia	lf	7850			
7.022	Geotextile for underdrain	sy	6542			
7.023	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1590			
7.024	Solid Outlet Pipe ADS Drain 6" Dia	lf	1963			
7.025	#57 Stone for outlet pipe bedding (135 pcf)	ton	397			
7.026	6" dia Non-Perforated HDPE Corrugated Tubing Lateral outlet pipes @ 200' O.C. (EL. 760)	lf	480			10W425-29
7.027	1081 crushed stone, bedding 6" depth	ton	16			
7.028	6" dia Perforated HDPE Drain (El. 760)	lf	2400			10W425-68
7.029	1081 crushed stone	ton	454			
7.030	Geotextile woven monofilament	sy	1867			Trench
7.031	Cut for underdrain system	cy	356			
7.032	Back Fill for underdrain system	cy	267			
7.012	Certification	ls	50000			
7.013	QA/QC for construction of disposal facility	ls	726800			2 F.T.E. during construction at \$40,000 per year & 5
8.000	Temporary slope protection (5' wide)					

8.001	Cut for ditch	bcy	5815		
8.002	9" D50 Riprap	ton	4239		
8.003	Seed ditch	sy	6978	581	
8.004	Jute Matting	sy	6978		North American Green S150 or Synthetic Industries Land
9.000	Riprap Stilling Basin				
9.001	Riprap D50 size 9"	ton	2344		
9.002	Cut for basin	bcy	3582		3' average depth of cut
10.000	Phase 2 Initial Construction				
10.001	Wet Sluice Sedimented Gypsum Quantities	cy	451295		Phase 2 only (prorated based on volume)
10.002	Initial Cons. Disposal Life	yr	1.4		327360 cy gypsum & ash annual rate
10.003	Perforated Pipe ADS Drain Tube 6" Dia	lf	7370		Elevations 770, 780
10.004	Geotextile for underdrain	sy	6142		Woven Monofilament (Mirafri HP 370)
10.005	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1492		
10.006	Solid Outlet Pipe ADS Drain 6" Dia	lf	1658		
10.007	#57 Stone for outlet pipe bedding (135 pcf)	ton	336		
11.000	Rim Ditches				
11.001	Cut	bcy	111899	130	Total Rim Ditching in Phase 2 through stage 4
12.000	Phase 2 Operational Cost				
12.001	Stage 1 (3 to 1 side slopes)				
12.002	Wet Cast Gypsum Dike Fill	cy	255189		Excavate gypsum from rim ditch & cast on outer & Phase 2 only
12.003	Wet Sluice Gypsum Quantities	cy	1334496		
12.004	Stage 1 Disposal Life (Assume dike & sluice gyp)	yr	4.9		327360 cy gypsum annual rate
12.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	11495		Elevations 790, 800, 810
12.006	Geotextile for underdrain	sy	9579		Woven Monofilament
12.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2328		
12.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2586		
12.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	524		
13.000	Phase 2 Operational Cost				
13.001	Stage 2 (3 to 1 side slopes)				
13.002	Wet Cast Gypsum Dike Fill	cy	263403		Excavate gypsum from rim ditch & cast on outer &
13.003	Wet Sluice Gypsum Quantities	cy	1509673		
13.004	Stage 2 Disposal Life (Assume dike & sluice gyp.)	yr	5.4		327360 cy gypsum annual rate
13.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	11865		Elevations 820, 830, 840
13.006	Geotextile for underdrain	sy	9888		Woven Monofilament
13.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2403		
13.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2670		
13.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	541		

14.000	Phase 3 Initial Construction								
14.001	Dry Stack Ash Quantities	cy	677412						Phase 3 only (prorated based on volumes)
14.002	Initial Cons. Disposal Life (Assume Dry Ash Stack)	yr	1.4						475600 ash annual rate; .5 miles round trip
14.002	Perforated Pipe ADS Drain Tube 6" Dia	lf	0						Elevations 770, 780
14.003	Geotextile for underdrain	sy	0						Woven Monofilament (Mirafi HP 370)
14.004	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0						
14.005	Solid Outlet Pipe ADS Drain 6" Dia	lf	0						
14.006	#57 Stone for outlet pipe bedding (135 pcf)	ton	0						
15.000	Phase 3 Operational Cost								
15.001	Stage 1 (3 to 1 side slopes)								
15.002	Dry Stack Ash Quantities	cy	1349180						Phase 3 only
15.003	Stage 1 Disposal Life (Assume Dry Stack Ash)	yr	2.8						475600 cy ash annual rate
15.004	Haul distance	mi	0.5						For Dry Stacking Ash Only (Round Trip)
15.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	0						Elevations 790, 800, 810
15.006	Geotextile for underdrain	sy	0						Woven Monofilament
15.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0						
15.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	0						
15.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	0						
16.000	Phase 3 Operational Cost								
16.001	Stage 2 (3 to 1 side slopes)								
16.002	Dry Stack Ash Quantities	cy	1504825						Phase 3 only
16.003	Stage 2 Disposal Life (Assume Dry Stack Ash)	yr	3.2						475600 cy ash annual rate
16.004	Haul distance	mi	0.5						For Dry Stacking Ash Only (Round Trip)
16.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	0						Elevations 820, 830, 840
16.006	Geotextile for underdrain	sy	0						Woven Monofilament
16.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0						
16.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	0						
16.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	0						
17.000	Phase 2 Operational Cost								
17.001	Stage 3 (3 to 1 side slopes)								
17.002	Wet Cast Gypsum Dike Fill	cy	227106						Excavate gypsum from rim ditch & cast on outer & interior dikes
17.003	Wet Sluice Gypsum Quantities	cy	1344916						
17.004	Stage 3 Disposal Life (Assume dike & sluice gyp.)	yr	4.8						327360 cy gypsum annual rate
17.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	10230						Elevations 850, 860, 870
17.006	Geotextile for underdrain	sy	8525						Woven Monofilament

17.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	2072	
17.008	Solid Outlet Pipe ADS Drain 6" Dia	lf	2302	
17.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	466	
18.000	Phase 3 Operational Cost			
18.001	Stage 3 (3 to 1 side slopes)			
18.002	Dry Stack Ash Quantities	cy	1334189	Phase 3 only
18.003	Stage 3 Disposal Life (Assume Dry Stack Ash)	yr	2.8	475600 cy ash annual rate
18.004	Haul distance	mi	0.5	For Dry Stacking Ash Only (Round Trip)
18.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	0	Elevations 850, 860, 870
18.006	Geotextile for underdrain	sy	0	Woven Monoofilament
18.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
18.008	Solid Outlet Pipe ADS Drain 3" Dia	lf	0	
18.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	0	
19.000	Phase 2 Operational Cost			
19.001	Stage 4 (3 to 1 side slopes)			
19.002	Wet Cast Gypsum Dike Fill	cy	168831	Excavate gypsum from rim ditch & cast on outer & interior dikes
19.003	Wet Sluice Gypsum Quantities			
19.004	Stage 4 Disposal Life (Assume dike & sluice ash & gyp.)	yr	2.7	327360 cy gypsum annual rate
19.005	Perforated Pipe ADS Drain Tube 6" Dia	lf	7605	Elevations 880, 890, 900
19.006	Geotextile for underdrain	sy	6338	Woven Monoofilament
19.007	#57 Stone for underdrain pipe bedding (135 pcf)	ton	1540	
19.008	Solid Outlet Pipe ADS Drain 3" Dia	lf	1711	
19.009	#57 Stone for outlet pipe bedding (135 pcf)	ton	347	
20.000	Phase 3 Operational Cost			
20.001	Stage 4 (3 to 1 side slopes)			
20.002	Dry Stack Ash Quantities	cy	577613	
20.003	Stage 4 Disposal Life (Assume dike & dry stack ash)	yr	1.2	475600 cy ash
20.004	Perforated Pipe ADS Drain Tube 6" Dia	lf	0	Elevations 880, 890
20.005	Geotextile for underdrain	sy	0	Woven Monoofilament
20.006	#57 Stone for underdrain pipe bedding (135 pcf)	ton	0	
20.007	Solid Outlet Pipe ADS Drain 3" Dia	lf	0	
20.008	#57 Stone for outlet pipe bedding (135 pcf)	ton	0	
20.000	Phase 2 Operational Cost			
20.001	Stage 5 (3 to 1 side slopes)			
20.002	Wet Cast Gypsum Dike Fill	cy	65631	Excavate gypsum from rim ditch & cast on outer &

Code	Description	Unit	Quantity	Rate	Total Cost
20.000	Well Slurry Gypsum Quantities				
20.004	Stage 5 Disposal Liner (Assume dike 6 Slurry wall)	cy	32,700	1.50	49,050
20.006	Perforated Pipe ADS Drain Tube 8" Dia	lf	1,000	1.00	1,000
20.008	Geotextile to underdrain	sf	3,142	0.40	1,257
20.007	657 Stone for underdrain pipe bedding (135 pcf)	cy	123	1.25	154
20.008	Solid Buffer Pipe ADS Drain 6" Dia	lf	840	0.40	336
20.009	657 Stone for buffer pipe bedding (135 pcf)	cy	112	1.25	140
21.000	Phase 3 Operational Cost				
21.001	Stage 6 (3 to 1 side slopes)				
21.002	Well Cast Gypsum Dike Fill	cy	249,600	1.50	374,400
21.003	Well Slurry Gypsum & Ash Quantities	cy	1,227	1.50	1,841
21.004	Stage 6 Disposal Liner (Assume dike 3 discharge)	cy	1,227	1.50	1,841
21.005	Perforated Pipe ADS Drain 6" Dia	lf	1,227	1.00	1,227
21.006	Geotextile to underdrain	sf	3,885	0.40	1,554
21.007	657 Stone for underdrain pipe bedding (135 pcf)	cy	167	1.25	209
21.008	Solid Buffer Pipe ADS Drain 6" Dia	lf	1,227	0.40	491
21.009	657 Stone for buffer pipe bedding (135 pcf)	cy	167	1.25	209
22.000	Phase 2 & Phase 3 Operational Cos				
22.001	Stage 6 (3 to 1 side slopes)				
22.002	Fill layer & bottom ash to 6" layer 4" thick	cy	1,227	1.50	1,841
22.003	Dry Creek Quantities				
22.004	Stage 6 Disposal Liner (Assume dike 3 discharge)	cy	1,227	1.50	1,841

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 3, but is required for option 7.
- (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 327,360 cy annually.
- (7) Single Phase power is assumed for pump installed for Dredge Cell (seepage retrofit). 3-phase power is assumed to not be required.