

**KINGSTON FOSSIL PLANT
OPTION 4 DRY ASH IN POND & GYPSUM IN POND
(WITHOUT BUFFER OPTION)**

Project name KIF0509304FLY&BOTTOM ASH

Engineer DAN SMITH

Estimator C. L. Toney

Labor rate table KIF 40 2004

Equipment rate table TVA Equipment

Project Ash

Plant KIF

Estimate # 0509304

PCN # KIF-530

Requesting Engr Dan Smith

Option 4

Revision 0

Phase 2

Estimate Type Preliminary

Estimate Accuracy +/- 20%

Est. Issue Date 12/20/2004

Funding Type Capital

Unit N

Notes

All cost are based in 2005 dollars. Additional notes are as follow:

- (1) Closure costs not included.
- (2) Liner is not required for this option.
- (3) Bottom ash columns are subject to change with final design.
- (4) Engineering (incl TVA oversight, subcontracts, and geotechnical investigation) - Assumes 10% of construction cost.
- (5) Assuming a disposal rate of 475,600 cy annually (including bottom and fly ash) & gypsum/ash generating 327,360 cy annually.
- (6) Single phase power is assumed for pump installed for dredge cell seepage retrofit. 3-phase power is assumed not to be required.

Report format

Sorted by 'Location/Activity'
Detail summary

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Material Amount	Sub Amount	Equip. Amount	Other Amt./hr	Total Cost/Unit	Total Amount	
01	Erosion Control/S P	Erect Silt Fence	1,000.00 lf	0.069	68.57 mh	1,984	502	317	-	2.81	2,813	
		Geotextile (Nonwoven) Erosion Protection Channel	4,300.00 sq	0.016	68.80 mh	5,772	175	175	-	1.84	7,911	
		D50 5' Riprap	5,215.00 ln	0.320	1,669.80 mh	49,667	53,037	26,865	-	24.85	129,668	
		3' Stone, 1" Thick To Prevent Erosion (Assume 105 pcf)	2,004.00 ln	0.096	192.36 mh	6,056	18,190	3,086	-	13.63	27,312	
		Sig 1-6 CMP Mill Spillage (1/2 of 48" Dia River Stand Pipe @ 126 FT/EH)	4.00 ea	168.084	664.33 mh	20,450	20,198	2,755	-	10,860.64	43,443	
		Cut (Excavation For Placement Of 48" Dia Half-Round Pipe) 43	52.00 sq	0.400	20.80 mh	589	-	177	-	14.91	776	
		Fill With 1032 Compacted Crushed Stone	83.00 ln	0.600	37.20 mh	1,107	804	589	-	26.99	2,510	
		30" Diameter CMP Culvert	1,000.00 lf	0.600	600.00 mh	17,487	26,442	3,882	-	47.61	47,611	
		Bedding For 30" CMP 6" Thick	135.00 ln	0.600	81.00 mh	1,943	1,284	230	-	3.67	3,457	
		30" Diameter CMP Stand Pipes (4" Pipes @ 6 Stages w/50' Per Stage)	720.00 lf	0.750	540.00 mh	16,623	19,036	2,731	-	52.70	37,940	
02	Seed/Mulch	D50 5' Riprap Outlet For Metal Spillway	53.00 ln	0.320	16.96 mh	505	273	-	24.85	1,317		
		Galvanized Compacted Metal Anti-Sleep Collar	15.00 ea	15.000	225.00 mh	7,461	4,882	1,571	-	869.59	13,914	
		Erosion Controls/S P	4,201.35 hrs	125.653	420,039	150,687	42,029	-	-	318,969		
01												
03	Seed/Mulch	See/Mulch Disturbed Areas	25.00 ac	-	-	-	64,619	-	-	2,485.34	64,619	
		Seed/Mulch	-	-	-	-	64,619	-	-	64,619	64,619	
04	South Access Road	1032 Crushed Stone Base, 6" Depth	3,520.00 ln	0.120	422.40 mh	13,739	31,950	4,147	-	14.16	49,836	
		South Access Road	422.40 hrs	13,739	422.40 hrs	4,147	31,950	4,147	-	49,836		
		422.40 hrs	13,739	422.40 hrs	4,147	31,950	4,147	-	49,836			
05	Perimeter Road	1032 Roller Compacted Crushed Stone Base, 6" Depth	6,885.00 ln	0.120	826.20 mh	26,872	62,493	8,112	-	14.16	97,478	
		Perimeter Road	826.20 hrs	26,872	826.20 hrs	8,112	62,493	8,112	-	97,478		
		826.20 hrs	26,872	826.20 hrs	8,112	62,493	8,112	-	97,478			
		826.20 hrs	26,872	826.20 hrs	8,112	62,493	8,112	-	97,478			
06	Dig Cell/P1 Opr Cost	Elv. 810 To Elv. 866	1.00 lot	-	-	-	-	-	-	0.00	0	
		Dry Ash Stack	5,476,070.00 sq	1,100,000	4,978.25 cd	10,903,210	-	7,312,047	-	3.33	18,215,257	
		Wet Dip And Slack Bottom Ash Only	678,848.00 sq	375,000	1,810.26 cd	531,659	-	1,264,903	-	2.66	1,796,863	
		Disposal Life (Assume Dike & Dredge Ash)	12.90 yr	-	-	-	-	-	-	-	0.00	0
		Haul Distance (Round Trip)	0.50 mile	-	-	-	-	-	-	-	0.00	0
07	Ph 2 Base Construct	Dig Cell/P1 Opr Cost	372,915.76 hrs	11,434,869	372,915.76 hrs	11,434,869	8,576,950	-	-	20,011,819		
		372,915.76 hrs	11,434,869	372,915.76 hrs	11,434,869	8,576,950	8,576,950	-	-	20,011,819		
08	Base Layers	Compacted Fly Ash Base (Fill)	910,556.00 sq	1,300,000	700.43 cd	1,696,157	-	1,414,641	-	0.00	3,110,798	
		Prep/Soil Subgrade	281,111.00 sq	28,111.100	10.00 cd	8,487	-	4,080	-	0.05	12,571	
		2.5" Thick Bottom Ash Layer	242,407.00 sq	1,300,000	186.43 cd	451,549	-	376,864	-	3.42	828,153	
		0.5" Thick Fly Ash Filter Layer	48,481.00 sq	1,300,000	37.25 cd	90,508	-	75,320	-	3.42	195,629	
		15" Dia Concrete Bottom Ash Drain Columns (haul 2 miles, 1,100 bcy)	19,920.00 lf	1,400,000	300.78 cd	117,943	-	32,770	-	20.54	347,537	
		Ratio TM Fly Ash Layer	281,111.00 sq	1,300,000	125.86 cd	304,775	-	254,191	-	0.54	150,712	
		Bottom Ash Dike Fill	163,614.00 sq	1,300,000	125.86 cd	304,775	-	254,191	-	0.54	150,712	
		4" Diameter Perforated PVC Pipe (Underdrains) SDR 17.5	41,400.00 lf	0.070	2,896.00 mh	79,084	64,987	12,320	-	3.78	566,966	
		Trenching For The Drain System (6" Dia Underdrains), 1,533 bcy	22,960.00 sq	0.200	398.00 mh	10,583	-	3,128	-	7.48	19,059	
		Strip Existing 1" Soil Cover (Phase 1 Expansion), 19,133 bcy	2,073.00 sq	0.200	414.60 mh	14,128	-	14,930	-	1.27	29,059	
		Anchor Trench Cut	2,073.00 sq	0.200	414.60 mh	14,128	-	14,930	-	1.27	29,059	
		2.0" Thick Bottom Ash Blanket Drain	1,971.00 sq	0.320	630.72 mh	18,155	-	6,286	-	8.31	17,221	
		1.0" Thick Filter Drain Ash Layer	39,111.00 sq	1,300,000	30.09 cd	78,855	-	15,607	-	17.13	33,763	
		Geomembrane	19,556.00 sq	0.050	30.09 cd	36,428	-	30,382	-	3.42	133,618	
		Perforated PVC ADS Drain Tube, 6" Diameter	59,662.00 lf	1,300,000	15.04 cd	83,662	131,282	7,480	-	3.79	222,424	
		Geotextile For Underdrain	7,850.00 lf	0.200	1,570.00 mh	42,649	6,666	6,666	-	7.66	62,908	
		Perforated ADS Drain Tube, 6" Diameter	6,542.00 lf	0.021	134.57 mh	3,839	13,247	458	-	2.68	17,543	
		Geotextile For Underdrain	1,590.00 lf	0.150	238.50 mh	6,865	14,432	2,027	-	14.67	23,325	
		#67 Stone For Outlet pipe Bedding (135 pcf)	1,963.00 lf	0.200	392.60 mh	10,715	3,249	1,667	-	7.96	15,631	
		Solid Outlet Pipe ADS Drain 6" Diameter	397.00 lf	0.150	59.55 mh	1,714	3,063	506	-	14.67	5,824	
		#67 Stone For Outlet pipe Bedding (135 pcf)	480.00 lf	0.200	96.00 mh	2,620	784	408	-	7.96	3,822	
		6" Dia Non-Perf HDPE Corrugated Tubing Lateral Outlet Pipes (EL. 768)	16.00 ln	0.600	8.00 mh	230	152	27	-	25.81	410	
		1081 Crushed Stone, Bedding 6" Depth	2,400.00 lf	0.200	480.00 mh	1,310	3,912	2,088	-	7.36	19,111	
		6" Dia Perforated HDPE Drain (EL. 768)	2,400.00 lf	0.300	3,600.00 mh	13,100	3,912	773	-	29.61	11,625	
		Geotextile Weave Reinforcement	1,867.00 sq	0.021	36.40 mh	1,068	3,180	151	-	2.89	5,007	
Cut For Underdrain System	358.00 sq	0.200	71.20 mh	2,050	805	605	-	7.46	2,655			
Backfill For Underdrain System	267.00 sq	0.250	66.75 mh	1,951	-	801	-	10.20	2,752			

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Payroll	Material Amount	Sub Amount	Equip Amount	Over Amount	Total Cost/Unit	Total Amount	
08	Ph 2 Base Construct	Certification	1.00 ls									50,000.00	
		QAOC For Construction Of Disposal Facility	1.00 ls									746,424	
		Ph 2 Base Construct				93,391.00 hrs	3,089,037	255,789	1,093,960	2,323,608	50,000	746,424	
		07				93,391.60 hrs	3,089,637	255,789	1,093,960	2,323,608	50,000	746,424	
		Temp Slope Protect											
		Cut For Ditch (5.815 bcy)	6,978.00 cy	1,200.000		10,991							3,300
		D50 3" Riprap	4,239.00 cy	0.320		1,356.48 m	40,371						24,850
		Seed Ditch	6,978.00 sy										105,319
		Jute Matting	6,978.00 sy	0.012									2,883
		08	Temp Slope Protect				83.74 m	2,389	5,464	427			1,190
09	Riprap Stilling Basin	Temp Slope Protect			1,765.86 hrs	53,741	48,575	3,583	34,304			8,280	
		08			1,765.86 hrs	53,741	48,575	3,583	34,304			8,280	
		Riprap D50 Size 3"	2,344.00 in	0.320		750.08 m	22,324					24,850	
		Cut For Basin (3.582 bcy)	4,300.00 cy	1,200.000		3.58 cd	6,767					3,300	
		Riprap Stilling Basin				950.75 hrs	29,091	23,838	19,495				14,188
		09				950.75 hrs	29,091	23,838	19,495				14,188
		10	Ph 2 Initial Constr										
		Wet Sluice Sedimented Gypsum Quantities	451,295.00 cy										
		Initial Cons. Disposal Life	1.40 Yrs										
		11	Rim Ditches										
11	Ph 2 Operational Cost	Cut (11,889 bcy)	134,219.00 cy	375.000		105,164						250,203	
		Rim Ditches				105,164						250,203	
		11				105,164						250,203	
		Stage 1 (3 To 1 Side Slopes)	1.00 lot										
		Wet Cast Gypsum Dike Fill	255,189.00 cy										
		Wet Sluice Gypsum Quantities	1,334,496.00 cy										
		4.90 Yrs											
		Stage 1 Disposal Life (3 To 1 Side Slopes)											
		Perforated Pipe ADS Drain Tube, 6" Diameter	11,495.00 lf	0.200		2,299.00 m	62,746	19,026	9,781				91,533
		Geotextile For Underdrain	9,579.00 sy	0.021		197.04 m	5,621	19,988	870				25,687
12	Ph 2 Operational Cost	#57 Stone For Outlet Pipe Bedding (135 pc)	2,403.00 in	0.150		10,052	21,311	2,068				34,151	
		Solid Outlet Pipe ADS Drain 6" Diameter	2,586.00 lf	0.200		517.20 m	14,116	2,196				20,592	
		#57 Stone For Outlet Pipe Bedding (135 pc)	524.00 in	0.150		78.60 m	2,293	4,756	668			7,687	
		Ph 2 Operational Cost				8,885.07 hrs	294,656	68,589	491,759				885,005
		12				8,885.07 hrs	294,656	68,589	491,759				885,005
		Stage 2 (3 To 1 Side Slopes)	1.00 lot										
		Wet Cast Gypsum Dike Fill	283,403.00 cy										
		Wet Sluice Gypsum Quantities	1,509,873.00 cy										
		5.40 Yrs											
		Stage 2 Disposal Life (Assume Dike & Sluice Gypsum)											
Perforated Pipe ADS Drain Tube, 6" Diameter	11,865.00 lf	0.200		2,373.00 m	64,785	19,639	10,075				94,479		
Geotextile For Underdrain	9,888.00 sy	0.021		203.40 m	6,802	20,022	892				26,516		
13	Ph 2 Operational Cost	#57 Stone For Outlet Pipe Bedding (135 pc)	2,403.00 in	0.150		10,376	21,811	3,084				35,251	
		Solid Outlet Pipe ADS Drain 6" Diameter	2,670.00 lf	0.200		534.00 m	14,374	2,291				21,251	
		#57 Stone For Outlet Pipe Bedding (135 pc)	541.00 in	0.150		81.15 m	2,338	4,911	690			7,938	
		Ph 2 Operational Cost				9,171.26 hrs	304,146	70,801	507,559				882,536
		13				9,171.26 hrs	304,146	70,801	507,559				882,536
		Stage 3 (3 To 1 Side Slopes)	1.00 lot										
		Wet Cast Gypsum Dike Fill	677,412.00 cy										
		Wet Sluice Gypsum Quantities	1,509,873.00 cy										
		1.40 Yrs											
		Initial Construction Disposal Life (Assume Dry Ash Stack)											
Dry Stack Ash Quantities	677,412.00 cy	1,100.000		615.83 cd	1,346,771						3,330		
14	Ph 3 Initial Constr												
Initial Construction Disposal Life (Assume Dry Ash Stack)	1.40 Yrs												
Ph 3 Initial Constr					44,339.70 hrs	1,346,771					2,293,301		
14					44,339.70 hrs	1,346,771					2,293,301		

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost/Unit	Total Amount
15	Ph 3 Operational Cost	14			44,339.70 hrs	1,348,771			904,530			2,253,301
	Stage 1 (3 To 1 Side Slopes)		1.00 lot								0.00	0
	Dry Stack Ash Quantities		1,349,160.00 cy	1,100.000	1,228.53 cd	2,686,395			1,801,523		3.33	4,487,828
	Stage 1 Disposal Life (Assume Dry Stack Area)		2.80 yrs								0.00	0
	Haul Distance (Round Trip)		0.50 mile								0.00	0
	Ph 3 Operational Cost				86,309.96 hrs	2,686,395			1,801,523			4,487,828
16	Ph 3 Operational Cost	15			86,309.96 hrs	2,686,395			1,801,523			4,487,828
	Stage 2 (3 To 1 Side Slopes)		1.00 lot								0.00	0
	Dry Stack Ash Quantities		1,904,825.00 cy	1,100.000	1,369.02 cd	2,996,204			2,009,352		3.33	5,005,556
	Stage 2 Disposal Life (Assume Dry Stack)		3.20 yrs								0.00	0
	Haul Distance (Round Trip)		0.50 mile								0.00	0
	Ph 3 Operational Cost				98,497.64 hrs	2,996,204			2,009,352			5,005,556
17	Ph 2 Operational Cost	16			98,497.64 hrs	2,996,204			2,009,352			5,005,556
	Wet Cast Gypsum Dike Fill		227,106.00 cy	375.000	606.62 cd	177,985			423,169		2.65	601,033
	Wet Sluice Gypsum Quantities		1,344,916.00 cy								0.00	0
	Stage 3 Disposal Life (Assume Dike & Sluice Gypsum)		4.80 yrs								0.00	0
	Perforated Pipe ADS Drain Tube, 6" Diameter		10,230.00 lf	0.700	2,046.00 mh	55,841			8,687		7.96	81,460
	Geotextile For Underdrain		8,525.00 sq	0.021	735.36 mh	5,003			587		2.88	22,881
	#57 Stone For Outlet pipe Bedding (135 pc)		2,072.00 tn	0.900	310.60 mh	8,947			2,642		14.67	30,395
	Solid Outlet Pipe ADS Drain 6" Diameter		2,302.00 lf	0.200	460.40 mh	12,586			1,955		7.96	18,330
	#67 Stone For Outlet pipe Bedding (135 pc)		486.00 tn	0.150	69.90 mh	2,012			584		14.67	6,836
	Ph 2 Operational Cost				7,907.39 hrs	262,232			437,643			780,916
18	Ph 3 Operational Cost	17			7,907.39 hrs	262,232			437,643			780,916
	Stage 3 (3 To 1 Side Slopes)		1.00 lot								0.00	0
	Dry Stack Ash Quantities		1,334,189.00 cy	1,100.000	1,212.90 cd	2,656,437			1,781,506		3.33	4,437,993
	Stage 3 Disposal Life (Assume Dry Stack Area)		2.80 yrs								0.00	0
	Haul Distance (Round Trip)		0.50 mile								0.00	0
	Ph 3 Operational Cost				87,328.74 hrs	2,656,437			1,781,506			4,437,993
19	Ph 2 Operational Cost	18			87,328.74 hrs	2,656,437			1,781,506			4,437,993
	Stage 4 (3 To 1 Side Slopes)		1.00 lot								0.00	0
	Wet Cast Gypsum Dike Fill		168,831.00 cy	375.000	450.22 cd	132,225			314,584		2.65	448,809
	Wet Sluice Gypsum Quantities		702,654.00 cy								0.00	0
	Stage 4 Disposal Life (Assume Dike & Sluice Ash & Gypsum)		2.70 yrs								0.00	0
	Perforated Pipe ADS Drain Tube, 6" Diameter		7,605.00 lf	0.200	1,521.00 mh	41,512			6,458		7.96	60,557
	Geotextile For Underdrain		6,338.00 sq	0.021	130.37 mh	3,719			443		2.88	16,996
	#57 Stone For Outlet pipe Bedding (135 pc)		1,540.00 tn	0.150	231.00 mh	6,929			1,984		14.67	22,931
	Solid Outlet Pipe ADS Drain 6" Diameter		1,711.00 lf	0.200	342.20 mh	3,343			1,453		7.96	13,624
	#67 Stone For Outlet pipe Bedding (135 pc)		347.00 tn	0.150	52.05 mh	1,498			442		14.67	5,090
	Ph 2 Operational Cost				5,878.35 hrs	194,944			325,344			565,669
20	Ph 3 Operational Cost	19			5,878.35 hrs	194,944			325,344			565,669
	Stage 4 (3 To 1 Side Slopes)		1.00 lot								0.00	0
	Dry Stack Ash Quantities		577,613.00 cy	1,100.000	526.10 cd	1,150,065			771,271		3.33	1,921,336
	Stage 4 Disposal Life (Assume Dike & Dry Stack Ash)		1.20 yrs								0.00	0
	Ph 3 Operational Cost				37,807.40 hrs	1,150,065			771,271			1,921,336
25	Dry Fly Ash Conver	20			37,807.40 hrs	1,150,065			771,271			1,921,336
	Dry Fly Ash Conversion Capital Cost		1.00 ls		hrs			25,675,000				25,675,000
	Dry Fly Ash Conver				hrs			25,675,000				25,675,000
XCONST FACILITY	Construct Facilities							25,675,000				25,675,000

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Mechanical Amount	Sub Amount	Equip Amount	Other Amount	Total Contract	Total Amount
	Construct Facilities	Mobilize, Dig, Test, Misc Other, & Demobilize	1.00 ls	7,720.66	7,720.66 mh	238,800			128,500	0	367,300.00	367,300
		Construct Facilities			7,720.66 hrs	238,800			128,500			367,300
ZNON MANUAL		XCONST FACILITY			7,720.66 hrs	238,800			128,500			367,300
	Non-Manual		1.00 ls	13,662.12	13,662.12 mh	683,106					683,106.00	683,106
		Non-Manual			13,662.12 hrs	683,106						683,106
		ZNON MANUAL			13,662.12 hrs	683,106						683,106

Estimate Totals

Material	27,755,429								
Subcontract	864,118								
Equipment	26,837,162								
Other	20,428,283								
	<u>50,000</u>								
	75,935,002	75,935,002							
Engineered Materials - Ph 2			100.000 %						
Adjustment - Engr Materials			(100.000) %						
Environmental Costs									
Adjustment Environmental			100.000 %						
			(100.000) %						
FPG Mech Engr - Phase 2	17,001		0.046 % @	42.00	A				405
FPG Elec Engr - Phase 2	17,001		0.046 % @	42.00	A				405
FPG Civil Engr - Phase 2	16,000		0.043 % @	42.00	A				387
Non-TVA Engr - Phase 2	260,995		0.408 % @	72.00	A				3,623
FPG Proj Contr Cost - Phase 2	1,001		0.003 % @	42.00	A				24
FPG Proj Contr Sched - Phase 2	2,998		0.008 % @	42.00	A				71
FPG Cost Estimating - Phase 2	1,001		0.003 % @	42.00	A				24
FPG Engr Records - Phase 2	1,001		0.003 % @	42.00	A				24
	<u>316,998</u>	76,252,000							
Rounding									
		76,252,000							
Total		76,252,000							