Petty, Harold L.

From: Smith, Daniel R on behalf of Smith, Daniel R.

Sent: Wednesday, June 16, 2004 8:42 PM

To: Powell, Ronald D.; Petty, Harold L.

Subject: FW: Gypsum Interface

Some nice information from Jack Boschuk. This one of the primary reasons why we ran the test. There was no migration of gypsum into the "filter layer" the 60:40 mix of gypsum and flyash. He refers to it as 60:40 because this is ratio by weight, rather than volume, I think.

Anyway, this is very good news for the design. This will save TVA millions of $$.

Dan

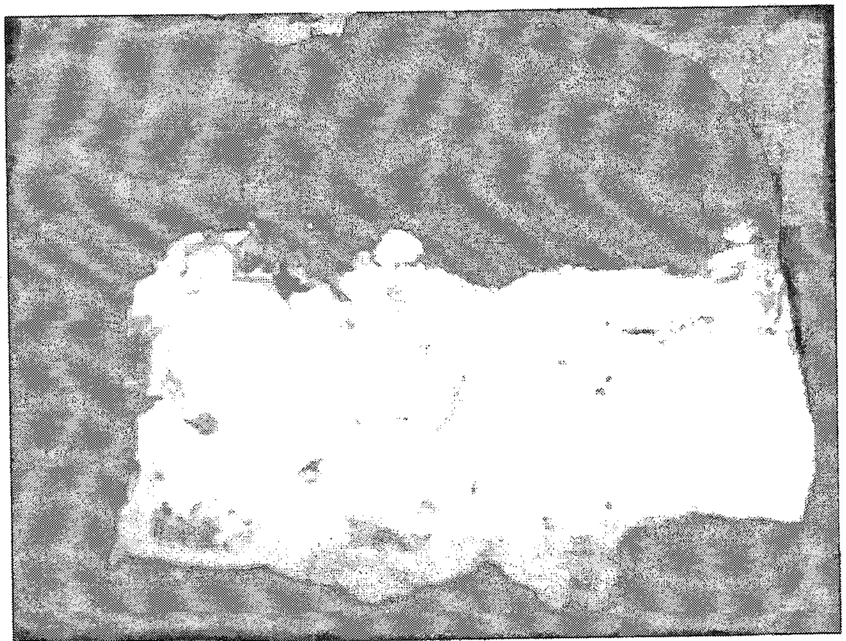
-----Original Message-----
From: John Boschuk, Jr. [mailto:jboschuk@jltlabs.com]
Sent: Wednesday, June 16, 2004 4:18 PM
To: Shah, Yogesh; Greg McNulty; Smith, Daniel R; Anundson, Wade
Subject: Gypsum Interface

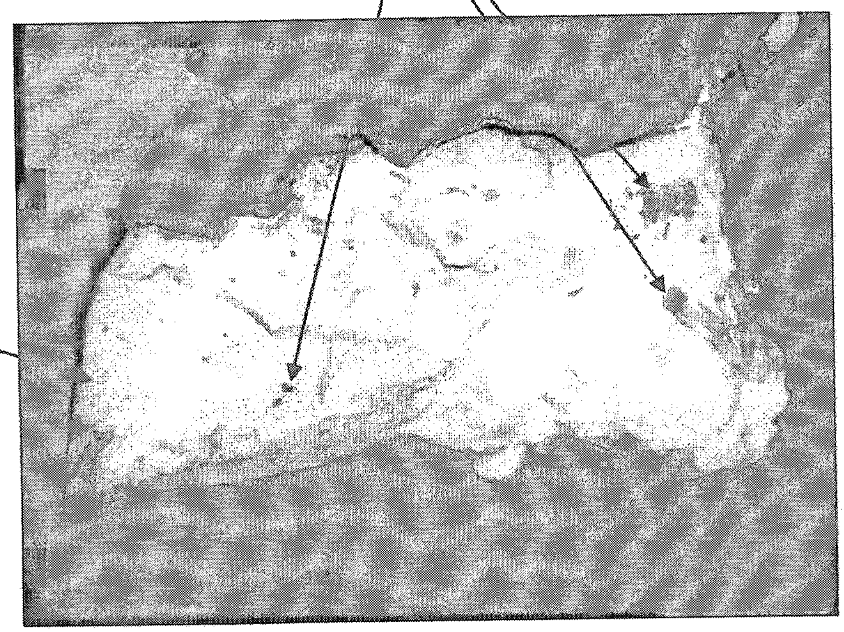
To All:

Attached is closeup photo of the interface between the Gypsum and 60:40 mix.
Absolutely no particle movement from the Gypsum into the 60:40 mix.

Jack Boschuk
JLT Laboratories, Inc.
938 S. Central Ave
Canonsburg, Pa. 15317
Tel: 724-746-4441
Fax: 724-745-4261
e-mail: jboschuk@jltlabs.com

Interface of Gypsum with the 60:40 mix





The 60:40 material did float up into the Gypsum slurry as the Gypsum was deposited

Note: There is no movement of Gypsum into the 60:40 layer

JLT Laboratories, Inc.

Petty, Harold L.

From: Smith, Daniel R.
Sent: Monday, April 28, 2003 9:40 AM
To: Hedgecoth, Missy
Cc: Stammler, Ted; Petty, Harold L.
Subject: Free water volume at KIF Ash Pond

A couple of weeks ago, you and I discussed the free water volume at KIF. Attached is a summary of our conversation, and the conclusions we arrived at after discussion. We met last Wednesday to discuss the presentation for gypsum disposal options, and someone made the comment that additional free water volume would have to be included if the gypsum were sluiced, and wet ash disposal continues. Based on our conversation (see attachment), there is some extra volume based on our assumptions. I would need to know what the additional volume for free water would be to include the gypsum slucing, in order to include in the total. Someone explained that the additional volume would relate to the volume of water used for slucing gypsum.

If you have any questions or comments on the attachment, please let me know.

Free Water Volume
at KIF Ash P...

Daniel R. (Dan) Smith, P.E.
Parsons E & C
633 Chestnut St, Suite 400
Chattanooga, TN 37932
Phone: (423) 757-8088
Fax: (423) 266-0922
Cell: (423) 364-1679
Email: Daniel.R.Smith@parsons.com

Petty, Harold L.

Subject: Free Water Volume at KIF Ash Pond Discussion with Missy Hedgecoth
Entry Type: Phone call

Start: Fri 04/11/2003 2:00 PM
End: Fri 04/11/2003 2:00 PM
Duration: 0 hours

Dan Smith (Parsons) had prepared an estimate of free water volume and faxed this to Missy for review. After some discussion, it became apparent that some revision was needed. The following details the basis for developing a minimum free water volume for KIF in the event a gypsum stack is considered for the existing ash pond. There are a number of ways to accomplish this, and the following methodology is considered feasible for concept development. It may or may not become the basis for final design. Information used to determine free water volume: December 1998, 2002 letter from E.L. Deskins (KIF Plant Mgr) to Mr. Sims Crownover, Manager TDEC Division of Water Pollution Control, Enforcement and Compliance Division.

Free water volume needed for permit: 505,050.5 cy
Existing elevation of weirs in stilling basin: 754.37. Raise weir in stilling basin to 759.5 (leaving 4 ft of freeboard). This provides 430,750 cy. 505,050.5 - 430,750 = 74,300.5 cy, minimum volume needed in ash pond to meet free water volume requirements.

Assume the water elevation in ash pond = water elevation in stilling basin, and assume an average 4.5 ft depth
Assume an L shaped area with the following dimensions: 2900 ft x 200 ft x 4.5 ft/27 = 96,667 cy. This provides an excess of 96,667 - 74,300.5 = 22,367 cy.

Therefore, it would be feasible to leave the stack configuration for Option 3 the same as Option 2 for purposes of the study.

Petty, Harold L.

From: Smith, Daniel R on behalf of Smith, Daniel R.

Sent: Tuesday, June 15, 2004 5:18 PM

To: Petty, Harold L.; Powell, Ronald D.

Subject: FW: Key Conclusions

FYI

Dan
-----Original Message-----
From: John Boschuk, Jr. [mailto:jboschuk@jltlabs.com]
Sent: Tuesday, June 15, 2004 2:48 PM
To: Shah, Yogesh; Greg McNulty; Smith, Daniel R; Anundson, Wade
Subject: Key Conclusions

To All:

Thought you should be aware of the key conclusions that will be discussed, in detail, in the final report.

Basically, your suggested design with these waste materials worked exceptionally well.

Jack Boschuk
JLT Laboratories, Inc.
938 S. Central Ave
Canonsburg, Pa. 15317
Tel: 724-746-4441
Fax: 724-745-4261
e-mail: jboschuk@jltlabs.com

MEMORANDUM

June 14, 2004
04LR386.01

TO: PARSONS TVA DESIGN TEAM

FROM: JACK BOSCHUK

RE: SOME KEY CONCLUSIONS

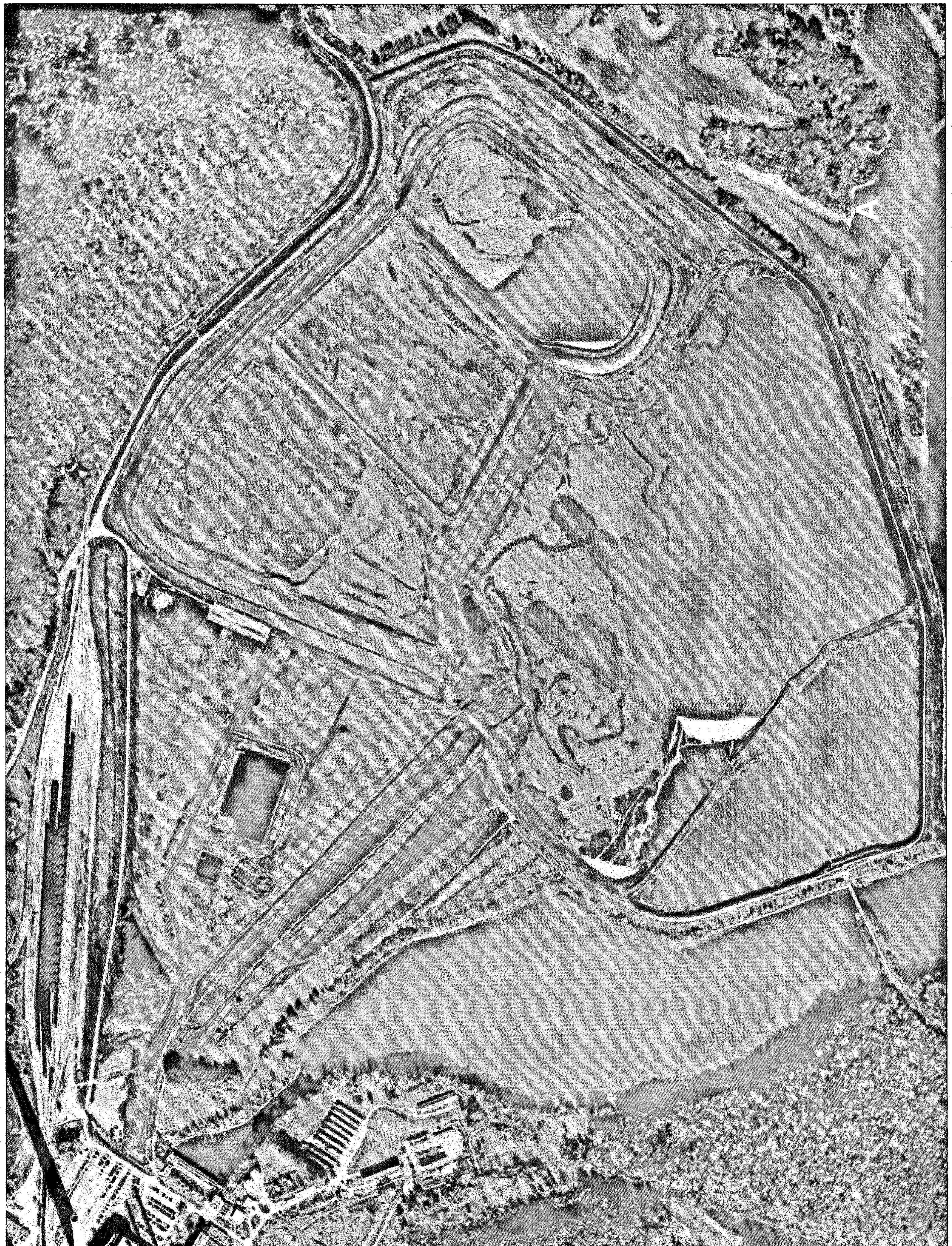
Here are a few key conclusions which will be discussed, in detail, in the final report. I thought you would want this information ASAP.

1) The Gypsum to 60:40 layer is compatible. No movement of fines was observed.
2) The 60:40 to Bottom Ash layer is also compatible. No movement of fines was observed.
3) The data suggests (to be confirmed) that the 60:40 and Bottom Ash layers were not saturated. This is a clear indication that the permeability of these layers is greater than the Gypsum indicating the drain is functioning well even under a normal stress of 65 psi (9,360 psf).

Overall, this test confirmed that this unique design functioned well. However, it will be difficult to construct these layers due to their sensitivity to moisture content and prevailing weather conditions. I would strongly suggest that construction of test pads under varying moisture and weather conditions be constructed to determine how best to mimic the design section in this column.

The sand drainage layer we designed for this column also performed exceptionally well. You may want to consider this gradation for your pipe drainage system design.

JB/rdo
\wp10\memo\0476



Petty, Harold L.

From: Petty, Harold L.
Sent: Friday, September 03, 2004 4:00 PM
To: Petty, Harold L.; Powell, Ronald D.
Cc: Purkey, Ronald E.; 'ndavies@geosyntec.com'
Subject: RE: Geosyntech

Ron:

Here it is again with the e-mail corrected

-----Original Message-----
From: Petty, Harold L.
Sent: Friday, September 03, 2004 12:48 PM
To: Powell, Ronald D.
Cc: Purkey, Ronald E.
Subject: Geosyntech

Ronnie:

Here is the contact name, address, and phone number.

We need to send the FedEx package this afternoon.

Neil Davies
Geosyntech Consultants
1100 Lake Hearn Drive
Suite 200
Atlanta, GA 30342

(404) 236-7286

ndavies@geosyntec.com

Thanks,
Lynn

TAO REQUEST

Company Name:	Parsons E&C			Contract No.:	99998970
TAO Number	PR-0637	Revision	5A	Phase	1
PCN:		Plant:	KIF	Units(s):	1-9
Project Description:	Scrubber Addition Gypsum Stack				

TVA Lead Discipline	Civil	☑	Electrical	☐	Mechanical	☐	Other (specify)	☐	

Work Budgeted For FY(s):	FY04 = $173,627	Shortcode:	001BRG4
List $ limit for first FY:		(Only if work is budgeted for multiple FYs)	

Discipline(s) requesting design support:

Civil	☑	Yes	☐	No	TVA Civil Eng. Contact:	Ted Stammler 751-6421
Civil Mgmt. Approval:						
Electrical	☐	Yes	☐	No	TVA Elect. Eng. Contact:	
Electrical Mgmt. Approval:						
Mechanical	☐	Yes	☐	No	TVA Mech. Eng. Contact:	
Mechanical Mgmt. Approval:						
Other (Specify)					TVA (other) Contact:	
Other Mgmt. Approval:						

Scope of Work to be performed: See Attachments ☐

The scope of work for Ardaman and Associates will consist of the following:
Provide two senior engineering consultants (Tom Ingra and Dr. Wissa) to provide consulting engineering services to Parsons E&C and TVA;

- Attend meetings in Chattanooga and at the site (two full days);
- review the overall configuration of the combined ash/gypsum disposal area;
- develop concepts (rough hand sketches) for various configurations for handling wet gypsum operationally (both wet sluiced from Kingston Steam Plant and dry gypsum transported from Bull Run Steam Plant);
- Discuss strengths and weaknesses of each proposed approach for handling gypsum;
- Discuss uncertainties with each approach;
- Address any questions/comments by TVA FES, TVA Plant or operational staff, or Parsons E&C.

Parsons E&C will provide personnel for the two-day meeting. Reading personnel will tie-in via telecon.

TAO REQUEST

Company Name:	GEOSYNTEC Ganesh Gopalakrishnah 404 236 7286	Contract No.:	LATER

TAO Number	n/a	Revision	0	Phase	2

PCN:		Plant:	KIF	Units(s) :	1-9

Project Description:	Engineering Peer Review of Coal Byproduct (Gypsum and Ash) disposal plans. KIF is Kingston Fossil Plant near Kingston, TN.

TVA Lead Discipline	☑	Civil	☐	Electrical	☐	Mechanical	☐	Other (specify)

Work Budgeted For FY(s):	04 and 05	Shortcode:	001DCDM

List $ limit for first FY:		(Only if work is budgeted for multiple FYs)

Discipline(s) requesting design support:

Civil	☑	Yes	☐	No	TVA Civil Eng. Contact:	Ron Purkey 423 751 4820
Civil Mgmt. Approval:						
Electrical	☐	Yes	☑	No	TVA Elect. Eng. Contact:	
Electrical Mgmt. Approval:						
Mechanical	☐	Yes	☑	No	TVA Mech. Eng. Contact:	
Mechanical Mgmt. Approval:						
Other (Specify)					TVA (other) Contact:	
Other Mgmt. Approval:						

Scope of Work to be performed:	See Attachments	☐
Provide Engineering Peer Review in accordance with attached scope. Geosyntec proposal will be official task scope.		

Expected Deliverables:	1. An exact description of each review component. 2. A Summary of findings. 3. Recommendations for improvement (if any).

Requested Start Date:	September 1, 2004	Requested Completion Date:	October 22, 2004

(Copy of this request must be attached to the resulting TAO(s). If requested task duration exceeds or overlaps a single Fiscal Year, multiple TAO(s) are required (one for each FY).

Scope of work for KIF Engineering Peer Review of Coal Byproduct (Gypsum and Ash) disposal plans:

The permit application for subject disposal plan was submitted in July to the State of TN and is currently under review by TDEC. The intent of this task is to obtain an independent peer review of the approach, the theory used, the constructability and operability of the disposal plan, the drainage and seep controls, the operations plan, and any other component of the disposal plan necessary for the complete peer review. Obviously, this is an independent review and Parsons nor the State of TN should be contacted. Anticipated work is as follows as a minimum:

1. Read the operations plan, the Hydrogeology Report, and overview the drawings. (complete 1 week after award)
2. Visit the site and familiarize yourself with the current site and future plans. (complete 2 weeks after award)
3. Perform an in depth peer review of entire disposal and operation plans. (complete 4 weeks after award)
4. Provide a report that includes the items listed below (complete 6 weeks after award)
  a. An exact description of each review component.
  b. A Summary of findings.
  c. Recommendations for improvement (if any).
5. Weekly telecons (1 hour duration) will be required
6. 1 week after delivery of peer review to TVA, a meeting will be held at TVA facilities to review the findings. Geosyntec will present the findings.

Petty, Harold L.

From: Smith, Daniel R on behalf of Smith, Daniel R.
Sent: Tuesday, September 16, 2003 3:42 PM
To: 'McEntyre, Charles'
Cc: Petty, Harold L.
Subject: Ash Settlement data for KIF

Charles, Lynn suggested that I get in touch with you to see if you know of any data for ash settling characteristics at KIF. We are doing a study to determine how to stack gypsum and continue stacking ash at the existing ash pond at KIF. The attached email provides some additional information regarding what we are trying to do. The concerns are if we build a "dike within the dike", we will reduce the available area to allow ash to settle out within the existing pond. As you may be aware, the ash pond discharges into a stilling pond, and then into the river/lake. The facility has to maintain a minimum free water volume to remain in complianced with permitting requirements, not to mention discharge limits. Modifying the ash pond could cause one or both of the following:

1) Exceedances at the outfall;
2) More ash settling in the stilling basin, thus reducing the free water volume over time to below the permitted volume.

There are computer programs developed by Waterways Expermient Station (US Army COE) in Vicksburg that we could possibly use to model this (program is free of charge), but from the description, we would need site specific data (see below).

Flocculent settling test results;
15-day compression settling test;
Zone settling test (if appropriate);
disposal area information (we should have this)
Dredge information (should have this)
Physical and engineering data on the sediments (we have this).

If this data is not available we would have to conduct these tests (probably don't have time because study is due end of October).

The other way we could do this would be to apply Stokes Law (we have gradation curves, specific gravity, etc), but accuracy might be limited somewhat.

Any information you might have would be helpful. If you are aware of any other sources of this information (i.e., within TVA or EPRI) I would be interested in that as well.

Attached is an email with a couple of drawings attached to show the proposed layout of the "dike within the dike", and the proposed countours developed for the study.

TVA Kingston ash pond study -...

Daniel R. (Dan) Smith, P.E.
Parsons E & C
633 Chestnut St, Suite 400
Chattanooga, TN 37932
Phone: (423) 757-8088
Fax: (423) 266-0922
Cell: (423) 364-1679
Email: Daniel.R.Smith@parsons.com

1255 Roberts Boulevard, N.W., Suite 200
Kennesaw, GA 30144-3694 USA
Voice: (678)202-9500
Fax: (678)202-9501

GEOSYNTEC CONSULTANTS

FAX COVER SHEET

To: Ron Powell, John Albright, cc Ron Purkey, Lynn Petty

Firm: TVA

Fax No.: 423-751-7094

From: Neil Davies

Project No.:

Cover Page plus 7. page(s) following

Sent by: RN Date: 10/25 Time: 8:30

MESSAGE:

Please find attached:

- Weekly Progress
- Kingston Alternative (Memo + sketches)

Look forward to talking with you @ 1pm /2pm

Neil.

Weekly Progress Summary
TVA – Kingston Fossil Plant and John Sevier Fossil Plant Sevier Projects
GeoSyntec Project No. GR3471

Week Ending October 24, 2004

KINGSTON PROJECT (Peer Review)

Progress/Activities This Report Period

- Additional review of Operations Plan, drawings and other supporting materials
- Develop independent review of stability – close to complete
- Report preparation – in progress
- Review of proposed fix for existing dike – in progress
- Detailed review of drawings
    - Inconsistencies and cross references identified
- Hydrogeo report
    - Completied memo describing our findings. Memo to be issued in advance of our report.
- Alternative Layout
    - In the course of our review, we have identified a potential alternative arrangement that may be of interest to TVA.
    - a summary memo is included with this progress report for discussion on today's weekly telecon

Activities Proposed for Next Period

- Continue review of Operations Plan, drawings and other supporting materials
- Continue work on peer review report
- Obtain preliminary feedback from TVA on alternative layout

Information Needs (from TVA)

- Preliminary feedback on potential alternative layout

Schedule

This project is currently on schedule.

JOHN SEVIER PROJECT (Siting Study)

Progress/Activities This Report Period

- Additional evaluation of preliminary sites/tracts proposed by TVA
- Preliminary volume estimates prepared for each site (using simplified layout) - note these have been posted to web site
- Internal QA checks on preliminary volumes
- Evaluation of combinations of areas –complete
- Preliminary evaluation of existing dry stack expansion alternatives – in progress
- Additional GIS maps prepared and posted to website
- Obtained summary details of permitted landfill (Brooks Site) from TDEC.

Activities Proposed for Next Period

- Refine alternatives based on actual property lines (if available from
- TVA)
- Refinement of volume estimates
- Complete evaluation of existing dry stack (potential for volume expansion)
- Development of site ranking – in progress

Information Needs (from TVA)

- Need feedback from TVA on ownership for tracts under consideration (Critical Path item)
- Electronic copy of areal photo (provided by TVA (if available)

Schedule
This project is currently on schedule.

Draft – For Discussion Purposes Only

Introduction of Alternative Ash and Gypsum Disposal Strategy
Kingston Fossil Fuel (KIF) Plant
GeoSyntec Consultants
22 October, 2004

Description of Alternative On-Site Disposal Strategy

- Relevant Figures: Please reference Figures 1 (Plan View), Figure 2 (E-W Cross-Section), and Figure 3 (N-S Cross-Section), each one displaying currently proposed option at the top of the page and the alternative option at the bottom of the page.
- Vertically Expand Existing Dredge Ash Disposal Area: Increase disposal capacity of existing dredge cells by controlling water levels within ash using toe drain network, to allow vertical expansion of cells at current 4H:1V side slope geometry to achieve approximately 3M yd^3 (minimum) of additional ash disposal capacity.
- Develop Gypsum Storage Basins: Develop southern end of existing ash pond into a conventional two-pond gypsum disposal area using rim ditch and sequential filling techniques, while maintaining "valley" between this gypsum disposal area and the existing dredge cells as a conventional ash pond for as long as possible, possibly using eastern side for a dredge ash staging area as needed.
- Convert from Wet Ash to Dry Ash Management: When wet ash disposal capacity is impacted, convert operations to a dry ash management technique and fill remainder of ash pond and eventually close entire ash disposal area using dry ash.

Assessment of Technical Components

- Stability of Existing Dredge Ash Disposal Areas: It appears that the recent pond instability was caused by locally high water levels in the dredge cells. If the water levels can be controlled, then it appears that the height of the existing cells can be increased significantly. The assumed properties of the ash used in stability analyses are reasonable. Based on these shear strength properties for the fly ash and the currently constructed side slopes, adequate short- and long-term stability can be controlled by the selective use of a network of toe drains that is incorporated into the design.
- Stability of Gypsum Basins: Under the alternative plan, the gypsum ponds will be constructed, filled, and managed using conventional gypsum disposal techniques and will incorporate side slopes no steeper than those currently proposed. Since the gypsum is inherently stronger than fly ash, the gypsum monocell design will be inherently more stable than the current proposed design.
- Site Operations - Gypsum: The alternative strategy incorporates a "conventional" gypsum disposal technique including construction via two sequentially operated, large surface area monocells. Gypsum distribution and sedimentation and the subsequent dike construction will incorporate perimeter rim ditches. From an operational perspective, this technique is significantly easier than the currently proposed technique.

Draft – For Discussion Purposes Only

- Site Operations – Ash: Ash disposal will utilize the current wet disposal technique for as long as possible. Therefore, operations regarding ash disposal will be largely unaffected in the short-term. It is acknowledged that the current ash pond will decrease in surface area to accommodate gypsum storage, so ash disposal operations regarding dredging and placement in the dredge cells will be impacted. The currently disposal strategy realizes these same wet ash disposal impacts, but because of the increased disposal quantities included in the alternative strategy, the impacts are not expected to be as severe and major operational impacts involving the transition to dry ash management can be delayed for several years.
- Site Operations – General O&M: The alternative strategy introduces a network of toe drains and potentially an increase in overall height of the dredge cells. It will be necessary to develop an inspection and monitoring plan for the side slopes and the toe drains. The increased height necessitates the development of haul roads to and from the dredge cells. It is anticipated that the net impact of these components will be relatively minor.

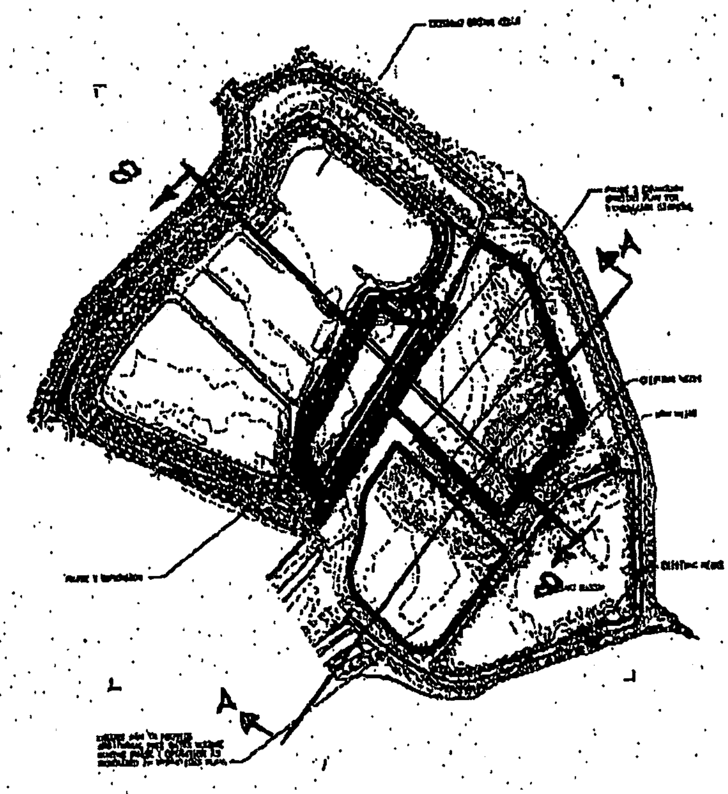
Design Considerations

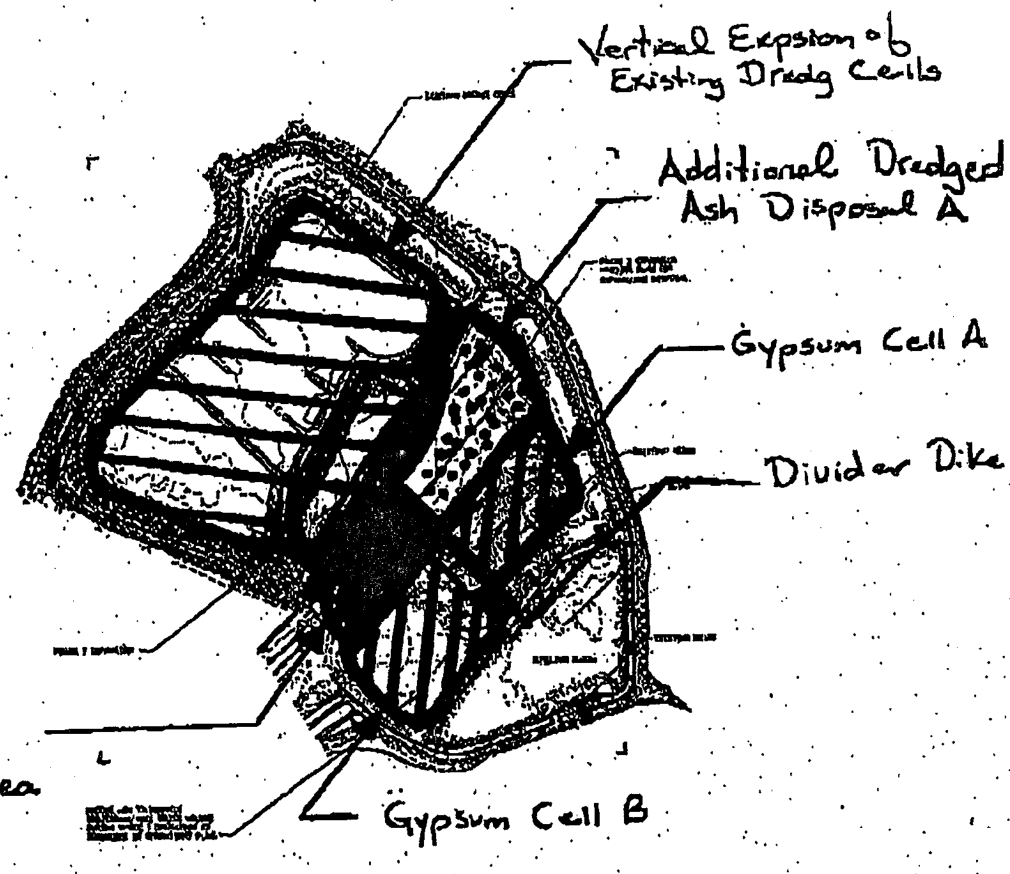
- Stability of Dredge Ash Cells: A detailed evaluation of the slope stability, including the appropriate use of benches and toe drains needs to be completed.
- Volume of Ash and Gypsum Disposal Areas: The attached figures are conceptual renderings of the alternative strategy. The footprint of the gypsum basins needs to be established based on design disposal volumes. Similarly, the size of the wet ash pond during the life of the facility needs to be assessed.
- Surface Water and Process Water Management: As with all gypsum and ash disposal strategies, the design of the surface water management ditches and retention ponds needs to be considered, as does the detention times materials within the wet ash pond.

Closure

The concepts presented herein are offered for consideration, comment, and critique by TVA. We are particularly interested in identifying any site-specific considerations that have been overlooked in the development of this alternative and those that are considered problematic by TVA. Based on GeoSyntec's preliminary evaluation, however, the concept introduced here appears to be a technically viable strategy for significantly increasing design capacity while minimizing impacts to site and plant operations. We look forward to discussing these ideas with the TVA team.

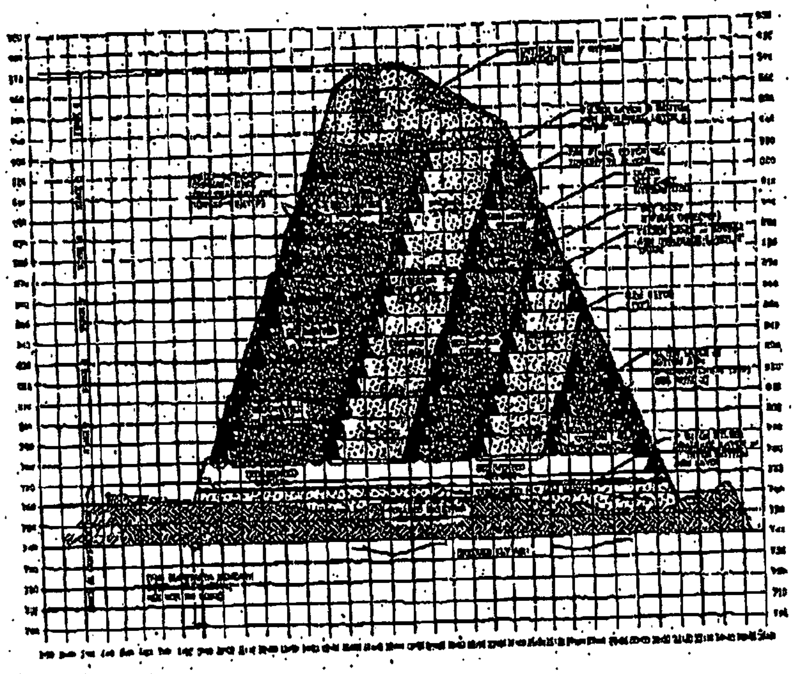
Figure 1.
Plan View

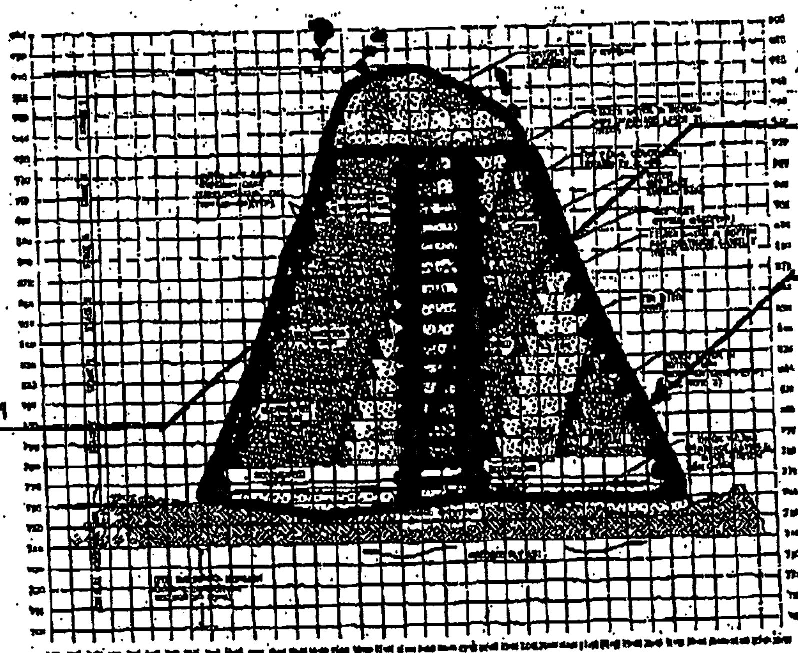




TVA-00017181

Figure 2.
Section A-A
Across
Gypsum
Ponds



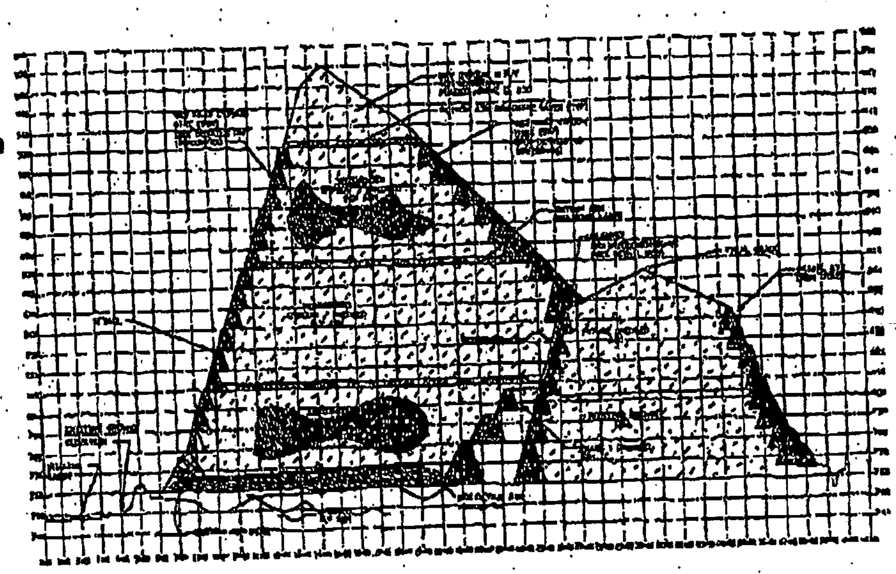


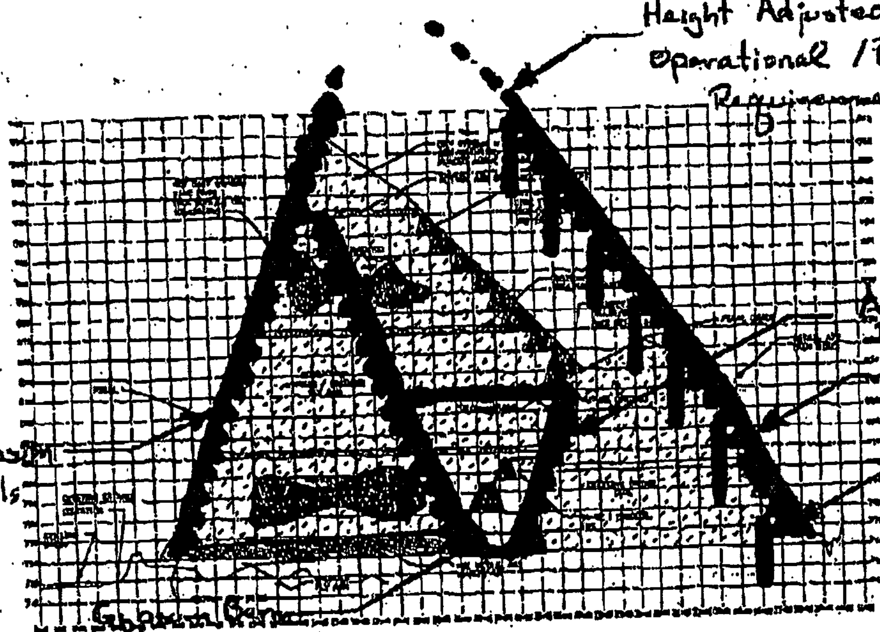
Divider Dike
(Incrementally
Constructed)

Gypsum
Cell A

Gypsum
Cell B

Figure 3.
Section B-1 3
Across
Dredge
Pond and
Gypsum
Pond





TVA-00017183

```
        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  6
   FA + BA, Loose

        Unit weight of material =  103.000

        CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
        Cohesion - - - - - - - -         .000
        Friction angle - - - - -  32.100 degrees

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  7
   FA Loose

        Unit weight of material =  100.000

        CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
        Cohesion - - - - - - - -      100.000
        Friction angle - - - - -  14.500 degrees

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  8
   Natural Clay CL (Alluvium)

        Unit weight of material =  126.400

        CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
        Cohesion - - - - - - - -      400.000
        Friction angle - - - - -  23.000 degrees

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  9
   Residuum SC-SM

        Unit weight of material =  130.400

        CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
        Cohesion - - - - - - - -      600.000
        Friction angle - - - - -  30.000 degrees

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE 10
   Bedrock Limestone/Shale

        Unit weight of material =  150.000

        CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
        Cohesion - - - - - - - -      735.000
        Friction angle - - - - -  29.900 degrees

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   All new material properties defined - No old data retained
1  UTEXAS3 - VER. 1.209 -  2/28/98 - (C) 1985-1998 S. G. WRIGHT
   One (1) copy licensed to Parsons I & T, Cincinnati, OH
   Date: 12: 4:2004   Time:  1:14:13   Input file: kfgyye3.dat
```

```
Kingston 1 Section Y-Y,  Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g
KIF Wet with Pond Surcharge Included

TABLE NO.  5
*********************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*********************************************************************

Line
 No.    Point        X           Y

  1 - Unit weight of water =    62.40   Pre-Earth quake Piezometric Su
  1        1         .000     758.000   Pre-Earth quake Piezometric Su
  1        2      281.000     758.000   Pre-Earth quake Piezometric Su
  1        3      657.770     758.000   Pre-Earth quake Piezometric Su
  1        4     1500.000     758.000   Pre-Earth quake Piezometric Su

All new piezometric lines defined - No old lines retained
```

1

```
UTEXAS3 - VER. 1.209 -  2/28/98 - (C) 1985-1998 S. G. WRIGHT
One (1) copy licensed to Parsons I & T, Cincinnati, OH
Date: 12: 4:2004   Time:  1:14:13   Input file: kfgyye3.dat
Kingston 1 Section Y-Y,  Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g
KIF Wet with Pond Surcharge Included

TABLE NO. 10
*********************************************************************
* NEW SURFACE PRESSURE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*********************************************************************

ALL NEW DATA INPUT - NO OLD DATA RETAINED

Surface Pressures -
                                      Normal        Shear
Point        X            Y          Pressure       Stress

   1        .000      750.000          .000          .000
   2        .000      750.000       499.200          .000
   3     516.900      750.000       499.200          .000
   4     540.900      758.000       499.200          .000
   5     540.900      758.000       124.750          .000
   6     546.900      760.000       124.750          .000
   7     546.900      760.000          .000          .000
```

1

```
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Date: 12: 4:2004   Time:  1:14:13   Input file: kfgyye3.dat
Kingston 1 Section Y-Y,  Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g
KIF Wet with Pond Surcharge Included

TABLE NO.  4
222222222222222222222222222222222222222222222222222222222222
2  NEW MATERIAL PROPERTY DATA - SECOND-STAGE COMPUTATIONS  2
222222222222222222222222222222222222222222222222222222222222

DATA FOR MATERIAL TYPE  1
Cast Gypsum  with .8 reduction

     Unit weight of material =  120.400

     ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

     UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
     strength envelope from R tests):
          Intercept of envelope (d-sub-R)  - - - - - - -     2254.200
          Slope of envelope (psi-sub-R) (degrees)  - -         42.300
     DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
          Cohesion (d-sub-S) - - - - - - - - - - - - - -      100.000
          Friction angle (psi-sub-S) (degrees) - - - -         43.000

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
```

```
        Negative pore pressures set to zero

  DATA FOR MATERIAL TYPE  2
  Sedimented Gypsum + FA with .8 reduction

        Unit weight of material =  116.400

        ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

        UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
        strength envelope from R tests):
             Intercept of envelope (d-sub-R)  - - - - - -    4214.400
             Slope of envelope (psi-sub-R) (degrees)  - -      23.400
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - -        .000
             Friction angle (psi-sub-S) (degrees) - - - -      37.000

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

  DATA FOR MATERIAL TYPE  3
  Sedimented Gypsum with .8 reduction

        Unit weight of material =  113.400

        ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

        UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
        strength envelope from R tests):
             Intercept of envelope (d-sub-R)  - - - - - -    4214.400
             Slope of envelope (psi-sub-R) (degrees)  - -      23.400
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - -        .000
             Friction angle (psi-sub-S) (degrees) - - - -      37.000

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

  DATA FOR MATERIAL TYPE  4
  Bottom Ash Dike(new) with .8 reduction

        Unit weight of material =  116.400

        ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

        UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
        strength envelope from R tests):
             Intercept of envelope (d-sub-R)  - - - - - -    1460.800
             Slope of envelope (psi-sub-R) (degrees)  - -      42.700
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - -        .000
             Friction angle (psi-sub-S) (degrees) - - - -      36.000

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

  DATA FOR MATERIAL TYPE  5
  Rolled Compacted Fly Ash(New) with .8 reduction

        Unit weight of material =  113.400

        ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

        UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
        strength envelope from R tests):
             Intercept of envelope (d-sub-R)  - - - - - -    3463.200
             Slope of envelope (psi-sub-R) (degrees)  - -      36.300
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - -     180.000
             Friction angle (psi-sub-S) (degrees) - - - -      36.000
```

```
      Pore water pressures defined by piezometric line
      Number of the piezometric line used =  1
      Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  6
   FA + BA, Loose  with .8 reduction

      Unit weight of material =  108.400

      ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

      UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
      strength envelope from R tests):
           Intercept of envelope (d-sub-R)  - - - - - -    5318.900
           Slope of envelope (psi-sub-R) (degrees)  - -      26.400
      DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
           Cohesion (d-sub-S) - - - - - - - - - - - - - -       .000
           Friction angle (psi-sub-S) (degrees) - - - -      32.100

      Pore water pressures defined by piezometric line
      Number of the piezometric line used =  1
      Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  7
   FA Loose with .8 reduction

      Unit weight of material =  100.000

      ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

      UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
      strength envelope from R tests):
           Intercept of envelope (d-sub-R)  - - - - - -     851.000
           Slope of envelope (psi-sub-R) (degrees)  - -        .000
      DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
           Cohesion (d-sub-S) - - - - - - - - - - - - - -    100.000
           Friction angle (psi-sub-S) (degrees) - - - -      14.500

      Pore water pressures defined by piezometric line
      Number of the piezometric line used =  1
      Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  8
   Natural Clay CL (Alluvium) with .8 reduction

      Unit weight of material =  126.400

      ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

      UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
      strength envelope from R tests):
           Intercept of envelope (d-sub-R)  - - - - - -     823.500
           Slope of envelope (psi-sub-R) (degrees)  - -        .000
      DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
           Cohesion (d-sub-S) - - - - - - - - - - - - - -    100.000
           Friction angle (psi-sub-S) (degrees) - - - -      14.500

      Pore water pressures defined by piezometric line
      Number of the piezometric line used =  1
      Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE  9
   Residuum SC-SM  with .8 reduction

      Unit weight of material =  125.000

      ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

      UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
      strength envelope from R tests):
           Intercept of envelope (d-sub-R)  - - - - - -     234.500
           Slope of envelope (psi-sub-R) (degrees)  - -      16.100
```

```
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - - -      600.000
             Friction angle (psi-sub-S) (degrees) - - - -         30.000

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   DATA FOR MATERIAL TYPE 10
   Bedrock Limestone/Shale .8 reduction

        Unit weight of material =  150.000

        ---- 2-STAGE STRENGTHS FOR SECOND STAGE OF COMPUTATIONS ----

        UNDRAINED ENVELOPE (= Tau-ff vs. sigma-fc
        strength envelope from R tests):
             Intercept of envelope (d-sub-R)  - - - - - -     3705.000
             Slope of envelope (psi-sub-R) (degrees)  - -       31.500
        DRAINED/EFFECTIVE STRESS (S) ENVELOPE:
             Cohesion (d-sub-S) - - - - - - - - - - - - - -      735.000
             Friction angle (psi-sub-S) (degrees) - - - -         29.900

        Pore water pressures defined by piezometric line
        Number of the piezometric line used =  1
        Negative pore pressures set to zero

   All new material properties defined - No old data retained
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   GYPSUM STACK Option 2, Earthquake = 0.11g
   KIF Wet with Pond Surcharge Included

   TABLE NO.  6
   22222222222222222222222222222222222222222222222222222222222
   2  NEW PIEZOMETRIC LINE DATA - SECOND-STAGE COMPUTATIONS  2
   22222222222222222222222222222222222222222222222222222222222

   Line
    No.    Point        X           Y

     1 - Unit weight of water =    62.40   Post-Earth quake Piezometric S
     1         1        .000     758.000   Post-Earth quake Piezometric S
     1         2    1500.000     758.000   Post-Earth quake Piezometric S

   All new piezometric lines defined - No old lines retained
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   Kingston 1 Section Y-Y,  Multi-Stage Run With UTEXAS3
   GYPSUM STACK Option 2, Earthquake = 0.11g
   KIF Wet with Pond Surcharge Included

   TABLE NO. 11
   22222222222222222222222222222222222222222222222222222222222
   2  NEW SURFACE PRESSURE DATA - SECOND-STAGE COMPUTATIONS  2
   22222222222222222222222222222222222222222222222222222222222

   ALL NEW DATA INPUT - NO OLD DATA RETAINED

   Surface Pressures -
                                         Normal        Shear
   Point        X           Y           Pressure       Stress

      1        .000      750.000          .000          .000
      2        .000      750.000       499.200          .000
      3     516.900      750.000       499.200          .000
      4     540.900      758.000       499.200          .000
      5     540.900      758.000       124.750          .000
      6     546.900      760.000       124.750          .000
      7     546.900      760.000          .000          .0001
```

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Kingston 6 Section Y-Y, Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g
KIF Wet with Pond Surcharge Included

TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Automatic Search Performed

Starting Center Coordinate for Search at -
X = 573.000
Y = 1011.000

Required accuracy for critical center (= minimum spacing between grid points) = 10.000

Critical shear surface not allowed to pass below Y = 720.000

For the initial mode of search all circles are tangent to horizontal line at -
Y = 720.000

Maximum number of iterations allowed for calculating the factor of safety = 1000

Seismic coefficient = .110

Procedure used to compute the factor of safety: SPENCER

Depth of crack = 5.000

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for the factor of safety = 3.000

Initial trial estimate for side force inclination = 15.000 degrees (Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Initial trial values for factor of safety (and side force inclination for Spencer's procedure) will be kept constant during search

Maximum subtended angle to be used for subdivision of the circle into slices = 3.00 degrees

Search will be continued to locate a more critical shear surface (if one exists) after the initial mode is complete

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Conventional (single-stage) computations to be performed
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Kingston 6 Section Y-Y, Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g
KIF Wet with Pond Surcharge Included

TABLE NO. 18

INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Are Tangent to a Horizontal Line at Y = 720.000

Center Coordinates X	Y	Radius	1-Stage Factor of Safety	Side Force Inclination (degrees)	Iterations
273.00	711.00	-9.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
573.00	711.00	-9.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
873.00	711.00	-9.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
273.00	1011.00	291.00	2.967	4.16	4
573.00	1011.00	291.00	1.306	16.60	7
873.00	1011.00	291.00	2.542	11.27	4
273.00	1311.00	591.00	2.793	4.41	4
573.00	1311.00	591.00	1.400	20.08	8
873.00	1311.00	591.00	2.299	14.50	6
523.00	961.00	241.00	1.387	11.33	7
573.00	961.00	241.00	1.300	15.90	7
623.00	961.00	241.00	1.313	18.88	8
523.00	1011.00	291.00	1.413	11.81	7
623.00	1011.00	291.00	1.310	19.71	8
523.00	1061.00	341.00	1.420	12.44	7
573.00	1061.00	341.00	1.318	17.22	7
623.00	1061.00	341.00	1.319	20.36	8
523.00	911.00	191.00	1.395	10.63	7
573.00	911.00	191.00	1.302	15.27	7
623.00	911.00	191.00	1.363	17.32	7
543.00	931.00	211.00	1.337	12.85	7
573.00	931.00	211.00	1.300	15.50	7
603.00	931.00	211.00	1.299	17.75	8
543.00	961.00	241.00	1.346	13.12	7
603.00	961.00	241.00	1.291	18.22	8
543.00	991.00	271.00	1.354	13.45	7
573.00	991.00	271.00	1.303	16.32	7
603.00	991.00	271.00	1.291	18.60	8
633.00	931.00	211.00	1.363	17.87	7
633.00	961.00	241.00	1.341	18.66	8
633.00	991.00	271.00	1.329	19.44	8
593.00	951.00	231.00	1.292	17.38	7
603.00	951.00	231.00	1.293	18.07	8
613.00	951.00	231.00	1.300	18.58	8
593.00	961.00	241.00	1.291	17.53	7
613.00	961.00	241.00	1.296	18.76	8
593.00	971.00	251.00	1.291	17.67	8
603.00	971.00	251.00	1.290	18.37	8
613.00	971.00	251.00	1.295	18.89	8
593.00	981.00	261.00	1.291	17.81	8
603.00	981.00	261.00	1.290	18.50	8
613.00	981.00	261.00	1.296	18.99	8
593.00	991.00	271.00	1.291	17.96	8
613.00	991.00	271.00	1.298	19.08	8

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = 603.00 Y-center = 981.00 Radius = 261.00
Factor of Safety = 1.290 Side Force Inclination = 18.50

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Kingston 6 Section Y-Y, Multi-Stage Run With UTEXAS3
GYPSUM STACK Option 2, Earthquake = 0.11g

KIF Wet with Pond Surcharge Included

TABLE NO. 19
INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Have the Same Radius - Radius = 261.000

```
-----------------------------------------------------------
                                      1-Stage
Center Coordinates                    Factor  Side Force
                                        of    Inclination
     X          Y         Radius      Safety   (degrees)   Iterations


    303.00     681.00      261.00 Center of circle is below lowest
                                  point of slope - CIRCLE REJECTED
    603.00     681.00      261.00 Center of circle is below lowest
                                  point of slope - CIRCLE REJECTED
    903.00     681.00      261.00 Center of circle is below lowest
                                  point of slope - CIRCLE REJECTED
    303.00     981.00      261.00   3.006        4.10          5
    903.00     981.00      261.00   2.980       10.21          5
    303.00    1281.00      261.00 See Message on Next Line(s)
CIRCLE DOES NOT INTERSECT SLOPE
    603.00    1281.00      261.00 See Message on Next Line(s)
CIRCLE DOES NOT INTERSECT SLOPE
    903.00    1281.00      261.00 See Message on Next Line(s)
CIRCLE DOES NOT INTERSECT SLOPE

    553.00     931.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    603.00     931.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    653.00     931.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    553.00     981.00      261.00   1.332       14.30          7
    653.00     981.00      261.00   1.380       18.88          7
    553.00    1031.00      261.00 See Message on Next Line(s)
DEPTH OF CRACK IS GREATER THAN DEPTH OF CIRCLE
    603.00    1031.00      261.00   2.528       21.26          5
    653.00    1031.00      261.00   2.554       21.27          5

    573.00     951.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    603.00     951.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    633.00     951.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    573.00     981.00      261.00   1.302       16.18          7
    633.00     981.00      261.00   1.332       19.20          8
    573.00    1011.00      261.00   1.941       23.16          6
    603.00    1011.00      261.00   1.951       22.88          6
    633.00    1011.00      261.00   1.999       21.04          6

    593.00     971.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    603.00     971.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    613.00     971.00      261.00 Bottom of circle exceeds allowable
                                  depth - CIRCLE REJECTED
    593.00     981.00      261.00   1.291       17.81          8
    613.00     981.00      261.00   1.296       18.99          8
    593.00     991.00      261.00   1.204       21.58          9
    603.00     991.00      261.00   1.213       21.61          9
    613.00     991.00      261.00   1.226       21.23          8

    583.00     981.00      261.00   1.295       17.04          7
    583.00     991.00      261.00   1.204       20.91          9
    583.00    1001.00      261.00   1.700       21.75          7
    593.00    1001.00      261.00   1.715       21.59          7
    603.00    1001.00      261.00   1.735       21.47          7
```

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = 593.00 Y-center = 991.00 Radius = 261.00

ESTIMATE NUMBER 050501R1

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

(WITHOUT POND BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26	1.31	1.36	1.42	1.48	1.54
	CAPITAL COSTS																
1	Install Drains For Swan Pond Road	Lump Sum	$1,967,628	1	$1,967,628	$1,967,628											
2	Ash In Pond	Lump Sum	$582,456	1	$582,456	$582,456											
2A	Phase 2 Base Construction (Base Layers)	Lump Sum	$5,431,967	2	$2,715,984											$4,008,707	$4,189,055
3	Gypsum On Peninsula	Lump Sum	$9,015,269	1	$9,015,269				$10,150,656								
5	Miscellaneous	Lump Sum	$1,974,007	4	$493,502	$493,502			$565,654							$728,393	$787,529
6	Engineering / Geotech	Lump Sum	$808,829	1	$808,829	$808,829											
	Total Capital Costs		$ 18,780,156			$ 3,852,415	$ -	$ -	$ 10,706,309	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,737,100	$ 4,926,584
	OPERATING COSTS																
8	Dredge Cell Phase 1	Lump Sum	$11,554,547	12	$962,879	$962,879	$1,004,283	$1,043,450	$1,084,144	$1,126,342	$1,169,230	$1,214,830	$1,263,423	$1,313,960	$1,366,519	$1,421,179	$1,478,027
14	Gypsum On Peninsula Disposal Cost	Lump Sum	$3,644,076	20	$182,204					$212,946	$221,251	$229,880	$239,076	$248,638	$258,584	$268,927	$279,684
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)	Lump Sum	$10,483,976	12	$873,666												
	QA/QC For Construction Of Disposal	Lump Sum	$470,247	24	$19,594	$19,594	$20,436	$21,233	$22,081	$22,900	$23,793	$24,721	$25,709	$26,738	$27,807	$28,920	$30,078
	Total Operating Costs		$ 26,152,844			$ 982,473	$ 1,024,719	$ 1,064,683	$ 1,106,225	$ 1,361,188	$ 1,414,274	$ 1,469,431	$ 1,528,208	$ 1,589,336	$ 1,652,910	$ 1,719,028	$ 1,787,787
	Total Costs		$ 45,933,000			$ 4,834,887	$ 1,024,719	$ 1,064,683	$ 11,812,515	$ 1,361,188	$ 1,414,274	$ 1,469,431	$ 1,528,208	$ 1,589,336	$ 1,652,910	$ 6,456,128	$ 6,714,371

ITEM No.	DESCRIPTION	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
	Escalation Factor	1.60	1.66	1.73	1.80	1.87	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
	CAPITAL COSTS															
1	Install Drains For Swan Pond Road														$1,967,628	$1,967,628
2	Ash In Pond														$582,456	$582,456
2A	Phase 2 Base Construction (Base Layers)														$8,197,763	$1,887,001
3	Gypsum On Peninsula														$10,150,656	$9,674,221
5	Miscellaneous														$2,575,078	$1,201,726
6	Engineering / Geotech														$808,829	$808,829
	Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 24,222,408	$ 13,121,662
	OPERATING COSTS															
8	Dredge Cell Phase 1	$1,537,148													$15,884,413	$7,337,188
14	Gypsum On Peninsula Disposal Cost	$290,872	$302,506	$314,607	$327,191	$340,279	$353,890	$368,046	$382,767	$398,078	$414,001	$430,561	$447,783	$465,696	$6,798,259	$1,116,949
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)	$1,394,726	$1,450,514	$1,508,635	$1,568,876	$1,631,631	$1,696,896	$1,764,772	$1,835,363	$1,908,778	$1,985,129	$2,064,534	$2,147,115	$2,233,000	$23,189,868	$1,987,801
	QA/QC For Construction Of Disposal	$31,278	$32,531	$33,832	$35,186	$36,592	$38,056	$39,578	$41,162	$42,808	$44,520	$46,301	$48,153	$50,079	$814,065	$188,038
	Total Operating Costs	$ 3,254,024	$ 1,785,551	$ 1,856,973	$ 1,931,252	$ 2,008,502	$ 2,088,842	$ 2,172,396	$ 2,259,232	$ 2,349,663	$ 2,443,650	$ 2,541,396	$ 2,643,052	$ 2,748,774	$ 48,783,606	$ 10,629,977
	Total Costs	$ 3,254,024	$ 1,785,551	$ 1,856,973	$ 1,931,252	$ 2,008,502	$ 2,088,842	$ 2,172,396	$ 2,259,232	$ 2,349,663	$ 2,443,650	$ 2,541,396	$ 2,643,052	$ 2,748,774	$ 71,006,014	$ 23,751,638

Present Worth of this Option $ 23,751,638

12/06/2006

ESTIMATE NUMBER 050930IR1

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

(WITHOUT POND BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011	2012
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26	1.31
	CAPITAL COSTS												
1	Install Drains For Swan Pond Road	Lump Sum	$1,967,628	1	$1,967,628	$1,967,628							
2	Ash In Pond	Lump Sum	$582,456	1	$582,456	$582,456							
2A	Phase 2 Base Construction (Base Layers)	Lump Sum	$2,715,985	2	$1,357,993								
3	Gypsum On Peninsula	Lump Sum	$9,015,269	1	$9,015,269				$10,150,656				
5	Miscellaneous	Lump Sum	$1,974,007	4	$493,502	$493,502			$555,654				
6	Engineering / Geotech	Lump Sum	$808,829	1	$808,829	$808,829							
	Total Capital Costs		$ 17,064,174			$ 3,852,415	$ -	$ -	$ 10,708,309	$ -	$ -	$ -	$ -
	OPERATING COSTS												
6	Dredge Cell Phase 1	Lump Sum	$11,554,547	12	$962,879	$962,879	$1,004,283	$1,043,480	$1,084,144	$1,126,342	$1,169,230	$1,214,630	$1,263,423
14	Gypsum On Peninsula Disposal Cost	Lump Sum	$364,408	2	$182,204					$212,947	$0	$0	$0
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)	Lump Sum	$10,483,976	12	$873,666								
	QA/QC For Construction Of Disposal	Lump Sum	$470,247	24	$19,594	$19,594	$20,436	$21,233	$22,061	$22,900	$23,793	$24,721	$25,709
	Total Operating Costs		$ 22,873,177			$ 982,473	$ 1,024,719	$ 1,064,683	$ 1,106,206	$ 1,361,188	$ 1,193,023	$ 1,239,651	$ 1,289,133
	Total Costs		$ 39,937,351			$ 4,834,887	$ 1,024,719	$ 1,064,683	$ 11,812,515	$ 1,361,188	$ 1,193,023	$ 1,239,651	$ 1,289,133

ITEM No.	DESCRIPTION	2013	2014	2015	2016	2017	2018	2019	2020	2021
	Escalation Factor	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80	1.87
	CAPITAL COSTS									
1	Install Drains For Swan Pond Road									
2	Ash In Pond									
2A	Phase 2 Base Construction (Base Layers)			$2,004,356	$2,084,529					
3	Gypsum On Peninsula									
5	Miscellaneous			$725,393	$757,529					
6	Engineering / Geotech									
	Total Capital Costs	$ -	$ -	$ 2,732,743	$ 2,842,058	$ -	$ -	$ -	$ -	$ -
	OPERATING COSTS									
6	Dredge Cell Phase 1	$1,313,960	$1,366,519	$1,421,179	$1,478,027	$1,537,148				
14	Gypsum On Peninsula Disposal Cost	$0 0	$0	$0	$0	$0	$0	$0	$0	$0
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)					$1,394,726	$1,450,514	$1,508,535	$1,568,876	$1,631,631
	QA/QC For Construction Of Disposal	$26,738	$27,807	$28,920	$30,076	$31,279	$32,531	$33,832	$35,185	$36,592
	Total Operating Costs	$ 1,340,696	$ 1,394,326	$ 1,450,099	$ 1,508,103	$ 2,963,152	$ 1,483,045	$ 1,542,368	$ 1,604,061	$ 1,668,224
	Total Costs	$ 1,340,696	$ 1,394,326	$ 4,132,847	$ 4,350,161	$ 2,963,152	$ 1,483,045	$ 1,542,368	$ 1,604,061	$ 1,668,224

ITEM No.	DESCRIPTION	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
	Escalation Factor	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
	CAPITAL COSTS										
1	Install Drains For Swan Pond Road									$1,967,628	$1,967,628
2	Ash In Pond									$582,456	$582,456
2A	Phase 2 Base Construction (Base Layers)									$4,088,884	$943,501
3	Gypsum On Peninsula									$10,150,656	$8,674,221
5	Miscellaneous									$2,535,078	$1,201,726
6	Engineering / Geotech									$808,829	$808,829
	Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,133,530	$ 12,178,381
	OPERATING COSTS										
6	Dredge Cell Phase 1									$15,884,413	$7,337,188
14	Gypsum On Peninsula Disposal Cost	$0	$0	$0	$0	$0	$0	$0	$0	$212,947	$121,763
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)	$1,696,896	$1,764,772	$1,835,363	$1,908,778	$1,985,129	$2,064,534	$2,147,115	$2,233,000	$23,189,858	$1,987,801
	QA/QC For Construction Of Disposal	$38,056	$39,578	$41,162	$42,808	$44,520	$46,301	$48,153	$50,079	$814,065	$185,035
	Total Operating Costs	$ 1,734,953	$ 1,804,351	$ 1,876,525	$ 1,951,586	$ 2,029,649	$ 2,110,835	$ 2,195,268	$ 2,283,079	$ 40,201,293	$ 9,634,760
	Total Costs	$ 1,734,953	$ 1,804,351	$ 1,876,525	$ 1,951,586	$ 2,029,649	$ 2,110,835	$ 2,195,268	$ 2,283,079	$ 60,334,823	$ 21,813,142

Present Worth of this Option $ 21,813,142

ESTIMATE NUMBER 0509302R1

KINGSTON FOSSIL PLANT OPTION 2 - DRY ASH IN POND GYPSUM ON PENINSULA

(WITHOUT POND BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011	2012
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26	1.31
	CAPITAL COSTS												
2	Ash In Pond	Lump Sum	$582,456	1	$582,456	$582,456							
2A	Phase 2 Base Construction (Base Layers)	Lump Sum	$3,971,817	2	$1,985,909								
3	Gypsum On Peninsula	Lump Sum	$9,014,991	1	$9,014,991				$10,150,343				
5	Miscellaneous	Lump Sum	$1,247,957	4	$311,989	$311,989			$351,281				
5A	Dry Fly Ash Conversion	Lump Sum	$28,242,600	1	$28,242,600	$28,242,600							
6	Engineering / Geotech	Lump Sum	$808,989	1	$808,989	$808,989							
	Total Capital Costs		$ 43,898,710			$ 29,945,934	$ -	$ -	$ 10,501,624	$ -	$ -	$ -	$ -
	OPERATING COSTS												
8	Dredge Cell Phase 1	Lump Sum	$20,011,819	12	$1,667,652	$1,667,652	$1,739,359	$1,807,188	$1,877,676	$1,949,028	$2,026,040	$2,104,017	$2,188,177
14	Gypsum On Peninsula Disposal Cost	Lump Sum	$3,644,075	20	$182,204					$212,946	$221,251	$229,880	$239,076
20,22,23&24	Phase 2 Dry Ash (Initial Thru Stage 3)	Lump Sum	$18,460,149	12	$1,538,346								
	QA/QC For Construction Of Disposal	Lump Sum	$470,247	24	$19,594	$19,594	$20,438	$21,233	$22,061	$22,900	$23,793	$24,721	$25,709
	Total Operating Costs		$ 42,586,290			$ 1,687,246	$ 1,759,797	$ 1,828,429	$ 1,899,738	$ 2,184,874	$ 2,270,084	$ 2,358,617	$ 2,452,962
	Total Costs		$ 86,485,000			$ 31,633,179	$ 1,759,797	$ 1,828,429	$ 12,401,361	$ 2,184,874	$ 2,270,084	$ 2,358,617	$ 2,452,962

DESCRIPTION	2013	2014	2015	2016	2017	2018	2019	2020	2021
Escalation Factor	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80	1.87
CAPITAL COSTS									
Ash In Pond									
Phase 2 Base Construction (Base Layers)			$2,831,130	$3,048,385					
Gypsum On Peninsula									
Miscellaneous			$460,488	$475,906					
Dry Fly Ash Conversion									
Engineering / Geotech									
Total Capital Costs	$ -	$ -	$ 3,331,628	$ 3,527,291	$ -	$ -	$ -	$ -	$ -
OPERATING COSTS									
Dredge Cell Phase 1	$2,275,704	$2,368,733	$2,461,402	$2,559,858	$2,662,252				
Gypsum On Peninsula Disposal Cost	$248,638	$258,584	$268,927	$279,684	$290,872	$302,506	$314,607	$327,191	$340,279
Phase 2 Dry Ash (Initial Thru Stage 3)					$2,455,827	$2,554,061	$2,656,223	$2,762,472	$2,872,971
QA/QC For Construction Of Disposal	$26,738	$27,807	$28,920	$30,076	$31,279	$32,531	$33,832	$35,185	$36,592
Total Operating Costs	$ 2,551,080	$ 2,653,124	$ 2,759,249	$ 2,869,618	$ 5,440,231	$ 2,889,097	$ 3,004,661	$ 3,124,848	$ 3,249,842
Total Costs	$ 2,551,080	$ 2,653,124	$ 6,160,874	$ 6,396,909	$ 5,440,231	$ 2,889,097	$ 3,004,661	$ 3,124,848	$ 3,249,842

DESCRIPTION	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
Escalation Factor	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
CAPITAL COSTS										
Ash In Pond									$582,456	$582,456
Phase 2 Base Construction (Base Layers)									$5,879,524	$1,379,782
Gypsum On Peninsula									$10,150,343	$8,874,016
Miscellaneous									$1,602,663	$759,726
Dry Fly Ash Conversion									$28,242,600	$28,242,600
Engineering / Geotech									$808,989	$808,989
Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 47,368,474	$ 38,447,448
OPERATING COSTS										
Dredge Cell Phase 1									$27,684,096	$12,707,692
Gypsum On Peninsula Disposal Cost	$353,890	$368,045	$382,767	$398,078	$414,001	$430,561	$447,783	$465,695	$8,795,269	$1,118,949
Phase 2 Dry Ash (Initial Thru Stage 3)	$2,987,890	$3,107,406	$3,231,701	$3,360,969	$3,495,408	$3,635,225	$3,780,633	$3,931,859	$40,632,644	$3,600,114
QA/QC For Construction Of Disposal	$38,056	$39,578	$41,162	$42,808	$44,520	$46,301	$48,153	$50,079	$514,066	$188,038
Total Operating Costs	$ 3,379,836	$ 3,515,029	$ 3,655,630	$ 3,801,855	$ 3,953,929	$ 4,112,087	$ 4,276,570	$ 4,447,633	$ 76,128,064	$ 17,612,694
Total Costs	$ 3,379,836	$ 3,515,029	$ 3,655,630	$ 3,801,855	$ 3,953,929	$ 4,112,087	$ 4,276,570	$ 4,447,633	$ 123,492,538	$ 55,960,142

Present Worth of this Option $ 55,960,142

12/08/2006

TVA-00017194

ESTIMATE NUMBER 0503303R1

KINGSTON FOSSIL PLANT OPTION 3 - WET ASH IN POND GYPSUM IN POND

(WITHOUT BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21
	CAPITAL COSTS										
1	Install Drains For Swan Pond Road	Lump Sum	$1,967,628	1	$1,967,628	$1,967,628					
4	Ash And Gypsum in Pond	Lump Sum	$582,456	1	$582,456	$582,456					
4A	Phase 2 Base Construction	Lump Sum	$5,593,822	1	$5,593,822				$6,303,940		
4B	Phase 3 Base Construction	Lump Sum	$2,156,779	1	$2,156,779						
5	Miscellaneous	Lump Sum	$1,686,838	3	$562,279	$562,279			$633,093		
5A	Dry Fly Ash Conversion	Lump Sum	$24,175,580	1	$24,175,580						
zz	Engineering	Lump Sum	$349,210	1	$349,210	$349,210					
	Total Capital Costs		$ 38,516,313			$ 3,461,573	$ -	$ -	$ 6,937,033	$ -	$ -
	OPERATING COSTS										
6	Drainage Cell Phase 1	Lump Sum	$12,624,840	12	$1,062,070	$1,062,070	$1,097,309	$1,140,104	$1,184,588	$1,229,682	$1,277,636
10,11,12,13,18&19	Phase 2 Wet Gypsum (Initial Thru Stage 4)	Lump Sum	$6,188,249	20	$269,412					$303,182	$315,006
14,15,16,17&20	Phase 3 Dry Ash (Initial Thru Stage 4)	Lump Sum	$17,748,174	12	$1,479,016						
	QA/QC For Construction Of Disposal Facility	Lump Sum	$746,424	24	$31,101	$31,101	$32,436	$33,703	$35,018	$36,349	$37,768
	Total Operating Costs		$ 38,307,687			$ 1,093,171	$ 1,129,747	$ 1,173,807	$ 1,219,606	$ 1,569,112	$ 1,630,398
	Total Costs		$ 72,824,000			$ 4,544,744	$ 1,129,747	$ 1,173,807	$ 8,156,619	$ 1,569,112	$ 1,630,398

ITEM No.	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Escalation Factor	1.26	1.31	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80
1										
4										
4A										
4B						$3,309,137				
5						$583,103				
5A						$37,109,701				
zz										
Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$41,251,941	$ -	$ -	$ -	$ -
6	$1,327,352	$1,380,454	$1,436,072	$1,493,099	$1,552,823	$1,614,836	$1,679,633			
10,11,12,13,18&19	$327,291	$340,383	$353,998	$368,158	$382,886	$398,200	$414,128	$430,693	$447,921	$465,838
14,15,16,17&20							$2,361,111	$2,455,555	$2,553,777	$2,655,928
QA/QC	$39,239	$40,809	$42,441	$44,139	$45,904	$47,740	$49,650	$51,636	$53,701	$55,849
Total Operating Costs	$ 1,693,890	$ 1,761,645	$ 1,832,111	$ 1,905,396	$ 1,981,611	$ 2,060,876	$ 4,504,421	$ 2,937,884	$ 3,055,399	$ 3,177,615
Total Costs	$ 1,693,890	$ 1,761,645	$ 1,832,111	$ 1,905,396	$ 1,981,611	$43,342,817	$ 4,504,421	$ 2,937,884	$ 3,055,399	$ 3,177,615

ITEM No.	2021	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
Escalation Factor	1.87	1.94	2.02	2.10	2.18	2.27	2.36	2.45	2.55		
1										$1,967,628	$1,967,628
4										$582,456	$582,456
4A										$6,303,940	$4,144,943
4B										$3,309,137	$711,277
5										$2,068,475	$1,164,068
5A										$37,109,701	$7,978,479
zz										$349,210	$349,210
Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 51,680,647	$ 10,896,069
6										$17,468,043	$6,016,623
10,11,12,13,18&19	$484,471	$503,850	$524,004	$544,964	$566,763	$589,433	$613,011	$637,531	$663,032	$9,874,746	$1,590,258
14,15,16,17&20	$2,762,165	$2,872,652	$2,987,558	$3,107,060	$3,231,343	$3,360,597	$3,495,020	$3,634,821	$3,780,214	$39,267,802	$3,365,121
QA/QC	$58,083	$60,407	$62,823	$65,336	$67,949	$70,667	$73,494	$76,434	$79,491	$1,292,167	$298,474
Total Operating Costs	$ 3,304,720	$ 3,436,909	$ 3,574,385	$ 3,717,361	$ 3,866,066	$ 4,020,697	$ 4,181,526	$ 4,348,788	$ 4,522,738	$ 67,689,757	$ 19,270,679
Total Costs	$ 3,304,720	$ 3,436,909	$ 3,574,385	$ 3,717,361	$ 3,866,066	$ 4,020,697	$ 4,181,526	$ 4,348,788	$ 4,522,738	$ 119,370,304	$ 30,188,737

Present Worth of this Option $ 30,188,737

12/05/2006

ESTIMATE NUMBER 05093C4R1

KINGSTON FOSSIL PLANT OPTION 4 - DRY ASH IN POND GYPSUM IN POND

(WITHOUT BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26
	CAPITAL COSTS											
4	Ash And Gypsum In Pond	Lump Sum	$582,456	1	$582,456	$582,456						
4A	Phase 2 Base Construction	Lump Sum	$4,145,589	1	$4,145,589				$4,667,688			
4B	Phase 3 Base Construction	Lump Sum	$2,763,726	1	$2,763,726							
5	Miscellaneous	Lump Sum	$1,155,447	3	$385,149	$385,149			$433,653			
5A	Dry Fly Ash Conversion	Lump Sum	$28,242,600	1	$28,242,600	$28,242,600						
zz	Engineering	Lump Sum	$349,512	1	$349,512	$349,512						
	Total Capital Costs		$ 37,239,230			$29,559,717	$ -	$ -	$ 5,101,341	$ -	$ -	$ -
	OPERATING COSTS											
6	Dredge Cell Phase 1	Lump Sum	$21,082,112	12	$1,756,843	$1,756,843	$1,832,327	$1,903,850	$1,978,100	$2,053,268	$2,133,345	$2,216,546
10,11,12,13,15&19	Phase 2 Wet Gypsum (Initial Thru Stage 4)	Lump Sum	$8,507,236	20	$425,362					$497,131	$516,520	$536,664
14,15,16,17&20	Phase 3 Dry Ash (Initial Thru Stage 4)	Lump Sum	$14,786,999	12	$1,232,250							
	QA/QC For Construction Of Disposal Facility	Lump Sum	$746,424	24	$31,101	$31,101	$32,498	$33,703	$35,018	$36,349	$37,766	$39,239
	Total Operating Costs		$ 45,122,770			$ 1,787,944	$ 1,864,825	$ 1,937,553	$ 2,013,118	$ 2,586,748	$ 2,687,631	$ 2,792,449
	Total Costs		$ 82,362,000			$31,347,661	$ 1,864,825	$ 1,937,553	$ 7,114,459	$ 2,586,748	$ 2,687,631	$ 2,792,449

DESCRIPTION	2012	2013	2014	2015	2016	2017	2018	2019	2020
Escalation Factor	1.31	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80
CAPITAL COSTS									
Ash And Gypsum In Pond									
Phase 2 Base Construction									
Phase 3 Base Construction					$4,242,341				
Miscellaneous					$591,207				
Dry Fly Ash Conversion									
Engineering									
Total Capital Costs	$ -	$ -	$ -	$ -	$ 4,833,547	$ -	$ -	$ -	$ -
OPERATING COSTS									
Dredge Cell Phase 1	$2,305,208	$2,397,416	$2,493,313	$2,593,045	$2,696,767	$2,804,638			
Phase 2 Wet Gypsum (Initial Thru Stage 4)	$558,130	$580,456	$603,674	$627,821	$652,934	$679,051	$706,213	$734,461	$763,840
Phase 3 Dry Ash (Initial Thru Stage 4)						$1,967,174	$2,045,861	$2,127,696	$2,212,803
QA/QC For Construction Of Disposal Facility	$40,809	$42,441	$44,139	$45,904	$47,740	$49,650	$51,636	$53,701	$55,849
Total Operating Costs	$ 2,904,147	$ 3,020,312	$ 3,141,126	$ 3,266,770	$ 3,397,441	$ 5,500,512	$ 2,803,709	$ 2,915,858	$ 3,032,492
Total Costs	$ 2,904,147	$ 3,020,312	$ 3,141,126	$ 3,266,770	$ 8,230,988	$ 5,500,512	$ 2,803,709	$ 2,915,858	$ 3,032,492

DESCRIPTION	2021	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
Escalation Factor	1.87	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
CAPITAL COSTS											
Ash And Gypsum In Pond										$582,456	$582,456
Phase 2 Base Construction										$4,667,688	$3,069,079
Phase 3 Base Construction										$4,242,341	$911,882
Miscellaneous										$1,410,010	$797,380
Dry Fly Ash Conversion										$28,242,600	$28,242,600
Engineering										$349,512	$349,512
Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 39,494,606	$ 33,852,770
OPERATING COSTS											
Dredge Cell Phase 1										$29,184,726	$13,387,233
Phase 2 Wet Gypsum (Initial Thru Stage 4)	$794,393	$826,169	$859,216	$893,585	$929,328	$966,501	$1,005,161	$1,045,368	$1,087,182	$15,863,795	$2,607,862
Phase 3 Dry Ash (Initial Thru Stage 4)	$2,301,316	$2,393,367	$2,489,102	$2,588,666	$2,692,213	$2,799,901	$2,911,897	$3,028,373	$3,149,508	$32,707,876	$2,893,971
QA/QC For Construction Of Disposal Facility	$58,083	$60,407	$62,823	$65,336	$67,949	$70,667	$73,494	$76,434	$79,491	$1,292,167	$298,474
Total Operating Costs	$ 3,153,792	$ 3,279,943	$ 3,411,141	$ 3,547,587	$ 3,689,490	$ 3,837,070	$ 3,990,553	$ 4,150,175	$ 4,316,182	$ 79,026,465	$ 19,196,939
Total Costs	$ 3,153,792	$ 3,279,943	$ 3,411,141	$ 3,547,587	$ 3,689,490	$ 3,837,070	$ 3,990,553	$ 4,150,175	$ 4,316,182	$ 118,521,071	$ 53,049,709

Present Worth of this Option $\boxed{\$\ 53,049,709}$

12/05/2005

ESTIMATE NUMBER 050930SR1

KINGSTON FOSSIL PLANT OPTION 5 - WET ASH IN POND GYPSUM ON PENINSULA

(WITH BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26
	CAPITAL COSTS											
1	Install Drains For Swan Pond Road	Lump Sum	$1,967,628	1	$1,967,628	$1,967,628						
2	Ash in Pond	Lump Sum	$582,456	1	$582,456	$582,456						
2A	Phase 2 Base Construction (Base Layers)	Lump Sum	$6,303,781	2	$3,154,351							
3	Gypsum On Peninsula	Lump Sum	$9,014,991	1	$9,014,991				$10,150,343			
5	Miscellaneous	Lump Sum	$2,451,636	4	$612,909	$612,909			$690,099			
6	Engineering / Geotech	Lump Sum	$808,684	1	$808,684	$808,684						
	Total Capital Costs		$ 21,134,156			$ 3,971,677	$ -	$ -	$ 10,840,442	$ -	$ -	$ -
	OPERATING COSTS											
8	Dredge Cell Phase 1	Lump Sum	$11,554,547	12	$962,879	$962,879	$1,004,283	$1,043,460	$1,084,144	$1,126,342	$1,169,230	$1,214,830
14	Gypsum On Peninsula Disposal Cost	Lump Sum	$3,644,076	20	$182,204					$212,948	$221,261	$229,880
20,22,23&24	Phase 2 Wet Ash (Initial Thru Stage 3)	Lump Sum	$10,483,875	12	$873,685							
	QA/QC For Construction Of Disposal	Lump Sum	$470,247	24	$19,594	$19,594	$20,438	$21,233	$22,061	$22,900	$23,793	$24,721
	Total Operating Costs		$ 26,152,844			$ 982,473	$ 1,024,719	$ 1,064,683	$ 1,106,206	$ 1,361,188	$ 1,414,274	$ 1,469,431
	Total Costs		$ 47,287,000			$ 4,954,150	$ 1,024,719	$ 1,064,683	$ 11,946,647	$ 1,361,188	$ 1,414,274	$ 1,469,431

DESCRIPTION	2012	2013	2014	2015	2016	2017	2018	2019	2020
Escalation Factor	1.31	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80
CAPITAL COSTS									
Install Drains For Swan Pond Road									
Ash in Pond									
Phase 2 Base Construction (Base Layers)				$4,665,768	$4,841,998				
Gypsum On Peninsula									
Miscellaneous				$904,635	$940,820				
Engineering / Geotech									
Total Capital Costs	$ -	$ -	$ -	$ 5,590,402	$ 5,782,818	$ -	$ -	$ -	$ -
OPERATING COSTS									
Dredge Cell Phase 1	$1,263,423	$1,313,960	$1,366,519	$1,421,179	$1,478,027	$1,537,148			
Gypsum On Peninsula Disposal Cost	$239,076	$248,638	$258,584	$268,927	$279,684	$290,872	$302,506	$314,607	$327,191
Phase 2 Wet Ash (Initial Thru Stage 3)						$1,394,725	$1,450,514	$1,508,535	$1,568,878
QA/QC For Construction Of Disposal	$25,709	$26,738	$27,807	$28,920	$30,076	$31,279	$32,531	$33,832	$35,185
Total Operating Costs	$ 1,528,208	$ 1,589,336	$ 1,652,910	$ 1,719,026	$ 1,787,767	$ 3,264,024	$ 1,785,551	$ 1,856,973	$ 1,931,252
Total Costs	$ 1,528,208	$ 1,589,336	$ 1,652,910	$ 7,279,428	$ 7,570,585	$ 3,264,024	$ 1,785,551	$ 1,856,973	$ 1,931,252

DESCRIPTION	2021	2022	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
Escalation Factor	1.87	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
CAPITAL COSTS											
Install Drains For Swan Pond Road										$1,967,628	$1,967,628
Ash in Pond										$582,456	$582,456
Phase 2 Base Construction (Base Layers)										$9,497,766	$2,191,589
Gypsum On Peninsula										$10,150,343	$8,674,615
Miscellaneous										$3,148,463	$1,492,495
Engineering / Geotech										$808,684	$808,684
Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 26,155,339	$ 13,716,867
OPERATING COSTS											
Dredge Cell Phase 1										$15,664,413	$7,337,188
Gypsum On Peninsula Disposal Cost	$340,279	$353,890	$368,046	$382,767	$398,078	$414,001	$430,561	$447,763	$465,696	$6,795,259	$1,116,949
Phase 2 Wet Ash (Initial Thru Stage 3)	$1,631,631	$1,696,898	$1,764,772	$1,835,363	$1,908,778	$1,985,129	$2,064,534	$2,147,116	$2,233,000	$23,189,888	$1,987,801
QA/QC For Construction Of Disposal	$36,592	$38,056	$39,678	$41,162	$42,808	$44,620	$46,301	$48,163	$50,079	$814,066	$188,038
Total Operating Costs	$ 2,008,502	$ 2,088,842	$ 2,172,396	$ 2,259,292	$ 2,349,663	$ 2,443,650	$ 2,541,396	$ 2,643,052	$ 2,743,774	$ 48,783,606	$ 10,629,977
Total Costs	$ 2,008,502	$ 2,088,842	$ 2,172,396	$ 2,259,292	$ 2,349,663	$ 2,443,650	$ 2,541,396	$ 2,643,052	$ 2,743,774	$ 73,938,945	$ 24,346,844

Present Worth of this Option $ 24,346,844

12/08/2006

ESTIMATE NUMBER 0509SO6R1

KINGSTON FOSSIL PLANT OPTION 6 - DRY ASH IN POND GYPSUM ON PENINSULA

(WITH BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	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	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26	1.31	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80	1.87	1.94	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
	CAPITAL COSTS																															
2	Ash In Pond	Lump Sum	$582,456	1	$582,456	$582,456																									$582,456	$582,456
2A	Phase 2 Base Construction (Base Layers)	Lump Sum	$4,848,613	2	$2,424,307											$3,678,201	$3,721,329														$7,299,530	$1,684,351
3	Gypsum On Peninsula	Lump Sum	$9,014,991	1	$9,014,991				$10,160,343																						$10,160,343	$6,674,016
5	Miscellaneous	Lump Sum	$1,683,630	4	$420,908	$420,908			$473,917							$621,246	$646,096														$2,162,187	$1,024,952
5A	Dry Fly Ash Conversion	Lump Sum	$28,242,500	1	$28,242,500	$28,242,500																									$28,242,500	$28,242,500
8	Engineering / Geotech	Lump Sum	$808,520	1	$808,520	$808,520																									$808,520	$808,520
	Total Capital Costs		$ 45,180,710			$30,054,384	$ -	$ -	$10,634,260	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,199,447	$ 4,367,425	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 49,245,516	$ 39,016,794
	OPERATING COSTS																															
6	Dredge Cell Phase 1	Lump Sum	$20,011,819	12	$1,667,652	$1,667,652	$1,739,361	$1,807,196	$1,877,676	$1,949,028	$2,025,040	$2,104,017	$2,188,177	$2,275,704	$2,366,733	$2,461,402	$2,559,858	$2,662,252													$27,664,095	$12,707,592
14	Gypsum On Peninsula Disposal Cost	Lump Sum	$3,644,076	20	$182,204					$212,946	$221,251	$229,880	$239,076	$248,638	$258,584	$268,927	$279,684	$290,872	$302,506	$314,607	$327,191	$340,279	$353,890	$368,045	$382,787	$398,078	$414,001	$430,561	$447,783	$465,696	$6,785,259	$1,116,949
20,22,23&24	Phase 2 Dry Ash (Initial Thru Stage 3)	Lump Sum	$18,460,149	12	$1,538,346													$2,456,827	$2,554,061	$2,656,223	$2,762,472	$2,872,971	$2,987,890	$3,107,406	$3,231,701	$3,360,969	$3,495,408	$3,635,225	$3,780,633	$3,931,859	$40,832,844	$3,600,114
	QA/QC For Construction Of Disposal	Lump Sum	$470,247	24	$19,694	$19,694	$20,436	$21,233	$22,061	$22,900	$23,793	$24,721	$25,709	$26,738	$27,807	$28,920	$30,076	$31,279	$32,531	$33,832	$35,186	$36,592	$38,056	$39,578	$41,162	$42,808	$44,520	$46,301	$48,153	$50,079	$614,065	$186,036
	Total Operating Costs		$ 42,588,290			$ 1,687,346	$ 1,759,797	$ 1,828,429	$ 1,899,738	$ 2,184,874	$ 2,270,084	$ 2,358,617	$ 2,452,962	$ 2,551,080	$ 2,653,124	$ 2,759,249	$ 2,869,618	$ 5,440,231	$ 2,889,097	$ 3,004,661	$ 3,124,848	$ 3,249,842	$ 3,379,836	$ 3,515,029	$ 3,655,630	$ 3,801,855	$ 3,953,929	$ 4,112,087	$ 4,276,570	$ 4,447,533	$ 78,126,064	$ 17,512,694
	Total Costs		$ 87,767,000			$31,741,629	$ 1,759,797	$ 1,828,429	$12,533,997	$ 2,184,874	$ 2,270,084	$ 2,358,617	$ 2,452,962	$ 2,551,080	$ 2,653,124	$ 6,958,696	$ 7,237,044	$ 5,440,231	$ 2,889,097	$ 3,004,661	$ 3,124,848	$ 3,249,842	$ 3,379,836	$ 3,515,029	$ 3,655,630	$ 3,801,855	$ 3,953,929	$ 4,112,087	$ 4,276,570	$ 4,447,533	$ 127,371,579	$ 56,529,488

Present Worth of this Option $\boxed{\$ \ 56,529,488}$

12/08/2006

ESTIMATE NUMBER 050930TR1

KINGSTON FOSSIL PLANT OPTION 7 - WET ASH IN POND GYPSUM IN POND

(WITH BUFFER)

PRESENT WORTH

ITEM No.	DESCRIPTION	UNITS	Total Cost 2005 Dollars	Number of Cycles	2005 Dollars per Cycle	2005	2006	2007	2008	2009	2010	2011	2012
	Escalation Factor					1.00	1.04	1.08	1.13	1.17	1.21	1.26	1.31
	CAPITAL COSTS												
1	Install Drains For Swan Pond Road	Lump Sum	$1,967,628	1	$1,967,628	$1,967,628							
4	Ash And Gypsum In Pond	Lump Sum	$582,456	1	$582,456	$582,456							
4A	Phase 2 Base Construction	Lump Sum	$8,473,778	1	$8,473,778				$7,289,088				
4B	Phase 3 Base Construction	Lump Sum	$2,672,560	1	$2,672,560								
5	Miscellaneous	Lump Sum	$1,830,703	3	$610,234	$610,234			$657,087				
5A	Dry Fly Ash Conversion	Lump Sum	$24,175,680	1	$24,175,680								
zz	Engineering	Lump Sum	$349,607	1	$349,607	$349,607							
	Total Capital Costs		$ 38,052,312			$ 3,509,926	$ -	$ -	$ 7,976,176	$ -	$ -	$ -	$ -
	OPERATING COSTS												
6	Dredge Cell Phase 1	Lump Sum	$12,624,840	12	$1,052,070	$1,052,070	$1,097,309	$1,140,104	$1,184,568	$1,229,682	$1,277,636	$1,327,369	$1,380,464
10,11,12,13,18&19	Phase 2 Wet Gypsum (Initial Thru Stage 4)	Lump Sum	$5,188,260	20	$259,413					$303,182	$315,006	$327,292	$340,383
14,15,16,17&20	Phase 3 Dry Ash (Initial Thru Stage 4)	Lump Sum	$17,748,174	12	$1,479,015								
	QA/QC For Construction Of Disposal Facility	Lump Sum	$746,424	24	$31,101	$31,101	$32,438	$33,703	$35,016	$38,349	$37,788	$39,239	$40,809
	Total Operating Costs		$ 36,307,688			$ 1,083,171	$ 1,129,747	$ 1,173,807	$ 1,219,585	$ 1,569,112	$ 1,630,306	$ 1,693,890	$ 1,761,645
	Total Costs		$ 74,360,000			$ 4,593,096	$ 1,129,747	$ 1,173,807	$ 9,195,762	$ 1,569,112	$ 1,630,306	$ 1,693,890	$ 1,761,645

ITEM No.	DESCRIPTION	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Escalation Factor	1.36	1.42	1.48	1.54	1.60	1.66	1.73	1.80	1.87	1.94
	CAPITAL COSTS										
1	Install Drains For Swan Pond Road										
4	Ash And Gypsum In Pond										
4A	Phase 2 Base Construction										
4B	Phase 3 Base Construction				$4,102,400						
5	Miscellaneous				$938,714						
5A	Dry Fly Ash Conversion				$37,109,701						
zz	Engineering										
	Total Capital Costs	$ -	$ -	$ -	$42,148,815	$ -	$ -	$ -	$ -	$ -	$ -
	OPERATING COSTS										
6	Dredge Cell Phase 1	$1,435,672	$1,493,089	$1,552,623	$1,614,936	$1,679,633					
10,11,12,13,18&19	Phase 2 Wet Gypsum (Initial Thru Stage 4)	$353,896	$368,168	$382,885	$398,200	$414,128	$430,693	$447,921	$465,838	$484,471	$503,850
14,15,16,17&20	Phase 3 Dry Ash (Initial Thru Stage 4)					$2,361,111	$2,455,555	$2,553,777	$2,655,928	$2,762,165	$2,872,652
	QA/QC For Construction Of Disposal Facility	$42,441	$44,139	$45,904	$47,740	$49,660	$51,636	$53,701	$55,849	$58,083	$60,407
	Total Operating Costs	$ 1,832,111	$ 1,905,396	$ 1,981,812	$ 2,060,876	$ 4,504,422	$ 2,937,884	$ 3,055,400	$ 3,177,615	$ 3,304,720	$ 3,436,909
	Total Costs	$ 1,832,111	$ 1,905,396	$ 1,981,812	$44,209,691	$ 4,504,422	$ 2,937,884	$ 3,055,400	$ 3,177,615	$ 3,304,720	$ 3,436,909

ITEM No.	DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	Escalated SubTotal	PRESENT WORTH of using Capital Dollars
	Escalation Factor	2.02	2.10	2.18	2.27	2.36	2.46	2.56		
	CAPITAL COSTS									
1	Install Drains For Swan Pond Road								$1,967,628	$1,967,628
4	Ash And Gypsum In Pond								$582,456	$582,456
4A	Phase 2 Base Construction								$7,289,088	$4,792,694
4B	Phase 3 Base Construction								$4,102,400	$851,783
5	Miscellaneous								$2,234,036	$1,263,348
5A	Dry Fly Ash Conversion								$37,109,701	$7,976,479
zz	Engineering								$349,607	$349,607
	Total Capital Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 53,634,916	$ 17,813,992
	OPERATING COSTS									
6	Dredge Cell Phase 1								$17,465,043	$9,016,629
10,11,12,13,18&19	Phase 2 Wet Gypsum (Initial Thru Stage 4)	$524,004	$544,964	$566,763	$589,434	$613,011	$637,531	$663,033	$9,874,747	$1,690,256
14,15,16,17&20	Phase 3 Dry Ash (Initial Thru Stage 4)	$2,987,558	$3,107,060	$3,231,343	$3,360,597	$3,495,020	$3,634,821	$3,780,214	$39,267,802	$3,366,121
	QA/QC For Construction Of Disposal Facility	$62,823	$65,336	$67,949	$70,667	$73,494	$76,434	$79,491	$1,292,157	$298,474
	Total Operating Costs	$ 3,574,385	$ 3,717,361	$ 3,866,055	$ 4,020,697	$ 4,181,525	$ 4,348,786	$ 4,522,738	$ 67,889,769	$ 13,270,679
	Total Costs	$ 3,574,385	$ 3,717,361	$ 3,866,055	$ 4,020,697	$ 4,181,525	$ 4,348,786	$ 4,522,738	$ 121,324,676	$ 31,084,672

Present Worth of this Option $ 31,084,672

12/05/2006

ITEM	DESCRIPTION	UNITS	QUANTITY
	Pumps & Pipe Phase 1		
17.00	100 hp pump for Phase 1 Stormwater Pond	ea	1
17.01	18 in dia discharge HDPE pipe SDR 11	lf	2000
17.02	Platform steel	ton	5
17.03	**Pumps & Pipe Full buildout**		
17.04	50 hp pump for Phase 2 stormwater Pond	ea	1
17.05	12 in dia discharge HDPE Pipe SDR 11	lf	4500
17.06	Platform steel	ton	5
18.00	**Electrical - Phase 1**		
18.01	Phase 1 Transformer 200kva	LS	$8,000
18.02	4 /0 600 volt Cable	lf	200
18.03	3 in dia conduit	lf	200
18.04	13 kV 15 amp pole mount fuse disconnect	ea	1
18.05	**Electrical - Full buildout**		
18.06	Phase 1 Transformer 200kva	LS	$8,000
18.07	4 /0 600 volt Cable	lf	200
18.08	3 in dia conduit	lf	200
18.09	13 kV 15 amp pole mount fuse disconnect	ea	1
18.10	No 6 15 kvolt overhead cable	lf	4500
18.11	Poles between ponds	ea	15
18.12			
18.13			
18.14			

PRELIMINARY

KIF Gypsum on Peninsula
Phase 2 - Gypsum Long Term Rim Ditch Stack

ITEM	DESCRIPTION	UNITS	QUANTITY	T-1 Spec	Comments/Assumptions
7.00	**Gypsum Stack Peninsula (7.00 through 18.00)**				See Note 1 at end of table
7.01	**Clear and Grub**				
7.02	Clear and grub	ac	35		C - Tree line only
7.03	Strip 1 ft vegetation and topsoil - spoil at stockpile	bcy	193,600		C - 120 ac entire site, place soil on site approximately 1 mile roundtrip
8.00	**Erosion Controls / Ponds**				
8.01	Erect silt fence	lf	9,250		C - 6 ft post spacing, trench bottom of fence, 10% hay bales
8.02	Cut for stormwater runoff ponds	bcy	170,970		C - 2 ponds, Phase 1 Pond: 6 ac 17' deep, Phase 2 Pond: 6 ac 10' deep. Place as fill in gypsum stack area.
8.03	Fill for stormwater runoff ponds	bcy	16,425		C - Fill for dikes around Phase 2 pond
8.04	Riprap for stormwater runoff pond	ton	2,713		C - Combined - 1 ft deep along inside slope
8.05	72 in dia cmp for outlet structure	lf	12		C
8.06	48 in dia cmp for riser for outlet structure	lf	14		C
8.07	Cut holes in riser	ea	6		C
8.08	48 in dia cmp outlet pipe (principle spillway)	lf	300		C
8.09	(2) Concrete for riser base (assume 7ft x 7 ft x 2 ft)	cy	9		C
8.10	Anti-seep collars (assume concrete)	ea	14		C - Assume 1.5 cy concrete per collar
8.11	Pipe bedding - #57 stone	ton	40		C
8.12	Clean out stormwater runoff pond	bcy	7,150		C - Assume 2 ft sediment, 67 cy/ac depth x 110 ac
9.00	**Access Roads**				Assume 1.3 miles of roadway (7000 ft); road is 20 ft wide
9.01	Bottom Ash	bcy	2593		C - Assume 6 in bottom ash
9.02	Crushed stone base	ton	2541		C - Assume 4 inch stone (1032), 110 pcf
9.03	Crushed stone base - parking lot	ton	275		C - Assume 100 x 100 ft w/ 6 in crushed stone (110 pcf)
10.00	**Fencing (Exclude De-watering Facility)**				
10.01	New fencing (including grounding)	lf	200		C - Assume chain link fence to block road only - no perimeter fence
10.02	Gates, swinging	ea	1		C - personnel
10.03	Gates, sliding, w/ motorized operator	ea	1		C - 20 ft wide
11.00	**Seed/Mulch**				
11.01	Seed/Mulch disturbed areas	ac	25		C - Areas outside dike

12.00	**Borrow Area Development**				
12.01	Clear and grub	ac	33		C
12.02	Erect silt fence	lf	3,000		C
12.03	Temporary perimeter ditch	bcy	2,900		C - 15 acres of runoff
12.04	Cut for temporary stormwater runoff ponds	bcy	4,422		C - 33 acres*134 cy/ac
12.05	Fill for temporary stormwater runoff ponds	bcy	884		C
12.06	72 in dia cmp for outlet structure	lf	12		C
12.07	48 in dia cmp for riser for outlet structure	lf	20		C
12.08	Cut holes in riser	ea	5		C
12.09	48 in dia cmp outlet pipe (principle spillway)	lf	200		C
12.10	(2) Concrete for riser base (assume 7ft x 7 ft x 2 ft)	cy	9		C
12.11	Anti-seep collars (assume concrete)	ea	20		C - Assume 1.5 cy per collar
12.12	Pipe bedding - #57 stone	ton	25		C - Assumed Unit wt = 125 pcf
12.13	Clean out stormwater runoff pond	bcy	4,422		C - Assume 2ft sediment, 67 cy/ac @ 33 ac
13.00	**Gypsum Disposal Facility**				
13.01	**Disposal Facility Construction**				
13.01	Earthwork cut	bcy	357,647		C - to shape base in gypsum stack area
13.02	Earthwork fill from borrow area	bcy	899,679		C - Remaining fill from onsite borrow area. 1428296-(357647+170970)=899679 Haul Length = 2 miles roundtrip
13.03	Additional spoil material	bcy	0		
13.04	Proofroll subgrade	ac	100		C
13.05	Cut and recompact liner	bcy	445,944		C - Over excavate 3' and recompact to build liner
13.06	Perimeter underdrain pipe	lf	8,220		C - 8 in dia HDPE, SDR = 17, perforated
13.07	Cut for Underdrain system	cy	2,667		C
13.08	Geotextile 8oz nonwoven for underdrain	sy	20,000		C - Wrapped around pipe bedding
13.09	6" depth 1081 crushed stone (110 pcf)	ton	1,320		C - Initial bedding for underdrain piping
13.10	Underdrain piping (8" dia HDPE)	lf	24,000		C
13.11	HDPE Fittings for underdrain piping	ea	65		
13.12	2.5' thick bottom ash drainage layer	bcy	371,620		C
13.13	6" Fly ash layer	bcy	74,324		C - Mix
13.14	Perimeter road surfacing - bottom ash	cy	3130		C - 6 in bottom ash topped w/ 4 in stone - 1.6 mi of roadway 20 ft wide
13.15	Perimeter road surfacing - crushed stone	ton	3067		C - Assumed Unit wt = 110pcf - 1.6 miles of roadway
13.16	Riprap Ditch (D50 = 6 in)	ton	64,682		C - Assume riprap 2 ft depth, 8055 lf ditch, Unit wt = 110 pcf
13.17	8 oz nonwoven geotextile (if riprap is used)	sy	65,335		C - Assume ditch has 9 ft bottom width, 10 ft depth and 3:1 side slopes
14.00	**Gypsum on Peninsula Disposal Cost**				Spread the O&M Cost Over the Life of the Stack

14.01	Cut for Underdrain system	cy	7,359		O&M
14.02	8 oz nonwoven geotextile for underdrain	sy	55,193		O&M - Wrapped around stone envelope
14.03	6" depth 1081 crushed stone (110 pcf)	ton	3,643		O&M - Initial bedding for underdrain piping
14.04	6" dia perforated HDPE SDR 17 underdrains	lf	66,232		O&M - Inside Wet Cast Gypsum Dike, Elevations 775 to 850 (20 yrs)
14.05	Fill for Underdrain system	cy	5,039		O&M - Bottom ash
14.06	Cut for Lateral outlet pipes	cy	2,392		O&M
14.07	6" dia non-perforated HDPE SDR 17 Lateral outlet pipes	lf	21,525		O&M - Lateral pipe located every 200' on center, avg length 65 ft
14.08	Fill for Lateral outlet pipes	cy	2,235		O&M - Bottom ash
14.09	6" depth 1081 crushed stone (110 pcf)	ton	1,184		O&M
14.10	Gypsum Disposal Stack (wet sluice)	cy	7918000		O&M
14.11	Wet cast Gyp Dike	cy	1324640		O&M - Elevations 775 to 850 (20 yrs)
14.12	Cut Rim Ditches	cy	127558		O&M
14.13	Life of Gypsum Disposal Stack	yr	20.0		O&M - Assume 395900 cubic yards per year (@ 84 pcf)
15.00	**Construction parking**				
15.01	Earthwork cut	bcy	833		C
15.02	Earthwork fill	bcy	300		C
15.03	Crushed stone base	ton	675		C - Assume 150 x 150 ft x 6 in thick crushed stone base
16.00	**Engineering**				
16.01	Engineering	ls			C - Take 10% of construction cost (see Dan Smith to confirm engineering cost).
17.00	**Pump Station**				
17.01	Phase 1 Pond				Later
17.02	Phase 2 Pond				Later
18.00	**Electrical**				See Electrical takeoffs

Notes:
1. Item #7 corresponds to Gypsum Disposal at the Peninsula. This numbering system matched the one used for the comparative study done in December '04.

C - Capital cost
O&M - Operation and Maintenance cost

ITEM	DESCRIPTION	UNITS	QUANTITY
	Pumps & Pipe Phase 1		.
17.00	100 hp pump for Phase 1 Stormwater Pond	ea	1
17.01	18 in dia discharge HDPE pipe SDR 11	lf	2000
17.02	Platform steel	ton	5
17.03	Pumps & Pipe Full buildout		
17.04	50 hp pump for Phase 2 stormwater Pond	ea	1
17.05	12 in dia discharge HDPE Pipe SDR 11	lf	4500
17.06	Platform steel	ton	5
18.00	Electrical - Phase 1		
18.01	Phase 1 Transformer 200kva	LS	$8,000
18.02	4 /0 600 volt Cable	lf	200
18.03	3 in dia conduit	lf	200
18.04	13 kV 15 amp pole mount fuse disconnect	ea	1
18.05	Electrical - Full buildout		
18.06	Phase 1 Transformer 200kva	LS	$8,000
18.07	4 /0 600 volt Cable	lf	200
18.08	3 in dia conduit	lf	200
18.09	13 kV 15 amp pole mount fuse disconnect	ea	1
18.10	No 6 15 kvolt overhead cable	lf	4500
18.11	Poles between ponds	ea	15
18.12			
18.13			
18.14			

Comments/Assumptions
Bury 3.5 ft deep with bottom ash bedding
Bury 3.5 ft deep with bottom ash bedding
13.8 kV to 480 v
underground
underground
13.8 kV to 480 v
underground
underground
aboveground - see below
Assume 300 ft spacing - aboveground on poles

KIF450 U6-9 FGD ADDITION

Phase A Preliminary Engineering

P STA	SEC	Activity ID	Activity Description	Forecast Start	Forecast Finish	Finish Target	Total Float	Resp Engr	Prin Engr	RE	Res ID	Bdgt Mhrs	Frcst Mhrs	Actual Mhrs	2005 2006 2007 2008
A		DIFAGYP20	Req TAO For Parsons - Mike Hughes (HLP)		01APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP22	Scoping Discussion		01APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP18	Map of Survey - Scope to Surveying (HLP)		08APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP17	Scope of Drilling to MATEC (HLP)		11APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP12	RSO&E Survey of Holes- Predrill (Phy Layout HLP)		18APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP31	CEC for Drilling (Generic #5259) (HLP)		20APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP15	Issue MATEC TAO (HLP)		25APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP16	Receive MATEC Proposal (HLP)		25APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP13	RSO&E Prepare Hydrogeo Workplan (Hank Julian)		26APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP11	Env Aff Meet /TDEC - Hydrogeo Wkpln-(Amos/Larry)		27APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP14	MACTEC Start Drilling (HLP)		28APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP07	RSO&E Begin Hydrogeo Report (Draft) (H Julian)		29APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP21	LOA for RSO&E (HLP)		29APR05A				HLP	MSH		0.00	0.00	0.00	
A		DIFAGYP09	LOA for GeoProbe (HLP)		03MAY05A				HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP06	RSO&E Receive Prelim MACTEC Rept (TVA) (HLP)		20JUN05A			HLP	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP19	Phase 1B: Issue TAO to Parsons (HLP)		15JUL05A			HLP	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP25	Carrier Site Visit	20JUL05A	21JUL05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	30	DIFAGYP04	RSO&E Complete Draft to Environ Aff -Hank Julian		23AUG05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	30	DIFAGYP05	RSO&E Complete Draft to Parsons -Hank Julian		23AUG05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP10	Receive Final Mactec Lab Results		26AUG05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	50	DIFAGYP03	Hydro Geo Final Internal Review Enviro Aff		29AUG05A			ALS	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP35	Part I Application (Larry Bowers-Begin Package)		01SEP05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP30	Nuyt update meeting		23SEP05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP37	NOD Response by Environmental Affairs	01OCT05A	31MAR06		28	MSH	HLP	MSH		0.00	0.00	0.00	
A	AM	DIFAGYP41	Site Meeting to Review MATEC Report -Steve Baugh	05OCT05A	05OCT05A			BSL	JSB	MSH		0.00	0.00	0.00	
A	35	DIFAGYP32	Preliminary Footprint Drawing to JPT		10OCT05A			MSH	HLP	MSH		0.00	0.00	0.00	
A	35	DIFAGYP33	JPT Meeting - Status		19OCT05A			MSH	HLP	MSH		0.00	0.00	0.00	

Start Date 01JAN89
Finish Date 15OCT14
Data Date 04DEC05
Run Date 06DEC05 14:11

Early Bar
Progress Bar
Critical Activity

FHEM

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STA	EC	Activity ID	Activity Description	Forecast Start	Forecast Finish	Finish Target	Total Float	Resp Engr	Prin Engr	RE	Res ID	Bdgt Mhrs	Frcst Mhrs	Actual Mhrs
A	35	DIFAGYP02	Final Hydrogeo Report to Envir Aff (Hank Julian)		28OCT05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFAGYP34	Quantity Takeoffs to Radford/Toney		28OCT05A			MSH	HLP	MSH		0.00	0.00	0.00
A	15	DIFAGYPES	Complete Cost Estimate for Phase 3 (GYP POND)	14NOV05A	17NOV05A			CLT	JLH	HLP		0.00	0.00	0.00
A	35	DIFAGYP36	Final Estimate back from Radford/Toney		18NOV05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFAGYP38	Final Footprint Study Drawing		18NOV05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFAGYP01	State Receives Hydro Geo Report		21NOV05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFAGYP39	PPD Preliminary to JPT		28NOV05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFAGYP40	Final PPD		02DEC05X			MSH	HLP	MSH		0.00	0.00	0.00
A		DIFAGYP08	State Approves Hydro Geo Report		15APR06*		13		HLP	MSH		0.00	0.00	0.00
A	30	DIFAGYPPC	Preliminary Engineering Complete (Phase 1B)		15APR06		13	SMH	HLP	MSH		0.00	0.00	0.00
Phase B Final Engineering														
A	50	DIFBGYP10	Part I Application to TDEC		21OCT05A			MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFBGYP05	10% Design Review		~~12DEC05*~~		4	MSH	HLP	MSH		0.00	0.00	0.00
A	35	DIFBHYP15	Send Drawings to Plant 1 Week Prior to 50% Mtg		06MAR06*		649	SMH	HLP	MSH		0.00	0.00	0.00
A	35	DIFBGYP20	50% Design Review Meeting		15MAR06*		640	SMH	HLP	MSH		0.00	0.00	0.00
A	50	DIFBGYP28	Part II Application to TDEC		16MAY06*		168	SMH	HLP	MSH		0.00	0.00	0.00
A	50	DIFBGYP30	ARAP/404 Permit Application		16MAY06*		168	SMH	HLP	MSH		0.00	0.00	0.00
A		DIFBGYP35	ARAP/404 Permit Issued		01MAY07*		228	SMH	HLP	MSH		0.00	0.00	0.00
A		DIFBGYP40	TDEC Issues Solid Waste Permit		15OCT07*		61	SMH	HLP	MSH		0.00	0.00	0.00
A	35	DIFBGYP45	100% Design Review Meeting		15DEC07*		0	SMH	HLP	MSH		0.00	0.00	0.00
E														
A	39	VRRESKIF69	FY 05 AG&WS SUPPORT - KINGSTON 6- 9 FGD ADDITION	17JAN05A	30SEP05A			GTM	REJ	TJM	FSAG,	500.00	38.00	38.00
A	35	VRRESKIFC0	FY 05 CIVIL SUPPORT - KINGSTON 6- 9 FGD ADDITION	04MAR05A	30SEP05A			VJD	HLP	TJM	FDCEA	50.00	42.00	42.00
A	31	VRRESKIFZ1	FY 05 MECH ENG SUPP - KINGSTON 6- 9 FGD ADDITION	16MAY05A	30SEP05A			MDL	DLD	TJM	FDMEA	200.00	200.00	200.00
A	33	VRRESKIFZ2	FY 05 I&C ENG SUPP- KINGSTON 6-9 FGD ADDITION	06JUN05A	23SEP05A			RDG	RCO	TJM	FDEE2D	200.00	4.00	4.00
A	31	VRRESKIFZ4	FY 06 MECH ENG SUPP - KINGSTON 6- 9 FGD ADDITION	03OCT05A	30SEP06		-1	MDL	VWD	TJM	FDME,	800.00	800.00	89.00
A	39	VRRESSYSAG	FY 06 FIRE PROT SUPP-KINGSTON 6- 9 FGD ADDITION	03OCT05A	30SEP06		0	NCR	REJ	TJM	FSAG,	200.00	208.00	8.00
A	39	VRRESSYSAH	FY 06 AGW&S SUPP-KINGSTON 6- 9 FGD ADDITION	03OCT05A	30SEP06		0	GTM	REJ	TJM	FSAG	2,000.00	2,000.00	46.00
A	35	VRRESSYSAI	FY 06 CIVIL SUPP-KINGSTON 6- 9 FGD ADDITION	03OCT05A	30SEP06		0	HLP	HLP	TJM	FDCEA	1,000.00	1,000.00	8.00

Start Date	01JAN89
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Early Bar
Progress Bar
Critical Activity

FHEM

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