Kingston Fossil Plant
Dry Fly Ash Collection
Design & Install New Fly Ash Handling System

Estimate Number: 04096 **Option:** 0 **PCN Number:**
Plant: KIF **Revision:** 0 **Estimate Type:** Conceptual
Cost Engineer: B. L. Renfroe **Unit #:** **Estimate Accuracy:** +/- 30%
Requesting Engr: R. E. Purkey **Phase:** 1 **Estimate Issue Date:** 12/10/2003

	Hours	Dollars
Phase I		
Engineering		$425,000
Partner (Non-Manual)		
Other / Other Organizations		$0
Total Phase I		***$425,000***
Phase II		
Engineering		$40,000
Long Lead Procurement		$1,185,000
Partner (Non-Manual)		
Other / Other Organizations		$0
Total Phase II		***$1,225,000***
Phase III		
Construction (Partner)		
Permanent Material		$51,521
Labor (T&L)	11,121.00	$407,918
Labor (Non-Manual)		
Equipment		$5,000
Subcontracts		$21,693,750
Partner Fee		$20,396
Partner Insurance		$12,238
Escalation		$805,601
Construction Risk Dollars		$0
Other		$21,321
Total Construction Cost		$23,017,745
Engineering		$87,000
Direct plant support + TVA Other Costs		$0
Project Risk Dollars		$245,255
Other / Other Organizations		$0
Total Phase III		***$23,350,000***
All Phases		
Construction Partner	11,121.00	$23,017,745
Long Lead Procurement		$1,185,000
Engineering		$552,000
Other / Other Organizations		$0
Total Risk Dollars		$245,255
Total Project Costs	**11,121.00**	**$25,000,000**
For Information only Total Environmental		**$0**
For Information only Total Demolition Costs		**$0**

Kingston Fossil Plant
Dry Fly Ash Collection
Design & Install New Fly Ash Handling System

Project name	Dry Fly Ash
Estimator	B. L. Renfroe
Labor rate table	KIF 60 2003
Plant	KIF
Estimate #	04096
Requesting Engr	R. E. Purkey
Option	0
Revision	0
Phase	1
Estimate Type	Conceptual
Estimate Accuracy	+/- 30%
Est. Issue Date	12/10/2003
Funding Type	Capital
Notes	Electrical Engineered Material Costs based on ABB quote. (1043-03-1633) UC Service Corporation proposal (Q03381) included Fily Ash Handling design & equipment, which is coming from United Conveyor Corporation. 161kV Power Feed is based off of an FY01 TPS estimate that has been escalated. Estimate is in FY04 Dollars.
Report format	Sorted by 'Location/Activity' 'Detail' summary

Location	Activity	Description	Takeoff Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
KIF									
	Fly Ash Collection								
		480V indoor switchgear	1.00 ls	73,360	150,000	-	-	-	223,360
		1500 KVA, 4.16kV/480V Transformer	2.00 ls	44,016	100,000	15,000	-	-	159,016
		4.16kV Indoor Switchgear	1.00 ls	73,360	150,000	-	-	-	223,360
		4.16kV Outdoor Switchgear	3.00 ls	104,538	210,000	-	-	-	314,538
		10MVA, 161kv/4.16kv liq filled Transformer	2.00 ls	44,016	500,000	75,000	-	-	619,016
		750 KVA, 4.16kV/480V Transformer	1.00 ls	11,004	25,000	3,750	-	-	39,754
		480V Outdoor MCC	1.00 ls	22,925	50,000	-	-	-	72,925
		CU 5KV 4/0-3C Shielded EPR/CSPE	3,500.00 lf	17,460	29,295	-	-	-	46,755
		UC Service Corporation	1.00 ls	0	0	16,000,000	-	-	16,000,000
		161kV Power Feed	1.00 ls			5,600,000	0	-	5,600,000
		CU 600V 2/0-3C XLPE/CSPE	2,250.00 lf	9,903	14,726	-	-	-	24,630
		Mis. Equipment & Unforeseen Items	1.00 ls	7,336	7,500	-	5,000	-	19,836
		Fly Ash Collection		407,918	1,236,521	21,693,750	5,000		23,343,189
		KIF		**407,918**	**1,236,521**	**21,693,750**	**5,000**		**23,343,189**

Estimate Totals

Labor	407,918		11,121.000	hrs
Material	1,236,521			
Subcontract	21,693,750			
Equipment	5,000			
	23,343,189	23,343,189		
Engineered Materials - Ph 2	1,185,000		100.000	%
Adjustment - Engr Materials	(1,185,000)		(100.000)	%
		23,343,189		
Small Tools Expense	5,004		0.450	$/hr
Consumables & Expendables	16,317		4.000	%
	21,321	23,364,510		
Escalation - Craft Labor	20,396		5.000	%
Escalation - Subcontract	759,281		3.500	%
Escalation - Perm Materials	24,730		2.000	%
Escalation - Small Tools	378		0.034	$/hr
Escalation - Consumables	816		0.200	%
	805,601	24,170,111		
Partner Insurance (FY 04)	12,238		3.000	%
Partner Award Fee (FY04)	20,396		5.000	%
	32,634	24,202,745		
Elect. Engineering Design	380,000			
Elect. Site Meeting / Travel	45,000			
Mech Engineering - Phase 2	20,000			
Civil Engineering - Phase 2	20,000			
Elect. Field Commissioning	75,000			
Project Controls & Estimating	12,000		2.526	%
	552,000	24,754,745		
Rounding	245,255			
	245,255	25,000,000		
	Total	***25,000,000***		

Powell, Ronald D.

From: Renfroe, Bret
Sent: Monday, December 15, 2003 10:18 AM
To: Powell, Ronald D.
Subject: KIF Dry Fly Ash Collection

Ron,

I rolled up the estimate that included replacing the ash handling with a Dry Fly Ash Collection. The total estimate was for $25,000,000. My estimated scheduled time to complete, would be 24 months. If you need anything else, let me know.

Bret L. Renfroe
Tennessee Valley Authority
Cost Estimator
1101 Market St. LP 2P - C
Chattanooga, TN 37402-2801
Phone: 423-751-7684
Fax: 423-751-4295

KINGSTON FOSSIL PLANT
INSTALL A LINER/LEACHATE COLLECTION
SYSTEM ON EXISTING DREDGE CELLS

Estimate Number	04097	**Option:**	0	**PCN Number:**	
Plant:	KIF	**Revision:**	0	**Estimate Type:**	Conceptual
Cost Engineer:	C. L.Toney	**Unit #:**		**Estimate Accuracy:**	+/- 30%
Requesting Engr:	Harold L. Petty	**Phase:**	1	**Estimate Issue Date**	12/12/2003

	Hours	Dollars
Phase I		
Engineering		$28,000
Partner (Non-Manual)		
Other / Other Organizations		$0
Total Phase I		***$28,000***
Phase II		
Engineering		$143,000
Long Lead Procurement		$0
Partner (Non-Manual)		
Other / Surveying &Envr Permitting		$25,000
Total Phase II		***$168,000***
Phase III		
Construction (Partner)		
Permanent Material		$1,190,688
Labor (T&L)	43,193.89	$1,026,554
Labor (Non-Manual)	4,320.00	$216,000
Equipment		$526,470
Subcontracts		$1,456,100
Partner Fee		$62,128
Partner Insurance		$37,277
Escalation		$110,290
Construction Risk Dollars		$0
Other		$66,979
Total Construction Cost		$4,692,486
Engineering		$25,000
Direct plant support + TVA Other Costs		$0
Project Risk Dollars		$39,514
Other / Field QA/QC Services		$47,000
Total Phase III		***$4,804,000***
All Phases		
Construction Partner	47,513.89	$4,692,486
Long Lead Procurement		$0
Engineering		$196,000
Other / Other Organizations		$72,000
Total Risk Dollars		$39,514
Total Project Costs	**47,513.89**	**$5,000,000**
For Information only Total Environmental		**$0**
For Information only Total Demolition Costs		**$0**

KINGSTON FOSSIL PLANT
INSTALL A LINER/LEACHATE COLLECTION SYSTEM ON EXISTING DREDGE CELLS

Project name	KIF/04097/DREDGE CELLS
Estimator	C. L.Toney
Labor rate table	KIF 40 2003
Equipment rate table	TVA Equipment
Project	Dridge Cell
Plant	KIF
Estimate #	04097
Requesting Engr	Harold L. Petty
Option	0
Revision	0
Phase	1
Estimate Type	Order Of Magnitude
Estimate Accuracy	+/- 50%
Est. Issue Date	12/12/2003
Funding Type	O & M
Notes	Installation of a liner/leachate collection system on the existing dredge cells. This is an order of magnitude cost estimate with conceptual design including sketches and estimated quantities provided by MACTEC. All costs are estimated in 2004 dollars. Estimate assumes a 24 month construction duration. Estimate assumes engineering dollars at +/-4% of construction total. Estimate includes an allowance for surveying services, enviromental permitting and field QA/QC services.
Report format	Sorted by 'Location/Activity' 'Detail' summary

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost/Unit	Total Amount
DREDGE CELL												
	Liner&Underdrain Sys											
		Haul Bottom Ash Dump & Construct Saw Tooth	535,000.00 cy	2,500.000	214.00 cd	828,529	-	-	442,980	-	2.38	1,271,509
		Anchor Trench Excavation	1,100.00 cy	0.200	220.00 mh	4,948	-	-	2,750	-	7.00	7,698
		HDPE Liner, 60-Mil (Including Penetration Boots)	2,800,000.00 sf		-	-	-	1,447,600	-	-	0.52	1,447,600
		Anchor Trench Compacted Backfill	1,100.00 cy	0.300	330.00 mh	7,422	-	-	8,006	-	14.03	15,428
		6" Non-Perforated Pipe	425.00 lf	0.160	68.00 mh	1,447	602	-	113	-	5.09	2,162
		12" Non-Perforated Pipe	125.00 lf	0.200	25.00 mh	532	486	-	42	-	8.47	1,059
		6" Perforated Pipe	13,000.00 lf	0.160	2,080.00 mh	44,248	18,428	-	3,466	-	5.09	66,141
		8" Perforated Pipe	285.00 lf	0.170	48.45 mh	1,031	628	-	81	-	6.11	1,740
		12" Perforated Pipe	125.00 lf	0.200	25.00 mh	532	486	-	42	-	8.47	1,059
		Rip Rap Placement	20.00 cy	0.300	6.00 mh	135	473	-	125	-	36.62	732
		1032 Crushed Stone	20.00 cy	0.300	6.00 mh	135	357	-	20	-	25.60	512
		1081 Crushed Stone	940.00 cy	0.400	376.00 mh	8,456	16,779	-	1,253	-	28.18	26,489
		Filter Fabric	90,000.00 sf	0.003	240.30 mh	5,404	4,950	-	801	-	0.12	11,155
		Spread Imported SandCover / Drainage Layer	102,000.00 cy	700.000	145.71 cd	78,651	1,147,500	-	36,429	-	12.38	1,262,579
		Liner&Underdrain Sys			**41,161.89 hrs**	**981,469**	**1,190,688**	**1,447,600**	**496,107**			**4,115,864**
		DREDGE CELL			***41,161.89 hrs***	***981,469***	***1,190,688***	***1,447,600***	***496,107***			***4,115,864***
xCONST FACILITY												
	Construct Facilities											
		Mobilization	1.00 ls	192.000	192.00 mh	4,734	-	-	2,430		7,163.95	7,164
		Admin Time (Employee proc, etc)	1.00 ls	160.000	160.00 mh	3,872	-	-	-		3,871.68	3,872
		Maint Road, Buildings & Facilities	1.00 ls	456.000	456.00 mh	8,792	-	-	18,240		27,031.68	27,032
		Drinking Water	1.00 ls	516.000	516.00 mh	10,968	-	-	1,935		12,902.58	12,903
		Hauling	1.00 ls	516.000	516.00 mh	11,987	-	-	3,870		15,856.68	15,857
		Portable Toilet Service	1.00 ls		-	-	-	8,500	-	-	8,500.00	8,500
		Demobilization	1.00 ls	192.000	192.00 mh	4,734	-	-	3,888		8,621.95	8,622
		Construct Facilities			**2,032.00 hrs**	**45,086**		**8,500**	**30,363**			**83,949**
		xCONST FACILITY			***2,032.00 hrs***	***45,086***		***8,500***	***30,363***			***83,949***
zNON MANUAL												
	Field General Expens											
		Non Manual - Phase 3	1.00 ls	4,320.000	4,320.00 mh	216,000	-	-	-	-	216,000.00	216,000
		Field General Expens			**4,320.00 hrs**	**216,000**						**216,000**
		zNON MANUAL			***4,320.00 hrs***	***216,000***						***216,000***

Estimate Totals

Labor	1,242,554		47,513.893	hrs
Material	1,190,688			
Subcontract	1,456,100			
Equipment	526,470		24,435.466	hrs
	4,415,812	4,415,812		
Small Tools Expense	19,437		0.450	$/hr
Consumables & Expendables	41,062		4.000	%
Office Supplies & Expense	6,480		3.000	%
	66,979	4,482,791		
Escalation - Craft Labor	49,275		4.800	%
Escalation - Subcontract	36,403		2.500	%
Escalation - Perm Materials	13,098		1.100	%
Escalation - Small Tools	1,469		0.034	$/hr
Escalation - Consumables	2,053		0.200	%
Escalation - Non-Manual Labor	7,560		3.500	%
Escalation - Office Supplies	432		0.200	%
	110,290	4,593,081		
Partner Insurance (FY04)	37,277		3.000	%
Partner Award Fee (FY04)	62,128		5.000	%
	99,405	4,692,486		
FPG Engineering - Phase 1	28,000			
FPG Engineering - Phase 2	143,000			
FPG Engineering - Phase 3	19,000			
Project Controls & Estimating	6,000		3.158	%
	196,000	4,888,486		
Phase 2 Surveying	20,000			
Phase 2 Enviromental Permit	5,000			
	25,000	4,913,486		
Phase 3 Field QA/QC 1% Constr	47,000			
	47,000	4,960,486		
Rounding	39,514			
	39,514	5,000,000		
	Total	***5,000,000***		

MACTEC

December 5, 2003

Mr. Ron Purkey
Tennessee Valley Authority
1101 Market Street, LP-2G
Chattanooga, TN 37402

Phone: (423) 751-4820
Fax: (423) 751-7094

Subject: **Report of Geotechnical Engineering Support Services**
Ash Disposal Area
Kingston Fossil Plant
Kingston, Tennessee
MACTEC Project 3043031074/0001

Dear Mr. Purkey:

MACTEC Engineering and Consulting, Inc., (MACTEC) is pleased to provide continuing geotechnical engineering support for the ash disposal studies at the Tennessee Valley Authority (TVA) Kingston Fossil Plant near Kingston, Tennessee.

Project Information

We have obtained project information through a series of site visits, meetings at the plant site, discussions with you and your staff, discussions with members of the TVA Ash Recovery Team, and discussions with plant personnel. We have also been provided geotechnical investigation reports that include field investigations and laboratory tests performed by Singleton Laboratories, TVA-prepared drawings, and slope stability analyses.

This letter addresses three sub-tasks we have been recently assigned:

1. Investigate the feasibility of installing a liner/leachate collection system on the existing dredge cells and provide a conceptual design including sketches and estimated material quantities. TVA will use the estimated material quantities to develop an order of magnitude cost estimate.

2. Gather information concerning the feasibility of installing a Vibrated Beam Slurry Wall to cut off seepage through the existing dredge cells.

3. Perform a cursory review of slope stability analyses of the dredge cells recently made by members of your staff.

The following paragraphs address these sub-tasks.

Synthetic Liner and Underdrain

At TVA's request, we gathered information related to the use of a synthetic low-permeability liner and underdrain system to assist in determining if this concept might be a potential feasible remediation alternative. Essentially, this concept involves the placing of a low-permeability liner and underdrain system on the prepared surface of the existing Stage C3 cells to create a "bathtub" where future ash placement in the cells would not result in additional piezometric head on the lower dikes and subsequent additional seepage and piping. After evaluating technical literature, construction specifications, and project experience with the placement of such systems, we have determined the construction of this system would consist of the following:

- Grading of the existing surface cell ash to form a "saw-tooth" surface conceptually shown on the attached "Grading and Collector Plan"
- Construction of a 60 mil High Density Polyurethane (HDPE) synthetic liner on the graded surface
- Construction of the collector drain system conceptually shown on the attached figure
- Placement of a protective cover and drainage layer consisting of about 12 inches of free draining sand on the HDPE liner

Conclusion – The construction of the synthetic liner and collector drains would conceptually provide an option for continued use of the dredge cells and reduction of the potential for additional seepage and piping associated with the continued use of the cells. During our limited investigation we did develop concerns related to the feasibility of such a system. These concerns can be summarized as follows.

- Based upon conversations with designers and contractors familiar with synthetic liner systems, we understand that these liners are relatively commonly used for fly and bottom ash landfills. However, we could find no project experience where such a liner had been placed on the surface of an existing ash pond to form a low-permeability cut off for future cell operations.

- Differential settlement caused by compression of the underlying ash sediments as a result of the placement of new ash could result in loss of liner or collector drain integrity. Also, differential settlement could result in distortion of the "saw-tooth" graded surface such that drainage conditions were not favorable.

- Based upon MACTEC's project experience of high volume dredge effluent eroding non-cohesive materials, the placement of new ash materials into the lined cells by uncontrolled dredging might disturb the free draining sand protective cover/drainage layer overlaying the liner. Loss of liner integrity and/or the creation of unfavorable drainage conditions might necessitate the construction of a stilling basin or some other such special feature to slowly release new ash sediments onto the surface of the lined cell.

- Construction of the proposed system would require some relatively fine grading of the existing ash materials. The ability of these materials to be formed and maintained in the necessary shape prior to the construction of the liner is not known.

- Liner systems require seams between adjacent pieces of liner to be joined using one of several different processes. Based upon our investigation, each of these processes requires relatively clean liner material for proper bonding at the seam. Based on the history of "dusting" problems with ash, stringent QA/QC construction procedures and precautions would be required to assure the development of proper seams in the liner.

- Future operations, such as dredging or underdrain or outlet drain construction, would have to be performed in such as way as not to compromise the integrity of the synthetic liner.

The attached quantities were developed based upon the conceptual design shown on the attached figures. Not included in the attached quantities are design services, surveying services, or QA/QC services.

Table 1 Approximate Quantities			
Item	**Cell 1**	**Cell 2**	**Total**
60-mil HDPE Liner	1,000,000 SF	1,800,000 SF	2,800,000 SF (65± Acres)
SP Sand Protective Cover/Drainage Layer	37,000 CY	65,000 CY	102,000 CY
6-Inch Perforated Pipe	---	---	13,000 LF
8-Inch Perforated Pipe	---	---	285 LF
12-Inch Perforated Pipe	---	---	120 LF
6-Inch Non-Perforated Pipe	---	---	425 LF
12-Inch Non-Perforated Pipe	---	---	125 LF
6-Inch Liner Penetration Boots	---	---	8 Each
12-Inch Liner Penetration Boots	---	---	1 Each
Rip Rap	---	---	20 CY
1032 Crushed Stone	---	---	20 CY
1081 Crushed Stone	---	---	940 CY
Filter Fabric	---	---	90,000 SF
Anchor Trench Excavation	---	---	1,100 CY
Anchor Trench Compacted Backfill	---	---	1,100 CY
Ash Grading - Cut	---	---	55,000 CY
Ash Grading - Fill	---	---	58,500 CY
Prepared By MH Date 12/4/03 Checked By [illegible] Date 12/4/03			

Vibrated Beam Slurry Wall

At TVA's request, we gathered information related to the Vibrated Beam Slurry Wall (VBSW) technique to determine if this concept might be a potential feasible remediation alternative. We discussed this concept with other Mactec employees with actual design and construction experience with this technique; contractors with installation experience; and the President and Vice President of the company that holds the patent rights, Slurry Systems Incorporated (SSI). We also obtained technical literature, construction specifications and project experience. Our limited investigation can be summarized as follows.

- MACTEC has successfully used this concept on several dams but typically to depths of 30 to 35 feet.
- One major commercial construction contractor indicated his experience was limited to a wall depth of about 55 feet maximum.

- We could find no project experience of a wall built through ash sediments although walls have been constructed on the outside of ash containment areas. SSI indicated they had successfully installed many walls in soils that had characteristics and behaviors similar to ash, i.e., wet, soft, fine grain sands and silts.

- SSI provided to us a listing of approximate 70 projects where they have installed VBSW. The majority of the listed projects were walls less than 50 feet in depth. However, there was one project with a wall of 82 feet and another at 100 feet depth.

- SSI indicated a wall with a maximum depth of 95 feet is currently being constructed in the northwest.

- SSI also indicated that most walls have been constructed with active seepage flow similar to the recent seepage at the ash cells at Kingston.

- MACTEC evaluated an existing soils investigation report (Singleton Laboratory Report dated September 29, 1994) supplied by TVA in an attempt to determine the elevation of an in-situ impervious soil to key the bottom of the slurry wall into to establish positive cutoff of flow. The widely spaced borings in this report did not provide sufficient information to confidently establish a required wall depth to ensure a positive cutoff. Based upon extremely limited information, it is believed a wall depth of roughly 90 feet would be required. As noted previously, there are very few existing VBSW that have been installed this deep. It should be noted that no boring information exists along the west side of the cells (along Swan Pond Road) and only one boring along the south side dike, i.e., only one boring in over 3,000 feet length of dike.

Conclusion – A VBSW may be capable of successfully cutting off the existing and future seepage from the dredge cells. However, we have some concerns about this technique before we could make a strong recommendation for its use. These concerns can be summarized as follows.

- We believe that additional borings are necessary to confidently establish a profile of impervious soil beneath the ash to know with some certainty the required depth of slurry wall.

- We cannot find an existing project where a VBSW has been constructed in ash sediments.

- The wall depths anticipated for the Kingston dredge cells would be approaching the upper limits of depths we have been able to determine for existing projects.

We have learned that VBSW cost approximately $2 to $4 per square foot to install depending upon the wall depth, i.e., costs increase with depth. Roughly 7,250 linear feet of wall would be required to completely encircle the existing Stage C perimeter dike. Assuming a required wall depth of about 90 feet and a cost of $5 per square foot due to the significant depth, a completed VBSW would cost roughly $3,300,000. This cost would not include a boring program to confidently establish a design wall depth.

Slope Stability Analyses

At TVA's request, we reviewed the slope stability analyses performed by TVA on the ash disposal cells. The information provided to us included slope stability input files, as well as corresponding plots showing slope geometries, material types and cross section zonings with assumed densities and shear strength properties, phreatic surfaces, computer generated failure surfaces, and associated factors of safety. The findings of our cursory review can be summarized as follows.

- The provided information included four sets of analyses. The first analysis included an "as is" or existing geometry with an approximate maximum elevation of 810 feet msl. This analysis investigated the short-term condition (end of construction). The minimum factor of safety was 1.6.

- The second analysis included a projected future geometry with a maximum elevation of 841 feet msl. This analysis investigated both the short-term and long-term static conditions. The minimum factors of safety for the short-term and long-term conditions were 0.9 and 1.2, respectively.

- The third analysis included the projected future geometry with a maximum elevation of 841 feet msl. This analysis incorporated the implementation of a hypothesized bentonite slurry cutoff wall which altered the phreatic surface. The factors of safety for the short-term and long-term conditions were 1.0 and 1.4, respectively.

- The fourth analysis included the projected future geometry with a maximum elevation of 841 feet msl. This analysis incorporated a slightly modified fly ash geometry and higher shear strength properties. The factors of safety for the short-term and long-term conditions were 2.9 and 2.3, respectively.

Conclusion - It was observed that the shear strength properties of the various materials (earth dike, residual soil, bottom ash, and fly ash) used in the slope stability analysis were exactly as reported in soils investigation reports (Singleton Laboratory Report(s) dated September 29, 1994 and May 31, 1995). These reports were supplied to us by TVA. Although the shear strength properties used in the analyses were obtained directly from laboratory testing, some of the values tend to be non-

conservative based on MACTEC's experience, e.g., angle of internal friction of 35 to 38 degrees used for fly ash. Additionally, there is some basis for considering raising parameters for other zones. Further analyses are recommended using more reasonable shear strength property values. Also, the analyses involving the projected future geometry produced short-term and long-term factors of safety of less than 1.5. Further stability analyses and evaluation of existing and proposed construction is recommended.

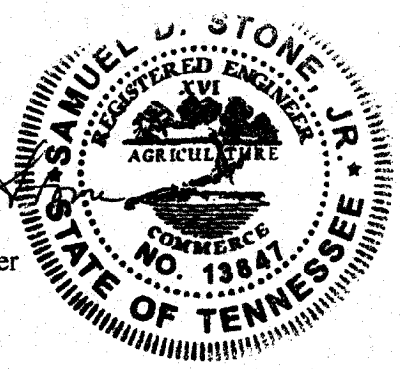
Mr. Purkey, we appreciate this opportunity to provide these services to TVA. If you have any questions regarding this information, please contact Carl Tockstein, Matt Haston, or Sam Stone at (865) 588-8544.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Matthew B. Haston, P.E.
Senior Engineer

Samuel D. Stone, P.E.
Senior Principal Engineer



MBH/SDS:sjm

cc: Mr. Lynn Petty
TVA Chattanooga

Electronic AutoCAD File Attachments on CD: DREDGECELLS_SITEPLAN
DREDGECELLS_SECT A & B

STAGE	YEAR	QUANTITY	UNIT	COST/CY	ESCL FACTOR	$AMOUNT	NPV
	2003		CY	$ 5.00			
D1	2004	198,800	CY	$ 5.00	1.030	1,023,820	$890,278
D2	2005	103,400	CY	$ 5.00	1.061	548,485	$421,912
D3	2006	122,200	CY	$ 5.00	1.093	667,656	$460,453
E1	2008	92,600	CY	$ 5.00	1.159	536,744	$306,711
E2	2010	98,900	CY	$ 5.00	1.230	608,173	$296,670
E4	2011	116,800	CY	$ 5.00	1.267	739,794	$336,270
						$4,124,672	**$2,712,293**

Note: Estimated escalation is based on 3% per year for combined labor and equipment.

KINGSTON FOSSIL PLANT
INSTALL 60 MIL HDPE LINER ON SWAN POND
ROAD SIDE OF EXISTING DREDGE CELL

Estimate Number	04101	**Option:**	0	**PCN Number:**	
Plant:	KIF	**Revision:**	0	**Estimate Type:**	Conceptual
Cost Engineer:	C. L.Toney	**Unit #:**		**Estimate Accuracy:**	+/- 30%
Requesting Engr:	Harold L. Petty	**Phase:**	1	**Estimate Issue Date**	12/15/2003

	Hours	Dollars
Phase I		
Engineering		$7,000
Partner (Non-Manual)		
Other / Other Organizations		$0
Total Phase I		***$7,000***
Phase II		
Engineering		$33,000
Long Lead Procurement		$0
Partner (Non-Manual)		
Other / Surveying & Envr Permitting		$10,000
Total Phase II		***$43,000***
Phase III		
Construction (Partner)		
Permanent Material		$0
Labor (T&L)	2,571.00	$62,230
Labor (Non-Manual)	260.00	$13,000
Equipment		$34,645
Subcontracts		$483,645
Partner Fee		$3,762
Partner Insurance		$2,257
Escalation		$15,770
Construction Risk Dollars		$0
Other		$4,036
Total Construction Cost		$619,345
Engineering		$6,421
Direct plant support + TVA Other Costs		$0
Project Risk Dollars		$17,234
Other / Field QA/QC Services		$7,000
Total Phase III		***$650,000***
All Phases		
Construction Partner	2,831.00	$619,345
Long Lead Procurement		$0
Engineering		$46,421
Other / Other Organizations		$17,000
Total Risk Dollars		$17,234
Total Project Costs	**2,831.00**	**$700,000**
For Information only Total Environmental		**$0**
For Information only Total Demolition Costs		**$0**

KINGSTON FOSSIL PLANT
INSTALL 60 MIL HDPE LINER ON SWAN POND
ROAD SIDE OF EXISTING DREDGE CELL

Project name	KIF/04101/DREDGE CELLS
Estimator	C. L.Toney
Labor rate table	KIF 40 2003
Equipment rate table	TVA Equipment
Project	Dredge Cell
Plant	KIF
Estimate #	04101
Requesting Engr	Harold L. Petty
Option	0
Revision	0
Phase	1
Estimate Type	Conceptual
Estimate Accuracy	+/- 30%
Est. Issue Date	12/15/2003
Funding Type	O & M
Notes	Installation of a liner on Swan Pond road side with1 foot of bottom ash on the existing dredge cells. This is a conceptual cost estimate based on input provided by FE civil site group. All costs are estimated in 2004 dollars. Estimate assumes a 3 month construction duration. Estimate assumes engineering dollars at +/-7% of construction total. Estimate includes an allowance for surveying services, enviromental permitting and field QA/QC services.
Report format	Sorted by 'Location/Activity' 'Detail' summary

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost/Unit	Total Amount
DREDGE CELL												
	Install Liner											
		Anchor Trench Excavation	600.00 cy	0.200	120.00 mh	2,699	-	-	1,500	-	7.00	4,199
		HDPE Liner, 60-Mil (Including Penetration Boots)	575,000.00 sf		-	-	-	482,625	-	-	0.72	482,625
		Anchor Trench Compacted Backfill	600.00 cy	0.300	180.00 mh	4,048	-	-	4,367	-	14.03	8,415
		Load, Haul, Dump Bottom Ash And Spread	29,000.00 cy	966.667	30.00 cd	47,340	-	-	24,300	-	2.47	71,640
		Install Liner			**2,220.00 hrs**	**54,087**		**482,625**	**30,167**			**566,879**
		DREDGE CELL			***2,220.00 hrs***	***54,087***	***0***	***482,625***	***30,167***			***566,879***
xCONST FACILITY												
	Construct Facilities											
		Mobilization	1.00 ls	64.000	64.00 mh	1,578	-	-	810		2,387.98	2,388
		Admin Time (Employee proc, etc)	1.00 ls	64.000	64.00 mh	1,578	-	-			1,577.98	1,578
		Maint Road, Buildings & Facilities	1.00 ls	43.000	43.00 mh	829	-	-	1,720		2,549.04	2,549
		Drinking Water	1.00 ls	58.000	58.00 mh	1,233	-	-	218		1,450.29	1,450
		Hauling	1.00 ls	58.000	58.00 mh	1,347	-	-	435		1,782.34	1,782
		Portable Toilet Service	1.00 ls		-	-	-	1,020	-	-	1,020.00	1,020
		Demobilization	1.00 ls	64.000	64.00 mh	1,578	-	-	1,296		2,873.98	2,874
		Construct Facilities			**351.00 hrs**	**8,143**		**1,020**	**4,479**			**13,642**
		xCONST FACILITY			***351.00 hrs***	***8,143***		***1,020***	***4,479***			***13,642***
zNON MANUAL												
	Field General Expens											
		Non Manual - Phase 3	1.00 ls	260.000	260.00 mh	13,000	-	-	-	-	13,000.00	13,000
		Field General Expens			**260.00 hrs**	**13,000**						**13,000**
		zNON MANUAL			***260.00 hrs***	***13,000***						***13,000***

Estimate Totals

Labor	75,230		2,830.999	hrs
Material	0			
Subcontract	483,645			
Equipment	34,645		1,738.000	hrs
	593,520	593,520		
Small Tools Expense	1,157		0.450	$/hr
Consumables & Expendables	2,489		4.000	%
Office Supplies & Expense	390		3.000	%
	4,036	597,556		
Escalation - Craft Labor	2,987		4.800	%
Escalation - Subcontract	12,091		2.500	%
Escalation - Perm Materials			1.100	%
Escalation - Small Tools	87		0.034	$/hr
Escalation - Consumables	124		0.200	%
Escalation - Non-Manual Labor	455		3.500	%
Escalation - Office Supplies	26		0.200	%
	15,770	613,326		
Partner Insurance (FY04)	2,257		3.000	%
Partner Award Fee (FY04)	3,762		5.000	%
	6,019	619,345		
FPG Engineering - Phase 1	7,000			
FPG Engineering - Phase 2	33,000			
FPG Engineering - Phase 3	5,000			
Project Controls & Estimating	1,421		3.158	%
	46,421	665,766		
Phase 2 Surveying	5,000			
Phase 2 Enviromental Permit	5,000			
	10,000	675,766		
Phase 3 Field QA/QC 1% Constr	7,000			
	7,000	682,766		
Rounding	17,234			
	17,234	700,000		
	Total	***700,000***		

KINGSTON FOSSIL PLANT
INSTALL 60 MIL HDPE LINER AROUND
PERIMETER OF EXISTING DREDGE CELL

Estimate Number	04102	**Option:** 0	**PCN Number:**		
Plant:	KIF	**Revision:** 0	**Estimate Type:**	Conceptual	
Cost Engineer:	C. L.Toney	**Unit #:**	**Estimate Accuracy:**	+/- 30%	
Requesting Engr:	Harold L. Petty	**Phase:** 1	**Estimate Issue Date**	12/15/2003	

	Hours	Dollars
Phase I		
Engineering		$16,000
Partner (Non-Manual)		
Other / Other Organizations		$0
Total Phase I		***$16,000***
Phase II		
Engineering		$77,000
Long Lead Procurement		$0
Partner (Non-Manual)		
Other / Surveying & Envr Permitting		$15,000
Total Phase II		***$92,000***
Phase III		
Construction (Partner)		
Permanent Material		$0
Labor (T&L)	5,827.14	$141,019
Labor (Non-Manual)	580.00	$29,000
Equipment		$78,905
Subcontracts		$1,164,970
Partner Fee		$8,501
Partner Insurance		$5,101
Escalation		$37,446
Construction Risk Dollars		$0
Other		$9,133
Total Construction Cost		$1,474,075
Engineering		$13,253
Direct plant support + TVA Other Costs		$0
Project Risk Dollars		$9,672
Other / Field QA/QC Services		$15,000
Total Phase III		***$1,512,000***
All Phases		
Construction Partner	6,407.14	$1,474,075
Long Lead Procurement		$0
Engineering		$106,253
Other / Other Organizations		$30,000
Total Risk Dollars		$9,672
Total Project Costs	**6,407.14**	**$1,620,000**
For Information only Total Environmental		**$0**
For Information only Total Demolition Costs		**$0**

KINGSTON FOSSIL PLANT
INSTALL 60 MIL HDPE LINER AROUND PERIMETER OF EXISTING DREDGE CELL

Project name	KIF/04102/DREDGE CELLS
Estimator	C. L.Toney
Labor rate table	KIF 40 2003
Equipment rate table	TVA Equipment
Project	Dredge Cell
Plant	KIF
Estimate #	04102
Requesting Engr	Harold L. Petty
Option	0
Revision	0
Phase	1
Estimate Type	Conceptual
Estimate Accuracy	+/- 30%
Est. Issue Date	12/15/2003
Funding Type	O & M
Notes	Installation of a liner around perimeter with 1 foot of bottom ash on the existing dredge cells. This is a conceptual cost estimate based on input provided by FE civil site group. All costs are estimated in 2004 dollars. Estimate assumes a 6.5 month construction duration. Estimate assumes engineering dollars at +/-7% of construction total. Estimate includes an allowance for surveying services, enviromental permitting and field QA/QC services.
Report format	Sorted by 'Location/Activity' 'Detail' summary

Location	Activity	Description	Takeoff Quantity	Labor Productivity	Labor Quantity	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Cost/Unit	Total Amount
DREDGE CELL												
	Install Liner											
		Anchor Trench Excavation	1,350.00 cy	0.200	270.00 mh	6,072	-	-	3,375	-	7.00	9,447
		HDPE Liner, 60-Mil (Including Penetration Boots)	1,626,000.00 sf		-	-	-	1,162,590	-	-	0.72	1,162,590
		Anchor Trench Compacted Backfill	1,350.00 cy	0.300	405.00 mh	9,108	-	-	9,825	-	14.03	18,934
		Load, Haul, Dump Bottom Ash And Spread	69,300.00 cy	966.667	71.69 cd	113,126	-	-	58,069	-	2.47	171,195
		Install Liner			**5,263.14 hrs**	**128,307**		**1,162,590**	**71,269**			**1,362,166**
		DREDGE CELL			***5,263.14 hrs***	***128,307***	***0***	***1,162,590***	***71,269***			***1,362,166***
xCONST FACILITY												
	Construct Facilities											
		Mobilization	1.00 ls	64.000	64.00 mh	1,578	-	-	810		2,387.98	2,388
		Admin Time (Employee proc, etc)	1.00 ls	64.000	64.00 mh	1,578	-	-			1,577.98	1,578
		Maint Road, Buildings & Facilities	1.00 ls	100.000	100.00 mh	1,928	-	-	4,000		5,928.00	5,928
		Drinking Water	1.00 ls	136.000	136.00 mh	2,891	-	-	510		3,400.88	3,401
		Hauling	1.00 ls	136.000	136.00 mh	3,159	-	-	1,020		4,179.28	4,179
		Portable Toilet Service	1.00 ls		-	-	-	2,380	-	-	2,380.00	2,380
		Demobilization	1.00 ls	64.000	64.00 mh	1,578	-	-	1,296		2,873.98	2,874
		Construct Facilities			**564.00 hrs**	**12,712**		**2,380**	**7,636**			**22,728**
		xCONST FACILITY			***564.00 hrs***	***12,712***		***2,380***	***7,636***			***22,728***
zNON MANUAL												
	Field General Expens											
		Non Manual - Phase 3	1.00 ls	580.000	580.00 mh	29,000	-	-	-	-	29,000.00	29,000
		Field General Expens			**580.00 hrs**	**29,000**						**29,000**
		zNON MANUAL			***580.00 hrs***	***29,000***						***29,000***

Estimate Totals

Labor	170,019		6,407.136	hrs
Material	0			
Subcontract	1,164,970			
Equipment	78,905		3,879.585	hrs
	1,413,894	1,413,894		
Small Tools Expense	2,622		0.450	$/hr
Consumables & Expendables	5,641		4.000	%
Office Supplies & Expense	870		3.000	%
	9,133	1,423,027		
Escalation - Craft Labor	6,769		4.800	%
Escalation - Subcontract	29,124		2.500	%
Escalation - Perm Materials			1.100	%
Escalation - Small Tools	198		0.034	$/hr
Escalation - Consumables	282		0.200	%
Escalation - Non-Manual Labor	1,015		3.500	%
Escalation - Office Supplies	58		0.200	%
	37,446	1,460,473		
Partner Insurance (FY04)	5,101		3.000	%
Partner Award Fee (FY04)	8,501		5.000	%
	13,602	1,474,075		
FPG Engineering - Phase 1	16,000			
FPG Engineering - Phase 2	77,000			
FPG Engineering - Phase 3	10,000			
Project Controls & Estimating	3,253		3.158	%
	106,253	1,580,328		
Phase 2 Surveying	10,000			
Phase 2 Enviromental Permit	5,000			
	15,000	1,595,328		
Phase 3 Field QA/QC 1% Constr	15,000			
	15,000	1,610,328		
Rounding	9,672			
	9,672	1,620,000		
	Total	***1,620,000***		