Type a question for help

۸

🛐 New 🔹 🗿 🗙 👘 Steph 🐘 Reply to all 🐘 Potential 🔯 🖓 Send/Receive 🔹 🙄 Find 🔗 I 🚇 Type a contact to find • • • • • • •

😢 🎯 Back 🖓 🖄 💾 🛕 👘 🖓 Messages

• 🖃 🖉 🖓

	Pond vs Peninsula	
avorite Folders	Arranged By: Date Newest on	top
Inbox (6) Unread Mail	3 Okter	
Sent Items	Baugh, James 5. 03/10/ Gypsum Disposal	/2005
Mill Mail Folders	Gary, Just wanted to be sure that budgeting for a couple gypsum disposal projects aren't failing through the	of
 KIF Projects KIF Projects - Ash Deleted Items KIF450 (Gypsum) 	FW: Kingeton By-Product Disposal - Meeting Result: fyi Dennis Original Message From: Baugh, James S.	'2005 :
 KIF530 (Develop Flyash, Gypsum, and bottom a Budget Design Environmental Meeting Agendas and Notes 	ash Daugh, James S. 02/17) Draft KTP Presentation This may change again Let me know if you have any questions. Steve Baugh Fuel By-Products and Properties LP 50	'2005 ∦ 5-C
Meetings Parsons Per Review Pond vs Pennicula Ponds and Resonnsibilities	Purkey, Ronald E. 02/09/ RE: Draft Sensitivity Analysis - KIF pond vs Peninsu Steve, We have reviewed the subject spread sheets and h the following comments(most of which I discussed e	2005 la nave sarlier
Scope KIF531 (Replace Kennedy Weir) Cher Progress Reports Score b Enderc	 Renfroe, Bret 02/08/ KIF Dry Fly Ash Estimate Attached is the latest estimate, It came out to be \$25MM. It includes the \$16MM quote, \$3MM for de slurry system, \$3MM in escalation, \$0.7MM in 	2005 ම luge
KIF Projects - Closed KIF Projects - Closed KIF Projects - General Information KIF SCR LIP (VIES38)	 ₩ Harless, J. Larry 02/08/ R£: KIF550: KIF dry fly ash estimate ₩II do. When and if this meeting is scheduled I will you know. Original Message 	2005 let
	Kinsey, Barry A. 02/07/ FW: KIF dry fly ash estimate	2005

Gypsum Disposal

Baugh, James S. រីខៈ Nuyt, Gary M. Co: Purkey, Ronald E.; Haber, Stanley M.

Gary,

Just wanted to be sure that budgeting for a couple of gypsum disposal projects aren't falling through the crack.....

1. Is the design and construction of gypsum disposal facilities for Bull Run in your scrubber project budget?

2. I am assuming (a dangerous thing) that following the decision to pursue the development of the peninsula for Kingston gypsum disposal, you will be picking up the peninsula design and construction costs in your scrubber project budget (Ron Purkey - will you provide the funding needs to Gary, Stan, and myself). Are you planning to cover these costs?

Let me know if we need to discuss this.

Thanks.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

: Elle Edit View Go Icols Actions Help : New - A A A A A A A A A A A A A A A A A A	forward 🛕 🛃 Send/Regeive 🔹 🎝 Find 🖄 Lûi. Type a con	Type a question for help tact to find 💽 🖌 🚱 着 🏠 📕
Mail Favorite Folders Inbox (6) <i>Unread Mail</i> <i>For Follow Up</i> Sent Items	Pond vs Peninsula Newest on top Arranged By: Date Newest on top Kinsey, Barry A. 02/07/2005 FW: KIF dry fly ash estimate 1 don't have anything loaded in the schedule to support this current	FW: KIF dry fly ash estimate Kimsey, Barry A. You forwarded this message on 01/09/2005 2147 AM Place treat this as Private.
All Mail Folders	 Altitude 02/07/2005 Fwi: Meeting: Petty (Meeting ID: 6705) When: Tuesday, February 08, 2005 2:30 PM-4:00 PM (GMT-05:00) Eastern Time (US & Canada). ************************************	 Te: Haber, Stanley M. Is this a FY05 or FY06 approved project? I don't have anything loaded in the schedule to support this current effort. If we need to do a full study we can. Original Message From: Harless, J. Larry Sent: Monday, February 07, 2005 4:33 PM To: Purkey, Ronald E.; Davis, Victor W.; Kimsey, Barry A. Cc: Peterson, Leonard J.; Renfroe, Bret; Hedgecoth, Melissa A. Subject: KIF dry fly ash estimate Sensitivity: Private
Construction Cons	 Renfroe, Bret 02/07/2005 RE: KIF Dry Fly Ash Estimate Ron, Based on Victor's response of no Mechanical contract admin.and review or mechanical BOP, the basis of the Purkey, Ronald E. 02/07/2005 FW: KIF Dry Fly Ash Estimate Please respond to Victor and myself. Thanks. Ron 	Minutes from the meeting dated 2/7/05 on the subject project. For the estimating section to complete the estimate on this project we will need some information on the following: • Electrical - Electrical power feeds, TVA FPG responsibility/scrubber responsibility

Them . The state of the state o	Forward 🛕 🔄 Send/Receive 🔹 🙄 Find 🖄 🔟 Type a contac	t to find 🔹 🧶 🚱 🤧 🏝 🖥
🕜 Back 🔗 💷 🚍 💁 🔗 💁 Messages		
Sensitive		(a) A second se Second second seco
il	Pond vs Peninsula	
orite Folders	Arranged By: Date Newest on top 🗸 🛧	FW: KIF Dry Fly Ash Estimate
Прох (6)	Purkey RopaldE 0207/2005	Purkey, Ronald E.
Unread Mail	EW: KIE Dry FMAsh Estimate	ια: Renfroe, Bret
🐊 For Follow Up	Please respond to Victor and myself. Thanks.	Co: Haber, Stanley M.
Sent Items	Pan mar (marcel Message	
Mail Folders	Baugh, James S. 02/07/2005	Please respond to Victor and myself. Thanks.
KIF PRB Fuel Switch	RE: KIF update	Ron
KIF Projects	we will schedule the conference call for a time that you can altend.	
KIF Projects - Ash	Original Message	Original Message
Deleted Items	🗌 🎰 Purkey, Ronald E. 02/07/2005	From: Davis, Victor W.
🖞 🃖 KIF450 (Gypsum)	RE: KIF update	Sent: Monday, February 07, 2005 7:36 AM
KIF530 (Develop Flyash, Gypsum, and bottom ast Budget	i have meeetings from 7-10am and at 3 pm	To: Purkey, Ronald E.
	From: Baugh, James S.	Subject: RE: KIF Dry Fly Ash Estimate
	Rurkey, Ropald F. 02/07/2005	I dan't ago anything in this for Machanical
Meeting Agendas and Notes	FW: KIF - Drainage Blanket - Need for Stability Dec 🔮	contract admin and review or mechanical BOP
Meetings	fyi	
🚵 Parsons	Original Message	Original Message
Peer Review	Durkey, Ronald E. 02/02/2005	From: Purkey, Ronald E.
Pond vs Peninsula	Fill: Matrix to KTE	Sent: Thursday, February 03, 2005 3:05
Scope	fyi	PM
KIF531 (Replace Kennedy Weir)	Original Message	To: Haber, Stanley M.; Davis, Victor W.
Other	From: Purkey, Ronald E.	Subject: RE: KIF Dry Fly Ash Estimate
Progress Reports	Purkey, Ronald E. 02/07/2005	Ston, it's all right, I will cand one
Search Folders	rw: kur - Ureinage blanket - Need for Stadility De W	Gran - it's an ingin - i win send one
KIF Projects - Closed	Original Message	Victor - for your viewing pleasure
KIF Projects - General Information	From: Purkey, Ronald E.	Victor - for your viewing preasure
are sub-right (ES-SR)	🛲 🔝 Baugh, James 5. 02/04/2005	Ron
Mail	KiF update	
	peninsula at KIF that we discussed earlier this week. I	Original Message

Sensitive		
Mall Favorita Folders Inbox (6) Unread Mail For Follow Up	Pond vs Peninsula Arranged By: Date Newest on Baugh, James S. 02/04 KJF update We have concleted the sensitivity analyses on por	KIF update KIF update Baugh, James S. Te: Purkey, Ronald E.; Haber, Stanley M. C: Lundy, Dennis L.
Sent Items All Mail Folders KIF FGD KIF PRB Fuel Switch KIF Projects KIF Projects - Ash Collected Items KIF450 (Gypsum) KIF530 (Develop Flyash, Gypsum, and bottom ash Dugget Design	 Definite Us at KJE that we discussed earlier this wee would like to review the shalysis summary on None Adgecoth, Melissa A. 02/04 RE: KIF Dry fly ash For those that need to call in to the meeting, the n is 423-751-2428, and the I.D. # is 6426. Again, the meeting is at 3:00 EST. Purkey, Ronald E. 02/03 RE: KIF Dry Fly Ash Estimate Stan - it's all right - I will send one victor - for your viewing pleasure Pool 	We have completed the sensitivity analyses on pond vs peninsula at KIF that we discussed earlier this week. I would like to review the analysis summary on Monday morning, then send it to you for comments. The conference call with UCC to resolve issues on the estimate for dry ash collection is scheduled for Monday.
Environmental Environmental Meeting Agendas and Notes Meetings Parsons Peer Review	Haber, Stanley M. 02/03 RE: KIF Dry Fly Ash Estimate Don't you think that he should get a copy? Original Message From: Purkey, Ronald E. 02/03	2005 Let me know if you have any questions. Steve Baugh Fuel By-Products and Properties LP 5G-C
Roles and Responsibilities Roles Cope KIF531 (Replace Kennedy Weir)	RE: KIP Dry Fly Ash Estimate no, Bret used the vendor's info as he had gotten th from TVA facilities to silo turnkey. Original Message	(423) 751-6137 he ash ∜
Outer Progress Reports Search Folders Search Folders KIF Projects - Closed KIF Projects - General Information	Haber, Stanley M. 02/03 RE: KIF Dry Fly Ash Estimate Ron, Did the Mechanical section review this to ensure th was complete from their perspective?	/2005
	Haber, Stanley M. 02/03 RE: UCC meeting yes. Original Message) /2005 ₩

S Pond vs Peninsula - Microsoft Outlook		Type a guestion for help
Diew - G A X G Book G Reply to All A Pool	orward 🧕 🛃 Send/Receive • 1 🏵 Find 🕑 🚇 Type a contact (• 1 프 환국,	to find 🔹 🧐 🚱 🖓 🦕
SI Sensitive		
Mail	Pond vs Peninsula 🗰	
Favorite Folders	Arranged By: Date Newest on top 🏹 🛧	RE: OCC meeting
Inbox (6)	Contradier, Stanley M. Dogus/2005	Haber, Stanley M.
Unread Mail	PE DEC meeting	ັສ: Baugh, James S.
📖 For Follow Up	y03.	
Sent Items	Citiginal Message	ves.
All Mail Folders	From: Baugh, James S	· · · · ·
al 🦽 KIF FGD	🔜 📖 Baugh, James S. 02/03/2005	Original Message
🕃 🎒 KIF PRB Fuel Switch	RE: UCC meeting	From: Baugh, James S.
🗃 🎒 KIF Projects	I have a copy on my desk - do have time to come by to	Sent: Thursday, February 03, 2005 9:06
🗟 🎒 KIF Projects - Ash	Original Message	AM
Deleted Items	Haher Stapley M 02/03/2005	To: Haber, Stanley M.
🗟 🎆 KIF450 (Gypsum)	FW:LICC meeting	Subject: RE: UCC meeting
🕀 🔛 KIF530 (Develop Flyash, Gypsum, and bottom ash	Steve,	
🛄 Budget	I believe that we were going to distribute a copy of the	I have a copy on my desk - do have time
🛄 Design	original UCC estimate for review by 2/2. I didn't get a	to come by to pick it up?
Environmental	🗛 Purkey, Ronald E. 02/03/2005	
Meeting Agendas and Notes	FW: UCC meeting	Original Message
Meetings	Original Message	From: Haber, Stanley M.
Parsons	From: Baugh, James 5. Sept: Wedgesday, Enhruppy 02, 2005 4:02 DM	Sent: Thursday, February 03, 2005
Peer Review		8:22 AM
Pond vs Peninsula	DS: VIS Dandus Desired Askin Dis	To: Baugh, James S.
Roles and Responsibilities	Steve	Subject: FW: UCC meeting
	It looks accurate to me.	Importance: Low
KIF531 (Replace Kennedy Weir)	Stan	
ing Other	🖓 Purkey, Ronald E. 02/01/2005	Steve,
Search Folders	KIF Dry Fly Ash Estimate	
With Drojects - Closed	Per my action item in the Meeting last Thursday, I have	I believe that we were going to
	attached the Dry Ash estimate for Kingston, Bret	distribute a copy of the original
	Remitte uid the estimate and will be glad to discuss any	UCC estimate for review by 2/2.
	Baugh, James 5. 02/01/2005	didn't get a copy. Can I have one
A Mail	Kir Pond vs Peninsula Action Pian	please? I also would like to be part
1 1 2 1 2 2 3 2 2 3 3 2 3 3 3 3 3 3 3 3	anything from our meeting this morning.	of the phone call on Friday.

Elle Edit. View Go Iools Actions Help 고리New - 그렇고 가 X · @Reply 전용Reply to All 중 F	orward 🛕 🛛 🔁 Send/Receive 🕞 🎒 Find 🖄 🕴 Type a conta	Type a question for he
🔆 🕲 Back ⊗ 🖾 🔚 🔔 🔅 🟠 Messages		
Sensitive		
Aail Aana ann an An	Pond vs Peninsula	
avorite Folders	Arranged By: Date Newest on top	KIF Pond vs Peninsula Action Plan
Inbox (6)	(1) Haber, Stanley M. 02/03/2005	Baugh, James S.
For Follow Up	FW: ULL meeting	Younened on 12/07/2005 77 45 AM
Sent Items	I believe that we were going to distribute a copy of the original UCC estimate for review by 2/2. I didn't get a	 To: Lundy, Dennis L.; Purkey, Ronald E.; Haber, Stanley M Attachments: AKIF action plan FEb 1 2005, vis (25 KB)
All Mail Folders	🖳 📖 Purkey, Ronald E. 02/03/2005	
Mir PRB Fuel Switch	FW: UCC meeting	Please review the attached and let me know if I
KIF Projects	From: Baugh, James S.	missed anything from our meeting this morning.
Deleted Items	Sent: Wednesday, February 02, 2005 4:03 PM	
🖼 🋄 KIF450 (Gypsum)	REVISE Produce Perincula Artico Plan	I hanks.
🖼 📖 KIF530 (Develop Flyash, Gypsum, and bottom ash	Steve,	Steve Bauch
Budget	It looks accurate to me.	Fuel By-Products and Properties
Environmental	Purkey, Ropald F. 02/01/2005	LP 5G-C
Meeting Agendas and Notes	KIF Dry Fly Ash Estimate	(423) 751-6137
Meetings	Per my action item in the Meeting last Thursday, I have	
Parsons	Attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any	
Pond vs Peninsula	Baugh, James 3. 02/01/2005	
Roles and Responsibilities	KIF Pond vs Peninsula Action Plan	
Scope	Please review the attached and let me know if I missed	
KIF531 (Replace Kennedy Weir)	Thanks.	
Progress Reports	📾 Petty, Harold L. 01/26/2005	
Search Folders	FW: KIF Pond or Peninsula decision	
KIF Projects - Closed	From: Watts, Janet K	
KIF Projects - General Information KIF SCD LIG (KIES38)	Sent: Wednesday, January 26, 2005 4:19 PM	
Mail	KINGSTONMATRIXPRESENTATION 2 severing the A	
1 S C S C		

From: Baugh, James S.

Sent: Thursday, March 10, 2005 9:26 AM

To: Nuyt, Gary M.

Cc: Purkey, Ronald E.; Haber, Stanley M.

Subject: Gypsum Disposal

Gary,

Just wanted to be sure that budgeting for a couple of gypsum disposal projects aren't falling through the crack....

1. Is the design and construction of gypsum disposal facilities for Bull Run in your scrubber project budget? 2. I am assuming (a dangerous thing) that following the decision to pursue the development of the peninsula for Kingston gypsum disposal, you will be picking up the peninsula design and construction costs in your scrubber project budget (Ron Purkey - will you provide the funding needs to Gary, Stan, and myself). Are you planning to cover these costs?

Let me know if we need to discuss this.

Thanks.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

From:Lundy, Dennis L.Sent:Monday, February 28, 2005 10:58 AMTo:Haber, Stanley M.Subject:FW: Kingston By-Product Disposal - Meeting Results

fyi

Dennis

----Original Message----From: Baugh, James S.
Sent: Monday, February 28, 2005 7:51 AM
To: Deskins, Earl L
Cc: Preslar, Jacky D.; Watts, Janet K; Lundy, Dennis L.
Subject: Kingston By-Product Disposal - Meeting Results

This is to confirm the results of and action items from our meeting at Kingston on February 23, 2005.

As a result of the meeting, we collectively agreed to pursue the Peninsula as the site for disposal of scrubber gypsum, and to dispose of ash only in the existing ash pond complex. We also agreed that the following project keydates will be achieved.

Permanent Dredge Cells Complete detailed design for dredge cell repair – 5/30/05 Complete dredge cell repairs – 9/30/05 Peninsula Development Complete HydroGeo studies – 8/15/05 Submit Part II Solid Waste Permit application – 10/15/05 Complete design, receive all required permits – 12/15/07 Complete construction – 11/30/08 Action items from the meeting are as follows:

1. Provide Earl Deskins with projected yearly O&M costs for both Peninsula and In-Pond disposal options -Baugh by March 7.

2. Provide Earl Deskins with a quarterly report on project status, cost, and schedule - Baugh to lead effort, support from Lundy

and Watts organizations - first quarterly report by June 3.

3. Provide Earl Deskins with a write up for the TWRA that discusses TVA's plans for the peninsula and the reason for these

plans - Watts to lead effort, support from Baugh and Lundy organizations - by March 18.

Let me know if you have any questions or if there are action items I did not include.

Thanks.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

03/14/2009

From: Baugh, James S.

Sent: Thursday, February 17, 2005 1:56 PM

To: Haber, Stanley M.

Subject: Draft KIF Presentation

Attachments: kINGSTON Pond vs Peninsula r4.ppt

This may change again....

Let me know if you have any questions.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137



Kingston Coal Combustion By-Product Disposal

Pond vs. Peninsula

February 23, 2005

 Cost Estimate for dry ash collection has been revisited Potential for reduction of drainage layer design and cost has been explored Engineering perspective Environmental perspective Environmental perspective Sensitivity Analysis of options has been performed – results are in this presentation Recommendation has been developed 		
---	--	--



- Original UCC turnkey estimate was \$16M in 2003 (TVA provides electrical service at the powerhouse wall)
- Due to 60% increase in steel prices, UCC estimate has increased to \$19M
- Additional upgrade to dense slurry system will add an additional \$3M
- Additional TVA cost is approximately \$3M
- Total cost of dry ash conversion is \$25M in 2005 dollars (\$24.2 currently used)

က

 Engineering Perspective GeoSyntec believes that the cost of the drainage layer can be reduced by 25 to 40% via design changes. Parsons position is that the current design is the minimum requirement. TVA Fossil Engineering concurs with Parsons. TVA Fossil Engineering concurs with Parsons. TVA Fossil Engineering concurs with recurrent design is the minimum requirement. TVA Fossil Engineering concurs with Parsons. Alversely impact schedules for providing required gypsum disposal cooperation with TVA Damage TVA's credibility with TDEC and impact TDEC's level of cooperation with TVA
--

TVA-00027997

IVA



Sensitivities run for Peninsula Option include:

- Impact of gypsum marketing
- Impact of potential development cost escalation:
- Sinkhole repair
- Potential need for off site clay
- Impact of 5# coal (rather than 2.8# coal) with and without gypsum marketing

× I	
•	PVs for the most likely scenarios (2.8# or 5#
	coal with marketing with adjustments to the
	base case cost estimates) are between \$23.7M and \$25.7M
•	Due to inherent cost uncertainties (dense
	slurry installation/operation and cost of
	sinkhole remediation), the most likely
	scenarios for pond and peninsula are
	essentially financially equal.

Negatives	 Potential community opposition to peninsula development Permitting and development cost risk due to Karst geology 	μ
Positives	 Best for gypsum marketing: — Adequate space for dewatering facilities dewatering facilities - Keeps marketer out of ash pond complex Simplifies disposal operations by keeping ash and gypsum Completely separate Land available for future expansion 	

Negatives	 Reduced in-pond operational flexibility More complex disposal operations; increased risk of problems if facility is not intensively managed Will not be possible to reclaim gypsum for marketing
Positives	 Avoids potential community opposition to peninsula development Potential reduction in manpower due to all waste disposal operations in a single consolidated facility

- Dewatering facilities for marketer may have to be located near or on the ball fields
 Will have to truck or convey
- gypsum for marketing across plant site Free Water Volume
 - Free Water Volume requirements will increase due to increase in volume of wastewater discharges

TVA-00028001

ω



- Develop the peninsula for long term gypsum disposal
- TDEC as is pending the outcome of additional site Leave the current permit application submitted to investigation on the peninsula.

တ





Additional Sensitivity Analysis Appendix Details

Option	Description	25 year	10 year	5 year Present	2008 Cash
		Present Worth	Present Worth	Worth	Flow
-	Peninsula, Base Case	\$ 23,751,838	\$ 19,574,386	\$ 15,779,328	\$ 11,812,515
1-1	Peninsula with marketing	\$ 19,623,264	\$ 15,920,486	\$ 12,436,566	\$ 6,728,591
1-2	Peninsula with cost escalation	\$ 26,079,479	\$ 21,902,027	\$ 18,106,969	\$ 15,352,565
1-3	5# coal, no marketing, peninsula	\$ 25,220,129	\$ 20,079,171	\$ 15,961,471	\$ 11,812,515
1-4	5# coal with marketing, peninsula	\$ 23,751,838	\$ 19,574,386	\$ 15,779,328	\$ 11,812,515
1-5	5# coal, marketing, cost escalation	\$ 25,744,394	\$ 21,709,344	\$ 18,037,443	\$ 15,352,565
1-6	2.8# coal, marketing, cost escalation	\$ 25,293,667	\$ 21,590,889	\$ 18,106,969	\$ 15,352,565
3	In pond, Base Case	\$ 30,166,737	\$ 16,510,466	\$ 13,485,506	\$ 8,156,619
3-1	In pond, reduced drainage layer,	\$ 21,279,352	\$ 13,231,093	\$ 10,892,184	\$ 4,904,225
	marketing and other considerations				
3-2	In pond, marketing and other	\$ 23,707,462	\$ 15,303,564	\$ 12,964,656	\$ 8,056,195
	considerations			2	
3-3	5# coal, no marketing, in pond	\$ 31,925,701	\$ 25,330,610	\$ 13,485,506	\$ 8,156,619
3-4	5# coal with marketing, in pond	\$ 28,962,461	\$ 16,510,466	\$ 13,485,506	\$ 8,156,619
3-5	5# coal, marketing, cost savings	\$ 24,663,976	\$ 15,614,702	\$ 12,964,656	\$ 8,056,195

WNL

12

IVA

Peninsula:

- Sensitivity PVs range from \$19.6 to 26M.
- Peninsula with marketing (2.8# coal) has the best 25, 10, options (if 50% drainage layer option is not included). and 5 year PVs as well as lowest 2008 cash flow of all
- some cost increase yield 25 year PVs of \$25.2 to \$25.7M. Likely scenarios, 2.8# or 5# coal with marketing and
- have a major impact on project economics. Engineering Sinkhole remediation and the effect on permitting could feels that the remediation costs assumed in the sensitivity analyses are high.

3

 In Pond: Sensitivity PVs ran Sensitivity PVs ran Lowest 25 year PV \$23.7M (if 50% drai included). Likely scenarios, 2 marketing and son marketing and son 25 year PVs of \$23 installing and oper system as assume been investigated i
--

INA

4

From:Purkey, Ronald E.Sent:Wednesday, February 09, 2005 2:13 PMTo:Baugh, James S.

Cc: Petty, Harold L.; Haber, Stanley M.

Subject: RE: Draft Sensitivity Analysis - KIF pond vs Peninsula

Steve,

We have reviewed the subject spread sheets and have the following comments(most of which I discussed earlier with you):

Option 1-1 \$10 million Gypsum pond cost for the marketing case is unrealistic. Should be \$3 million max

Option 1-2

Too much escalation - most of which is Karst Mitigation - the \$1/2 million we used in 1-1 is twice what we expected plus we added 10% contingency to that. This doesn't approach the size and geology of COF. Suggest \$1M.

Option 1-3 No comments

Option 1-4 Gypsum pond on peninsula cost too high because of the marketing.

Option 3 No comment

Option 3-1 Eliminate case due to drainage blanket errors

Option 3-2

Geho pump costs and O&M/station service - great deal - 53 cents/cy is a gooood deal also. If we go that way later, we would want to look into this much deeper.

Option 3-3 No comments

Option 3-4 No coments

Still appears the answer earlier is still the answer with or without marketing.

Ron

-----Original Message-----From: Baugh, James S. Sent: Monday, February 07, 2005 1:23 PM

03/14/2009

To: Purkey, Ronald E.; Haber, Stanley M. **Cc:** Lundy, Dennis L.; Hedgecoth, Melissa A.; Park, Gordon G **Subject:** Draft Sensitivity Analysis - KIF pond vs Peninsula

The attached excel spread sheet entitled "Summary Matrix R1" shows the draft results of the series of sensitivity analyses performed as we discussed in our meeting last week. The actual analyses with assumptions are also attached.

Please look over the analyses/results and let me know if you have suggested changes or additions. If I haven't heard back from you by mid day on Wednesday of this week, I'll follow up with you.

Let me know if you have any questions and thanks for your help.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

From:	Renfroe, Bret
Sent:	Tuesday, February 08, 2005 2:52 PM
То:	Purkey, Ronald E.; Davis, Victor W.; Haber, Stanley M.; Kimsey, Barry A.
Cc:	Harless, J. Larry; Peterson, Leonard J.
Subject:	KIF Dry Fly Ash Estimate
Attachments:	KIF Fly Ash Estimate R1.pdf

Attached is the latest estimate, It came out to be \$25MM. It includes the \$16MM quote, \$3MM for deluge slurry system, \$3MM in escalation, \$0.7MM in engineering and roughly 10% contingency @ \$2.3MM. Assumptions include The Scrubber project will install a new 161kV Substation and will be designed to handle the additional load required by this project. Additional electrical & mechanical items are assumed minimal considering the magnitude of the project and would be captured in contigency.

If you have any questions, let me know.

Bret Renfroe

Cost Estimating Ph: 423-751-7684 Fx: 423-751-4295

TVA/FPG/FE&TS/EDS/ESS/CES

Spreadsheet Report Dry Fly Ash

Kingston Fossil Plant

Page 1

02/08/2005 2:36 PM

Design & Install New Fly Ash Handling System **Dry Fly Ash Collection**

B. L. Renfroe Dry Fly Ash Project name

Estimator

KIF 60 2004 Labor rate table

TVA Equipment Equipment rate table

KIF 05212 Plant

Estimate # Requesting Engr Option Phase Estimate Type Estimate Accuracy Est. Issue Date

R. E. Purkey

Revision

Conceptual

02/08/2005 +/- 30% Capital Based on UC Service Corporation proposal (203381), it includes Fly Ash Handling design & equipment, which is coming from United Conveyor.

Notes

Funding Type

Substation and will be designed to handle the additional load required by this project. Additional electrical & mechanical items are assumed minimal considering the magnitude of the project and would be captured in contigency. Roughly 10% contingency has been used. Assumptions: The Scrubber project will install a new 161kV

Sorted by 'Location/Activity' 'Detail' summary Report format

TVA-00028011

TVA/FPG/FE&TS/EDS/ESS/CES

Spreadsheet Report Dry Fly Ash

Page 2 02/08/2005 2:36 PM

¥			8	8
INO			0,000	0,000
Am			16,0	3,6
2tal				
Ĕ				
Ē			1	
101				
An				
the				
Ö				
nt			1	1
not				
An				
dini				
ů.				
E			ğ	8
no			0,000	00°,C
Am			16,C	3,6
qng				
1			0	
III				
OW				
al A				
ter				
Na				
			0	
Unc				
Å m				
or J				
Lab				
(UII)				
uar				
a t			<u>अ</u>	# 00
(eo			1.1	÷
Tal				
5				
ţidi,				
5SCI			tion	٤
ă			pora	yste
			S	S Z
			NICE	Slu
			C Se	sluge
			ĭ	ð
		Ľ		
A		setic		
Nİ.		Solle		
Ă		sh (
		N A		
		ш		
lo lo				
)Cat				
Ľ				
	КIF			
	-			

TVA/FPG/FE&TS/EDS/ESS/CES

Spreadsheet Report Dry Fly Ash

Estimate Totals

Labor Subcontract	0 19,000,000 48,000,000	10 000 000	0.000	his	
Engineered Materials - Ph 2 Adjustment - Engr Materials		19,000,000	100.000 % (100.000) %		ပပ
Escalation - Subcontract	3,040,000 3,040,000	22,040,000	16.000 %		O
Elect. Engineering Design Elect. Site Meeting / Travel Mech Engineering - Phase 2 Civil Engineering - Phase 2 Elect. Field Commissioning Project Controls & Estimating	380,000 45,000 120,800 75,000 75,000 655,347	22,695,347	2.526 %		0
Contingency	2, <u>304,653</u> 2,304,653 Total	25,000,000 25,000,000			L

From:	Harless, J. Larry
Sent:	Tuesday, February 08, 2005 8:29 AM
То:	Haber, Stanley M.
Subject:	RE: KIF530: KIF dry fly ash estimate
Sensitivity:	Private

Will do. When and if this meeting is scheduled I will let you know.

-----Original Message-----From: Haber, Stanley M. Sent: Tuesday, February 08, 2005 7:48 AM To: Harless, J. Larry Cc: Waldrep, Roger T. Subject: KIF530: KIF dry fly ash estimate Sensitivity: Private

Larry,

Please keep me copied on your future notes.

Stan -----Original Message-----From: Kimsey, Barry A. Sent: Monday, February 07, 2005 4:46 PM To: Haber, Stanley M. Subject: FW: KIF dry fly ash estimate Sensitivity: Private

Is this a FY05 or FY06 approved project? I don't have anything loaded in the schedule to support this current effort. If we need to do a full study we can.

-----Original Message-----From: Harless, J. Larry Sent: Monday, February 07, 2005 4:33 PM To: Purkey, Ronald E.; Davis, Victor W.; Kimsey, Barry A. Cc: Peterson, Leonard J.; Renfroe, Bret; Hedgecoth, Melissa A. Subject: KIF dry fly ash estimate Sensitivity: Private

Minutes from the meeting dated 2/7/05 on the subject project. For the estimating section to complete the estimate on this project we will need some information on the following:

- Electrical Electrical power feeds, TVA FPG responsibility/scrubber responsibility
- Mechanical BOP for water supply to the silo, drains from the existing water exhausters, if they
 move from their present location.
- Mechanical Add an elevator wash down, sump and scale for the silo.

I would suggest a meeting with all the represented staffs, electrical, mechanical, scrubber group rep. (Tom Myers), estimating (Bret Renfroe & Larry Harless) and Ron Purkey to define the BOP for electrical

03/14/2009

and mechanical. Melissa Hedgecoth can provide the details for the "UCC" bid package.

Ron can we all meet when you and Tom get together to resolve these issues?

J. Larry Harless Supervisor Cost Estimating and Project Controls Cost Phone: (423) 751-3413

From:Kimsey, Barry A.Sent:Monday, February 07, 2005 4:46 PMTo:Haber, Stanley M.Subject:FW: KIF dry fly ash estimateSensitivity:Private

Is this a FY05 or FY06 approved project? I don't have anything loaded in the schedule to support this current effort. If we need to do a full study we can.

----Original Message----From: Harless, J. Larry
Sent: Monday, February 07, 2005 4:33 PM
To: Purkey, Ronald E.; Davis, Victor W.; Kimsey, Barry A.
Cc: Peterson, Leonard J.; Renfroe, Bret; Hedgecoth, Melissa A.
Subject: KIF dry fly ash estimate
Sensitivity: Private

Minutes from the meeting dated 2/7/05 on the subject project. For the estimating section to complete the estimate on this project we will need some information on the following:

- Electrical Electrical power feeds, TVA FPG responsibility/scrubber responsibility
- Mechanical BOP for water supply to the silo, drains from the existing water exhausters, if they move from their present location.
- Mechanical Add an elevator wash down, sump and scale for the silo.

I would suggest a meeting with all the represented staffs, electrical, mechanical, scrubber group rep. (Tom Myers), estimating (Bret Renfroe & Larry Harless) and Ron Purkey to define the BOP for electrical and mechanical. Melissa Hedgecoth can provide the details for the "UCC" bid package.

Ron can we all meet when you and Tom get together to resolve these issues?

J. Larry Harless

Supervisor Cost Estimating and Project Controls Cost Phone: (423) 751-3413

🛱 FW: A	ting: Petty (Meeting ID: 6705) - Meeting	2
Elle E	Yew Insert Format Jook Actions Help	
V Agee	2 Tentative X Decline & Propose New Time Celender 🚓 X 🔹 🔹 🔹 🖓 🔞	<u> </u>
Access The app	Haber, Stanley M. on U2/07/2005 2:23 PM ment occurs in the past.	
From:	Petty, Harold L. on behalf of Latitude Sent: Mon 02/07/2005 2:26 PM	
Required Optional Subject:	Petry, Harold L.; Daniel, R.Smith@worleyparsons.com; eGreg.McNulty@parsons.com; Boggs, J. Markus; Smith, Amos L; Bowers, Larry C; GEOSYNTEC CONSULTANTS INC Attn: R NEIL DAVIES; TElkady@GeoSyntec.com; Purkey, Ronald E. Haber, Stanley M. FW: Meeting: Petty {Meeting ID: 6705}	
Location		
When:	Fuesday, February 08, 2005 2:30 PM-4:00 PM (GMT-05:00) Eastern Time (US & Canada).	
Here	he revised phone call meeting information.	٨
NOTI	HE REVISED MEETING ID NUMBER OF 6705	
l appi Thani Lynn	ate everyone's adjusting their schedule to 2:30 pm for tomorrow's telecon due to our conflict. τ	
	L L	
C From: Sent: To: Subje When When	ial Appointment Latitude Monday, February 07, 2005 2:22 PM Latitude; Petty, Harold L. Meeting: Petty {Meeting ID: 6705} Tuesday, February 08, 2005 2:30 PM-4:00 PM (GMT-05:00) Eastern Time (US & Canada).	
Harol follow	'etty has invited you to a MeetingPlace e-Conference (Mtg ID 6705) on MeetingPlace, February 08, 2005 at 02:30 PM America/New_York. If provided, use the password:	
To at	d from your PC:	
1) La A Me	h the attached "Click to Attend" web link, or browse to <u>http://latitude.cha.tva.gov</u> & enter Mtg ID 6705 ngPlace web page appears.	
2) Cli	Inin Voice & enter your phone number	

3) Click Join Data

From:	Baugh, James S.
Sent:	Monday, February 07, 2005 1:23 PM
То:	Purkey, Ronald E.; Haber, Stanley M.
Cc:	Lundy, Dennis L.; Hedgecoth, Melissa A.; Park, Gordon G
Subject:	Draft Sensitivity Analysis - KIF pond vs Peninsula
Attachments:	KIF Base Case Peninsula.xls; KIF Peninsula with marketing.xls; KIF Peninsula Co escalation xls; KIF 5 Pound coal to Peninsula no marketing xls; KIF Base Case In

tachments: KIF Base Case Peninsula.xls; KIF Peninsula with marketing.xls; KIF Peninsula Cost escalation.xls; KIF 5 Pound coal to Peninsula no marketing.xls; KIF Base Case In Pond.xls; KIF In Pond with marketing and other considerations.xls; KIF In Pond 5 pound coal.xls; Summary Matrix r1.xls; KIF 5 Pound coal to Peninsula with marketing.xls; KIF In Pond 5 pound coal with marketing.xls; KIF In Pond Reduced drainage layer.xls

The attached excel spread sheet entitled "Summary Matrix R1" shows the draft results of the series of sensitivity analyses performed as we discussed in our meeting last week. The actual analyses with assumptions are also attached.

Please look over the analyses/results and let me know if you have suggested changes or additions. If I haven't heard back from you by mid day on Wednesday of this week, I'll follow up with you.

Let me know if you have any questions and thanks for your help.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137 Case: Location: Governing Assumptions: Coal Supply Drainage Layer Marketing

Base Peninsula

2.8 # Current Parsons design No marketing KINGSTON FOSSIL PLANT OPTION 1 - WET ASH IN POND GYPSUM ON PENINSULA

STIMATE NUMBER

(WITHOUT POND BUFFER) PRESENT WORTH

Material		DESCRIPTION	UNITS	Total Cost	Number of	2005 Dollars	2005	2009	2007	2008	2000	2010	ā	2012	-					+	-	-	$\left \right $				ŀ	ŀ			
Additionality Additiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii		Escalation Fact	rtor			Bar chain	8	1				-					*	12	8	Ŕ	50¥	ŝ	2022	2023	2024	2026	2026	2027	2028 2	228 Esc	Inted PRES
Marketion Ware	ſ	Canada Sanata						Ĺ	ſ			5	R	1.31	1.36	1.42	1.48	1.64	80 H	- -	1.80	1	1	88						ŝ	Total
Holicolity (frameworks) Unspective (frameworks) Use	ſ	CAPTING COSTS							ſ		t	ł	ł	┨	$\left \right $												1	8	2.46		8
Main (unified) Unified (unified)	1.1	Install Drains For Swan Pond Road	Lump Sem	51,967,628	-	\$1,967,62	S1 967.628									+							╢		Щ		╢				╢
Imaximation lange Set (36) Set (36) Set (36) Set (36)	ιT	Ash In Pond	Lump Sum	\$562,456	ŀ	\$582,454	6 \$582.456																							1	967,628
Unitational Unitational <	1.11	Phase 2 Base Construction (Base Layers	a) Lump Sum	\$5 431,967	2	\$2,715,98																									5562,456
Minimulation Lingto Filling Minimulation	<u>ст</u>	Gyptum Oe Peninsula	Lump Sum	59015,269		\$9015,26				\$10,150,656						*	4,008,707	169,056													177.763
Optimized Sector Sect	- TP	Mitcolianeous	Lump Sum	\$1,974,007	-	5483,502	2 S403,502			\$265,664																				S10	150,656
Total Capital Carter I a range (in the interval carter) I a range	_	Engineering / Geolech	rump Sum	\$506,829	-	\$509, 52	5306,629										\$ 126,393	1151,528													535,075
Total Capital Capita Capital Capital Capital Capital Capital Capital Ca	_																										f				806,928
		Total Capital Costs		19,780,166			\$ 3,842,416		ŀ	8 10,708,306			ŀ								-										
Orient contraction Unit contractio	_	OPERATING COSTS	ļ][737,109 5 4,6	026,584 S	-	-	-	-					-	f	ŀ	9 -	22.409 \$
Openance feasible feasibl	-	Oredego Cell Phone 1	tump Sum	\$11,04,547	12	\$962,879	\$962,879	51,004,263	\$1,043,450	\$1 064 144	\$1155.12	1 100 220									$\ $	╟	╟		ļ	\square	Ħ	H	H	\mathbf{H}	$\left \right $
Prime Number Number Number Number Statute <	-	Gyptum On Paninsula Disposal Cost	tump Sum	\$3,544,075	8	\$162,204					\$212,946	1321.281	\$229,880	2234 075 t	12 000-010	12 000 019 51	421.179 51.	478.027 \$1.5	37.148			Щ								\$10	984.413
Concernence Numera Marcine Marcine <thmarcine< th=""> Marcine <thmarcine< th=""> Marcine <thmarcine< th=""></thmarcine<></thmarcine<></thmarcine<>	_	Phase 2 Wei Ash (Initial Thru Stage 3)	Iump Sum	\$10,483,975	12	\$373,660	Ī		T							-		200 400 2.7	1219/06	22 208	100	191 \$340	279 \$265.5	10 8965	10 \$582,76	\$398.078	14,001	199'0015	SHT 780 S	155,695 \$6	796,269
		OVICE For Construction Of Dispose	Lunp Jun	5470,247	R	\$19,694	100'615	\$20,426	\$21,20	\$22,061	\$22,900	\$23,793	524 721	\$25.709	\$26,736	\$27,807	\$28,920	51.35 130,076 53	94,726 51,42 11,279 53,	2.534 51.50	8,520 \$1,568 A12 E14	878 \$1.631	631 51,666.2 20 510 510 606.2	51,764,77	2 \$1,425.36	\$1,008,778	\$1,906,129	2,004,014	2, MJ, 110 SZ.	23,000	189 3828
		Total Operating Costs	ļ	26 157 844			-				╢	╢	$\left \right $										Vince	0.804	H.IN	542,808	344,520	\$48,301	S48, 163	20,079	814,066
	r 1						1 BOLATO	AL/10011 4	1,004,013	5 1,106,296	1,361,166 4	1,414,274 3	468,431 \$ 1.	528,208 \$ 1,4	569,336 \$ 1,6	952,910 \$ 1,7	11, 2 820,81*	87.787 \$ 3,254	4,024 2 1,786	051 5 1 858.	973 8 1.831.2	A PART 2 1 12	C 5 100 01								
		Total Costs		45,833,000			5 4,034,067	1 1,024,710	\$ 1,064,660	\$ 11,812,610 \$	1.301,105 6	1.414.274 5	409-421 5 1	And the second		10 010 01								4 41/2/08	87 607 7 6 6	C 245 (1992)	2,443,460 \$	2,641,399 \$ 2	643,062 \$ 2,7	18,774 \$ 48.	\$ 909 24

Present Worth of this Option

00/14/2009
_
~~
~~
_
<u> </u>
~
×
5
ģ
_
ö
ā.
2
-
ē
~
<u> </u>
0
- iii
_
~
5
-
_
_
ō
õ
D I
ATIO
LATIO
ALATIO
CALATIO
SCALATION
ESCALATION
ESCALATION
ESCALATION

	1.040	2.556	2.451	2.359	2.270	2.187	2.105	2.026	1.948	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000
	1.040	2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
	1.040	2.363	2.266	2.181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000		
	1.040	2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1,170	1.125	1.082	1.040	1.000			
	1.040 2025	2.185	2.095	2.016	1.940	1.869	1.799	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000				
	1.040 2024	2.101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					
	1.040 2023	2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000						
	1.040 2022	1.942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000							
	1.040	1.868	1.791	1.723	1.659	1.598	1.538	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000								
	1.040	1.796	1.722	1.657	1.595	1.536	1.479	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000									
	1.040 2019	1.727	1.655	1.593	1.534	1.477	1.422	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
	1.040 2018	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000											
	1.040 2017	1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000												
	1.040 2016	1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1.000													
	1.040 2015	1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1.040	1.000														
	1.040 2014	1.419	1.361	1.310	1.260	1.214	1.169	1.125	1.082	1.040	1.000															
	1.040 2013	1.365	1.308	1.259	1.212	1.168	1.124	1.082	1.040	1.000																
	1.040 2012	1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																	
	1.039 2011	1.262	1.210	1.164	1.121	1.080	1.039	1.000																		
	1.039 2010	1.214	1.164	1.121	1.078	1.039	1.000																			
	1.038 2009	1.169	1.121	1.078	1.038	1.000																				
•	1.039 2008	1.126	1.080	1.039	1.000																					
T	1.039 2007	1.084	1.039	1.000																						
	1.043 2006	1.043	1.000																							
	1.045 2005	1.000																								
		2005	206 200	2007	2008 7008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029

	Cash Flows	NPV
2005	4,834,887	
2006	1,024,719	
2007	1,064,683	
2008	11,812,515	
2009	1,361,188	
2010	1,414,274	\$ 15,779,328
2011	1,469,431	
2012	1,528,208	
2013	1,589,336	
2014	1,652,910	
2015	6,456,126	\$ 19,574,386
2016	6,714,371	
2017	3,254,024	
2018	1,785,551	
2019	1,856,973	
2020	1,931,252	·
2021	2,008,502	
2022	2,088,842	
2023	2,172,396	
2024	2,259,292	
2025	2,349,663	
2026	2,443,650	
2027	2,541,396	
2028	2,643,052	
2029	2,748,774	\$ 23,751,838

Case: Location: Governing Assumptions: Coal Supply Marketing Peninsula with marketing Peninsula

2.8 # Assume SynMat markets 100% after 2011

No gypsum disposal cost after 2011 No change in footprint development

HINOW THESE	Table Collect		T	T	\$1,967,628	100	3082,400	\$1,887,001		\$6,674,221	\$1,201,726		5808.629	Ţ		13 131 802		I		\$7,337,188	\$331,137	\$1,987,601	\$169,039			001 'WHO'R	22,966,026	
Escalated PR		-	╽		\$1,967,628	100	990 7900	38, 77, 763		\$10,150,856	\$2,535,078	Η	529 829	ļ		24 272 400 1	-	ŀ		\$15,984,413	\$664.077	\$23,189,868	\$614,065			¢ 975'209'04	64,674,833 5	
2028		ł		İ			1	ľ							+	ļ		ŀ			8	\$2,233,000	\$50,079		·	BJ0'407'7	2,283,079 1	
3026		2		I				ľ		The second second second second second second second second second second second second second second second se					The second second second second second second second second second second second second second second second se	ļ		ŀ			05	\$2,147,115	548,153			4 C (340' CD4	\$ 2,195,268 \$	
1202	20.0		İ	Ī			CONTRACTOR AND PRACTICE.	ſ					+			ľ		ľ			8	52,064,534	\$46,301			1 0000011 V	1 2,110,836 1	
2026	444		Ī		-								T					ľ			8	\$1,900,129	544,520			awo'azn'z +	1 2,028,649	
2025	5 46																				8	\$1,908,778	\$42,808				1 1,061,196	
2024	340															•					30	\$1,836,363	\$41,162		1 070 201	1.910,040	\$ 1,676,525	
2023	302				and the second se					A PRIME IN A DESCRIPTION OF A DESCRIPTIO			i			ŀ					8	\$1,764,772	\$39,578		1 1 101 101		1 1,804,361	
2022	191																				8	\$1,696,896	\$38,054		0 1721 000	anatan i'i a	\$ 1,734,963	
2021	181										the state of the state of the						·	Ĺ			05	10210213	\$36,592		1 1 000 012		1,688,224	
2020							NAME AND ADDRESS OF TAXABLE				PROPERTY, LABOR & LANDARS &					•					8	51.568,876	235.185		1 401 041	An1-1-1-1	1,604,061	
2019	Ē															•					8	21,508,636	\$23,832		1 1 841 746		8 1,542,366	
2018	8															•					ä	\$1,450,514	\$22.53		1 1 483 DAK		5 1,483,045	
2017	8								_		0					•				7 \$1,537,14		\$1,394,72	531,27		8 2 001 1A2		\$ 2,963,152	
2016	2							7 \$4,169.05			3 \$757,52					1 8 4,926,654		-		9 51,478,02	5		20'055 0		1 1 1 1 1 1 1		1 5 6,434,611	
2015	1.45							\$4,000,70			\$728,39					\$ 4,737,100				\$1.421.17	•		7 \$28.92		3 1 450 086		1 3 4,107,109	
102	1.42															•			_	51,366,51	8		12 S27,80		0 5 1 304 37		8 5,384,324	
£1/2	81															•				\$1,313,8	2		226.77		3 2 1 340 60		3 \$ 1,340,69	
2012	1.31													-		•				¥ 292 IS	8		21 \$25.7		1 5 1.280.13		1 8 1,269,13	
2011	1.26									-						•				30 \$1,214,6	1,9223, 15		27128		1 1 459.43		4 8 1,469,43	
2010	1.21						Concernance of the local division of the loc	COLUMN TRANSPORT												42 51,169,2	46 \$221,2		23.7		8 1 114 27		1 1,414,27	
2005	411					ļ				8	ž		ĺ					-	_	44 51,125,2	\$212.5		61 \$22,9		31 1 361.1		16 8 1,361,11	
2002	617					ļ				\$10,150,6	1999 C					\$ 10,706,3				51,084.1			33 \$22.0		81 5 1.106.21		81 8 11,012,5	
2007	80'1			ŀ		-														200'14			128 861		19 3 1.064.6		10 1 1,064,6	
2006	1,04	-			628	88					209	200			_	16 4				51,004,			594 \$20	ļ	73 4 1.024.7		87 \$ 1,024,7	
rs 2005	1.00				628 \$1,967	406 \$562	Contract of the local division of the local	195		80	202 5493	A70 58/16		-		\$ 3,852.4				2046 518	204	065	519, \$19,		1 992.4		1 4,834,8	
2006 Dolla					\$1,867	1662		\$2,715,		010'88	2430	SATE								7465	2132	C105	519					
Number of Cycles					-	-		7 2		-	*	-				1				- 12	20	12	7 24			ļ		_
Total Cost 2005 Dotlens					\$1,987,62	64 2005		85'101'05	10.000	97'GIN'AS	21,974,00	KA MAR	and the second rest of the second second		And a state of the	\$ 19,700,156			11 11 11 11 11 11 11 11 11 11 11 11 11	90,900,116	23,644,07	\$10,450.97	\$470,24		\$ 28,162,844		E 45,633,080	\$ 22,966,026
UNITS					Lump Sum	Lamo Sum		Lung Sun		roub soul	Lunp Sun	Auto Sun								ILVIND SUM	Lemp Sum	Lump Bum	Lump Sum	ļ	Ĺ			
DESCRIPTION	Escalation Facto		CAPITAL COSTS		Install Drains For Swan Pond Road	Ash In Pond		Phase 2 Base Construction (Base Layors)		BINGUILLA UN UNRADA	Miscellanagus	Encineering / Geotech				Total Capital Costs		OPERATING COSTS			Gypnum On Penlinsula Disposal Cost	Phase 2 Wet Ash (Initial Thru Stage 3)	QAVOC For Construction Of Disposal		Total Operating Costs		Total Costs	Present Worth of this Option
No.					-	~		2A	ŀ	•											¥	20,22,258.54		ſ				

ESTIMATE NUMBER 0509301R1

(WITHOUT POND BUFFER) PRESENT WORTH

TVA-00028024

0014/2008

	040	5773	556	451	359	270	187	105	026	948	873	108	732	665	100	539	480	5	369	316	265	217	22	125	082	5	000
	040	0703	45.0	356 2	268 2	183 2	103 2	024 2	948 2	873 1.	801 1.	732 1	565 1	501	539 1	480 1	1.	369 1	316 1.	265 1	217 1.	1 1	25	982 1	1040	100	7
	040	170	162 3	266 2	181 2	660	122 2	946 2.	373 1.	100	732	565 1	10	539 1.	180	123	1.	116 1.	1 1 1 1	17 1.	1 02	25 1.	82 1	40 1.0	00	≚ 	
	1040	7070	C C10	79 2	2 2	18 2	44 2(11 1.5	101	32 1.4	65 1.	01 1.6	39 16	80 1.	23 1.4	69 1.4	16 1.3	65 1.3	17 1.2	70 1.2	25 1.1	82 1.1	40 1.0	200	≌ 		
	40	1	85 23	95 2.1	16 2.0	40 2.0	69 1.5	9.1 .6	32 1.8	85 1.7	1.6	39 1.6	80 1.5	23 1.4	59 1.4	16 1.3	35 1.3	12	70 1.2	25 1.1	32	10	0 1.0	ੁੰ 			
	40 1.0	24	10	14 2.0	39 2.0	90	97 1.8	2.4	55 1.7	1.6	1.6	1.5	3 1.4	9 1.4	6 1.3	5 1.3	7 1.26	0 1.2	5 1.1	2 1.1	0.1.0	- 0	ة ة				
	0.5	2	14	7 20	4 1.9	4 1.86	8 175	17	1.66	9 1.6	1.5	14	1.42	3 1.36	5 1.31	126	121	5 1.17	2 1.12	1.08	10.1	1 5 1 1 1 1 1					
	30,4	2	6	1.93	1.86	1.79	1.72	1.66	1.60	1.53	1.48	1.42	1.36	1.316	1.26	1.21	1.170	1.12	1.082	1.040	8						
	1.040		1 942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000							
	1.040	EVE.	1 868	1.791	1.723	1.659	1.598	1.538	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000								
	1.040	2020	1.796	1.722	1.657	1.595	1.536	1.479	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000									
	1.040 2019	2	1.727	1.655	1.593	1.534	1.477	1.422	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000									:	
	1.040	2	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000											
	1.040		1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000												
	1:040 2016	2	1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1.000													
	1.040		1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	.082	.040	000														
	2014		419	.361	.310	260	214	.169	.125	.082	040	000															
	2013		.365	308	.259 1	212	168	124 1	082 1	040	000																
	040 1		312 1	258 1	211 1	165 1	123 1	081	040	000	1																
	039 1		262 1	210 1	164 1.	121 1.	380 1.	339 1.	- 8	-																	
	010		214 1,	64 1.	21 1.	1. 1.	39 1.	00	÷																		
	38 1.(009 2		69 1.2	21 1.1	78 1.1	38 1.0	00 1.0	-																			
	39 1.0 08 2		26 1.1	30 1.1	39 1.0	0.1	1.0																				
10	9 1.0 27 20		4 1.1	9 1.03	0 1.0	1.0																					
	3 1.03 66 20		3 1.08	1.03	1.00																						
	5 200		1.04	1.00(
	1.045 200		1.000																								
			2005	2006	2007	208	2003	2010	2	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	5029

	Cash Flows	NPV
2005	4,834,887	
2006	1,024,719	
2007	1,064,683	
2008	11,812,515	
2009	1,361,188	
2010	1,414,274	\$ 15,779,328
2011	1,469,431	
2012	1,289,133	
2013	1,340,698	
2014	1,394,326	
2015	6,187,199	\$ 19,263,248
2016	6,434,687	
2017	2,963,152	
2018	1,483,045	
2019	1,542,366	
2020	1,604,061	
2021	1,668,224	
2022	1,734,953	
2023	1,804,351	
2024	1,876,525	
2025	1,951,586	
2026	2,029,649	
2027	2,110,835	
2028	2,195,268	
2029	2,283,079	\$ 22,966,026

Case: Location: Governing Assumptions: Coal Supply Marketing Increased cost for sinkhole mitigation: Base cost in estimate for 6 sinkholes Parsons estimated cost for repair of 1 sinkhole in pond at Gallatin Assume 12 sinkholes repaired at GAF cost Removal of rock pinnacles (2 acres, 2' out of ground, 3' depth in ground, \$25/yd) Addition to estimate

Base cost for on site clay Base volume of clay

Assume 25% of clay must come from on site source not on the peninsula Add \$2.50 per yard cost to load and haul to peninsula

Peninsula with escalation Peninsula

2.8 # No marketing

	513	,50	0
	250	,00	0
3	,000	,00	0
	403	,33	3
2	889	,83	3

2,128,285 406,800

254,250

ž			T	r	8	r	8	12	8	5	1	8	Ŗ	3	Т	П	₂ 1	T.	m	18	्रा	151	12	П	Þ	3	ę	
PRESENT WORT	Canital Dallare				\$1,967.6		\$582.4	C1 907.0		\$9,001,8		\$1,201.7	e ener	2000			15,448,50			s7,337,18	\$1,116.94	81997B	\$189.0			10,020,01	\$ 28,079,47	
Escalmed					\$1,067,628		\$582,456	Ca 177 769	20111112	\$13,690,706		\$2,535,078	ore ones	1000			27,762,456			\$15,964,413	602/94/96	\$23,189,868	\$314,065			1 0 00 (00/ 'Bt	74,646,065	
5029	T			I				Ì					Ť				•				\$465,655	\$2,233,000	\$50,079			4,140,114	8 2,748,774 \$	
2028	2.48			I				Ī					I				•				\$447,783	\$2,747,115	548, 153		000 000 0	1 100/100/2 4	2,443,062	
2027	2.35		Ī					Ī					Ī	ĺ	-					T	\$430,561	\$2,004,524	\$46,301		100 110 V		\$ 2,541,396	
2028	2.27													The second second second second second second second second second second second second second second second se			5 -				\$414,101	51,900,129	544,520		A10.11 C .	Analytic's a	\$ 2,443,650	
9202	2.18									Contraction and and				and the second sec			•				\$396,078	51,906,776	\$42,806		100 010 0 1	-	\$ 2,349,663	
7054	210																			an analas an an	\$382,767	\$1,630,363	\$41,162		nor our c .	4 4, AUD, 402	\$ 2,209,292	
5202	202																•				\$368,045	\$1,764,172	\$39,578		201 01 0	- 411 4144	\$ 2,172,396	
2023																					\$363,890	31,046,046	538,066		- 10000	-	\$ 2,068,842	
2021	1.87								The second second second second second second second second second second second second second second second se					And a subscription of the					~		\$340,279	31,631,631	\$36,592		. 9,000 00		£ 2,008,502	
6202	1.60																				\$327,191	\$1,500,676	\$35, 185		t 1 011 240		1, 931, 262	
5018	1.73																-				2314,60)	\$1,000,530	\$33,832		2 1 842 074		\$ 1,656,973	
2018	1.00																•				\$302,500	31,430,51	\$32,63		A 1 705 545		8 1,735,561	
2017	001																•			7 \$1,537,146	\$290,872	21,996,12	\$31,275		100 100 1 1		\$ 3,254,024	
2016	78-1							7 54 169 26		and the second se	A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A NAME OF A	0001010					\$ 4,926,884			9 \$1,478,02	1 \$279.69		10,062 0		1 1 787 187		\$ 8,714,371	
2016	7						+	54,008.70		and a second second second second second second second second second second second second second second second	01.01.02	80'0718					\$ 4,737,100		_	21'129'12	5261,92		C6 YC3		0 1 718 A28		8 6,456,126	
2014	4						-										•			0 \$1,366,51	\$269,66		8 \$27.80		1 8 1 842 841		1 \$ 1,862,810	
2013	1.36			ļ													•			31313,96	5 \$248,63		\$26,73		1 1 100 200		8 1,589,334	
2012	1.31																			51,263,43	\$239.01		526,70		1 5 1 528.20		1 \$ 1,528,20	
2011	1,20												ļ	-						30 \$1,214,80	15229.8		24.7		4 5 1.469.43		4 8 1,489,43	
2010	12.1							-									-			42 51,169,2	46 \$221.2		00 \$23,7		8 1.414.27		8 1.414.27	
2009	483	_								8	2	5								44 \$1,126.3	\$12,9		61 \$22,9		1 1 281 19		5 1,391,15	
2006	1.13			┞		_				\$13,690,7	SAUK D	0000					\$ 14,245,34			1,084,1			33 \$22.0		2 1106.2		15,352,56	
2002	1.08		_											_			-			1013,4			36 \$21.2		19 8 1.064.61		18 \$ 1,084,61	
2006	1.04				528		8				~		829			ļ		ļ		100 15 623			320 4	ļ	73 1 1.024.7		87 \$ 1,024,7	
1002 H	1.00				528 \$1,967,		2062.	200		295	000	2000	329 \$8(8.)				2'noz'e			12965 5262	204	366	594 \$19,5		3 982.4		\$ 4,834,8	
1 2005 Dollar per Cycle		H	L		\$1,96,15		12003	\$2,715,5		\$12,159,	1013	-	\$2005	-						\$962.5	\$182.5	Y8285	519.5	╞	┞			
Number of Cycles			L		-			7 2		-	-		+							7 12	20	6 12	7 24	ŀ				~
Total Cost 2005 Dollars					\$1,967,624		C+/ZDGR	\$6,431,96		\$12,109,35.	000 728 13	2012/10/10	28085				102,414,25			\$11,554,54	\$3,644,075	\$10,483,075	\$470,245		5 28.152.844		\$ 49,017,083	\$ 26,079,479
UNITS	ttor			ŀ	Lump Sun		Lump dury	Inne Sun		Iump Sun	Time Area		Iump Sun					F	ĺ	Imp Sum	ILUMP SUM	mus dwirt	tump Sum					-
DESCRIPTION	Escalation Fam.		CAPITAL COSTS		Install Dreins For Swan Pond Road		Brock til den	^{ohase} 2 Base Construction (Base Layers		Gypeum On Paninsula	Merellaneste		Engineering / Geotech			Tatal Plants Plants	FOLDI CAPITAL COSTS		OPENALING COSIS	Dredege Cell Phase 1	Gypsum On Peninsula Disposal Cost	Phase 2 Wet Ash (InNial Thru Stage 5)	DAIOC For Construction Of Disposal		Total Operating Costs		Total Costs	Present Worth of this Option
Ma y					-	ľ	*	24		•	ľ		•			1		ľ	I	9	ž	20,27,23624		T	1			-
		-	-	-	- Andrewski (* 1996)	-	-	1000	-4	-	-	-	-	-	-	-								-			_	

(WITHOUT POND BUFFER)

PRESENT WORTH

KINGSTON FOSSIL PLANT OPTION 1 - WET ASH IN POND GYPSUM ON PENINSULA

ESTIMATE NUMBER 050900 R1

TVA-00028029

03/14/2008

	5	5					١.			,	,																
	1.040	<u>2</u>		2.556	2.451	2.359	2.270	2.187	2,105	2.026	1 948	1873	1 801	1 732	1,665	1.601	1 539	1 480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040
	1.040	2028		2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1801	1.732	1.665	1.601	1.539	1480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000
	1.040	2027		2.363	2.266	2.181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
	1.040	2026		2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000		
	1.040	5772		2.185	2.095	2.016	1.940	1.869	1.799	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	000			
	1.040	2024		2.101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	.082	040	000				
	1.040	C2V2		070	.937	864	.794	1.728	.663	.601	.539	.480	.423	369	.316	.265	.217	170	.125	.082	040	000					
	040	2777	0.0	.942	862	782	725	. 662	. 599	539	480	423	.369 1	.316 1	265 1	.217 1	170 1	.125 1	.082	<u>8</u>	000	-					
	.040	1707	000	000	-R-	.723	659	598	.538 1	480 1	423 1	.369 1	.316 1	265 1	.217 1	170 1	125 1	082 1	-[왕	8							
	040	2020	-	0.0	27.	100/	595	536	479 1	423 1	.369 1	316 1	265 1	217 1	170 1	125 1	082 1	940	8	-	1						
	1 040	51/2		121	000	283	534 1	477	422	369	316 1	265 1	217 1	170 1	125 1	082	99	-	-								
	040 1	5			780	792	475 1	421	367	316 1	265 1	217 1.	1.70 1.	125 1.	082	7 7	 8	-									
	040 1		1 208				418	366	315 1.	265 1.	217 1.	120	125	-	구 옷	⊇ g	-										
	040		1 1	32	1 4	-	202	13	5	17 1.	2	25 1.	82	주 물	≓ gl	-											
	40		76 1	2		8			15	2	25	82 1.1	₽ ₽	⊇ ⊇	-												
	40 1.0		10 14	51			00	2	59 1.2	25	32	- -	ੂ ਹ	-													
	01 20 20		14	1 2				~			õ	0	Ĕ														
	0 10		2 1 34	130	1.2						0	8															
	1.04		131	1 25	1 1 21	4 4 4				1 0	00																
	201		1.26	1 210	1 16	Ç,	1 001	ŝ		Ĩ.																ĺ	
	201		1214	1.164	1121	1 070	1 020		200							l											
	1.038		1.169	1.121	1.078	1028		1																			
0	1.039		1.126	1.080	1.039	1 000																					
F	1.039 2007		1.084	1.039	1.000			ľ	l																		
	1.043 2006		1.043	1.000																							
i	1.045		1.000																	ľ							
			2005	2006	2007	2008	2009	2010	2011	2012	2012	NHOC NO	2015	2016	2047	2018	2010	2020	2021	2022	2023	2024	2025	2026	2027	2028	2020
						L	1	L				L	L	1	L		1			1		L					L

000

	Cash Flows	NPV
2005	4,834,887	
2006	1,024,719	
2007	1,064,683	
2008	15,352,565	
2009	1,361,188	
2010	1,414,274	\$ 18,106,969
2011	1,469,431	
2012	1,528,208	
2013	1,589,336	
2014	1,652,910	
2015	6,456,126	\$ 21,902,027
2016	6,714,371	
2017	3,254,024	
2018	1,785,551	
2019	1,856,973	
2020	1,931,252	
2021	2,008,502	
2022	2,088,842	
2023	2,172,396	
2024	2,259,292	
2025	2,349,663	
2026	2,443,650	
2027	2,541,396	
2028	2,643,052	
2029	2,748,774	\$ 26.079.479

Case:	Sensitivity	
Location:	Peninsula	
Governing Assumptions:		
Coal Supply	5 #	
Gypsum Marketing	No marketing	
Annual Gypsum Production		583,929
Net Gypsum to Peninsula		583,929
Annual Ash production		475,600
Capacity of peninsula		9,300,000
Years of peninsula capacity	16	
Year peninsula capacity expires	2025	
Assume construct a new 40 acre area on the peninsula (\$100,000 acre in 2005 \$) in 2024	\$	4,000,000

327000 2.8

х

583928.5714

1176610 2101090

583928.8

0.55999981

	DESCRIPTION	UNITS	Total Cost 2005 Dolkurs	Number of Cycles	2005 Dollars per Cycle	2005	5005	2007	2006	2006	2016	1102	2012	2013	2014	2016	2018	2017	2018	2019	2020	2021 2	1022	c 8200	1004	ats 20	026 24	20	202	B Escalate SubTot	ad PRESEN	T WORTH sing
	Escalation Factor	5	T	İ		8	8	1.08	2	11	121	23	1.81	86	1.42	14	1.54	1.60	1.66	67	8		a.	202	2 10	18	2 12	36 27	18 2.5		Capital	Dollars
	CAPITAL COSTS							ſ	ſ				ĺ		ſ	ł	ſ			ł	ł	╞	┞	ľ			ŀ				+	
1000			640 COT 670	<u> </u>		64 Arr 110																										
	IN LAS ONGIT FUILS NOW	and dura	070'108'14	-	070,102,14	070 /06 1 6								Ì					t				-							\$136	57,628	51,967,628
n Pon	0	Lump Sun	\$562,456	-	\$082,450	\$562,456	A DESCRIPTION OF A DESC	A DESCRIPTION OF TAXABLE PARTY.					THE OWNER AND A DESCRIPTION OF A DESCRIP						┢				the second second second							32	2,466	\$582,456
16 2 Ba	st Construction (Base Layers)	Lump Sun	\$5,431,967	2	\$2,715,984											\$4,006,707	\$4,169,055		+						-	+				28.17	7,763	51,887,001
E I	n Peninsula	Lump Sun	\$9,015,269	-	\$9,015,269		Construction of the second second second	W.A., MARINA MILLION	\$10,150,666											+				840	200.934			+		\$18.55	3,712	57.264.664
aftane	loes	Lamp Sum	\$1,974,007	Ŧ	205,502	\$450,502			1006,604	Γ						\$728,393	\$757,528	╉	+	+	$\left \right $									\$2.63	5.078	51.201.726
Toert	ng / Geotech	mus dmr.1	5909'828	ļ	\$408,829	\$808,529		T					T	T						t					+				The second second second second	5	M 879	Safre A/2
ľ	fotal Canital Costs		10.700 154			A BK2 &1K			S 10 704 300							1 777 646	1 000 104		-	-	ŀ	-	•			<u> </u> .	H		-			
			and the second se														A LOUGH AND A	•	-		-		-	2 -	+ 1 pon'm+	-			•		+) cor/c	0/12/900
Ĩ	DPERATING COSTS	ľ		-		Γ	Γ							F	-		ŀ	┝	╞	\mathbf{F}	ŀ	┝	ŀ	ŀ	╞	-	-	┝				Ι
906	el Phase 1	Lump Sum-	211 204 242	12	\$962,879	\$962,879	292'000'15	S1,043,460	\$1,084,144	\$1,125,342	\$1,169,230	\$1,214,830	\$1,263,423	\$1,313,960	\$1,366,518	\$1,421,179	S1,478,027 S	1,637,148												\$16,99	4,413	57, 337, 188
O ma	n Peninsula Disposal Cost	Lump Sum	\$3,644,075	8	\$182,204			Π		\$212,946	\$221,261	000/5225	\$239,075	\$248,638	\$258,584	\$263,927	\$279,684	\$290,872	1302,506	\$514,607	\$327, 191	5 6/2 09:55	363,890	5168,045	\$382,767 \$	305.078	414,001 \$	430,561 \$4	47,783 \$46	5,696 \$6,79	6,269	51116,949
10 2 M	ot Ash (Initial Thru Stage 3)	Limp Sum	\$10,453,975	12	\$23,605	Π											ľ	1,394,720 \$	3 916/057/	0,008,530	1,563,876 \$	15 1551 159	000 000 21	764,772 \$1	835,363 \$1	13 8// 306	985,129 52,	064,634 \$2.1	47,115 \$2,22	3,000 \$23,18	9,663	\$1,967,801
8	r Construction Of Disposal	Lump Sum	\$470,247	24	\$19,694	190,612	\$20,436	\$21,235	\$22,061	006'77\$	\$27,793	\$24,721	\$25,709	\$26,736	\$27,807	026'925	\$30,076	\$31,279	\$22,531	\$33,832	\$35,186	\$36,582	990'9ES	\$39,578	\$41, 162	\$42,808	244,520	\$ 102'945	48,153 32	0.079	4.065	\$138.035
۴	otal Operating Costs		28,152,844			B42,473	8 1,024,719	\$ 1,064,685	9 1,108,206	801,146,1-8	1.414,274	\$ 1,699,431	\$ 1.528.208	1,1988,336 5	5 1.852.910 \$	1.719.026 \$	1.767.767 \$ 2	264.024 5 1	765.561 5 1	866.973 \$ 1	831.262 B 2	008.602 \$ 24	Des. EA2 3 2	172 596 6 2	358 792 6 2 3	40 AES 2 2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	41.344 3.744	1 042 1 2 74	1714 A 40 702	ana a	0 626 177
	Total Costs		45, 813,000			4,834,687	\$ 1,024,718	\$ 1,064,685	\$ 11,812,615	\$ 1,361,168	1 1,414,274	\$ 1,468,431	\$ 1.528,209 \$	5 1,588,336 \$	5 1,652,910 3	8,454,126 \$	8.714,371 8 3	1 254,024 6 1	786,561 \$ 1	866.073 5 1	931,252 8 2	008,502 \$ 24	068, 842 8 2	172,396 \$ 10,	042,348 \$ 2,3	M6,065 2 2.4	MC3, 650 8 2.6	41,365 \$ 2.64	3.062 8 2.74	201405 79409	9.07015 2	4.342,282
Sent	Worth of this Option		1 24,342,282																													

(WITHOUT POND BUFFER)

PRESENT WORTH

KINGSTON FOSSIL PLANT OPTION 1 - WET ASH IN POND GYPSUM ON PENINSULA

ESTMATE NUMBER 0509301R1

03/14/2009

TVA-00028034

_																						_			
1.040 2029	2.556	2.451	2.359	2.270	2.187	2.105	2.026	1.948	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1 423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1,000
1.040 2028	2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.065	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
1.040 2027	2.363	2.266	2,181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1,170	1.125	1.082	1.040	1.000		
1.040 2026	2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000			
1.040 2025	2.185	2.095	2.016	1.940	1.869	1.799	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1 040	1.000				
1.040 2024	2.101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	000					
1.040	2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	1.369	1,316	1,265	1.217	1.170	1.125	1.082	040	80						
1.040 2022	1.942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	000							
1.040	1.868	1.791	1 723	1.659	1.598	1.538	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	80								
1.040	1.796	1.722	1.657	1.595	1.536	1.479	1.423	1.369	1.316	1.265	1.217	1.170	1,125	1.082	1.040	1.000									
1.040 2019	1.727	1.655	1.593	1.534	1.477	1.422	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
1.040 2018	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000											
1.040 2017	1.596	1.531	1.473	1,418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000												
1.040 2016	1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1.000													
1.040	1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1.040	1.000														
1.040 2014	1.419	1.361	1.310	1.260	1.214	1.169	1,125	1.082	1.040	1.000															
1 040 2013	1.365	1.308	1.259	1.212	1.168	1.124	1 082	1.040	1,000																
1.040 2012	1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																	
1.039 2011	1.262	1.210	1.164	1.121	1.080	1.039	1.000																		
1.039 2010	1.214	1.164	1.121	1.078	1.039	1.000																			
1.038 2009	1.169	1.121	1.078	1.038	1.000																				
1.039 2008	1.126	1.080	1.039	1.000																					
1.039 2007	1.084	1.039	1.000																						
1.043 2006	1.043	1.000																							
1.045 2005	000																								
-	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
			Ľ	Ľ		Ľ	lĺ	1	1	1	ľ	Ľ	Ľ												

	Cash Flows	NPV
2005	4,834,887	
2006	1,024,719	
2007	1,064,683	
2008	11,812,515	
2009	1,361,188	
2010	1,414,274	\$ 15,779,328
2011	1,469,431	
2012	1,528,208	
2013	1,589,336	
2014	1,652,910	
2015	6,456,126	\$ 19,574,386
2016	6,714,371	
2017	3,254,024	
2018	1,785,551	
2019	1,856,973	
2020	1,931,252	
2021	2,008,502	
2022	2,088,842	
2023	2,172,396	
2024	10,662,348	
2025	2,349,663	
2026	2,443,650	
2027	2,541,396	
2028	2,643,052	
2029	2,748,774	\$ 24,342,282

Case: Location: Governing Assumptions: Coal Supply Drainage Layer Marketing

Base In Pond

2.8 # Current Parsons design No marketing

NUMBER (508301R1

PRESENT WORTH

(WITHOUT POND BUFFER)

PRESENT WORTH	Capital Dollars		200 450 200 46 90 201 201	81, 161, 260 890, 191, 13	\$349,210	18,806,050	T	\$5.016.323	81,500,256	12,385,121	\$298,474	11 770 674	30,166,737
Evoluted		51 CE1 ED6	562,553 562,553 562,553 562,553	12,058,475 137,109,701	\$349.210	31,000,547	ľ	117,486,043	89 674 745	\$29,257,802	51,292,167	1 689 70	119,570,301
82	528						ľ	T	200 2004	\$3,700,214	187.672	3 8/2 2/2 1	4,522,738 \$
222	2					Ī	ľ	T	105 (035	\$3,834,821	\$75,434	1 11/10	4,348,788 5
1202	967)						ſ		\$513.011	020 969 ES	\$73.694	5 4181.525	525,181,5 2
2005	777					·			\$569.433	182,080,587	\$70.657	1920.657	\$ 4,020,657
202	17					•			\$966.763	5121343	616 193	3.364,055	5 3,886,856
¥202	710					·			136 143	20107.060	2011 2015	1907/1/72 \$	196,714,6 8
12 BZ	Ĭ					·			0 8624,00	\$2,967,58	482.82	CALANE 2	\$ 3,574,385
202						•			100.000	\$2.672.65	04'08	80536916 \$	\$ 3,436,908
1202						•	L		17.HBH2	8 52,762,16	820.058	3,304,720	022'106'6 \$
2020									1 5465.03	7 \$2,656.52	1005	5 3,177,615	5 3,177,815
2016						•			26 JMS 6	105.02	02'03	eec'950't 5	200,200.5
2018						•	L		5430,69	52,455,55	50105	1 2,937,884	\$ 2,937,894
2017				-		-	_	02/6/3/15	5414,12	\$2,361.11	249.614	124,506,421	\$ 4,504,421
2018 7			\$1,936,13	\$953,100 \$57,100,70		 \$ 41,231,341		\$1.614.906	\$109.200		91.04	\$ 2,000,876	142,42,817
2015						 •		\$1,552.823	109 2965		946,916	1, 101, 611	1,161,611
2017								\$1,493.056	\$368.158		801-116	\$ 1,905.386	\$ 1,905,366
5402 5671						•		\$1,435,672	966 5553		111 24	6 1,832,111	\$ 1,832,115
RI RI						_		PSPTOPCIS	\$340.363		840.900	8 1,761,646	\$ 1,781,645
1-122 125								SEC 125, 12	\$277.281		\$19 2V	\$ 1,493,810	\$ 1,633,BHD
940 47								\$1.277.534	\$315,000		52.76	905,009,1 \$	\$ 1,630,308
2009								\$1,229,56	181 2023		516.965	5 1,589,112	1,509,112
2005			14 COR 98	50 CT 86		5 6,937,033		\$1,181,58			\$35,018	\$ 1,219,586	\$ 8,156,019
2007								\$1,140,104			CO/ '855	100,111,1	1,173,807
2006								DX //50 14			ecy 203	\$ 1,128,747	11/28/14
2005		29/36/15	59735	\$562.29	N26M3	5,461,673		\$1,052,070			10.103	\$ 1,083,171	\$ 4,546,746
2005 Dolars Der Chris		S1,967,628	\$5.05 AS	524.175.580	\$349.2K			\$1,062,070	8789,412	\$1.478,015	101'123		
Number of Critics		+		3	1		Π	12	8	12	м	Π	Π
Total Cost 2005 Dolars		\$1,967,626	\$342,456 \$306,822 \$2,156,773	\$1 686 838 \$24 175 580	\$349,210	36,546,313		\$12.674 840	\$5,189,249	\$17748.174	216.474	36,307,687	000'YZ#'21
STIMU		Luno Sun	Line Sin Line Sin	Lune Sun Lune Sun	ung dun;			Lung Sun	tum Sun	Lung Sun	tump Sum		
DESCARPTION Ecclasion Pacto	CARTAL CORTS	frietal Dealins For Swan Pond Road	Ash And Oppaum Prend Phase 2 Base Construction Phase 3 Base Construction	Meedianous Ory Py Ash Conversion	Engineering	FOCUL CEDINAL COSTS	OPERATING COSTS	Drudege Call Phase 1	Phase 2 Wet Oppuum (Initial Thru Stage 4)	Photo 3 Dry Arth (relise) Thru Stage 4	OAIOC For Construction Of Disposal Facility	Total Operating Costs	Total Cests
No.		-	- \$	5 M	R			•	10,11,12,12,18815	14,15,16,178,20			

Present Worth of this Option \$ 30,166,737

6002/14/20

9 R		92	1	10	2	2	92	ø	9	5	١=	_S	9	2	2	8	2	2	ģ	اورا	2	0	2	2	9	2
58		2.55	2.45	2.36	2.27	2.18	2.10	2.02	1.94	1.87	18	1.73	1.66	1.60	1.53	1.48	1.42	1.36	1.31	1.26	1.21	1.17	1.12	1.06	1.04	9
1.040		2.458	2,356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1,665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
1.040		2.363	2,266	2.181	2:098	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000		
1.040		2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	ľ		
1.040		2.185	2,095	2.016	1.940	1.869	1.789	1.732	1.665	1.601	1.539	1,480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1000				
1.040		2,101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					
1.040		2.020	1,937	1.864	1.784	1.728	1.663	1.601	1.539	1.480	1.423	1,369	1.316	1.285	1.217	1.170	1.125	1.062	1.040	1.000						
1.040 2022		1.942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.062	1.040	1.000							
1040		1 868	1.791	1.723	1.659	1.598	1.538	1,480	1.423	1369	1.316	1265	1217	1.170	1.125	1.082	1.040	1.000								
1.040		1.796	1.722	1,657	1.595	1.538	1.479	1.423	1,369	1.318	1.265	1.217	1.170	1.125	1.082	1.040	1,000									
1.040 2019		1.727	1.655	1.593	1.534	1.477	1.422	696.1	1,316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
1.040		1,660	1.592	1.532	1.475	1.421	1367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	100											
1.040 2017		1 596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000												
1 040 2016		1535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1.000													
1.040 2015		1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1.040	1.000														
1.040		1.419	1.361	1.310	1.260	1.214	1.169	1.125	1.082	1.040	1.000	ŀ														
1.040 2013		1.365	1.308	1.258	1.212	1.168	1.124	1.082	1.040	1.000																
1.040		1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																	
1.039 2011		1.262	1.210	1.164	1.121	1.080	1.039	1.000																		1
1.039 2010		1.214	1.164	1.121	1.078	1.038	1.000																			1
2009		1.169	1.121	1.078	1.038	1.000																				1
2008		1.126	1.080	1,039	1.000																					
1.036 2007		1.084	1.039	1 000																						
1.043		1.043	1.000																							
1.045 2005		1.000																								
_		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
	Ш											L				L				IJ						_

	Cash Flows	NPV
2005	4,544,744	
2006	1,129,747	
2007	1,173,807	
2008	8,156,619	
2009	1,569,112	
2010	1,630,308	\$ 13,485,506
2011	1,693,890	
2012	1,761,645	
2013	1,832,111	
2014	1,905,396	
2015	1,981,611	\$ 16,510,466
2016	43,342,817	
2017	4,504,421	
2018	2,937,884	
2019	3,055,399	
2020	3,177,615	
2021	3,304,720	
2022	3,436,909	
2023	3,574,385	
2024	3,717,361	
2025	3,866,055	
2026	4,020,697	
2027	4,181,525	
2028	4,348,786	
2029	4,522,738	\$ 30,166,737

Case: Location: Governing Assumptions:	Reduced drainage layer In Pond
Coal Supply	2.8 #
Drainage Layer (no change)	
Present cost in 2005 dollars -Phase 2	5,598,822
Present cost in 2005 dollars -Phase 3	2,155,779
Gypsum Marketing	100% marketing after 2011
No gypsum disposal cost after 2011	
In Pond gypsum handling cost:	
Present cost over 20 years	5,188,249
Assume same cost as for peninsula - no increased cost through 2014	3,644,075
Fly Ash handling cost	
Present cost over 20 years	12,624,840
Assume same cost as for peninsula -	11,554,547
no increased cost through 2014	
Delay Dry Ash conversion	
Present year for dry ash conversion	2016
Gypsum marketing - 2012-2016	1,309,440
Years of fly ash storage gained	2.75
Revised year for dry ash conversion	2019
Reduced Fly Ash Handling cost	
Present cost/yr for dry ash handling	1,479,015
Revised cost for handling dense slurry	250,000
based on conversation with JEA and	
Calvin Toney (1 dozer and 1 operator)	

KINGSTON FOSSIL PLANT OPTION 1 - WET ASH IN POND GYPSUM ON PENINSULA (WITHOUT POND BUFFER)

ESTIMATE NUMBER 050301R1

PRESENT WORTH

PRESENT WORTH	Capital Dollars		T	\$1,967,628	\$587,458 \$4,144,945 \$711,277	\$1,164,066 \$5,899,534	540 210	111818713 \$		\$7.631,960	\$331,137	8129-756	11, 1023	5 8,088 JAR	\$ 23,707,462
Escatated SubTotal				\$1,967,628	582.48 582.09 593.00	52 069 475 81,753 38	\$349.210	56,314,215	Π	319,245,675	5664.017	\$5.621.656	\$1,202,167	£ 27,023,508	817,756,03 8
8202	2.46	I	İ					Ī	I		8	5626 975	\$76.401	1 //B/45	118,468
1202	2.46							Ī	I		80	SEN. 198	\$75,434	1000	5 690,833
1222	238		Ì					Ē	Ħ		50	1590.768	101.612	964,262 1	664,252
2026	2.07							Ĩ	Π		8	2100 9995	110'011	638,714	1 638,714
202	2.18							Ī	Π	Π	8	881'39'55	267,040	614,148	614,148
2024	210							·			8	161,523	865 339	\$ 580,527	125,062 8
1202	2.02				1			Ī	Π		ŝ	165 1053	cre cre	\$ 567,844	87.814
2023	1.94	1	1					Ī	Ħ		8	S465,560	201-102	545,075	545,875
2024	18.1							ľ	Π		8	3499,860	\$50.003	370,076	526.976
0202	1,60							ŀ	Ħ		3	\$449,936	810'038	\$ 304,705	S04.785
5102	1.73					MI,M. 368		6 e1,743.368	Ħ	\$1,662,579	8	\$431,663	363,701	2,147,849	13,851,315
2018	1 48							ľ	Π	\$1504.633	03	08	\$51,036	1,350,203	1,850,269
2017	1.40									\$1,507.146	8	8	049.614	1,560,737	1,548,797
2018	1.54				53,000,027	\$563,103		\$ 4,172,240	Π	\$1.475,027	8		547.745	51,525,767	5.696.007
2015	1.48 \$									\$1421.179	8		\$45.904	\$ 1,467,063	\$ 1.467.083
2014	1.42								Π	\$1,366,519	8	commencial and an	944.139	\$ 1,410,657	5 1.410.657
5013	1.36							ŀ	Π	11,313,950	8		342.041	\$ 1,336,401	135461 2
2012	1.151								Π	\$1 263.423	8		10,000	\$ 1,304,232	1 11 101 212
2011	1.26								Π	\$1,214,630	S229.640		902,968	\$ 1,403,040	910 131 1 3
2010	1.21									\$1,169,230	\$221,251		\$37.766	\$ 1,428,247	1424247
2005	117							ŀ	Π	\$1125.342	1212,946		\$36,349	\$ 1,374,637	1 14 617
2008	1.15				046,000,040	26030,003		\$ 6,337,633	Π	\$1.084.144			\$35,016	5 1,118,102	4 0 0 CE 104
2007	1.05							ľ		\$1,043,450			\$33,703	\$ 1,077,153	1011111
2002	1.04							•		\$1,004,283			\$32,438	12/18/01 1	101 T T T T
2002	1.00			\$1,567,628	5392,456	6(2,293	\$249.2-0	\$ 3,481,573		\$962,879			101.102	1985'1288 \$	1 1 100 001
2005 Dollars Der Cycle				\$1,967,628	\$581,459 \$5,591,822 \$2,155,779	\$561.279	\$349.210			\$962.870	\$182.204	\$250.000	101.153		
Number of Cycles	ſ		H	-		e -	-	T	Ħ	12	8	12	z	T	
Total Cost 2015 Dokurs				\$1,267,626	\$402.456 \$5.568.822 \$2.155.779	805 866 18 085 211 M28	\$149 210	36,316,313	H	\$11,654,547	\$2 544 075	\$13,000,000	NZF 91/5	18,945,046	45 161 140
UNITS		ŀ		ump Sum	Lunp Sun Lunp Sun Lunp Sun	Luno Sun Luno Sun	Lump Burn	-	H	une ann	Lune Sun	tump 3m	Ump Sun	ľ	
DESCRUPTION	Escalation Pactor		CAPITAL COSTS	held Drains For Swan Pord Road	Ash And Gypsum In Pond Phase 2 Base Construction Phase 3 Base Construction	Micelawous Dry Ply Adn Cenversion	logiteering	Total Capital Certs	OPERATING COSTS	Oredege Call Phase 1	Share 2 Wet Oxpain (hibb Thru Stope 4)	Phase 3 Dry Ash (thisis Thru Stage 4)	OVOC For Construction Of Disposal Facility	Total Operating Costs	The second
E a	1				- 5 9	5 ¥5	n				81 881 25 21 15 01	14,15,18,178.20			

Present Worth of this Option 2. 23.707.462

5002/11/50

1.040	2029		2.556	2.451	2.359	2.270	2.187	2,105	2.026	1.948	1.873	1.801	1.732	1.665	199	1.539	1.480	1.423	1.369	1.316	1.285	1.217	1.170	1,125	082	040	000
1.040	2028		2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.665	1.601	1.538	1.480	1.423	1.359	1.316	1.285	1.217	1.170	1.125	1.082	1.040	1.000	
1.040	2027		2.363	2.266	2.181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1,601	1.539	1.480	1.423	1.369	1.316	1.205	1.217	1.170	1.125	1.082	1.040	1,000		
1.040	2026		2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1,539	1.480	1.423	1369	1.316	1265	1217	1.170	1.125	1.082	1.040	1.000	ľ		
1.040	2025		2.185	2,095	2.016	1.940	1.869	1.789	1.732	1.665	1.601	1.539	1.480	1,423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000				
1.040	2024		2.101	2.014	606	1.866	1.797	1.730	1.665	1.601	1.539	1,480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	040	1.000					
1.040	2023		2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	696	1.316	1.265	1.217	1.170	1.125	1.062	040	000						
1.040	2022		942	1.862	1.792	1.725	1.662	1.599	1.539	480	.423	369	316	265	1.217	0211	1,125	082	040	000							
1.040	2021		1 868	1.791	1 723	1 659	1 508	1.538	1.480	1.423	1.369	1316	1.265	. 217	1.170	1.125	.082	040	000								
040	2020		96/	2221	1.657	202	1.538	624-1	1.423	996	318	265	1.217	1.170	1.125	.082	040	000	Ì								
040	2019		727	1,655	283	534	477	.422	696	316	265	217	170	.125	.082	040	80										
1.040	2018		1.650	1.592	1.532	1.475	1.421	1.367	1.316	1 265	1.217	1.170	1.125	1.082	1.040	8											
1.040	2017		1.596	1.531	1.473	1.418	396	1.315	1.265	1.217	1.170	1.125	1.062	040	8												
040	2016		535	472	416	. 363	313	264	217	170	125	082	040	00													
040	2015		476	415	362	311	263	215	170	125	082	040	8	Ì													
040	2014		419	.361	310	260	214 1	169	125	082	040	000															
040	2015		365	306	259 1	212 1	168 1	124 1	.082 1	040 1	1000																
040	2012		312 1	.258 1	211 1	165 1	.123 1	180	040	000																	
600	2011		262 1	210 1	164	.121 1	080	039	000	-																	
600	2010		2.4	1.164 1	121	1.078	600	000																			
1.038	2009		169	1.121 1	840.1	038	000																				
660	2008		126	080	600	÷	Ť																				
680	2007		084	039	80																						
043	2006		043	000																							
045	2005		000																								
É	-		2005	2006	2002	8002	2008	2010	5011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	5029
L		Ļ	Ľ		Ľ		Ľ	Ľ	Ľ		Ľ		Ľ	Ľ		Ľ	Ľ	Ľ	Ľ						Ľ	Ľ	

	Cash Flows	NPV
2005	4,455,553	
2006	1,036,721	
2007	1,077,153	
2008	8,056,195	
2009	1,374,637	
2010	1,428,247	\$ 12,964,656
2011	1,483,949	
2012	1,304,232	
2013	1,356,401	
2014	1,410,657	
2015	1,467,083	\$ 15,303,564
2016	5,698,007	
2017	1,586,797	
2018	1,650,269	
2019	43,891,315	
2020	504,785	
2021	524,976	
2022	545,975	
2023	567,814	
2024	590,527	
2025	614,148	
2026	638,714	
2027	664,262	
2028	690,833	
2029	718,466	\$ 23,707,462

20074000 23007000	228000					
583, 929 583, 929 1 972, 600	6,423,680 5 17			ko X		583928.8
Sensitivity In Pond 5 ≴ Current Parsons design Narkeling	2016 2026			327000 2.8 583928.5714	1176510 2101090	0.5599981
	h and gypsum as of 2010 f 2016 gaoty (develop the peninsula)					

TVA-00028045

ESTRATE NUMBER 0509301R1

PRESENT WORTH

(WITHOUT POND BUFFER)

W THESENT WC	all of the local data			29614 829/2961	5542 459 554 554 554 554 554 554 554 554 554	2542846 82.262 5882.404 85.620	540.20 EM	228/20 S 228/20/		1/70.574 87.350	9.674.745 \$1.590	1.526.100 \$3.655	1,282,187 82.64	13,060,067 8 13,0697,	1 1 1 1 1 1
200 E	,	T	l			5453		R 5			1 200'039	780.214 \$4	119,674	00 8 90LTZ	1 1 1 1 1
× g						╢			$\left \right $		a 105/09	53 128 M3	3/6+3/6	348,790 3 4,5	
2 1200	2								$\left \right $		110,018	55 0Z0 967	173.494	1 5 525'UV	
1026 2						550754		484,371 \$	┝		X7 6855	380.597 \$3	370.007	020,637 5 4,	
	3 40				+	×		12 S	H		596,763	121343 23	307,949	9 6 650 200	
1212	200							•	ŀ		196 1155	3,107,060	000'006	E E 1967212)	
1202	ŝ		I					•	ŀ		\$524,004	2,987,555 \$	902.023	\$ 30C'44C'C	
2202	181		ľ					•	ŀ		\$503,850	\$2,872,652	101-102	1 006,000	
1202	4 12		ŀ		ľ			ŀ	H	H	1/11/1915	\$2, 82, 165	800.003	3,336,726	
0202	8 7		ŀ					-	H	╟	\$465,636	\$2,655,928	810'018	3177.015 \$	
5407			ľ						H		1287148	\$2,653,777	\$50,701	3,005,200,5	
2018	ž		ľ	П				ľ	ľ		\$430.653	\$2,455,555	101.030	2,907,094 5	
2017	99.1								-	8	\$414.128	111,180,52	P40,CS 0	2,924,660 \$	
2016	2	I	ſ		\$3,300.137	2963.103		4,172,240 \$	F	8	\$394,200	957.072.58	81740	2,746,239 \$	
Sms	5					\$35,982,404		1 25,082,404		\$1.552.823	\$162.865	Construction and the	198	1,101,611 5	
144	9		ſ					•		\$1,450,029	\$369.158		A1 14	1,005,306 1	
61402	ž	ľ	ľ							\$1,456.672	\$353.996	Π	612.411	1,832,111	
2012	2									\$1,380.454	\$96,0463	Π	E40,005	\$ 1,761,045	
102	1.8									\$1,327,359	NZ./283	and the subscription of th	tto 710	\$ 1,603,690	
0442	1 31									\$1,277,535	\$115,000		201 105	\$ 1,630,306	
6002	4 1									295'622'15	\$303,162	and a second	010 343	1 1,560,112	
2008	11				\$6,303,940	2603.063		\$ 6,907,003		81,18A,568			810'005	\$ 1,210,596	
2002	ä	ĺ						•		\$1,149,104		And and a set of the set	90. 93 1	1 1,173,607	
9002	4		Ĺ					•		\$1,097,309			122,420	\$ 1,420,747	
50 02	8			51,967,628	\$582.456	\$562.278	02943	1 3,461,573		11.052.010			101-101	171,000,1 1	
2005 Dollars Der Cyrels				\$1,967,626	\$582.45 \$55.596.827 \$2,156.779	12/201	\$349.214			3/0/290/1\$	\$256,412	\$1,479,015	101 155		
Number of Orelas	ſ		ſ	-		· -	-	Π		12	8	12	24		
Total Cost 2005 Dollars	ſ			\$1.567.528	\$682.456 \$6.586.822 \$2,155.773	959 521 9CS	\$16.210	C1C,010,90		\$12,524,540	\$5.185.249	\$17,745,714	5143-424	789,307,687	
UNITS	t	t	t	Lung Sen	Lump Sum Lump Sum	Lung Sun Lung Sun	Lump Sun			ump Sun	Lump Sun	Lung Sun	Lung Sun	ľ	
DESCRIPTION	facility action		CAPITAL CORTS	listial Drains For Swan Pond Road	Ash And Orpsum In Pond Phase 2 Base Construction Phase 3 Base Construction	Mecelanious (& construct permissia) Dry Ply Ash Conversion	Engineering	Total Capital Costs	OPERATING COSTS	Dredlege Cell Phase 1	Phase 2 Wet Oppean (hitle Thru Stage 4)	Phase 3 Dry Ash (table Thru Stage 4)	QA'QC For Construction Of Disposal Facility	Total Operating Costs	-11-10
TEN No			ſ	1	- \$ 8	s M	2				1,12,13,108.19	15,16,174.20			

Present Worth of this Option

07/11/2008

2029	2.556	2.451	2.369	2.270	2.187	2.105	2.026	1.948	1.873	1.801	1.732	1.665	1.601	1,539	1.480	1.423	1.369	1.316	1265	1.217	1.170	1.125	1082	1040	1.000	
1.040	2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.665	1.60	1.539	1.480	1.423	1.389	1.316	1.265	1.217	1.170	1.125	1.082	1.040	80.1		
1.040	2.363	2.266	2,181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	8			
1.040	2.272	2.179	2097	2,018	1.944	1.871	1801	1.732	1.665	1,601	1.539	1.480	1.423	1.369	1.316	1.265	1217	1.170	1.125	1.082	1.040	000				
1,040	2,185	2.095	2.016	1.940	1.069	1.799	1.732	1.665	1.601	1.539	1 480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					
1.040	2.101	2.014	1,939	1.866	1 797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.062	090	1000	ľ					
1.040 2023	2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1 000							
1.040	1.942	1.862	1.792	1.725	1.002	1.599	1.539	1.480	1.423	1.369	1.316	1,265	1.217	1.170	1.125	1.082	1.040	1.000								
1.040 2021	1.868	1.791	1.723	1,659	1.596	1538	1.480	1.423	1.369	1.316	1.205	1217	1,170	1.125	1.082	1.040	1.000									
2020	1.796	1.722	1.657	1.585	1.536	1.479	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
1.040	1.727	1.655	1.593	1.534	1.477	1.422	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000											
1.040	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.00												
1.040	1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000													
2016	1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1,000														
1.040	1.476	1.415	1.362	1.311	1.263	1.215	1,170	1.125	1.082	1.040	1.000															
1.040	1.419	1.361	1.310	1.260	1.214	1.169	1.125	1.082	1.040	1.000																
1.040	1.365	1.306	1.259	1.212	1.168	1.124	1.082	1.040	1.000							-		-								
1.040	1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																		
2011	1.262	1210	1.164	1.121	1.080	1.039	1.000																			
1.039 2010	1.214	1.164	1.121	1.078	1.039	1.000																				
1.036 2009	1,169	1,121	1.078	1.038	1.000																					
1.039 2008	1.126	1,080	1.039	1.000																						
1.039 2007	1.084	1.039	1.000									•														
1.043	1.043	1.000																								
1.045 2005	1.000																									
	2005	2006	2002	2008	2003	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	

	Cash Flows	NPV
2005	4,544,744	
2006	1,129,747	
2007	1,173,807	
2008	8,156,619	
2009	1,569,112	
2010	1,630,308	\$ 13,485,506
2011	1,693,890	
2012	1,761,645	
2013	1,832,111	
2014	1,905,396	
2015	37,664,016	\$ 25,330,610
2016	6,888,479	
2017	2,824,889	
2018	2,937,884	
2019	3,055,399	
2020	3,177,615	
2021	3,304,720	
2022	3,436,909	
2023	3,574,385	
2024	3,717,361	
2025	3,866,055	
2026	24,505,068	
2027	4,181,525	
2028	4,348,786	
2029	4,522,738	\$ 31,925,701

KIF Pond vs Peninsula - Sensitivity Analysis Summary

Optior	Description	25 year Prese Worth	nt 10 year Present Worth	5 year Present Worth	2008 Cash Flow	Gypsum Marketing	Dry Ash Conversion	Drainage Layer	Coal	Other considerations
1	Peninsula, Base Case	\$ 23,751.8	38 \$ 19,574,386	\$ 15,779,328	\$11,812,515	No	N/A	NIA	2.8#	
1-1	Peninsula with marketing	\$ 22,966,0	26 \$ 19,263,248	\$ 15,779,328	\$11,812,515	Yes	A/A	N/A	2.8#	100% marketing after 2011
1-2	Peninsula with cost escalation	\$ 26,079,4	79 \$ 21,902,027	\$ 18,106,969	\$ 15,352,565	٥N	A/N	N/A	2.8#	
1-3	5# coal, no marketing, peninsula	\$ 24,342,2	82 \$ 19,574,386	\$ 15,779,328	\$11,812,515	No	A/A	N/A	5#	
1-4	5# coal with marketing, peninsula	\$ 23,751,8	38 \$ 19,574,386	\$ 15,779,328	\$11,812,515	No	A/A	N/A	5#	
3	In pond, Base Case	\$ 30,166,7	37 \$ 16,510,466	\$ 13,485,506	\$ 8,156,619	No	2016	Parsons	2.8#	
3-1	In pond, reduced drainage layer,	\$ 21,279,3	52 \$ 13,231,093	\$ 10,892,184	\$ 4,904,225	Yes	2019	50% Cost	2.8#	Reduced fly ash handling cost per JEA;
	marketing and other considerations							of Parsons		reduced gypsum handling cost (same as
										Option 1)
3-2	In pond, marketing and other	\$ 23,707,4	62 \$ 15,303,564	\$ 12,964,656	\$ 8,056,195	Yes	2019	Parsons	2.8#	Reduced fly ash handling cost per JEA;
	considerations									reduced gypsum handling cost (same as
5.5	5# coal no marketing in pond	\$ 31 075 7	01 8 25 330 610	\$ 12 ARE EOR	\$ 8 156 610	ÿ	2015	Dareone	# 4	Ti tiondo

4 9

Parsons

23

Yes

13,485,506 \$ 8,156,619

16,510,466 \$

28,962,461

3-4 5# coal with marketing, in pond

Case:	Sensitivity	
Location:	Peninsula	
Governing Assumptions:		
Coal Supply	5#	
Gypsum Marketing	Marketing	
Annual Gypsum Production		583,929
Net Gypsum to Peninsula		211,929
Annual Ash production		475,600
Capacity of peninsula	9	,300,000
Years of peninsula capacity	44	
Year peninsula capacity expires	2053	

327000 2.8

5

Х

583928.5714

1176610 2101090	
0.55999981	583928.8

STIMATE NUMBEI

(WITHOUT POND BUFFER) PRESENT WORTH PRESENT WORTH 366 5 2,643,052 5 2,746,774 8 71,005,014 8 \$6,796,259 \$23,180,968 Escalated SubTotal \$10,150,655 \$2 535,076 \$908,829 \$15,984,413 \$814,065 \$8,177,76 2029 \$50.07 \$48,15 2028 \$2,147,15 \$46,301 \$430,56 \$ 2,348,663 \$ 2,443,650 \$ 2,641,365 2027 \$414,001 \$44,520 2026 2025 10,6952 51.003.7 \$382,767 \$1,835,363 \$ 2,172,396 \$ 2,258,202 2024 \$1,764,77 5202 2022 1 600 00 W W 1 2.008.502 \$1,631,63 202 \$327,191 \$1,558,876 2020 2 2 24992) 2 100292) 2 100292 2 2 22720 2 3 200292 2 3 200293 2 3 20029 1.856.673 853 86 1 100 785.551 2018 \$1,450.5 \$1,537,148 KT 1405, 12 2017 \$1,476,027 2016 91Q2 \$1,421,1 \$1,256,519 1.589.336 \$ 1.662.010 2014 2013 \$',313,9 51,263,423 1.528.208 2012 \$1,214,830 \$24.72 1.414.274 1 1.469.431 2011 \$1,169,230 \$23,79 2010 \$1,126,342 \$ 1,064,663 \$ 1,106,206 \$ 1,361,188 2008 51,084,144 2008 \$1,043.4 2007 \$1,004,283 \$ 962,473 1 1,024,719 2008 \$962.879 \$9(6,829 \$19,604 \$1,967,62 2002 \$1,967,628 \$308,829 \$962,875 2006 Dollars \$182.20 Number of 46, \$33,000 \$11,554,547 28, 152, 844 \$470.247 1,974,00 \$808,82 \$1 967 62 Total Cost UNITS ung dun ump Sum mp Sum Lump Sum tump Sum Lump Sum Lump Sum Lump Sum an 2 Wei Ash (Initial Thru Stage 5) psum On Penineula Disposal Cost A/QC For Construction Of Disposal Total Operating Costs stall Drains For Swan Pond Road PERATING COSTS Phase 2 Base Construction (Base Total Canfhal Costs Total Costs DESCRIPTION APITAL CO: ingineering / Geolech dege Cell Phase Npsum On Penin Mar o

Present Worth of this Option [\$ 23,751,838]

00114/2009

₽

2029	2.556	2.451	2.369	2.270	2.187	2.105	2.026	1.948	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
2028	2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.065	1.601	1.539	1.480	1.423	1,309	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000		
2021	2,363	2.266	2.181	2.099	2.022	1.946	1.873	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000			
2026	2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.205	1.217	1.170	1.125	1.082	1.040	1.000				
2025	2185	2.095	2.016	1.940	1.869	1.799	1.732	1.665	1.601	1,539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1000					
20240	2.101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000						
2023	2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000							
2023 2023	1.942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000								
2040 2007	1.868	1.791	1.723	1.659	1.598	1.538	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000									
2020	1.796	1.722	1.667	1.595	1.536	1.479	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
2019	1.727	1.665	1.593	1.534	1.477	1.422	1.369	1.316	1.265	1.217	1.170	1.125	1.062	1.040	1.000											
2018	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.062	1.040	1.000												
2040	1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000			-										
2016	1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	1.000														
2015	1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1.040	1.000															
2010	1,419	1.361	1.310	1.260	1.214	1.169	1.125	1.082	1.040	1.000																
2013	1.365	1.308	1.259	1.212	1.168	1.124	1.082	1.040	1.000																	
2012	1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																		
2015	1.262	1.210	1.164	1.121	1.080	1.039	1.000																			
201039	1.214	1.164	1.121	1.078	1.039	1,000																				
2008	1.169	1.121	1.078	1.008	1.000																					
2008	1.126	1.080	1.039	1.000																						
2007	1.084	1.039	1.000																							
2000 2000 2000	1.043	1.000																								
2003	1.000																									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	-			i	. I				. 1				. 1					. 1						. 1	. 1	

	Cash Flows	NPV
2005	4,834,887	
2006	1,024,719	
2007	1,064,683	
2008	11,812,515	
2009	1,361,188	
2010	1,414,274	\$ 15,779,328
2011	1,469,431	
2012	1,528,208	
2013	1,589,336	
2014	1,652,910	
2015	6,456,126	\$ 19,574,386
2016	6,714,371	~
2017	3,254,024	
2018	1,785,551	
2019	1,856,973	
2020	1,931,252	
2021	2,008,502	
2022	2,088,842	
2023	2,172,396	
2024	2,259,292	
2025	2,349,663	
2026	2,443,650	
2027	2,541,396	
2028	2,643,052	
2029	2,748,774	\$ 23,751,838

Case:	Base
Location:	In Pond
Governing Assumptions:	
Coal Supply	5#
Drainage Layer	Current Parsons design
Gypsum Marketing	100% marketing after 2011
Annual Gypsum Production	583,929
Net Gypsum to Pond	211,929
Annual Ash production	475,600
Ash production - 2005 to 2009	1,902,400
Available storage for wet ash and	
gypsum as of 2010	6,423,680
Years of pond capacity as of 2010	8
Year when dry collection required	2018
Years of remaining pond capacity	23
Year pond capacity expires	2032

327000 2.8 583928.5714 1176610 2101090

0.55999981

583928.8

5

х

ESTIMATE NUMBER OSIAJO1R1

PRESENT WORTH

(WITHOUT POND BUFFER)

	PKESENT WORTH of using	Cupiel Dokers		51,567,628	262.455	112 1128	\$1,164,066	\$7,213,511	\$349.210	\$ 16,133,081		\$0.016.623	\$1,580,758	\$2,925,512	12111023		\$ 12,829,370	\$ 28,962,461
	SubTotal			51.967.628	847.083	10,000,02	52,068,476	50 (SH 00)	\$349.210	13,164,535		517.465.045	19.674.745	219,895,611	51 282 18		15,329,647	118,483,582
	502	2.56				I	Γ			Ī	I	T	\$660,012	\$3,780,214	\$79.491		152,738	1,522,738
	202	245					ſ		Π	Ī	T	T	159'(298	12 634, 821	\$78.434		4,348,796	5 4,348,786
	2027	236					Ī			Ī	I	Π	110,018	020'58*'6\$	573.494		525,191.5.2	1 4,111,525
	5002	227					Ī			·			\$169,413	10,360.647	\$70.067		1 4,020,657	1 4,020,867
	202	2.18								·			\$665,763	\$9,231,343	896,98		\$ 3,965,055	\$ 3,861,055
	1202	2.10			and the second se					·			196 119	000 /01 55	NY 745		3,717,381	105,717,8 8
	2023	2.02											1524,004	\$2,967,558	VA CR		3,574,385	\$ 3,574,385
	1202	1.14											\$503,850	\$2,872,652	101 (191		1 3,434,569	5 3,436,909
	ŤR.	187											111,1421	\$2,782,165	200'955		\$ 3,304,720	5 3,304,720
	92,02	8,4					ſ			·			\$465.618	\$2,856,936	\$55.846		\$ 3,177,815	\$ 3,177,615
	5462	6. 1					ĺ			·			100.011	12,551.777	107,63		\$ 3,045,199	\$ 3,055,388
	2018	1.66							A COMPANY AND A COMPANY	•			90 00 M	\$2 456 55	NV145		100,100,5 \$	\$ 2,837,884
	2012	1.60						300 105 203 0		\$ 34,584,089		51,679,533	SU.12		79'675		1 2,143,311	\$ 40,737,409
	2016	1.54				\$3,309,137	201 1265	×		\$ 4,172,240		205715715	02.1902		947,740		\$ 2,040,878	\$ 5,233,116
	2015	148								•		\$1,552,623	1392,065		100'514		110,100,1 2	119'135'1 5
	2014	271										51,493,095	\$19913		11.115		1,906,309	\$ 1,906,356
	2013	1.26								•		51.436.672	965'0205		197295		1 1,832,111	\$ 1,832,111
	2412	131								ŀ		\$1,380.45	\$340.360		\$40,806		1,781,645	\$ 1,761,045
	2011	1.15										91.327,366	\$2,728		530,235		1 1,693,890	3 1,693,690
	20102	12								ľ		11.277.558	5315.00		61.158		5 1,610,308	806,068,1 4
	ZCDB	21.1								ļ		\$1,229,58	\$303,15		PE'963		\$ 1,568,112	\$ 1,589,112
	2006	1.13				105,303	1 5833 00			5 6,837,033		51.184.56			10 963 6		1 1,219,586	8,156,615
	2002	1.08								ŀ	ļļ	9 51,140,10			20'00		1 1,173,00	1,173,803
	5006	1.14								ļ		00 10 15 0			CV 255 K		1 1,529,74	1 1,028,240
	8	1.00		29/295/15	\$682.4	52	12 003	8	10 \$249.21	\$ 3,481,57	Ц	70 \$1,052.01	2	2	11.12		11,000,1 2	\$ 4,544,74
	2005 Dollars per Cycle			\$1.967.62	\$282.4	\$5,594.8.	(C CM/3	\$24.176 M	10462			\$1,052.05	\$266.4	1084715	1.12	1		
L	Number of			1	+		ŀ		÷		l	12	8	12	12			
	Total Cost 2006 Dollars			829 /96 IS	\$682,456	\$2,560,522	21 605 270	\$24 15 580	S10.210	\$ 38,518,313		\$12,624,840	612'99:55	\$17.346,174	8146.424	ſ	\$ 38,337,697	5 72,824,000
	UNITS	3		tunp Sm	tump Sum	Lumo Sun Lumo Sun	Inter See	Lump Sum	Lump Sun]		Lunp Sun	Lung Sam	Lurro Sun	r Lump Dum	F	Ц	L
	DESCRIPTION	Excatation Part	CAPITAL CORTS	Instal Draws For Sum Pond Road	Ash And Oppsum in Pond	Phase 2 Base Construction Phase 3 Base Construction	Moral Boosts	Dry Fly Ash Conversion	Engineering	Total Capital Costs	OPERATING COSTS	Dredege Cell Phene 1	9 Phase 2 Wet Organin (halial Thru Stage 4)	Phase 3 Dy Ash (hibis Thru Stage 4)	OVICE For Construction Of Disposed Focility		Total Operating Costs	Totat Costs
L	Ë 3				7	\$ 9	-	¥\$	n			9	10,11,12,13,18&1.	14,15,18,174.20				

Present Worth of this Option

6002/#1-00
ESCALATION TABLE: Contract Labor - T&L

₽

040	502	2.556	2.451	2.359	2.270	2.187	2.105	2.026	1.948	1.873	1.801	1.732	1.665	1.601	1.530	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
1.040	5020	2.458	2.356	2.268	2.183	2.103	2.024	1.948	1.873	1.801	1.732	1.665	1.601	1.539	1.490	1.423	1.369	1.316	1.285	1.217	1.170	1.125	1.082	1.040	1.000		
96	1202	2.363	2.268	2.181	2.099	2.022	1.946	1.873	1.801	1.732	1.005	1.601	1,539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000			
040	20202	2.272	2.179	2.097	2.018	1.944	1.871	1.801	1.732	1.065	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000				
1040	6707	2.185	2:095	2.016	1.940	1.869	1.799	1.732	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					
1.040	+202	2.101	2.014	1.939	1.866	1.797	1.730	1.665	1.601	1.539	1.480	1.423	1.309	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					1	
1.040	6707	2.020	1.937	1.864	1.794	1.728	1.663	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000						1	
040	7707	1.942	1.862	1.792	1.725	1.662	1.599	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000							1	
9.5 9.5	1777	1.868	1.791	1.723	1.659	1.598	1.538	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.062	1.040	1.000									
040	7070	1.796	1.722	1.657	1.595	1.536	1 479	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000										
1.040	5013	1.727	1.655	1.583	1.534	1.477	1.422	1.369	1.316	1.266	1.217	1.170	1.125	1.082	1.040	1.000											
1.040	2018	1.660	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000												
1.040	5017	1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1.082	1.040	1.000													
96	61.07	1,535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1.082	1.040	8														
96	6102	1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1.040	8															
1.040	50148	1.419	1.361	1.310	1.260	1.214	1,169	1.125	1.082	1.040	1.000																
90	6102	1.365	1.308	1.259	1.212	1.168	1.124	1.082	1.040	1.000																	
1.040	5014	1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																		
000	1107	1,262	1.210	1.164	1.121	1.080	1.039	1.000																			
1039	5010	1.214	1.164	1.121	1.078	1.039	1.000																				
88	EW12	1.169	1.121	1.078	1.038	1 000																					
1039	BUU2	1.126	1.080	1.039	1.000																						
1.036	1007	1.084	1.039	1.00																							
543		1.043	1.000																								
1.045	ŝ	00																									
	1	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	1	1	L.,	1	1	1				L	1	1				1	1		1	1	L			L	.	4 I	

	Cash Flows	NPV
2005	4,544,744	
2006	1,129,747	
2007	1 ,173,807	
2008	8,156,619	
2009	1,569,112	
2010	1,630,308	\$ 13,485,506
2011	1,693,890	
2012	1,761,645	
2013	1,832,111	
2014	1,905,396	
2015	1,981,611	\$ 16,510,466
2016	6,233,116	
2017	40,737,400	
2018	2,937,884	
2019	3,055,399	
2020	3,177,615	
2021	3,304,720	
2022	3,436,909	
2023	3,574,385	
2024	3,717,361	
2025	3,866,055	
2026	4,020,697	
2027	4,181,525	
2028	4,348,786	
2029	4,522,738	\$ 28,962,461

Case: Location: Governing Assumptions: Coal Supply Drainage Layer	Reduced drainage layer In Pond 2.8 #
Present cost in 2005 dollars -Phase 2 Present cost in 2005 dollars -Phase 3 Phase 2 cost with 50% reduction Phase 3 cost with 50% reduction	5,598,822 2,155,779 2,799,411 1,077,890
Gypsum Marketing No gypsum disposal cost after 2011	100% marketing after 2011
In Pond gypsum handling cost: Present cost over 20 years Assume same cost as for peninsula - no increased cost through 2014	5,188,249 3,644,075
Fly Ash handling cost Present cost over 20 years Assume same cost as for peninsula - no increased cost through 2014	12,624,840 11,554,547
Delay Dry Ash conversion Present year for dry ash conversion Gypsum marketing - 2012-2016 Years of fly ash storage gained Revised year for dry ash conversion	2016 1,309,440 2.75 2019
Reduced Fly Ash Handling cost Present cost/yr for dry ash handling Revised cost for handling dense slurry based on conversation with JEA and Calvin Toney (1 decor and 1 exceptor)	1,479,015 250,000



KINGSTON FOSSIL PLANT OPTION 1 - WET ASH IN POND GYPSUM ON PENINSULA

UNBER 05H304R1

PRESENT WORTH

(WITHOUT POND BUFFER)

RESERT WORTH of using	Ceptral Dollars		\$1,267,628	\$582.456 \$2.072.471 \$366,638	F1 164 066	\$349,210	Π	HOLINE ZI	Π	68916978	2011025	H26756	\$288 417	8 M 848 4	21,278,352
Exceleted SubTotal			129/298/15	\$382.454 \$3.151.879 \$1.654.569	E.058.475 \$41.743.366	8749,210		21,507,074 5		\$19,245,625	\$964,077	\$5,621,606	\$1,292,167	27,073,556	131,153,181 5
8202	2.56									T	3	5/6 9293	101.673	718,496	718,466
\$202	2.46						T				8	\$614,399	1111	680,833	\$51,069
2027	216	Π									8	\$190.766	177.494	2847113	232,433
8002	2.27	Π							Ι		8	\$168.017	\$70,662	698,744	618,714
2025	2.48	Π					T				8	1246.1260	825,949	614,148	611,118
2004	2.0	Π					Ī				8	161'92'35	365.336	540,527	125'06
52.02	200	Π					Ì				8	166'1023	\$62.623	587,814 \$	367,814
7027	181	I							Ħ		8.	89515895	101.088	545,075 \$	515,510
LOX.	1.87	Π					ľ	7			8	5466,800	\$58,063	\$24,878 \$	524,875
2020	18	Ħ							Ħ	Ħ	8	\$146,505	616.840	\$ 584, 105	504,735 \$
5102	61	H			941,743,386		╢	\$1 995'17'17	H	\$1,662.579	2	\$431,669	107.535	2,447,848 5	43,881,315
2016	18	Π						-		\$1,599,633	8	8	961.636	1 692'0571	1,650,269 [1
2017	8	Π						-		\$1,537,148	3	8	549,650	1,996,797 5	1,568,797 \$
2016	5	H		51,054,565	\$963,103			2,547,672		\$1,478,027	8		\$17,740	1,526,767 5	4,043,439 5
4102	87							ľ	Π	\$1.121.12	8		145.804	\$ \$30'257'5	1,437,083 5
2014	1.42	Η							H	\$1,288.519	8		81,13	1,410,657 5	1,410,657 8
2013	1.36	Η						•	H	09611019	8		117715	1,356,601 \$	1,356,401 3
2012	£1	Π					T	-		51,263,423	8		540,800	1,304,232	1,264,232 5
2011	1.28	Η					-	-	h	1214.830	\$229.800		\$10 X3	1,483,941 \$	1 116/2271
2010	1.21	Η						-		\$1.169.230	1521225		137.760	1,428,247 \$	\$ [1428241
802	18							-	Η	SILEONS	\$212.946		075 163	1,374,837 \$	1,374,637 \$
3002	1.13		Ħ	21 (51 870	\$633.050			3, 785,063 \$	H	\$1.084.144	+	┢┿	810,518	1,118,162 \$	4,804,225 \$
2002	1.08	Η						-	H	\$1.043,450	╞┼	╟	433.70%	\$ \$\$\$7.70,1	1,077,553 \$
2006	N ¹	H						-	H	\$1,004,263	╞		632,436	1,008,721 \$	1,036,721 \$
5005	1.00	Η	\$1,967,625	\$552.458	\$562,279	012,0105		3,484,572 \$	H	\$962,679			101-101	3 099'000	\$ 555,555 \$
05 Dollars Mr Cycle	H	H	\$1.967.626	\$1 077 890	622 230	\$348 210		-	H	5062 AT9	\$162,204	000'0923	\$31.101	ľ	ĥ
imber of M	╋	╢	-		6-	-		-	H	12	8	12	7	╢	H
M Cost			\$1 567 628	\$1077,880 \$1.077,880	0002 521 V725	\$249.210		22,639,013	H	211.554.547	\$3,644,075	\$3.101.000	\$748.424	10,945,046	51,584,058
NITS Tot			e Sem	5000	Les o	ES 9		-		the Sum	the Ser	the Sun	e Sw	-	-
DESCRIPTION	Jorge Linkersta	CAPITAL COSTS	test of tests For Swan Post Road Lun	Ash And Oppsum is Pond Phase 2 Base Construction Phase 3 Base Construction	Misteliancous Dry Py Ash Conversion Lun	and provided the		Total Capital Costs	OPERATING COSTS	Dredege Cel Phase 1	Phase 2 Wet Orgaum (Initial Thru Stage 4) Lun	Press 3 Dry Aun (bitted Thru Stage 4) Lun	GARC For Construction Of Disposal Facility Lun	Total Operating Costs	Total Costs
191 st				•\$\$	\$Å	u					10,11,42,13,18619	14,13,16,113,20			

Present Worth of this Option

03/14/2009

ESCALATION TABLE: Contract Labor - T&I

1.040	2029		2.556	2.451	2.359	2.270	2 187	2 105	2 026	1 948	1 873	100 1	100.	1./32	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1 000
010	2028		2.458	2.356	2.268	2 183	2 103	100	1 948	1 873	1 801		75	1.665	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000	
1.040	2027		2,363	2 266	2 181	2 044	2 022	1 046	1 873	1801	1725	101	000	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000		
1 040	2026		2.272	2.179	2 097	2 01B	200	1 0 7 1	100	727	A ARE	201	1.601	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000			
1 040	2025		2 185	2 095	2.016	1 040	1 050	1002	4 733	1 205	100.1	100'	1.539	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000				
1 040	2024	ĺ	2 101	2014	1 010	2000	200.1	161.1	2001	200.1	100.1	890.1	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000					
1 040	2023		000 0	1 027	100.1	100- 1	481.	07/1	200-	100-1	890.1	1.480	1.423	1.369	1.316	1.265	1.217	1.170	1.125	1.082	1.040	1.000						
040 4	2022		1 040	1 067	100	76/	C7/-	700	RACI	8001	1480	1423	1.369	1.316	1265	1 217	1170	1125	1.082	1.040	1 000							
0101	2021		020 1	- 1000	1./31	100	1.659	1.598	800	99	1.423	1.369	1.316	1.265	1217	1 170	1 125	1 087	1040	0001								
10101	2020		941.1	1./30	1.144	1.00/	1.595	1.536	1.4/9	1.4Z3	1.369	1.316	1.265	1.217	1 1 70	1 1 2 5	1 080	1 040		2								
	2019		101	17/7	C00.1	1.593	1.534	1.477	422	1.369	1.316	1.265	1.217	1 170	1 1 25	1 087	1000											
	1.040 2018			1.66U	1.592	1.532	1.475	1.421	1.367	1.316	1.265	1.217	1.170	1 125	1 087			200										
	2040			1.596	1.531	1.473	1.418	1.366	1.315	1.265	1.217	1.170	1.125	1 087			2001											
ł	1.040 2016	2		1.535	1.472	1.416	1.363	1.313	1.264	1.217	1.170	1.125	1 082	1 010		200.												
	1.040 2015	2123		1.476	1.415	1.362	1.311	1.263	1.215	1.170	1.125	1.082	1 240		3													
	1.040	Ī		1.419	1.361	1.310	1.260	1.214	1.169	1.125	1.082	1.040	1 000															
	1.040	20		1.365	1.308	1.259	1.212	1.168	1.124	1.082	1.040	1 000																
	1.040	4V14		1.312	1.258	1.211	1.165	1.123	1.081	1.040	1.000																	
	039	1		1.262	1.210	1.164	1.121	1.080	1.039	1.000																		
	620.1	2010		1.214	1.164	1.121	1.078	1.039	1.000																			
	038	RINZ		1.169	1.121	1.078	1.038	1 000																				
	039	2008		1.126	080.1	1.039	000																					
٤	039	2007		084	039	00																						
	.043	2006		043	000																							
	1.045 1	2005		000																								
	F			2005	2006	2002	0000		0000	1100	107	7102	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	0000
	1		1	L	L	Ł	1	1	1	Í.	1						1		1	L	1	L	1		١		Ł	L

2029

	Cash Flows	NPV
2005	4,455,553	
2006	1,036,721	
2007	1,077,153	
2008	4,904,225	
2009	1,374,637	
2010	1,428,247	\$ 10,892,184
2011	1,483,949	
2012	1,304,232	
2013	1,356,401	
2014	1,410,657	
2015	1,467,083	\$ 13,231,093
2016	4,043,439	
2017	1,586,797	
2018	1,650,269	
2019	43,891,315	
2020	504,785	
2021	524,976	
2022	545,975	
2023	567,814	
2024	590,527	
2025	614,148	
2026	638,714	
2027	664,262	
2028	690,833	
2029	718,466	\$ 21,279,352

Haber, Stanley M

From:	Purkey, Ronald E.
Sent:	Monday, February 07, 2005 10:14 AM

To: Myers, Thomas J.; Kimsey, Barry A.

Cc: Renfroe, Bret; Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Petty, Harold L.

Subject: RE: KIF Dry Fly Ash Estimate

Tom,

The \$2M was the electrical estimate of not having to provide a transformer and associated equipment. The electrical feeds and controls and other electrical work outside the power sources would still be outside the scope of the scrubber and to DFA's account. This has been discussed on other occasions and maybe you were not present.

Barry,

Do you have anything to add to my coment? Ron

----Original Message----From: Myers, Thomas J.
Sent: Monday, February 07, 2005 10:07 AM
To: Purkey, Ronald E.
Cc: Renfroe, Bret; Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Petty, Harold L.

Subject: RE: KIF Dry Fly Ash Estimate

Ron,

In looking at the attached, there are two line items that would be picked up by the KIF Scrubber Project **IF** the Scrubber Project was implemented <u>before</u> the Dry Fly Ash Project. Those items are the 161-kV feed (shown in your estimate at \$5.6MM) and the 161-kV Transformer (shown in your estimate at \$619k). The Scrubber Project would provide <u>space</u> as necessary for items such as additional switchgear in the Scrubber electrical room and provide a feeder off of the 161-kV transformer, <u>but would</u> expect the Dry Fly Ash Project to pick up the cost of all of the remaining additional medium and low voltage switchgear and connections.

That having been said, we are not sure how you arrived at the \$2MM credit mentioned for the fly ash project in one of the options discussed at KIF on January 27. It would appear based on these numbers that the credit would be \$6.2MM (the estimated value of the two line items mentioned above) which could sway the resulting NPV's in your option cost comparisons.

Please let me know if we have missed something or if you have any questions or comments.

Tom *Thomas J. Myers, PMP* FGD Turnkey Project Manager TVA Fossil Projects

03/14/2009

LP 2T - C Phone: 423-751-3415 Fax: 423-751-6116 E-Mail: tjmyers@tva.gov

----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

Ron Purkey

Haber, Stanley M

From:	Myers, Thomas J.
Sent:	Monday, February 07, 2005 10:07 AM
То:	Purkey, Ronald E.
Cc:	Renfroe, Bret; Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Petty, Harold L.
Subject:	RE: KIF Dry Fly Ash Estimate
Attachments:	KIF Fly Ash Estimate.pdf

Ron,

In looking at the attached, there are two line items that would be picked up by the KIF Scrubber Project IF the Scrubber Project was implemented <u>before</u> the Dry Fly Ash Project. Those items are the 161-kV feed (shown in your estimate at \$5.6MM) and the 161-kV Transformer (shown in your estimate at \$619k). The Scrubber Project would provide space as necessary for items such as additional switchgear in the Scrubber electrical room and provide a feeder off of the 161-kV transformer, but would expect the Dry Fly Ash Project to pick up the cost of all of the remaining additional medium and low voltage switchgear and connections.

That having been said, we are not sure how you arrived at the \$2MM credit mentioned for the fly ash project in one of the options discussed at KIF on January 27. It would appear based on these numbers that the credit would be \$6.2MM (the estimated value of the two line items mentioned above) which could sway the resulting NPV's in your option cost comparisons.

Please let me know if we have missed something or if you have any questions or comments.

Tom

Thomas J. Myers, PMP FGD Turnkey Project Manager TVA Fossil Projects LP 2T - C Phone: 423-751-3415 Fax: 423-751-6116 E-Mail: tjmyers@tva.gov

----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

03/14/2009

Ron Purkey

Haber, Stanley M

From:	Renfroe, Bret
Sent:	Monday, February 07, 2005 10:02 AM
То:	Purkey, Ronald E.; Davis, Victor W.
Cc:	Haber, Stanley M.; Harless, J. Larry; Peterson, Leonard J.; Hedgecoth, Melissa A.; Murray, David B.

Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Based on Victor's response of no Mechanical contract admin.and review or mechanical BOP, the basis of the estimate is the quote from UCC and Electrical feeds to power the system proposed by UCC.

Bret Renfroe

Cost Estimating Ph: 423-751-7684 Fx: 423-751-4295

-----Original Message----From: Purkey, Ronald E.
Sent: Monday, February 07, 2005 9:44 AM
To: Renfroe, Bret
Cc: Haber, Stanley M.
Subject: FW: KIF Dry Fly Ash Estimate

Please respond to Victor and myself. Thanks.

Ron

-----Original Message----- **From:** Davis, Victor W. **Sent:** Monday, February 07, 2005 7:36 AM **To:** Purkey, Ronald E. **Subject:** RE: KIF Dry Fly Ash Estimate

I don't see anything in this for Mechanical contract admin.and review or mechanical BOP

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 3:05 PM **To:** Haber, Stanley M.; Davis, Victor W. **Subject:** RE: KIF Dry Fly Ash Estimate

Stan - it's all right - I will send one

Victor - for your viewing pleasure

Ron

-----Original Message-----From: Haber, Stanley M.

03/14/2009

Sent: Thursday, February 03, 2005 3:03 PM To: Purkey, Ronald E. Subject: RE: KIF Dry Fly Ash Estimate

Don't you think that he should get a copy?

-----Original Message-----From: Purkey, Ronald E. Sent: Thursday, February 03, 2005 3:00 PM To: Haber, Stanley M. Subject: RE: KIF Dry Fly Ash Estimate

no, Bret used the vendor's info as he had gotten the ash from TVA facilities to silo turnkey.

-----Original Message-----From: Haber, Stanley M. Sent: Thursday, February 03, 2005 10:24 AM To: Purkey, Ronald E. Cc: Petty, Harold L. Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Tuesday, February 01, 2005 2:44 PM **To:** Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L. **Cc:** Renfroe, Bret

Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

Ron Purkey

Haber, Stanley M

From:Purkey, Ronald E.Sent:Monday, February 07, 2005 9:44 AMTo:Renfroe, BretCc:Haber, Stanley M.Subject:FW: KIF Dry Fly Ash Estimate

Please respond to Victor and myself. Thanks.

Ron

-----Original Message----- **From:** Davis, Victor W. **Sent:** Monday, February 07, 2005 7:36 AM **To:** Purkey, Ronald E. **Subject:** RE: KIF Dry Fly Ash Estimate

I don't see anything in this for Mechanical contract admin.and review or mechanical BOP

-----Original Message-----From: Purkey, Ronald E. Sent: Thursday, February 03, 2005 3:05 PM To: Haber, Stanley M.; Davis, Victor W. Subject: RE: KIF Dry Fly Ash Estimate

Stan - it's all right - I will send one

Victor - for your viewing pleasure

Ron

-----Original Message----- **From:** Haber, Stanley M. **Sent:** Thursday, February 03, 2005 3:03 PM **To:** Purkey, Ronald E. **Subject:** RE: KIF Dry Fly Ash Estimate

Don't you think that he should get a copy?

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 3:00 PM **To:** Haber, Stanley M. **Subject:** RE: KIF Dry Fly Ash Estimate

no, Bret used the vendor's info as he had gotten the ash from TVA facilities to silo turnkey.

-----Original Message-----From: Haber, Stanley M. Sent: Thursday, February 03, 2005 10:24 AM To: Purkey, Ronald E. Cc: Petty, Harold L.

03/14/2009

Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

-----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret

Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

Ron Purkey

Haber, Stanley M

From: Baugh, James S.
Sent: Monday, February 07, 2005 7:48 AM
To: Purkey, Ronald E.
Cc: Hedgecoth, Melissa A.; Haber, Stanley M.
Subject: RE: KIF update

We will schedule the conference call for a time that you can attend.

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Monday, February 07, 2005 7:04 AM **To:** Baugh, James S.; Haber, Stanley M. **Subject:** RE: KIF update

i have meeetings from 7-10am and at 3 pm

-----Original Message----- **From:** Baugh, James S. **Sent:** Friday, February 04, 2005 3:57 PM **To:** Purkey, Ronald E.; Haber, Stanley M. **Cc:** Lundy, Dennis L. **Subject:** KIF update

We have completed the sensitivity analyses on pond vs peninsula at KIF that we discussed earlier this week. I would like to review the analysis summary on Monday morning, then send it to you for comments.

The conference call with UCC to resolve issues on the estimate for dry ash collection is scheduled for Monday.

Let me know if you have any questions.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

Haber, Stanley M

From:Purkey, Ronald E.Sent:Monday, February 07, 2005 7:04 AMTo:Baugh, James S.; Haber, Stanley M.Subject:RE: KIF update

i have meeetings from 7-10am and at 3 pm

-----Original Message-----From: Baugh, James S. Sent: Friday, February 04, 2005 3:57 PM To: Purkey, Ronald E.; Haber, Stanley M. Cc: Lundy, Dennis L. Subject: KIF update

We have completed the sensitivity analyses on pond vs peninsula at KIF that we discussed earlier this week. I would like to review the analysis summary on Monday morning, then send it to you for comments.

The conference call with UCC to resolve issues on the estimate for dry ash collection is scheduled for Monday.

Let me know if you have any questions.

Steve Baugh Fuel By-Products and Properties LP 5G-C (423) 751-6137

Haber, Stanley M

From:	Purkey, Ronald E.
Sent:	Monday, February 07, 2005 6:59 AM
То:	Haber, Stanley M.
Subject:	FW: KIF - Drainage Blanket - Need for Stability Decision
Attachments:	Bottom Drainage Memo.doc; KIF Blanket drain paper.doc

fyi -----Original Message-----From: Purkey, Ronald E. Sent: Friday, February 04, 2005 2:51 PM To: Lundy, Dennis L. Subject: KIF - Drainage Blanket - Need for Stability Decision

Dennis,

I have put our position on the blanket drain below.

Here is the history of the blanket drain:

TVA had a precedence for a blanket drain with the TDEC at CUF. The requirement for a geologic buffer and liner is in the TDEC regulations. We are using the blanket drain to intercept water and minimize effects to groundwater.

In both the 10% and 50% design review (in May 04) meetings, the blanket drain below the ash stack for the in pond option was presented. The blanket drain had 2 distinct purposes:

1. It was required for stability based upon Parson's design - i.e. something less would be technically unacceptable

2. The Hydro/Geo model used the blanket drain and Environmental Affairs will use it effectively in their "in lieu of a liner" requests to the TDEC (draft position paper from EA attached).

In November 04, the cost of the blanket drain vs. something less came up for the first time. We estimated at that time the differential cost was \$1.5 Million - we didn't do a formal estimate. Based on GeoSyntec's estimate the cost is more like 25-40% of \$6,000,000, with the savings potential (if we could ever get a design and it permitted) of \$1.5 to 2.4 million.

Geosyntec has stated that they think something less may be used (Bottom Drain Memo from Geosyntec attached). There is some degree of uncertainty attached to it.

Parsons will not accept something less than a full drainage blanket because of their assumptions (see discussion below)

Re-doing the design (estimate \$150,000) and revising the hydrogeo and permit application (\$25,000) will be required.

Here is our position taking all factors in-hand:

We have carefully reviewed each design/proposal and support Parsons claim that the drainage layer is required for stability reasons. I do believe we have adequate input to make an informed decision.

Parsons arguments as follows supports this decision:

1. The water table is high within the ash stack demonstrated by an exploratory boring (Location B4) 0 blow counts (soup not soil) and the seemingly unlimited outflow of water in the Swan Pond Road seep.

2. The potential of the pond to collapse from within for seismic conditions

3. The difficulty in predicting the state of dredged ash at any one time

4. The new cells being 100+ feet higher than the ones we now have

5. Hydraulic conductivity of water in the ash is significantly aided by a full, continuous drainage layer. This results in quicker consolidation and more space to place more ash.

6. Future raisings of the ash storage may hinge on the blanket drain at the bottom being present.

7. A quick drainage period is essential for long term stability

Geosyntec Proposal (attached) Comments:

1. Figure 3's results are optimistic and data blow counts indicate saturation lives much longer - i.e. the effective saturation layers are apparently much longer lasting than we can predict

2. Savings potentials predicted were 25-40% with an open ended array of potential alternatives which would add to the complexity of pond construction.

3. Their points are well intended, but a more conservative approach in light of recent events at KIF are preferred. The faster the stack drains the more stable it will be.



Memorandum

To:	Mr. Ron Purkey, P.E. – TVA
From:	Neil Davies and Bob Bachus – GeoSyntec
Date:	4 February 2005
Subject:	Bottom Drainage Layer Alternatives, Proposed Dredge Cell Lateral
	Expansion, Kinston Fossil Plant

Background

This memorandum relates to recent discussions held between representatives of TVA, Parsons and GeoSyntec related to the bottom drainage layer of the proposed Dredge Cell Lateral Expansion at TVA's Kingston Fossil Plant, located in Kingston , TN. Representatives of GeoSyntec Consultants, (GeoSyntec) participated in a conference call on February 2, 2005 to discuss potential alternative approaches to the currently proposed design as represented on drawings prepared by Parsons. At the conclusion of the conference call, Mr. Ron Purkey (TVA) asked if GeoSyntec considered that other more cost effective alternatives to the currently designed system would be feasible in terms of addressing stability of the disposal facility. Mr. Purkey further requested that GeoSyntec provide an opinion of the magnitude of potential savings and provide this information to TVA by February 4, 2005.

Summary of the Issue

Based on information discussed during the above referenced telephone conference, it is our understanding that Parsons believes that a continuous drainage blanket is required across the entire base of the proposed lateral expansion. This is illustrated on the project drawings (specifically, Drawing no. 10W435-64). During the conference call, Parsons stated that the drainage layer is needed to address both seismic stability and environmental concerns. Further, in Section 9.2.6 of Parsons' responses to GeoSyntec's review comment s on the Kingston Dredge Cell Lateral Expansion, it is stated that,

"The upper two layers are provided to keep the phreatic surface from rising above the top drainage layer and not to drain the entire ash or gypsum stack column between two layers. It should be noted that the effective stress stability evaluation for the wet stack operation assumes that the phreatic surface is at the top bottom ash drainage layer (Elev. 930 feet) for the end of construction case. Thus the entire gypsum column is assumed to be submerged in water below Elev. 930 feet, except near the outer slope where the water is drained by the perimeter drain system and more pervious perimeter dikes. Therefore, it is actually not necessary to calculate the required vertical spacing of the drainage layers" Based on this statement, it would appear that Parsons did not specifically rely upon the presence of the bottom drainage layer in their stability evaluations. It is not completely clear to us what specific water pressure conditions were and were not considered in the Parsons analysis. Regardless of the specific assumed design conditions, GeoSyntec concurs with other statements made by Parsons in this document that the presence of a continuous bottom ash layer will facilitate drainage of the bottom ash column drains and consolidation of interior ash and/or gypsum. The primary questions relate to: (i) the lateral extent of the drainage features; and (ii) whether there are alternative and less expensive designs for the bottom drainage layer that will provide comparable performance to the proposed design.

Potential Alternative Bottom Drainage Layer Designs

GeoSyntec believes that other more cost-effective methods are available to TVA for the purpose of providing drainage at the base of the stack. During the conference call, we suggested that a drainage blanket that extends over a part of the lateral expansion footprint might be equally effective in terms of providing adequate drainage to address static and seismic stability concerns. To illustrate this point, GeoSyntec performed some simplistic seepage analyses using SEEP/W. Graphical output is provided below to facilitate discussion. Note that these analyses are intentionally simplistic are provided for comparison purposes only, and are not intended for design purposes. The effects of perimeter drains above the bottom drainage layer are intentionally not included in these simplified analyses to better illustrate the action of the bottom drainage layer.

In both cases, we modeled the lateral expansion as a simple trapezoid with dimensions of 1,000 ft x 2,000 ft x 165 ft high (representative of raising the stack from elevation 765 to elevation 930 feet). In addition, we simplified the problem to a two-dimensional problem, as illustrated in the figures below. Note that this simplification will likely result in a conservative estimate of drainage rates since the problem is clearly three-dimensional.

In Case 1 (Figure 1), we modeled the effect of a highly permeable base drain across the entire footprint of the stack. The material was assumed to be saturated at year 0. As illustrated in Figure 1(below), the phreatic surface at the center of the impoundment is lowered to an elevation within the lower third of the height within a five year period, while the water level at the edges lowers more rapidly.

In Case 2, we modeled the effect of a highly permeable drainage blanket that would extend 300 feet inwards from the toe of the slope on three sides (Figure 2). As in Case 1, the material was assumed to be saturated at year 0. Using the dimensions indicated, the area of the drainage blanket used in Case 2 is approximately 50 percent of the total footprint of the base. Figure 3 indicates that under this configuration, a 300-foot wide base drain located around the perimeter is very effective at lowering the phreatic surface

within 200 feet of the face of the slopes. The rate that the water level lowers at the edges is comparable to the rate for the complete bottom drainage layer shown in Figure 1. The phreatic surface within the interior of the fill is lowered to an elevation within the lower third of the height within a ten to fifteen year period. While this is slower dissipation than the full coverage drain, the partial drainage blanket is shown to be effective at lowering the level within the entire impoundment. If the blanket drain is extended further towards the center of the fill, the phreatic surface moves farther from the face of the slope and the rate at which the phreatic surface is lowered within the interior of the fill increases. The actual design extent of the partial drain would be determined during the final design, but this simple model demonstrates that a partial blanket drain can be highly effective at lowering the phreatic surface, while providing significant potential cost savings..

The simple analysis models presented in the previous figures were re-run utilizing different values for hydraulic conductivity for the bottom drain material. While these results are not specifically shown, it is interesting to note that in each of the models that we ran, the hydraulic conductivity of the drainage layer significantly influenced the rate of drainage (i.e., the effective hydraulic conductivity of the drainage layer may control the drainage rate). This indicates the importance of the hydraulic conductivity of the bottom drain cannot be provided, it will be necessary to compensate for the lower hydraulic conductivity by using relatively closely spaced perforated pipes within the drainage media to assure the effectiveness of the bottom drain.

Based on the results of the simple modeling performed for presentation in this memorandum, GeoSyntec believes that that there are a number of potential alternative approaches available to TVA to address base drainage of the proposed lateral expansion at Kingston. These include, but are not limited to:

- modifying the extent of the proposed bottom drainage layer; our very preliminary and simplistic evaluations indicate that it may be feasible to reduce the size of this layer by up to 50 percent without compromising static or seismic stability;
- use of geotextile-wrapped bottom ash "fingers" or "tubes" constructed on a geocomposite drainage layer and compacted low permeability fly ash; and
- various combinations of a bottom drainage layer covering a partial area of the footprint supplemented by geosynthetic drainage strips.

GeoSyntec also understands that the bottom drainage layer, as designed, is also intended to serve as a hydrogeologic buffer. If the drainage layer is modified, then it will be necessary to evaluate the performance of alternative proposals in terms of their ability to



satisfy permit requirements. This would typically be done using one of the following methods:

- perform an "equivalency demonstration" with the objective of demonstrating that the flux moving through the base is equivalent (or close) to the "as designed" system; or
- perform a fate and transport analysis of the specific constituents of concern (COCs) to demonstrate that environmental impacts are within acceptable ranges.

Utilizing the properties of compacted fly ash and by incorporating elements of drainage system design (e.g., slope and hydraulic conductivity of the drainage blanket), we are confident that an equivalency demonstration can be made. This demonstration would be a component of the bottom layer drainage design modification described above.

Seismic Stability Considerations

We also believe that the specific design details for the drainage layer at the bottom of the cell and around the perimeter of the facility may have a profound impact of the calculated seismic slope stability. GeoSyntec recommends that the assessment of the optimized drainage include a detailed re-evaluation of the seismic slope stability. This recommendation is made for two reasons: (i) significant changes to drainage features will have a direct influence on stability; and (ii) there is a chance that the Tennessee Division of Solid Waste (TDSW) may request consideration (or at least a comment regarding) larger ground motions than reflected in the current permit documents. A discussion related to this recommendation follows.

The current seismic analysis of global slope stability has been conducted utilizing a pseudo-static analysis methodology. This is the most common analysis method for assessing global slope stability due to a seismic event and the methodology is appropriate for the proposed lateral expansion at Kingston. In this analysis method, the ground motions from a seismic event are simulated by applying an external horizontal force to the analyzed slope and then proceeding with a conventional static global slope stability analysis. The biggest challenge facing the designer/engineer is the selection of the external horizontal force that is representative of the ground motions from the design earthquake. The horizontal force is simulated by selecting an appropriate seismic coefficient. In simplified seismic analyses where relatively small ground accelerations are realized, the seismic coefficient is commonly assumed to be a fraction of the peak ground acceleration (PGA) in bedrock for the earthquake that has been found to have a two percent chance of exceedance in 50 years. This is the approach taken by Parsons for

Kingston and presented in Attachment 5 titled "Peak Ground Acceleration Evaluation". For global slope stability, the design appears to consider a bedrock PGA of 0.22g and a pseudo-static seismic coefficient of 0.11g (i.e., a 50 percent reduction in the bedrock PGA) in the subsequent global pseudo-static slope stability analyses. This approach follows traditionally accepted geotechnical practice, but is recognized as having the potential to be overly conservative because it does not account for the attenuation of the ground motion as it interacts with the materials through which the seismic motions propagate.

It is GeoSyntec's experience that for projects where the PGA is greater than approximately 0.20g, it is common for the seismic global slope stability analysis to govern the design. This appears to, in fact, be the case for Kingston, where the calculated global static factor of safety reduced from approximately 1.6 to 1.1 when seismic loading was considered.

In cases where a pseudo-static seismic analysis is demonstrated to have a significant impact on the calculated slope stability analysis results, GeoSyntec typically recommends that a site-specific seismic response analysis be conducted to more realistically assess the ground motions within the impacted earth structure. The objective of this assessment is to develop ground motion signatures that consider the geometry of the slope, the engineering properties of the foundation soils, and the physical properties of materials used to construct the analyzed earth structure, and (in the case of Kingston) the impounded materials. In this way, a more realistic estimate to the ground motions can be recognized. During the site-specific assessment, the actual geometry and physical properties of the earth structure (in this case the dredged ash basins and the compacted ash/gypsum perimeter berms) are considered and a numerical simulation is performed to model the propagation of the PGA applied at the bedrock surface upward through the dredged ash. In this way, the actual damping/acceleration of the bedrock PGA by the impounded ash can be simulated and assessed. Depending on the frequency content of the design earthquake and the properties of the impounded ash, it may be shown that the impounded ash is effective at damping (or accelerating) the ground motions. The analysis results are then assessed to quantify the average ground motion and an appropriate pseudo-static seismic coefficient can be calculated and used in subsequent slope stability calculations. Again, the goal of this procedure is to develop a more realistic representation of the anticipated ground motions that can be used in future slope stability calculations.

As mentioned, GeoSyntec has utilized the approach of conducting seismic response analyses and in some cases seismic deformation analyses for slopes across the U.S. when PGA values greater than approximately 0.20g are considered. This is the most common case in the western U.S. where bedrock PGA values greater than 0.60g are common. This approach seems to be appropriate for Kingston facility because of the indicated sensitivity of the calculated factor of safety to the selected design ground motion and because of the somewhat unique properties of the impounded ash/gypsum. It may even be more important for the Kingston facility, where the bedrock PGA considered by the designers appears to be 0.22g in accordance with guidance documents prepared by TDSW (1993) and U.S. Environmental Protection Agency (USEPA, 1995).

It is important to note that the above referenced documents relied on assessments of bedrock PGA values presented in documents prepared by the United States Geological Survey (USGS) dated 1991. More recent USGS publications (i.e., 2002) present revised bedrock PGA values that have recently been required by regulatory agencies, although not explicitly incorporated into the TDSW guidance documents. Considerations of these revised ground motions were required by TDSW in a permit application for a facility in Memphis prepared by GeoSyntec in 2003, primarily due to the close proximity of the Memphis site to the New Madrid Fault zone. In the case of Kingston, Tennessee, the revised bedrock PGA shown in the more recent USGS publication is approximately 0.27g, representing an increase in ground motion of more than 20 percent compared to the previously considered ground motions. GeoSyntec is not aware of any actions by TDSW that will require that seismic slope stability analyses be conducted using the revised ground motions, but we believe that if supplemental analyses are to be conducted, it would be to TVA's best interest to at least be aware of the impacts of the revised ground motions. In the extreme case (and one which we feel is not likely), if revised calculations are required, then the design presented in the current permit package may be deemed deficient, necessitating a re-evaluation of the seismic stability. Because of the potential consequence of this, we believe that at a minimum, analyses utilizing the revised ground motions should be performed.

While the consideration of a more representative site seismic response and (potentially) increased design ground motions may adversely impact the seismic stability of the current design, GeoSyntec believes that refined seismic analyses are warranted and that they will ultimately benefit TVA. These analyses may include seismic response analyses as well as seismic deformation analyses. These analyses will be coupled with design considerations regarding the selected drainage features around the perimeter and along a portion of the bottom of the facility. Based on experience on a range of similar projects, GeoSyntec believes that a cost-effective and stable design can be demonstrated for the Kingston facility. We note that in a recent project for a large earth dam in North Georgia, GeoSyntec demonstrated that the use of more robust seismic analyses resulted in a much more efficient and less expensive design than the design developed (by others) utilizing the simplified seismic slope stability analysis procedures. Of equal importance, however, GeoSyntec recognizes that any modification of the analysis methods recommended in the TDSW guidance documents must be thoroughly supported and presented to the agency. GeoSyntec has utilized site-specific analysis results and seismic response techniques for the previously referenced Memphis project that was impacted by its proximity to the New Madrid Fault zone. For the Memphis project, GeoSyntec developed supporting documentation and presented analysis results that were accepted and approved by TDSW. GeoSyntec enjoys a tremendous professional relationship with the TDSW technical staff and is confident that a technically compelling demonstration to TDSW can be developed

and approved, if the revised analysis results for Kingston differ from those presented in the dated TDSW and USEPA guidance documents.

Summary and Recommendations

In summary, GeoSyntec recommends that TVA perform an evaluation of bottom drainage alternatives. The evaluation would address the following items, at a minimum:

- cost benefit analysis of various drainage configurations;
- re-evaluation of the hydrogeologic buffer requirements together with an equivalency demonstration or fate and transport analysis to address permit requirements; and
- re-evaluation of global static and seismic stability following selection of any revisions to the bottom drainage.

Based on the very preliminary analyses presented herein, we believe that potential savings of the order of 25 to more than 40 percent of the cost to construct the currently proposed bottom drainage layer may be achievable. However, additional analysis and evaluation will be required to confirm this preliminary opinion. We are confident that significant savings can be realized.

GeoSyntec believes that the evaluations and analyses described herein could be completed within approximately three to four weeks. Depending upon the level of analyses needed and interaction with other team members, the estimated cost to perform this work is likely in the range \$40,000 to \$55,000. Note this is a quick "guesstimate" to aid TVA in decision making.

Should you have any questions regarding any of the information provided in this memorandum, please do not hesitate to contact either of us. We appreciate the opportunity to work with your team on the Kingston project.



1255 Roberts Blvd., Suite 200 Kennesaw, Georgia 30144 Tel (678) 202-9500 Fax (678) 202-9501

Figure 1

Case I: Drainage layer constructed along the entire base of the dredged ash stack.



Note: Estimated water levels in the dredged fly ash are shown for 5 years time increment (i.e., 0, 5, 10,...etc.) up to 50 years.

Bottom Drainage Memo

GEOSYNTEC CONSULTANTS





Comments to Phase I Memorandum

GEOSYNTEC CONSULTANTS

1255 Roberts Blvd., Suite 200 Kennesaw, Georgia 30144 Tel (678) 202-9500 Fax (678) 202-9501

Figure 3

Case 2: Drainage layer of 300 feet in length from the edge of the fly ash stack.



Note: Estimated water levels in the dredged fly ash are shown for 5 years time increment (i.e., 0, 5, 10,...etc.) up to 50 years.

Comments to Phase I Memorandum

Position Paper on the Whether the Drainage Blankets Can be Removed from TVA's Pending Solid Waste Disposal Applications for Bull Run and Kingston Fossil Plants

Background

The permit applications for the BRF and KIF FGD disposal facilities contain blanket drains similar to the one used for the FGD stack at CUF. However, these drains use bottom ash in lieu of gravel as the drainage layer to save money. These drains are an integral part of the landfill design from a stack dewatering, material consolidation, and stability standpoint. Since these drains also act as an intercept drain that reduces leachate flux to groundwater, they were also included in the groundwater impact modeling that is included in the HydroGeologic Reports for both facilities. The blanket drains have been included in every plan developed by EDS beginning with the plans included in the Phase I Study and the plans presented at the 10% and 50% Design Review Meetings. These review meetings were held prior to the submission of the permit packages for both facilities and omission of the blanket drains was never discussed at any these meetings. After the permit packages were submitted, EDS had a peer review of the KIF landfill design preformed by an independent consulting company, and as part of that review the need for the blanket drains was questioned. However, the decision was made to proceed with design as is with minor changes to add operational flexibility. Now TVA's Byproducts Management (BPM) staff has again questioned the need for these drains. It should be noted that at no time prior to the submission of the applications, did BPM raise this issue.

Environmental Affairs Position

It is Environmental Affairs position that the permit applications for BRF and KIF **not be withdrawn** and that TVA continues with the applications as is. Our rationale for that position is as follows:

1. The removal of the drains at this stage of the permit process will likely result in a design that cannot be permitted.

The TN Solid Waste regulations, Rule 1200-1-7, require that a Class II landfill, the classification of these facilities, have both a 5 foot geologic buffer and a composite liner. However, TVA has negotiated a TVA specific Design Memorandum (DM 93) that allows a three foot buffer of 10-6 clay in lieu of the buffer and liner required of other Class II facilities. At both BRF and KIF, we have asked TDEC for a further variance from DM 93 to allow no buffer based on site specific geologic information and ground water modeling. This modeling utilized the blanket drains as an intercept drain which reduced contaminant flux to groundwater. We have received verbal indication that this approach will be acceptable to TDEC. It should be noted that the CUF permit application had an under drain and the same approach was used at BRF and KIF. BPM has stated that a 1993 memo from Glen Pugh to Tom Tiesler granted

a variance for all construction in TVA's ash ponds. However that memo specifically states that it only applies to "ash disposed on existing ash"

It should also be noted that TDEC is hyper sensitive to the long term stability of elevated wet stacking. This concern existed prior to the blowout at KIF and has only been reinforced by that event. Given that the drains were included at CUF and in our initial plans for BRF and KIF removing them at this time for obvious cost reasons will raise numerous red flags with TDEC on stability and ground water impact issues.

Given the above issues and the fact that TDEC has already completed review of the BRF HydroGeo Report, Environmental affairs strongly feels that changing direction at this late date will likely result in an application that will not be permitted.

2. The withdrawal and subsequent redesign of the landfill at BRF will seriously jeopardize the availability of the landfill at scrubber startup.

Since the under drains are integral to the HydroGeo, stability calculations, seismic analysis, and flow routing, removing them would require a major redesign that could delay the resubmission of plans as much as 6 months. Also how motivated will TDEC be to restart their review would be a valid concern. If TDEC is very cooperative, we could meet our schedule. If they are not we would not meet it.

3. Environmental Affairs shares EDS's concerns about the long term stability of the stacks without these drains.

While these issues are outside our expertise, we share EDS, Parson's, and TDEC concerns about the long term stability of a poorly drained wet stack.

4. Withdrawal of the permits at this stage has a high potential to seriously damage Environmental Affairs and TVA's credibility with TDEC.

Given the number of times we have gone to TDEC with emergency requests due to our lack of adequate solid waste planning, they will not view this change of direction in a good light. We simply can not meet our waste disposal needs in the next 5 years without their active cooperation. To endanger that cooperation for this issue is not a decision EA can support.

5. Since these issues were not raised in the 10% and 50% review meeting to revisit them at this late date is in direct conflict with TVA's Projects Process.

In the next 5 years we will have designed, permitted and built more waste disposal facilities than TVA has in its history. We have very tight timeframes for many of these facilities, and if we are to bring these facilities on line in time, we must adhere to our projects process.

Page 1 of 1

Haber, Stanley M

From:Purkey, Ronald E.Sent:Monday, February 07, 2005 6:59 AMTo:Haber, Stanley M.Subject:FW: Matrix on KIF

fyi

----Original Message----From: Purkey, Ronald E.
Sent: Friday, February 04, 2005 3:30 PM
To: Baugh, James S.; Hedgecoth, Melissa A.
Cc: Petty, Harold L.
Subject: Matrix on KIF

2d - answered earlier

4a - distributed earlier in week

5d - Based upon our later discussion regarding 2 years of gypsum in the next 25 years, this gypsum can be sluiced to the pond just like fly ash and this gypsum dredged to the dredge cells just like fly ash is now. I have cleared this with Larry Bowers.

1b - I know of nothing that would make the comparisons inconsistent - estimates for Karst mitigation on the Peninsula have been as low as \$250,000 vs the \$500,000 used. The worst possible is felt to be \$1,000,000, but borings we have would not support that assumption. We can fix approximately 20 - 50' diameter karst areas with the \$500,000 which is about twice what is expected.

Other assumptions appear to be in line.

1a - Calvin and Robert Knox are documenting the O&M assumptions

call if you have comments

Ron

Haber, Stanley M

From:	Purkey, Ronald E.
Sent:	Monday, February 07, 2005 6:58 AM
То:	Haber, Stanley M.
Subject:	FW: KIF - Drainage Blanket - Need for Stability Decision
Attachments:	Bottom Drainage Memo.doc

fyi

From: Purkey, Ronald E.
Sent: Friday, February 04, 2005 2:54 PM
To: Baugh, James S.; Hedgecoth, Melissa A.
Subject: KIF - Drainage Blanket - Need for Stability Decision

Steve,

We have carefully reviewed each design/proposal and support Parsons claim that the drainage layer is required for stability reasons. I do believe we have adequate input to make an informed decision.

Parsons arguments as follows supports this decision:

1. The water table is high within the ash stack demonstrated by an exploratory boring (Location B4) 0 blow counts (soup not soil) and the seemingly unlimited outflow of water in the Swan Pond Road seep.

2. The potential of the pond to collapse from within for seismic conditions

3. The difficulty in predicting the state of dredged ash at any one time

4. The new cells being 100+ feet higher than the ones we now have

5. Hydraulic conductivity of water in the ash is significantly aided by a full, continuous drainage layer. This results in quicker consolidation and more space to place more ash.

6. Future raisings of the ash storage may hinge on the blanket drain at the bottom being present.

7. A quick drainage period is essential for long term stability

Geosyntec Proposal (attached) Comments:

1. Figure 3's results are optimistic and data blow counts indicate saturation lives much longer - i.e. the effective saturation layers are apparently much longer lasting than we can predict

2. Savings potentials predicted were 25-40% with an open ended array of potential alternatives which would add to the complexity of pond construction.

3. Their points are well intended, but a more conservative approach in light of recent events at KIF are preferred. The faster the stack drains the more stable it will be.

03/14/2009

GEOSYNTEC CONSULTANTS

1255 Roberts Blvd., Suite 200 Kennesaw, Georgia 30144 Tel (678) 202-9500 Fax (678) 202-9501

Memorandum

To:	Mr. Ron Purkey, P.E. – TVA
From:	Neil Davies and Bob Bachus – GeoSyntec
Date:	4 February 2005
Subject:	Bottom Drainage Layer Alternatives, Proposed Dredge Cell Lateral
	Expansion, Kinston Fossil Plant

Background

This memorandum relates to recent discussions held between representatives of TVA, Parsons and GeoSyntec related to the bottom drainage layer of the proposed Dredge Cell Lateral Expansion at TVA's Kingston Fossil Plant, located in Kingston , TN. Representatives of GeoSyntec Consultants, (GeoSyntec) participated in a conference call on February 2, 2005 to discuss potential alternative approaches to the currently proposed design as represented on drawings prepared by Parsons. At the conclusion of the conference call, Mr. Ron Purkey (TVA) asked if GeoSyntec considered that other more cost effective alternatives to the currently designed system would be feasible in terms of addressing stability of the disposal facility. Mr. Purkey further requested that GeoSyntec provide an opinion of the magnitude of potential savings and provide this information to TVA by February 4, 2005.

Summary of the Issue

Based on information discussed during the above referenced telephone conference, it is our understanding that Parsons believes that a continuous drainage blanket is required across the entire base of the proposed lateral expansion. This is illustrated on the project drawings (specifically, Drawing no. 10W435-64). During the conference call, Parsons stated that the drainage layer is needed to address both seismic stability and environmental concerns. Further, in Section 9.2.6 of Parsons' responses to GeoSyntec's review comment s on the Kingston Dredge Cell Lateral Expansion, it is stated that,

"The upper two layers are provided to keep the phreatic surface from rising above the top drainage layer and not to drain the entire ash or gypsum stack column between two layers. It should be noted that the effective stress stability evaluation for the wet stack operation assumes that the phreatic surface is at the top bottom ash drainage layer (Elev. 930 feet) for the end of construction case. Thus the entire gypsum column is assumed to be submerged in water below Elev. 930 feet, except near the outer slope where the water is drained by the perimeter drain system and more pervious perimeter dikes. Therefore, it is actually not necessary to calculate the required vertical spacing of the drainage layers" Based on this statement, it would appear that Parsons did not specifically rely upon the presence of the bottom drainage layer in their stability evaluations. It is not completely clear to us what specific water pressure conditions were and were not considered in the Parsons analysis. Regardless of the specific assumed design conditions, GeoSyntec concurs with other statements made by Parsons in this document that the presence of a continuous bottom ash layer will facilitate drainage of the bottom ash column drains and consolidation of interior ash and/or gypsum. The primary questions relate to: (i) the lateral extent of the drainage features; and (ii) whether there are alternative and less expensive designs for the bottom drainage layer that will provide comparable performance to the proposed design.

Potential Alternative Bottom Drainage Layer Designs

GeoSyntec believes that other more cost-effective methods are available to TVA for the purpose of providing drainage at the base of the stack. During the conference call, we suggested that a drainage blanket that extends over a part of the lateral expansion footprint might be equally effective in terms of providing adequate drainage to address static and seismic stability concerns. To illustrate this point, GeoSyntec performed some simplistic seepage analyses using SEEP/W. Graphical output is provided below to facilitate discussion. Note that these analyses are intentionally simplistic are provided for comparison purposes only, and are not intended for design purposes. The effects of perimeter drains above the bottom drainage layer are intentionally not included in these simplified analyses to better illustrate the action of the bottom drainage layer.

In both cases, we modeled the lateral expansion as a simple trapezoid with dimensions of 1,000 ft x 2,000 ft x 165 ft high (representative of raising the stack from elevation 765 to elevation 930 feet). In addition, we simplified the problem to a two-dimensional problem, as illustrated in the figures below. Note that this simplification will likely result in a conservative estimate of drainage rates since the problem is clearly three-dimensional.

In Case 1 (Figure 1), we modeled the effect of a highly permeable base drain across the entire footprint of the stack. The material was assumed to be saturated at year 0. As illustrated in Figure 1(below), the phreatic surface at the center of the impoundment is lowered to an elevation within the lower third of the height within a five year period, while the water level at the edges lowers more rapidly.

In Case 2, we modeled the effect of a highly permeable drainage blanket that would extend 300 feet inwards from the toe of the slope on three sides (Figure 2). As in Case 1, the material was assumed to be saturated at year 0. Using the dimensions indicated, the area of the drainage blanket used in Case 2 is approximately 50 percent of the total footprint of the base. Figure 3 indicates that under this configuration, a 300-foot wide base drain located around the perimeter is very effective at lowering the phreatic surface
within 200 feet of the face of the slopes. The rate that the water level lowers at the edges is comparable to the rate for the complete bottom drainage layer shown in Figure 1. The phreatic surface within the interior of the fill is lowered to an elevation within the lower third of the height within a ten to fifteen year period. While this is slower dissipation than the full coverage drain, the partial drainage blanket is shown to be effective at lowering the level within the entire impoundment. If the blanket drain is extended further towards the center of the fill, the phreatic surface moves farther from the face of the slope and the rate at which the phreatic surface is lowered within the interior of the fill increases. The actual design extent of the partial drain would be determined during the final design, but this simple model demonstrates that a partial blanket drain can be highly effective at lowering the phreatic surface, while providing significant potential cost savings..

The simple analysis models presented in the previous figures were re-run utilizing different values for hydraulic conductivity for the bottom drain material. While these results are not specifically shown, it is interesting to note that in each of the models that we ran, the hydraulic conductivity of the drainage layer significantly influenced the rate of drainage (i.e., the effective hydraulic conductivity of the drainage layer may control the drainage rate). This indicates the importance of the hydraulic conductivity of the bottom drain cannot be provided, it will be necessary to compensate for the lower hydraulic conductivity by using relatively closely spaced perforated pipes within the drainage media to assure the effectiveness of the bottom drain.

Based on the results of the simple modeling performed for presentation in this memorandum, GeoSyntec believes that that there are a number of potential alternative approaches available to TVA to address base drainage of the proposed lateral expansion at Kingston. These include, but are not limited to:

- modifying the extent of the proposed bottom drainage layer; our very preliminary and simplistic evaluations indicate that it may be feasible to reduce the size of this layer by up to 50 percent without compromising static or seismic stability;
- use of geotextile-wrapped bottom ash "fingers" or "tubes" constructed on a geocomposite drainage layer and compacted low permeability fly ash; and
- various combinations of a bottom drainage layer covering a partial area of the footprint supplemented by geosynthetic drainage strips.

GeoSyntec also understands that the bottom drainage layer, as designed, is also intended to serve as a hydrogeologic buffer. If the drainage layer is modified, then it will be necessary to evaluate the performance of alternative proposals in terms of their ability to satisfy permit requirements. This would typically be done using one of the following methods:

- perform an "equivalency demonstration" with the objective of demonstrating that the flux moving through the base is equivalent (or close) to the "as designed" system; or
- perform a fate and transport analysis of the specific constituents of concern (COCs) to demonstrate that environmental impacts are within acceptable ranges.

Utilizing the properties of compacted fly ash and by incorporating elements of drainage system design (e.g., slope and hydraulic conductivity of the drainage blanket), we are confident that an equivalency demonstration can be made. This demonstration would be a component of the bottom layer drainage design modification described above.

Seismic Stability Considerations

We also believe that the specific design details for the drainage layer at the bottom of the cell and around the perimeter of the facility may have a profound impact of the calculated seismic slope stability. GeoSyntec recommends that the assessment of the optimized drainage include a detailed re-evaluation of the seismic slope stability. This recommendation is made for two reasons: (i) significant changes to drainage features will have a direct influence on stability; and (ii) there is a chance that the Tennessee Division of Solid Waste (TDSW) may request consideration (or at least a comment regarding) larger ground motions than reflected in the current permit documents. A discussion related to this recommendation follows.

The current seismic analysis of global slope stability has been conducted utilizing a pseudo-static analysis methodology. This is the most common analysis method for assessing global slope stability due to a seismic event and the methodology is appropriate for the proposed lateral expansion at Kingston. In this analysis method, the ground motions from a seismic event are simulated by applying an external horizontal force to the analyzed slope and then proceeding with a conventional static global slope stability analysis. The biggest challenge facing the designer/engineer is the selection of the external horizontal force that is representative of the ground motions from the design earthquake. The horizontal force is simulated by selecting an appropriate seismic coefficient. In simplified seismic analyses where relatively small ground accelerations are realized, the seismic coefficient is commonly assumed to be a fraction of the peak ground acceleration (PGA) in bedrock for the earthquake that has been found to have a two percent chance of exceedance in 50 years. This is the approach taken by Parsons for

Kingston and presented in Attachment 5 titled "Peak Ground Acceleration Evaluation". For global slope stability, the design appears to consider a bedrock PGA of 0.22g and a pseudo-static seismic coefficient of 0.11g (i.e., a 50 percent reduction in the bedrock PGA) in the subsequent global pseudo-static slope stability analyses. This approach follows traditionally accepted geotechnical practice, but is recognized as having the potential to be overly conservative because it does not account for the attenuation of the ground motion as it interacts with the materials through which the seismic motions propagate.

It is GeoSyntec's experience that for projects where the PGA is greater than approximately 0.20g, it is common for the seismic global slope stability analysis to govern the design. This appears to, in fact, be the case for Kingston, where the calculated global static factor of safety reduced from approximately 1.6 to 1.1 when seismic loading was considered.

In cases where a pseudo-static seismic analysis is demonstrated to have a significant impact on the calculated slope stability analysis results, GeoSyntec typically recommends that a site-specific seismic response analysis be conducted to more realistically assess the ground motions within the impacted earth structure. The objective of this assessment is to develop ground motion signatures that consider the geometry of the slope, the engineering properties of the foundation soils, and the physical properties of materials used to construct the analyzed earth structure, and (in the case of Kingston) the impounded materials. In this way, a more realistic estimate to the ground motions can be recognized. During the site-specific assessment, the actual geometry and physical properties of the earth structure (in this case the dredged ash basins and the compacted ash/gypsum perimeter berms) are considered and a numerical simulation is performed to model the propagation of the PGA applied at the bedrock surface upward through the dredged ash. In this way, the actual damping/acceleration of the bedrock PGA by the impounded ash can be simulated and assessed. Depending on the frequency content of the design earthquake and the properties of the impounded ash, it may be shown that the impounded ash is effective at damping (or accelerating) the ground motions. The analysis results are then assessed to quantify the average ground motion and an appropriate pseudo-static seismic coefficient can be calculated and used in subsequent slope stability calculations. Again, the goal of this procedure is to develop a more realistic representation of the anticipated ground motions that can be used in future slope stability calculations.

As mentioned, GeoSyntec has utilized the approach of conducting seismic response analyses and in some cases seismic deformation analyses for slopes across the U.S. when PGA values greater than approximately 0.20g are considered. This is the most common case in the western U.S. where bedrock PGA values greater than 0.60g are common. This approach seems to be appropriate for Kingston facility because of the indicated sensitivity of the calculated factor of safety to the selected design ground motion and because of the somewhat unique properties of the impounded ash/gypsum. It may even be more important for the Kingston facility, where the bedrock PGA considered by the designers appears to be 0.22g in accordance with guidance documents prepared by TDSW (1993) and U.S. Environmental Protection Agency (USEPA, 1995).

It is important to note that the above referenced documents relied on assessments of bedrock PGA values presented in documents prepared by the United States Geological Survey (USGS) dated 1991. More recent USGS publications (i.e., 2002) present revised bedrock PGA values that have recently been required by regulatory agencies, although not explicitly incorporated into the TDSW guidance documents. Considerations of these revised ground motions were required by TDSW in a permit application for a facility in Memphis prepared by GeoSyntec in 2003, primarily due to the close proximity of the Memphis site to the New Madrid Fault zone. In the case of Kingston, Tennessee, the revised bedrock PGA shown in the more recent USGS publication is approximately 0.27g, representing an increase in ground motion of more than 20 percent compared to the previously considered ground motions. GeoSyntec is not aware of any actions by TDSW that will require that seismic slope stability analyses be conducted using the revised ground motions, but we believe that if supplemental analyses are to be conducted, it would be to TVA's best interest to at least be aware of the impacts of the revised ground motions. In the extreme case (and one which we feel is not likely), if revised calculations are required, then the design presented in the current permit package may be deemed deficient, necessitating a re-evaluation of the seismic stability. Because of the potential consequence of this, we believe that at a minimum, analyses utilizing the revised ground motions should be performed.

While the consideration of a more representative site seismic response and (potentially) increased design ground motions may adversely impact the seismic stability of the current design, GeoSyntec believes that refined seismic analyses are warranted and that they will ultimately benefit TVA. These analyses may include seismic response analyses as well as seismic deformation analyses. These analyses will be coupled with design considerations regarding the selected drainage features around the perimeter and along a portion of the bottom of the facility. Based on experience on a range of similar projects, GeoSyntec believes that a cost-effective and stable design can be demonstrated for the Kingston facility. We note that in a recent project for a large earth dam in North Georgia, GeoSyntec demonstrated that the use of more robust seismic analyses resulted in a much more efficient and less expensive design than the design developed (by others) utilizing the simplified seismic slope stability analysis procedures. Of equal importance, however, GeoSyntec recognizes that any modification of the analysis methods recommended in the TDSW guidance documents must be thoroughly supported and presented to the agency. GeoSyntec has utilized site-specific analysis results and seismic response techniques for the previously referenced Memphis project that was impacted by its proximity to the New Madrid Fault zone. For the Memphis project, GeoSyntec developed supporting documentation and presented analysis results that were accepted and approved by TDSW. GeoSyntec enjoys a tremendous professional relationship with the TDSW technical staff and is confident that a technically compelling demonstration to TDSW can be developed



and approved, if the revised analysis results for Kingston differ from those presented in the dated TDSW and USEPA guidance documents.

Summary and Recommendations

In summary, GeoSyntec recommends that TVA perform an evaluation of bottom drainage alternatives. The evaluation would address the following items, at a minimum:

- cost benefit analysis of various drainage configurations;
- re-evaluation of the hydrogeologic buffer requirements together with an equivalency demonstration or fate and transport analysis to address permit requirements; and
- re-evaluation of global static and seismic stability following selection of any revisions to the bottom drainage.

Based on the very preliminary analyses presented herein, we believe that potential savings of the order of 25 to more than 40 percent of the cost to construct the currently proposed bottom drainage layer may be achievable. However, additional analysis and evaluation will be required to confirm this preliminary opinion. We are confident that significant savings can be realized.

GeoSyntec believes that the evaluations and analyses described herein could be completed within approximately three to four weeks. Depending upon the level of analyses needed and interaction with other team members, the estimated cost to perform this work is likely in the range \$40,000 to \$55,000. Note this is a quick "guesstimate" to aid TVA in decision making.

Should you have any questions regarding any of the information provided in this memorandum, please do not hesitate to contact either of us. We appreciate the opportunity to work with your team on the Kingston project.



Figure 1

Case I: Drainage layer constructed along the entire base of the dredged ash stack.



Note: Estimated water levels in the dredged fly ash are shown for 5 years time increment (i.e., 0, 5, 10,...etc.) up to 50 years.

Bottom Drainage Memo

GEOSYNTEC CONSULTANTS





Comments to Phase I Memorandum

GEOSYNTEC CONSULTANTS

1255 Roberts Blvd., Suite 200 Kennesaw, Georgia 30144 Tel (678) 202-9500 Fax (678) 202-9501

Figure 3

Case 2: Drainage layer of 300 feet in length from the edge of the fly ash stack.



Note: Estimated water levels in the dredged fly ash are shown for 5 years time increment (i.e., 0, 5, 10,...etc.) up to 50 years.

Comments to Phase I Memorandum

From:Baugh, James S.Sent:Friday, February 04, 2005 3:57 PMTo:Purkey, Ronald E.; Haber, Stanley M.Cc:Lundy, Dennis L.Subject:KIF update

We have completed the sensitivity analyses on pond vs peninsula at KIF that we discussed earlier this week. I would like to review the analysis summary on Monday morning, then send it to you for comments.

The conference call with UCC to resolve issues on the estimate for dry ash collection is scheduled for Monday.

Let me know if you have any questions.

From:	Hedgecoth, Melissa A.
Sent:	Friday, February 04, 2005 3:42 PM
То:	Hedgecoth, Melissa A.; Baugh, James S.; Purkey, Ronald E.; Haber, Stanley M.; Renfroe, Bret; Murray, David B.; Myers, Thomas J.
Cc:	Nuyt, Gary M.
Subject:	RE: KIF Dry fly ash

For those that need to call in to the meeting, the number is 423-751-2428, and the I.D. # is 6426. Again, the meeting is at 3:00 EST. Thanks,

Missy

Original Appoi	ntment
From:	Hedgecoth, Melissa A.
Sent:	Friday, February 04, 2005 1:42 PM
To:	Baugh, James S.; Purkey, Ronald E.; Haber, Stanley M.; Renfroe, Bret; Murray, David B.; Myers, Thomas J.
Cc:	Nuyt, Gary M.
Subject:	KIF Dry fly ash
When:	Monday, February 07, 2005 3:00 PM-4:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where:	LP 5N A03 (Mill Creek)

This meeting is to discuss the current Dry Fly Ash Conversion cost estimate with United Conveyor Corporation.

Tom Myers, could you please see if the person that has been looking at electrical costs for Kingston is available? We would like to get a better idea on the <u>additional</u> costs to meet the electrical needs for the dry fly ash conversion.

Thanks, Missy

From:	Purkey, Ronald E.
Sent:	Thursday, February 03, 2005 3:05 PM
То:	Haber, Stanley M.; Davis, Victor W.
Subject:	RE: KIF Dry Fly Ash Estimate
Attachments:	KIF Fly Ash Estimate.pdf

Stan - it's all right - I will send one

Victor - for your viewing pleasure

Ron

-----Original Message----- **From:** Haber, Stanley M. **Sent:** Thursday, February 03, 2005 3:03 PM **To:** Purkey, Ronald E. **Subject:** RE: KIF Dry Fly Ash Estimate

Don't you think that he should get a copy?

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 3:00 PM **To:** Haber, Stanley M. **Subject:** RE: KIF Dry Fly Ash Estimate

no, Bret used the vendor's info as he had gotten the ash from TVA facilities to silo turnkey.

-----Original Message----- **From:** Haber, Stanley M. **Sent:** Thursday, February 03, 2005 10:24 AM **To:** Purkey, Ronald E. **Cc:** Petty, Harold L. **Subject:** RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

Spreadsheet Report Dry Fly Ash

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

UC Service Corporation proposal (003381) included Flly Ash Handling design & equipment, which is coming from United Conveyor Corporation. 161kV Power Feed is based off of an FY01 TPS estimate Electrical Engineered Material Costs based on ABB quote. that has been escalated. Estimate is in FY04 Dollars. Sorted by 'Location/Activity' 'Detail' summary (1043-03-1633) KIF 04096 R. E. Purkey B. L. Renfroe Conceptual +/- 30% 12/10/2003 KIF 60 2003 Dry Fly Ash Capital Estimate Type Estimate Accuracy Est. Issue Date Funding Type Plant Estimate # Requesting Engr Notes Report format Project name Option Labor rate table Estimator Revision Phase

TVA-00028105

Spreadsheet Report Dry Fly Ash 2000

							-	-	_	_	_		-	-
I Amount			223,360	159,016	223,360	314,538	619,016	39,754	72,925	46,755	16,000,000	5,600,000	24,630	19,836
u Tota			-	-	-	-						•		•
er Amoun														
at Of			-		1	-1	-	- 1		•		0		000
up Amour					CANADA I DA I RADIOLOGI TOTA DA MANA MININA									5,0
nt Eq			-	000	•	-	000	750		•	000	000		
Sub Amou				15,			75,1	'n			16,000,1	5,600,1		
Amount			150,000	100,000	150,000	210,000	500,000	25,000	50,000	29,295	0		14.726	7.500
Matorial.														
Amount			73,360	44,016	73,360	104,538	44,016	11.004	22,925	17,460	0		9,903	7.336
y Labor														
H Quantit			00 Is	00 Is	00 Is	00 Is	sl 00	00 Is	00 Is	00 lf	00 Is	00 Is	00 lf	s UU
Takec			-	2.	1.	3.	2		1.	3,500.	1	1	2.250.	1
				ter			Isformer	ž		эE				2
cription			ar	DV Transform	tear	haear	lio filled Tran	/ Transforme		ted EPR/CSF			=/CSPF	orecoon Itom
Des			tor switchges	4 16kV/480	door Switcha	utdoor Switch	61kv/4.16kv	4 16kV//480V	Hoor MCC	/0-3C Shield	A Comprisition	wer Feed	2/0-3C XI PF	ment & Infr
			480V indo	1500 KVA	4 16kV Inc	4 16kV Ot	10MVA 1	750 KVA	480V Out	CIL5KV 4	LC Servic	161kV Po	CLIEDOV	Mie Eouir
vhy		liection												
Acti		Fly Ash Co												
LO.		tula-						-						
Locati	ΕL							· · · · · · · · · · · · · · · · · · ·						
	X	L	I	1	1	[1	-	í.	1				1

Spreadsheet Report Dry Fly Ash

Estimate Totals

Labor Material Subcontract Equipment	407,918 1,236,521 21,693,750 5,000 23,343,189	23,343,189	11,121.000	hrs	
Engineered Materials - Ph 2 Adjustment - Engr Materials	1,185,000 (1,185,000)	23,343,189	100.000 % (100.000) %		ပပ
Small Tools Expense Consumables & Expendables	5,004 16,317 21,321	23,364,510	0.450 \$/hr 4.000 %		τu
Escalation - Craft Labor Escalation - Subcoontract Escalation - Perm Materials Escalation - Small Tools Escalation - Consumables	20,396 759,281 24,730 378 805,601	24,170,111	5.000 % 3.500 % 2.000 % 0.034 \$/hr 0.200 %		υυυτυ
Partner Insurance (FY 04) Partner Award Fee (FY04)	12,238 20,396 32,634	24,202,745	3.000 % 5.000 %		00
Elect. Engineering Design Elect. Site Meeting/ Travel Mech Engineering - Phase 2 Civil Engineering - Phase 2 Elect. Field Commissering Project Controls & Estimating	380,000 45,000 20,000 75,000 75,000 552,000	24.754,745	2.526 %		00
Rounding	245,255 245,255	25,000,000			L
	Total	25,000,000			

From:	Haber, Stanley M.
Sent:	Thursday, February 03, 2005 3:03 PM

To: Purkey, Ronald E.

Subject: RE: KIF Dry Fly Ash Estimate

Tracking: Recipient Delivery

Purkey, Ronald E. Delivered: 02/03/2005 3:03 PM Read: 02/03/2005 3:03 PM

Don't you think that he should get a copy?

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 3:00 PM **To:** Haber, Stanley M. **Subject:** RE: KIF Dry Fly Ash Estimate

no, Bret used the vendor's info as he had gotten the ash from TVA facilities to silo turnkey.

Read

-----Original Message----From: Haber, Stanley M.
Sent: Thursday, February 03, 2005 10:24 AM
To: Purkey, Ronald E.
Cc: Petty, Harold L.
Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

From:Purkey, Ronald E.Sent:Thursday, February 03, 2005 3:00 PMTo:Haber, Stanley M.Subject:RE: KIF Dry Fly Ash Estimate

no, Bret used the vendor's info as he had gotten the ash from TVA facilities to silo turnkey.

----Original Message----From: Haber, Stanley M.
Sent: Thursday, February 03, 2005 10:24 AM
To: Purkey, Ronald E.
Cc: Petty, Harold L.
Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

-----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

From:	Haber, Stanley M.
Sent:	Thursday, February 03, 2005 10:24 AM
То:	Purkey, Ronald E.
Cc:	Petty, Harold L.

Subject: RE: KIF Dry Fly Ash Estimate

Ron,

Did the Mechanical section review this to ensure that it was complete from their perspective?

Stan

----Original Message----From: Purkey, Ronald E.
Sent: Tuesday, February 01, 2005 2:44 PM
To: Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc: Renfroe, Bret
Subject: KIF Dry Fly Ash Estimate

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

From: Haber, Sta	anley M.	
------------------	----------	--

Sent: Thursday, February 03, 2005 9:08 AM

To: Baugh, James S.

Subject: RE: UCC meeting

Tracking: Recipient Delivery

Baugh, James S. Delivered: 02/03/2005 9:08 AM Read: 02/03/2005 9:48 AM

Read

yes.

-----Original Message-----From: Baugh, James S. Sent: Thursday, February 03, 2005 9:06 AM To: Haber, Stanley M. Subject: RE: UCC meeting

I have a copy on my desk - do have time to come by to pick it up?

-----Original Message-----From: Haber, Stanley M. Sent: Thursday, February 03, 2005 8:22 AM To: Baugh, James S. Subject: FW: UCC meeting Importance: Low

Steve,

I believe that we were going to distribute a copy of the original UCC estimate for review by 2/2. I didn't get a copy. Can I have one please? I also would like to be part of the phone call on Friday.

Stan

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 7:47 AM **To:** Haber, Stanley M. **Subject:** FW: UCC meeting

-----Original Message-----From: Baugh, James S. Sent: Wednesday, February 02, 2005 4:03 PM To: Purkey, Ronald E. Subject: UCC meeting

FYI, Kent Shever (the guy who we need to talk to with UCC) is not available until Friday. We will schedule a conference call with him on Friday of this week.

From:Baugh, James S.Sent:Thursday, February 03, 2005 9:06 AMTo:Haber, Stanley M.Subject:RE: UCC meeting

I have a copy on my desk - do have time to come by to pick it up?

-----Original Message-----From: Haber, Stanley M. Sent: Thursday, February 03, 2005 8:22 AM To: Baugh, James S. Subject: FW: UCC meeting Importance: Low

Steve,

I believe that we were going to distribute a copy of the original UCC estimate for review by 2/2. I didn't get a copy. Can I have one please? I also would like to be part of the phone call on Friday.

Stan

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 7:47 AM **To:** Haber, Stanley M. **Subject:** FW: UCC meeting

-----Original Message-----From: Baugh, James S. Sent: Wednesday, February 02, 2005 4:03 PM To: Purkey, Ronald E. Subject: UCC meeting

FYI, Kent Shever (the guy who we need to talk to with UCC) is not available until Friday. We will schedule a conference call with him on Friday of this week.

From:	Haber, Stanley M.
Sent:	Thursday, February 03, 2005 8:22 AM
То:	Baugh, James S.
Subject:	FW: UCC meeting
Importance:	Low

 Tracking:
 Recipient
 Delivery

 Baugh, James S. Delivered: 02/03/2005 8:22 AM

Steve,

I believe that we were going to distribute a copy of the original UCC estimate for review by 2/2. I didn't get a copy. Can I have one please? I also would like to be part of the phone call on Friday.

Stan

-----Original Message----- **From:** Purkey, Ronald E. **Sent:** Thursday, February 03, 2005 7:47 AM **To:** Haber, Stanley M. **Subject:** FW: UCC meeting

-----Original Message-----From: Baugh, James S. Sent: Wednesday, February 02, 2005 4:03 PM To: Purkey, Ronald E. Subject: UCC meeting

FYI, Kent Shever (the guy who we need to talk to with UCC) is not available until Friday. We will schedule a conference call with him on Friday of this week.

Haber, Stanley M

From:Purkey, Ronald E.Sent:Thursday, February 03, 2005 7:47 AMTo:Haber, Stanley M.

Subject: FW: UCC meeting

-----Original Message-----From: Baugh, James S. Sent: Wednesday, February 02, 2005 4:03 PM To: Purkey, Ronald E. Subject: UCC meeting

FYI, Kent Shever (the guy who we need to talk to with UCC) is not available until Friday. We will schedule a conference call with him on Friday of this week.

Haber, Stanley M

From:Haber, Stanley M.Sent:Wednesday, February 02, 2005 7:46 AMTo:Baugh, James S.

Subject: RE: KIF Pond vs Peninsula Action Plan

Tracking: Recipient Delivery

Baugh, James S. Delivered: 02/02/2005 7:46 AM Read: 02/02/2005 7:46 AM

Steve,

It looks accurate to me.

Stan

-----Original Message----From: Baugh, James S.
Sent: Tuesday, February 01, 2005 12:29 PM
To: Lundy, Dennis L.; Purkey, Ronald E.; Haber, Stanley M.
Subject: KIF Pond vs Peninsula Action Plan

Please review the attached and let me know if I missed anything from our meeting this morning.

Read

Thanks.

Haber, Stanley M

From:	Purkey, Ronald E.
Sent:	Tuesday, February 01, 2005 2:44 PM
То:	Haber, Stanley M.; Miller, Evelyn C.; Baugh, James S.; Radford, Larry D.; Latsch, Mitchell D.; Hedgecoth, Melissa A.; Deskins, Earl L; Campbell, Linda F.; Preslar, Jacky D.; Rehberg, Robert L.; Bowers, Larry C; Petty, Harold L.; Nuyt, Gary M.; Myers, Thomas J.; Petty, Harold L.
Cc:	Renfroe, Bret
Subject:	KIF Dry Fly Ash Estimate
Attachments:	KIF Fly Ash Estimate.pdf

Per my action item in the Meeting last Thursday, I have attached the Dry Ash estimate for Kingston. Bret Renfroe did the estimate and will be glad to discuss any item with you. Thanks.

eet Report Y Ash ossill Plant Collection V Ash Handling System	Fly Ash	. Renfroe	60 2003	96 E. Purkey	ceptual 30% 10/2003 pital	crircal Engineered Material Costs based on ABB quole. 43-03-1033) Service Corporation proposal (200381) included Flly Ash Handling sign & equipment, which is corning from United Conveyor ropration. 161kV Power Feed is based off of an FY01 TPS estimate it has been escatated. Estimate is in FY04 Dollars.	ted by Location Activity Bait Burmary	
A/FPG/FE&TS/EDS/ESS/CES Bry F Dry F Kingston Dry Fly As Design & Install New F	Project name Dry	Estimator B. I	Labor rate table KIF	Plant KI Estimate # 04 Requesting Engr R. Option 0 Revision 0	Estimate Type Co Estimate Accuracy +/- Est Issue Date 12. Funding Type Co	Notes No	δα β	

Spreadsheet Report Dry Fly Ash

t Total Amount			0000'077	910'RCL -	- 223,360	- 314,538	- 619,016	- 39,754	- 72,925	- 46,755	- 16,000,000	- 5,600,000	- 24,630	- 19,836
mt Other Amoun			-	•	-	-	-	-	•	-	-	0	Ł	000
ount Equip Amou				15,000	-	-	75,000	3,750	-	-	000'00	000'00		-
Amount Sub Am			150,000	100,000	150,000	210,000	500,000	25,000	50,000	29,295	0 16,00	5,6(14.726	7.500
- Amount Material			73,360	44,016	73,360	104,538	44.016	11.004	22,925	17,460	0		9.903	7 336
if Quantity Labo			00 Is	s 00 ls	00 Is	00 is	00 k	00 15	00 ls	00 ff	00 Is	00 Is	DO IF	00 le
Takeo				r 2	1		former 2			3.500	1		2 250	
Description			DV indoor switchgear	D0 KVA_4 16kV/480V Transforme	6kV Indoor Switchgear	RkV Outdoor Switchooar	MVA 1614-0/4 16kv lin filled Trans	VVA 4 16V/1480V Transformer		5KV 4/0-3C Shielded EPR/CSPF	Service Connoration	11/1 Downer Feed		
Activity		Fly Ash Collection	480	150	11 7	11 V	101			5	27	181	2	3
Location	KIF	-												

Spreadsheet Report Dry Fly Ash

Estimate Totals

Haber, Stanley M

From:	Baugh, James S.
Sent:	Tuesday, February 01, 2005 12:29 PM
То:	Lundy, Dennis L.; Purkey, Ronald E.; Haber, Stanley M.
Subject:	KIF Pond vs Peninsula Action Plan
Attachments:	KIF action plan FEb 1 2005.xls

Please review the attached and let me know if I missed anything from our meeting this morning.

Thanks.

Kingston - Pond vs Peninsula - Additional Analysis Tasks

	Item		Responsible	<u>Complete</u>
1	Proj	ect assumptions for cost estimating		
	a	Document governing assumptions used in cost estimating	Purkey/Toney	03-Feb-05
	b	Verify that assumptions are consistent for in-pond and peninsula options	Purkey/Toney	04-Feb-05
	- Č	Adjust economics as needed for consistency of assumptions	Baugh/	05-Feb-05
	Ĭ	· · · · · · · · · · · · · · · · · · ·	Hedgecoth/	
			Toney	
-				
2	Dra	inage laver		
	a	Prepare a position paper on why drainage layer is a TDEC requirement	J. Watts	05-Feb-05
	b	Run sensitivity analyses with varying cost assumptions for drainage layer	Baugh/	05-Feb-05
	~		Hedgecoth	
	C	Adjust cost of drainage layer in base case analysis if appropriate	Baugh/	05-Feb-05
			Hedgecoth/	
			Toney	
	d	Establish the TVA Engineering position on minimum requirements for the	Purkey	05-Feb-05
		drainage laver		
2	Imr	act of 5# coal on analysis		
۲,	2	Determine source of assumptions for use of 2.8# coal	Baugh	02-Feb-05
	h	Provide pond/peninsula storage capacity data for sensititivy analysis	Purkey	02-Feb-05
		Run sensitivity analysis with 5# coal	Baugh/	05-Feb-05
	ľ		Hedgecoth	
	Dr	Fly Ash conversion		
⊢⁼	2	Distribute copies of cost estimate for review	Purkey	02-Feb-05
	h h	Provide a copy of the original UCC turnkey estimate	Hedgecoth	02-Feb-05
		Review cost estimate with LICC to indentify potential issues	Toney/	03-Feb-05
	ľ		Hedgecoth/	
1	L		Fossil Engr	
<u> </u>	1	Revise project economics as appropriate	Baugh/	05-Feb-05
ł	۱ '		Hedgecoth/	[
I	1		Toney	
5	Gv	psum marketing		
۲		Determine how marketing would affect pond/peninsula options	Hedgecoth/	03-Feb-05
	٦		Radford/	
			Catlett	
F	h	Revise project economics to consider marketing	Baugh/	05-Feb-05
	۳ ا		Hedgecoth/	
1	1		Toney	
┣	+	Run sensitivity analyses - marketer fails to meet guarantees	Baugh/	05-Feb-05
	1		Hedgecoth	
F	+	Determine if it is feasible to stack gypsum in the active pond with marketing	Purkey	03-Feb-05
	1	and a 2.8# coal (based on quantities to be disposed of)	1	
-				
F		I molexity of Operations - In Pond option		
F	Ψ ²	Review and adjust ongoing construction costs in economic analysis	Hedaecoth/	02-Feb-05
	°		Radford/	
1			Tonev	
┣-		Run sensitivity analyses - vaning costs of ongoing construction	Baugh/	05-Feb-05
	1	In the sensitivity analyses - varying costs of ongoing construction	Hedgecoth/	
			Radford	
\vdash	+		+	
	711-	knowns - Peninsula development costs		
H		Pup sensitivity analyses - vaning costs of peningual development including	Baugh/	05-Feb-05
	1	a nun sensitivity analyses - valying costs of pennisual development, including	Hedgecoth/	
			Radford	
\vdash	+			
	00.	Immony of Analyses		
Ľ	201	Develop a summary of economic analyses including cash flows and 5 10	Baugh/	05-Feb-05
	1	and 25 year NEVe	Hedgecoth/	
1		anu 20 your will vo	Tonev	
1				

From:	Petty, Harold L.
Sent:	Wednesday, January 26, 2005 4:36 PM
То:	Purkey, Ronald E.; Haber, Stanley M.
Subject:	FW: KIF Pond or Peninsula decision

----Original Message----From: Watts, Janet K
Sent: Wednesday, January 26, 2005 4:19 PM
To: Preslar, Jacky D.
Cc: Lundy, Dennis L.; Cooper, Marcia A.; Baugh, James S.
Subject: KIF Pond or Peninsula decision

Jacky,

I've had discussion with staff today and want to let you know from a regulatory perspective we cannot revisit the blanket drain as part of the design for the wet ash in Pond - gypsum option. There are several reasons if you would like to discuss please give me a call.

I would also like to say I don't understand what the process is if we are revisiting a design that impacts a regulatory/permitting process well after the 10% review, after the 50% review, after the design is done and application has been submitted to state. Staff tells me there is a process. I will pursue finding it and then maybe those of us involved in these issues can agree that we are going to follow it or, we need to come up with a new improved process.

My concerns about this regulatory issue that is related to design include impacts to the BRF schedule since it had similar design/permict application elements.

And if I've misunderstood something please correct me.

Janet

From:	Petty, Harold L.
Sent:	Wednesday, January 26, 2005 2:03 PM
То:	Haber, Stanley M.
Cc:	Bowers, Larry C; Purkey, Ronald E.
Subject:	KINGSTONMATRIXPRESENTATION 2 saved on the z drive.ppt
Attachments:	KINGSTONMATRIXPRESENTATION 2 saved on the z drive.ppt



Kingston Fossil Plant **Decision Matrix**

Pond or Peninsula?

January 27th, 2005 Plant Managers Conference Room 10 AM – 11:30 AM

Presentation of Decision Matrix Agenda

- How We Got Here & Where We Are
- > Basis for Matrix
- Presentation of Options
- Presentation of Option Costs
- Summary of Present Worth by Option
- Engineering Recommendation
- Path Forward

How We Got Here & Where We Are	Initial Look at Peninsula for Gypsum Only	Plant Manager's Concerns for this Area and Request to Revisit a Pond Only Option (JPT)	Blowout – November 2003	Interim Cell Decision	Permit Package Required by DSWM	TVA took this opportunity to do the engineering and	permitting required for a Lateral Expansion utilizing	the remaining capacity in the pond complex. This	expansion included all wastes in all forms.	Part II Permit Package Submitted in June 2004	s.
--------------------------------	---	---	-------------------------	-----------------------	---------------------------------	---	---	--	---	---	----

How We Got Here & Where We Are

Peer Review

Questions Raised by Yard Regarding Complexity of Operation

Results of Peer review

Gypsum & Ash Separately in Pond Option Even More Flexibility Added to Maintain Continue Permit Application As Is

Strengthened our Argument for Not Having a Liner
Where We Are

IT'S DECISION TIME.

Permit Process for Peninsula Option must begin now to have a facility in-place when Decision Needed for Gypsum Disposal Gypsum Production Begins in 2009 Gypsum is produced

Basis for Matrix

This is the "Given and Assumed" Portion of the Problem

Ash Production Per Year (2003 numbers):

398,000 CY Fly Ash

77,600 CY Bottom Ash

Provided by Missy Hedgecoth:

Gypsum Production Per Year:

327,360 CY

Provided by FGD Team – Based on Calculation using a 2.8# Coal (Average) Burn – Assumes No Marketing Success

Basis for Matrix	um Production Begins in 2009	nty-Five Year Window – 2005 Present Worth Value (PWV)	ure Cost are NOT included for any option since all options rovide in excess of 25 years capacity	⁻ Iy Ash Conversion Cost – Includes a \$2,000,00 deduction that sumes the electrical power cost would be absorbed by the crubber project.	e the in pond option is at the 50% design stage and the eninsula option is at the Phase 1 stage, a 5% delta in ontingencies has been added to the peninsula option to "level e playing field" between the pond and peninsula options.
	Gypsum P	Twenty-Fi	Closure C provide	Dry Fly As assume scrubb	Since the peninsu conting the play

Basis for Matrix

Operations Assumptions:

Gypsum Delivery Costs are assumed as equal between the Pond **Option and the Peninsula Option – Evidenced by the similar** distance and height pumped. O&M cost for Gypsum in Pond Options are higher to account for more complex operation Greater effort in maintaining rim ditches, additional engineering support and surveying costs, etc.

O&M Costs have been reviewed and confirmed by HED (Larry Radford)

Basis for Matrix

Peninsula Options Include:

Assumed cost of \$ 500,000 (2005 dollars) for Karst Mitigation Must be an Assumption – Exact Cost will not be known until construction is completed

Based on 1300 linear feet of impact and a "in lieu of" fee of \$200/ft Assumed cost of \$250,000 (2005 dollars) for Stream Mitigation of impact per TDEC guidance

Presentation of Options

- of options the cost for a liner in the pond (if control. Gypsum disposal on the peninsula be required for the lateral expansion of the this Matrix. For the purpose of comparison required by TDEC) is omitted since it may There are Four Major Options included in dredge cell even if no gypsum is placed there. This decision is outside TVA's assumes a clay liner.
- excess of the required 25 years capacity. As stated earlier, all options provide in

Wet Ash in Pond – Gypsum on Peninsula

- Includes Fix for Swan Pond Road
- Dredge Cells are
 Operational for the
 Next 25 Years
- Dry Fly Ash Conversion is Not Required During the 25 year Evaluation Period (Beyond 2029)

Dry Ash in Pond – Gypsum on Peninsula

For Study Purposes

- No Fix for Dredge Cells on Swan Pond Required
- Gypsum Rim Ditching on Peninsula
- Dry Fly Ash Conversion Assumed to Occur in 2005

Wet Ash in Pond – Gypsum in Pond

- Includes Fix for
 Swan Pond Road
- Assumes Combined
 Dredge Cell/Gypsum
 Rim Ditch Operation
 in Pond
 - Dry Fly Ash
 Conversion is
 Required in 2016

Dry Ash in Pond – Gypsum in Pond

For Study Purposes

- No Fix for Dredge
 Cells on Swan Pond
 Required
 Dry Fly Ash
 - Dry Fly Ash
 Conversion
 Assumed to occur
 in 2005

Presentation of Option 1 Costs

Net Ash in Pond - Gunsum on	Capital Costs (Pwv)	\$ 13,121,862
Peninsula	O&M Cost (PWV)	\$ 10,629,977
Details are in the Appendixes	Total Present Worth	\$ 23,751,838

Presentation of Option 2 Costs

Dry Ash in Pond – Gvpsum on	Capital Costs (PWV)	\$ 38,447,448
Peninsula	O&M Cost (PWV)	\$ 17,512,694
Details are in the Appendixes	Total Present Worth	\$ 55,960,142

Presentation of Option 3 Costs

Wet Asn in Pond - Gypsum in	Capital Costs _(PWV)	\$ 16,896,059
Pond	O&M Cost (PWV)	\$ 13,270,679
Details are in the Appendixes	Total Present Worth	\$ 30,166,737

Presentation of Option 4 Costs

Dry Ash in Pond - Gunstim in	Capital Costs (PWV)	\$ 33,952,770
Pond	O&M Cost (PWV)	\$ 19,096,939
Details are in the Appendixes	Total Present Worth	\$ 53,049,709

Summary of Present Worth by Option

Option 1 Wet Ash in Pond – Gypsum on Peninsula	Option 2 Dry Ash in Pond – Gypsum on Peninsula	Option 3 Wet Ash in Pond – Gypsum in Pond	Option 4 Dry Ash in Pond – Gypsum in Pond
Present Worth	Present Worth	Present Worth	Present Worth
\$23,751,838	\$55,960,142	\$30,166,737	\$53,049,709

Summary of Non-Economic Factors by Option

Option 1 Wet Ash in Pond – Gypsum on Peninsula Straight forward design and operation Potential opposition of neighbors across the lake

Involves ARAP & 404 Permitting

Takes a State Wildlife
 Management Area

•Adds a New NPDES Outfall

Involves karst mitigation

Option 3 Wet Ash in Pond – Gypsum in Pond

Permit is already in process

 Less potential for public opposition

 Does not involve any greenfield impacts More operationally complex

 Utilizes potential ash disposal capacity for gypsum

Operational complexity of in-pond option Proximity of neighbors across the lake А Д





Engineering Recommendation

Recommended Option Wet Ash in Pond – Gypsum on Peninsula (Option 1)

PERMITTING FOR OPTION 3 CONTINUE TO HOWEVER, WE ALSO RECOMMEND THAT **BE PURSUED.**

 This Option Can Be a Fall Back Position If Public **Opposition Delays Permitting Peninsula** Lateral Expansion Permit Required for Ash **Regardless of Gypsum Decision** Already in Permit Process No Additional Expense

Path Forward

Begin Development of Permit Package for Peninsula **Collection of groundwater information has been** ongoing

ARAP & 404 permits will be required

Milestone Dates are included in Appendix A

NPDES Outfall permitting will be pursued

Appendix A – Permitting Milestones

Appendix B – Cost Spreadsheets

Appendix C – Detailed Cost Sheets