

**KINGSTON FOSSIL PLANT
OPTION 7 - WET ASH IN POND & GYPSUM IN POND
(WITH BUFFER OPTION)**

Project name KIF0509307R1FLY&BOT ASH

Engineer DAN SMITH

Estimator C. L. Toney

Labor rate table KIF 40 2004

Equipment rate table TVA Equipment

Project Ash
Plant KIF
Estimate # 0509307R1
PCN # KIF530
Requesting Error Dan Smith
Option 7
Revision 1
Phase 2
Estimate Type Preliminary
Estimate Accuracy +/- 20%
Est. Issue Date 01/21/2005
Funding Type Capital
Unit N

Notes
(Wet ash in dredge call/Phase 1, Wet gypsum in Phase 2, Phase 3 is dry stack ash)

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

- (1) Closure costs not included.
- (2) Bottom ash columns are subject to change with final design.
- (3) Engineering (incl TVA oversight, subcontracts, and geotechnical investigation) - Assumes 10% of construction cost.
- (4) Assuming a disposal rate of 475,600 cy annually (including bottom and fly ash) & gypsum/ash generating 327,950 cy annually.
- (5) 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/Outage Seq
Detail summary

Spreadsheet Report
KIF0509307R1FLY&BOT ASH

Estimate Company

Location	Activity	Usage Seq	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost/Unit	Total Amount
	Capital		530 9" Riprap	5,215.00 in	0.320	1,668.80 mh	49,897	53,037				24.85	123,590
			3" Stone, 1" Thick To Prevent Erosion (Assume 105 pcf)	2,004.00 in	0.096	192.38 mh	6,056	18,190				13.63	27,312
			Sig 14 CMP MI Spillway (1/2 of 48" Dia Riser Stand Pipe @ 128 FVE)	4.00 ea	166.084	664.33 mh	20,450	20,798				10,860.84	43,443
			Cu (Excavation For Placement Of 48" Dia Half-Round Pipe) 43.00				598	177				14.91	776
			Fill With 1032 Compacted/Crushed Stone	52.00 cy	0.400	20.80 mh	1,107	804				26.89	2,510
			3" Diameter CMP Culvert	1,000.00 lf	0.900	900.00 mh	17,487	26,442				47.61	47,611
			Bedding For 30" CMP, 6" Thick	135.00 in	0.500	67.50 mh	1,943	1,284				25.61	37,940
			3" Diameter CMP Stand Pipe (4 Pipes @ 6 Stages w/30" Per Stage)	720.00 lf	0.750	540.00 mh	15,623	19,038				24.85	37,940
			530 9" Riprap Outlet For Metal Spillway	53.00 in	0.320	16.96 mh	505	273				24.85	13,914
			Galvanized Compacted Metal Anti-Trap Collar	16.00 ea	16.000	256.00 mh	7,461	4,882				24,853.34	64,519
			SubMudch Disurbed Area	26.00 ac			13,739	31,950	64,619			14.16	49,536
			1032 Crushed Stone Base, 6" Depth	3,520.00 in	0.120	422.40 mh	12,912	62,493				14.16	97,178
			1032 Roller Compacted Crushed Stone Base, 6" Depth	6,865.00 in	0.120	823.20 mh	26,872	8,112				0.00	0
			Base Layers	1.00 lot								0.00	0
			Cut For Dredge Calf (268.500 bay)	322,200.00 cy	0.040	12,888.00 mh	429,605	338,937				3.39	768,423
			Compacted Fly Ash Base (Fill)	910,556.00 cy	1.300,000	70,433.00	1,698,197	1,416,841				3.02	3,110,988
			Preform Subgrade	28,111.00 sy	28,111.00	10,000.00	8,497	4,980				0.45	12,470
			10" Thick Bottom Ash Layer	245,407.00 cy	1,300,000	168,47.00	457,549	376,804				3.42	628,159
			10" Thick Fly Ash Layer	48,481.00 cy	1,300,000	37.29.00	90,309	70,520				3.42	165,829
			18" Dia Coarse Bottom Ash Drain Columns (Head 2 miles, 1,100 bay)	15,920.00 lf			347,537					20.94	947,537
			Roll Tiff Fly Ash Layer	28,111.00 sy	1,400,000	200.79.00	17,943	32,770				0.94	507,172
			Bottom Ash Dike Fill	163,914.00 cy	1,300,000	125.85.00	304,175	234,191				3.42	595,966
			10" Layer Of Bottom Ash	96,953.00 cy	1,300,000	74.99.00	180,520	150,842				3.42	331,262
			Geosynthetic Clay Liner	290,889.00 sy	0.026	7,563.11 mh	215,760	688,308				3.21	933,864
			4" Diameter Perforated PVC Pipe (Underdrains) SDR 17.5	41,400.00 lf	0.070	2,896.00 mh	79,694	14,320				3.78	166,401
			Trenching For The Drain System (4" Dia Underdrains), 1.532 bay	1,840.00 cy	0.200	368.00 mh	10,593	3,128				7.46	13,721
			Strip Excavating 1' Soil Cover (Phase 1, Expansion), 19,133 bay	22,960.00 cy	0.050	1,148.00 mh	3,498	14,350				1.27	29,068
			Anchor Trench Cut	2,073.00 cy	0.200	414.60 mh	1,195	528				8.31	17,221
			2.0" Thick Bottom Ash Blanket Drain	1,971.00 cy	0.320	630.72 mh	18,158	15,907				17.13	33,763
			1.0" Thick Fly Ash Layer	36,111.00 sy	1,300,000	30.09.00	72,955	60,783				3.42	133,676
			Geomembrane	56,667.00 sy	0.050	2,933.35 mh	8,492	7,480				3.79	22,224
			Perforated Pipe ADS Drain Tube, 6" Diameter	7,850.00 sy	0.021	134.57 mh	3,639	458				2.68	17,543
			Geosellite For Underdrain	6,542.00 sy	0.021	134.57 mh	3,639	458				14.87	15,621
			48" Stone For Outlet Pipe Bedding (135 pcf)	1,590.00 in	0.150	238.50 mh	6,865	4,432				7.96	16,624
			Solid Outlet Pipe ADS Drain 6" Diameter	1,963.00 in	0.200	392.60 mh	10,715	3,249				14.87	15,621
			6" Dia Non-Perf HDPE Compacted Tubing Lateral Outlet Pipes (EL: 760)	397.00 in	0.150	59.55 mh	1,714	3,603				7.96	15,621
			6" Dia Perforated HDPE Drain (EL: 760)	480.00 in	0.200	96.00 mh	2,620	794				7.96	15,621
			108" Crushed Stone, Bedding 6" Depth	16.00 in	0.500	8.00 mh	230	152				25.61	410
			108" Crushed Stone	2,400.00 in	0.500	480.00 mh	1,300	3,117				7.96	19,111
			Geosellite Woven Monofilament	454.00 in	0.500	227.00 mh	6,534	4,317				25.61	11,625
			Cut For Underdrain System	1,867.00 sy	0.021	39.40 mh	1,096	3,780				7.46	2,855
			Backfill For Underdrain System	356.00 sy	0.200	71.20 mh	2,050	601				10.20	2,722
			Certification	287.00 sy	0.250	66.75 mh	1,921	801				50.000	50,000
			Cut For Ditch (5.8' x 5' box)	1.00 ls	1,200,000	6.82.00	10,981	12,941				3.30	29,022
			Ditch 5" Riprap	4,239.00 in	0.320	1,366.46 mh	40,371	43,111				24.85	106,319
			Seed Ditch	6,978.00 sy			3,583					0.51	3,583
			Jute Matting	6,978.00 sy	0.012	83.74 mh	2,388	5,641				1.19	8,280
			Riprap D30 Size 9"	2,344.00 in	0.320	750.08 mh	22,324	23,638				24.85	59,237
			Cut For Basin (5,532 bay)	4,300.00 cy	1,200,000	3.58.00	6,767	7,420				3.30	14,186
			Contingency @ 10%	1.00 ls								884,436.00	884,436
			Capital										9,728,794
			Ash / Gypsum In Pond	127,379.53 hrs			4,164,817	1,273,242	415,739	2,940,561		934,436	9,728,794
			04	127,379.53 hrs			4,164,817	1,273,242	415,739	2,940,561		934,436	9,728,794
			Miscellaneous										9,728,794
			Capital										21,977,800
			Dry Fly Ash Conversion Capital Cost	1.00 ls			1,094,275		21,977,800			21,977,800.00	21,977,800
			Non Manual	1.00 ls	21,885.500	21,885.50 mh	1,094,275					1,094,275.00	1,094,275
			Mobilize, Dmg Test, Misc Other, & Demobilize	1.00 ls	11,824.864	11,824.86 mh	370,000			200,000		570,000.00	570,000
			Contingency @ 10%	1.00 ls								2,364,208.00	2,364,208
			Capital										26,006,283
			Miscellaneous										26,006,283
			05										26,006,283
			Drg Centrl Opr Cost										26,006,283
			O & M										0
			Elv 810 To Elv 844	1.00 lot								0.00	0
			Bottom Ash Dike Fill	622,416.00 cy	1,300,000	478.78.00	1,159,419					3.42	2,126,005
			Change	4,853,654.00 cy								1.57	7,631,300
			Post Op. and Stack	678,848.00 cy	235,000	2,888.71.00	848,392					4.32	2,668,655
			Disposal Life (Assume Dike & Dredge Ash)	12.80 yr								0.00	0
			O & M										12,624,600

Spreadsheet Report
KIF0509307R1/FLY&BOT ASH

Estimate Company

Location	Activity	Outage Set	Description	Takeoff Quantity	Labo Productivity	Labo Quantity	Labo Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost	Total Amount
07	Ph 2&Ph 3 Base Const	O & M	CAVOC For Construction Of Opposal Facility	1.00 ls		57,581.99 hrs	2,007,811	7,631,560	2,985,449			12,624,840	12,624,840
10	Ph 2 Initial Constr	O & M	Wet Sluice Sedimented Gypsum Quantities	451,295.00 cy									
			Initial Disposal Life	1.40 yrs									
			Perforated Pipe ADS Drain Tube, 6" Diameter	7,370.00 lf	0.200	1,474.00 mh	40,228	12,189	6,268			58,685	58,685
			Geoswille For Underdrain	6,142.00 sy	0.021	128.34 mh	3,604	12,437	430			16,471	16,471
			#67 Stone For Outlet pipe Bedding (135 pc)	1,492.00 tn	0.150	223.80 mh	6,442	13,542	1,902			21,887	21,887
			Solid Outlet Pipe ADS Drain 6" Diameter	1,688.00 lf	0.200	337.60 mh	9,950	37,744	1,408			43,202	43,202
			#57 Stone For Outlet pipe Bedding (135 pc)	388.00 tn	0.150	58.20 mh	1,651	3,050	428			4,929	4,929
			O & M			2,206.14 hrs	80,777	49,972	10,427			115,175	115,175
			Ph 2 Initial Constr			2,206.14 hrs	80,777	49,972	10,427			115,175	115,175
			10			2,206.14 hrs	80,777	49,972	10,427			115,175	115,175
11	Rim Ditches	O & M	Cut (11,189 boy)	134,278.00 cy	235.000	571.40 cd	167,816				4.22	597,076	597,076
			O & M			4,571.20 hrs	167,816					597,076	597,076
			Rim Ditches			4,571.20 hrs	167,816					597,076	597,076
			11			4,571.20 hrs	167,816					597,076	597,076
12	Ph 2 Operational Cost	O & M	Stage 1 (3 To 1 Side Slopes)	1.00 lot									
			Wet Cast Gypsum Dike Fill	255,189.00 cy	235.000	1,095.91 cd	318,923					1,077,693	1,077,693
			Wet Sluice Gypsum Quantities	1,334,496.00 cy									
			Stage 1 Disposal Life (Assumes Dikes & Sluice Gypsum)	4.90 yrs									
			Perforated Pipe ADS Drain Tube, 6" Diameter	11,495.00 lf	0.200	2,299.00 mh	62,746	19,026	9,761			91,533	91,533
			Geoswille For Underdrain	9,579.00 sy	0.021	197.04 mh	5,621	13,356	670			25,687	25,687
			#67 Stone For Outlet pipe Bedding (135 pc)	2,328.00 tn	0.150	349.20 mh	1,131	2,151	298			3,411	3,411
			Solid Outlet Pipe ADS Drain 6" Diameter	2,568.00 lf	0.200	517.20 mh	1,918	4,280	298			20,592	20,592
			#57 Stone For Outlet pipe Bedding (135 pc)	924.00 tn	0.150	138.60 mh	493	936	138			1,467	1,467
			O & M			12,128.33 hrs	413,721	68,989	775,034			1,257,343	1,257,343
			Ph 2 Operational Cost			12,128.33 hrs	413,721	68,989	775,034			1,257,343	1,257,343
			12			12,128.33 hrs	413,721	68,989	775,034			1,257,343	1,257,343
13	Ph 2 Operational Cost	O & M	Stage 2 (3 To 1 Side Slopes)	1.00 lot									
			Wet Cast Gypsum Dike Fill	283,403.00 cy	235.000	1,120.86 cd	329,189					1,112,382	1,112,382
			Wet Sluice Gypsum Quantities	1,509,673.00 cy									
			Stage 2 Disposal Life (Assume Dike & Sluice Gypsum)	5.40 yrs									
			Perforated Pipe ADS Drain Tube, 6" Diameter	11,965.00 lf	0.200	2,375.00 mh	64,765	19,639	10,075			94,479	94,479
			Geoswille For Underdrain	20,022.00 sy	0.021	400.44 mh	1,602	20,022	692			25,516	25,516
			#67 Stone For Outlet pipe Bedding (135 pc)	2,403.00 tn	0.150	360.45 mh	1,076	2,181	306			3,521	3,521
			Solid Outlet Pipe ADS Drain 6" Diameter	2,670.00 lf	0.200	534.00 mh	1,457	4,419	298			21,261	21,261
			#57 Stone For Outlet pipe Bedding (135 pc)	541.00 tn	0.150	81.15 mh	2,338	4,911	690			7,936	7,936
			O & M			12,618.91 hrs	427,043	70,801	799,981			1,297,825	1,297,825
			Ph 2 Operational Cost			12,618.91 hrs	427,043	70,801	799,981			1,297,825	1,297,825
			13			12,618.91 hrs	427,043	70,801	799,981			1,297,825	1,297,825
14	Ph 3 Initial Constr	O & M	Dry Ash Stack	569,783.00 cy	1,100.000	517.98 cd	1,134,475				3.33	1,895,291	1,895,291
			Disposal Life (Assumes Dry Stack Ash)	1.20 yrs									
			O & M			37,294.89 hrs	1,134,475					1,895,291	1,895,291
			Ph 3 Initial Constr			37,294.89 hrs	1,134,475					1,895,291	1,895,291
			14			37,294.89 hrs	1,134,475					1,895,291	1,895,291
15	Ph 3 Operational Cost	O & M	Stage 1 (3 To 1 Side Slopes)	1.00 lot									

Spreadsheet Report
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Estimate Company

Location	Activity	Outage Seq.	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Dist. Amount	Total Cost/Unit	Total Amount	
16	Ph 3 Operational Cost	O & M	Dry Stack Ash Quantities	1,349,180.00 cy	1,100.000	1,226.53 cd	2,696,305	-	-	-	-	3.33	4,487,828	
			Stage 1 Disposal Life (Assume Dike Stack)	2.80 yrs	-	-	88,309.96 hrs	2,696,305	-	-	-	-	0.00	4,487,828
			Ph 3 Operational Cost	15	-	-	88,309.96 hrs	2,696,305	-	-	-	-	-	4,487,828
17	Ph 3 Operational Cost	O & M	Dry Stack Ash Quantities	1,504,925.00 cy	1,100.000	1,398.02 cd	2,995,204	-	-	-	-	3.33	5,005,556	
			Stage 2 (3 To 1 Side Slopes)	3.20 yrs	-	-	98,497.64 hrs	2,995,204	-	-	-	-	0.00	5,005,556
			Ph 3 Operational Cost	16	-	-	98,497.64 hrs	2,995,204	-	-	-	-	-	5,005,556
18	Ph 2 Operational Cost	O & M	Dry Stack Ash Quantities	1,334,188.00 cy	1,100.000	1,212.90 cd	2,656,457	-	-	-	-	3.33	4,437,963	
			Stage 3 Disposal Life (Assume Dry Stack)	2.80 yrs	-	-	87,328.74 hrs	2,656,457	-	-	-	-	0.00	4,437,963
			Ph 3 Operational Cost	17	-	-	87,328.74 hrs	2,656,457	-	-	-	-	-	4,437,963
19	Ph 2 Operational Cost	O & M	Stage 3 (3 To 1 Side Slopes)	1.00 lot	235.000	965.41 cd	283,826	-	-	-	-	0.00	950,096	
			Wet Cost Gypsum Dike Fill	227,106.00 cy	-	-	-	-	-	-	-	-	4.22	950,096
			Wet Sluice Gypsum Quantities	1,344,916.00 cy	-	-	-	-	-	-	-	-	0.00	950,096
20	Ph 3 Operational Cost	O & M	Stage 4 (3 To 1 Side Slopes)	1.00 lot	235.000	716.43 cd	210,987	-	-	-	-	0.00	712,993	
			Wet Cost Gypsum Dike Fill	168,831.00 cy	-	-	-	-	-	-	-	-	4.22	712,993
			Wet Sluice Gypsum & Ash Quantities	702,654.00 cy	-	-	-	-	-	-	-	-	0.00	712,993
21	Ph 2 Operational Cost	O & M	Stage 4 Disposal Life (Assume Dike & Sluice Ash)	2.70 yrs	0.200	1,527.00 mth	41,512	12,588	-	-	-	7.96	60,557	
			Perforated Pipe ADS Drain Tubes, 6" Diameter	7,905.00 lf	0.021	130.37 mth	3,719	12,833	-	-	-	-	2.68	16,995
			Geotextile For Underdrain	6,338.00 sy	0.150	231.00 mth	6,650	13,978	-	-	-	-	14.67	22,591
22	Ph 2 Operational Cost	O & M	#57 Stone For Outlet Pipe Bedding (135 pc)	1,540.00 lf	0.200	342.20 mth	9,340	2,832	-	-	-	7.96	13,624	
			Soil Outlet Pipe ADS Drain 6" Diameter	1,711.00 lf	0.150	52.05 mth	1,498	3,150	-	-	-	-	14.67	6,090
			#57 Stone For Outlet Pipe Bedding (135 pc)	347.00 lf	0.150	8.024.06 hrs	273,716	45,381	-	-	-	-	81.653	81,653
23	Ph 2 Operational Cost	O & M	Stage 4 Disposal Life (Dry Stack Ash)	1.20 yrs	1,100.000	625.10 cd	1,150,265	-	-	-	-	0.00	1,921,536	
			Dry Stack Ash Quantities	577,513.00 cy	-	-	-	-	-	-	-	-	3.33	1,921,536
			Ph 3 Operational Cost	20	-	-	37,807.40 hrs	1,150,265	-	-	-	-	0.00	1,921,536
24	Ph 3 Operational Cost	O & M	Stage 4 Disposal Life (Dry Stack Ash)	1.20 yrs	1,100.000	37,807.40 hrs	1,150,265	-	-	-	-	0.00	1,921,536	
			Dry Stack Ash Quantities	577,513.00 cy	-	-	-	-	-	-	-	-	3.33	1,921,536
			Ph 3 Operational Cost	20	-	-	37,807.40 hrs	1,150,265	-	-	-	-	0.00	1,921,536

Estimate Totals

Labor	20,987,840							
Material	2,056,231							
Subcontract	30,783,866							
Equipment	16,702,837							
Other	3,477,519							
	<u>74,010,393</u>							
Engineered Materials - Ph 2				100,000 %				C
Adjustment - Engr Materials				(100,000) %				C
Environmental Costs				100,000 %				C
Adjustment Environmental				(100,000) %				C
FPG Mech Engr - Phase 2	7,001			0.025 % @	42.00			A
FPG Elec Engr - Phase 2	7,001			0.025 % @	42.00			A
FPG Civil Engr - Phase 2	15,999			0.058 % @	42.00			A
Non-TVA Engr - Phase 2	281,001			0.497 % @	72.00			A
FPG Proj Cost - Phase 2	1,000			0.004 % @	42.00			A
FPG Proj Cost Sched - Phase 2	2,999			0.011 % @	42.00			A
FPG Cost Estimating - Phase 2	1,000			0.004 % @	42.00			A
FPG Engr Records - Phase 2	1,000			0.004 % @	42.00			A
Engr Contingency@10%-Phase 2	31,701			0.115 % @	42.00			A
	<u>348,702</u>							
Rounding								L
	<u>905</u>							
	<u>74,390,000</u>							
Total								74,360,000