Petty, Harold L.

From: NDavies@GeoSyntec.com
Sent: Friday, March 03, 2006 4:58 PM
To: Julian, Hank
Cc: TElkady@GeoSyntec.com; Petty, Harold L.
Subject: RE: KIF Peninsula: Draft EA

Hank:
We have reviewed Section 3.2.2 as requested. I will send you by separate email a pdf of a couple of pages where we have revised and/or questioned a few of the specific numbers in the test related primarily to areas/volumes etc. The revised numbers are from the current version of the design drawings.

We are not aware of any proposal to place monitoring ports beneath the landfill with horizontal conduits. This has not been discussed with us and I am not sure why one would consider this approach. As I am sure you are aware, the more typical approach is use perimeter wells located downgradient of the landfill and compare data to upgradient conditions. Also, it is typical to screen the wells beneath the geologic buffer, not within it.

There are several places in the report where there is mention of the "liner". Since the design does not incorporate a geocomposite liner, I would recommend against the use of this language. In the documents we are developing we are referring only to the "geologic buffer" which will consist of a 3 foot thick layer of recompacted soil with a design hydraulic conductivity of not greater than 1 x 10-7 cm/sec.

Hank – I hope this helps. If you have any questions, please let us know. I will be out of the country next week but available by email. Tamer Elkady in Atlanta is also working on the project.

Best regards
Neil

From: Julian, Hank [mailto:hejulian@tva.gov]
Sent: Wednesday, March 01, 2006 9:52 AM
To: Neil Davies
Subject: KIF Peninsula: Draft EA

<<KIF_Peninsula_Draft_EA.pdf>>
Please review Section 3.2.2 of the attached draft EA. Does current design of the facility integrate provisions noted in the EA? For instance, the EA states "monitoring ports beneath the landfill would be situated at centroid and peripheral locations with horizontal conduit runs to sampling ports. Perimeter monitoring wells would be installed at critical locations to complement those monitoring locations beneath the landfill. Upgradient wells are currently being installed at higher elevations of the site (ridgeline) that should serve to gauge background groundwater quality. The final groundwater-monitoring plan will be detailed in the facility operations plan." Note that the original design plan for the facility involved some type of liner (e.g. natural low-K soils and/or artificial) with a bottom ash drainage layer and near-horizontal conduits to route water from the drainage blanket to collection pond. To my knowledge, the hydraulic were never modeled.

Thanks,

Hank

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those states. Thus, although SO_2 emissions reductions due to installation of FGD are expected to lead to improvement in overall regional air quality, the most improvement would be within the TVA region.

3.2. Solid Waste and Groundwater

3.2.1. Affected Environment

KIF currently produces two coal combustion byproducts (CCB): Fly ash and bottom ash are byproducts from the combustion of coal and are disposed on site. KIF is expected to burn between 3.2 and 4.4 million tons of coal annually through at least 2015. The coal averages 12.5 percent ash; therefore, total ash production would range from approximately 400,000 to 550,000 tons of ash per year. Fly ash comprises approximately 80 percent (320,000 to 440,000 tons per year) and bottom ash is the remaining 20 percent (80,000 to 110,000 tons per year).

All fly ash and bottom ash produced at KIF is currently sluiced to the active ash pond. Bottom ash is reclaimed for use in dike construction for the two dredge cells that were developed on part of the inactive ash pond area. Periodically, fly ash is hydraulically dredged from the active ash pond into either of two active dredge cells. Decant water from the dredge cells drains by gravity back to the active ash pond for discharge. Between 320,000 to 440,000 tons of fly ash and 80,000 to 110,000 tons of bottom ash are handled in this manner annually.

KIF is considered a small quantity generator by TDEC for generation of hazardous waste. The types of these wastes currently generated include small quantities of waste paint; waste paint solvents; mercury contaminated debris; sandblasting, scraping, paint chips; solvent rags due to cleaning electric generating equipment; Coulomat (used as moisture removal from oil); and liquid-filled fuses.

3.2.2. Environmental Consequences

No Action Alternative
For the No Action Alternative, KIF could continue to handle fly ash by sluicing to the pond and dredging to the dredge cells until capacity in these cells is exhausted.

Action Alternative
Proposed Scrubber
For the proposed action to construct and operate a wet LSFO FGD system at KIF, gypsum would be produced as a new byproduct. TVA proposes to market the gypsum, and it is anticipated that at least 385,000 tons per year of KIF gypsum can be marketed for use in wallboard, cement, and agricultural uses. However, the gypsum that is not marketed would be disposed on site. The proposed gypsum disposal facility at KIF would be located on the west bank of the Clinch River/Watts Bar Reservoir near CRM 3.5 in Roane County, Tennessee (KIF Peninsula Area #2, Figures 3-1 and 3-3).

Several sites were initially considered for the location of the proposed KIF gypsum disposal area. Eight sites were determined to be not practicable based on preliminary investigations. For a site to be economically feasible, it must provide a minimum capacity for 5 years of operation if it is located at the KIF site or 20 years of operation capacity if it is located off site. For long-term operation, the ultimate goal is to design for 20 years of total capacity. In addition, the gypsum dewatering facility would need to be close to the gypsum pond and stack area and the barge loading area to be economically

feasible. The preferred site is the mid-section of the KIF Peninsula (KIF Peninsula Area #2) which is outlined in Figure 3-1.

The gypsum stack would be constructed in a phased approach so that the initial stacking area to be developed would encompass only about 35 acres of the total 125 acres. Land surface across the proposed disposal site ranges from 740 to 792 feet mean sea level (ft-msl), and is mainly above the 100-year flood stage elevation (747.1 ft-msl at CRM 3.5). If marketing were successful, it is anticipated that the smaller footprint could serve for surge capacity and disposal for over 20 years. If marketing were unsuccessful, it would be necessary to develop the total footprint, which is anticipated to have a life of up to 25 years of gypsum disposal capacity. The proposed stack would be permitted as a Class II waste disposal facility and would meet design and siting criteria of TDEC's Division of Solid Waste Management, with waivers from gas migration and certain other standards not appropriate for this facility.

Depending on the sulfur content of the coal and the efficiency of the scrubbers, between 349,000 tons per year (3.1 lb sulfur per mmBtu coal) and 680,000 tons per year (5.0 lb sulfur per mmBtu coal) of high purity gypsum byproduct would be produced.

The status of KIF as a small quantity generator of hazardous waste should not change as a result of the Action Alternative.

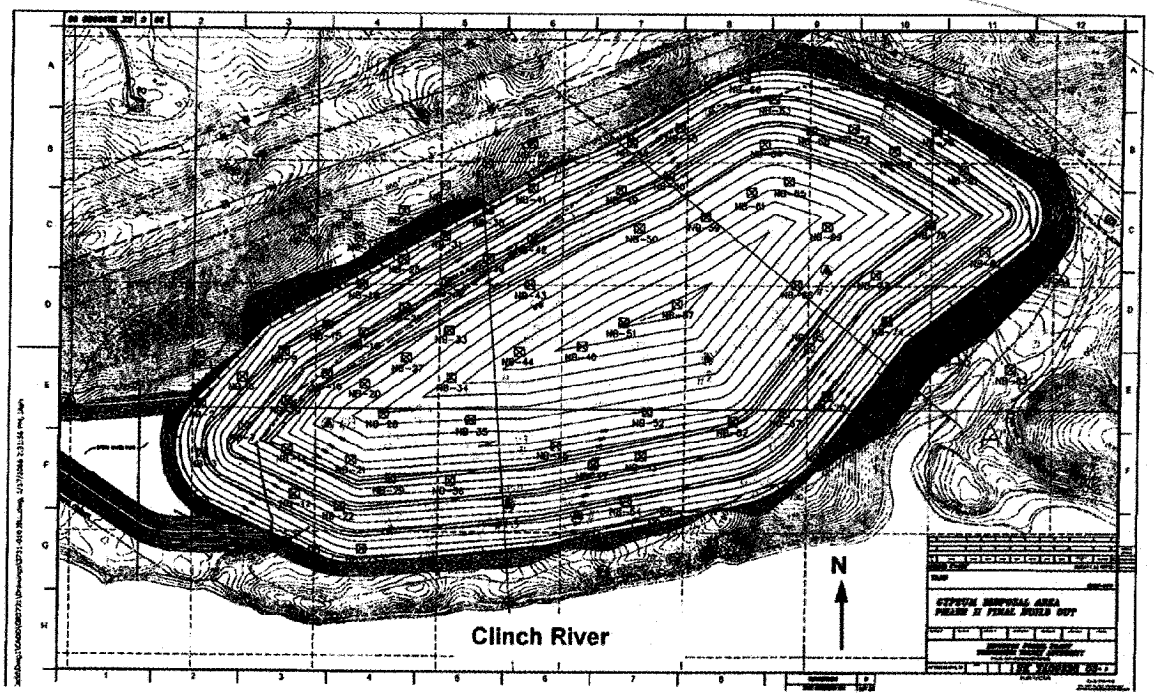

Figure 3-1. Plan View of Site at Proposed Final Grade Including Cross-Section Location A

Flue Gas Conditioning for SO_3 Mitigation by Addition of Lime

KIF is considering utilization of lime ($Ca(OH)_2$) for flue gas conditioning (SO_3 mitigation) to help reduce plume opacity. The $Ca(OH)_2$ would react with SO_3 in the flue gas to produce calcium sulfate (gypsum). The gypsum and any unreacted lime would be removed from the flue gas by the electrostatic precipitators and would be wet-sluiced to the KIF ash pond (Outfall 001).

The estimated quantities of lime and gypsum that would be sluiced to the KIF ash pond are 25,682 tons/year of lime (62,664 cubic yards (yd^3)/year) and 10,091 tons/year (8,930 yd^3/year) of gypsum, respectively. A portion of the lime and gypsum would probably dissolve in the ash pond sluice water and be discharged. Any undissolved lime and gypsum would probably settle in the ash pond. It is not anticipated that the lime and gypsum sluiced to the ash pond would have a significant impact on operation of the KIF ash disposal facilities or operation of those facilities.

Groundwater

The proposed construction of a new Class II CCB disposal facility proposed at KIF may occur in two separate phases. Both phases would involve disposal of gypsum derived from the FGD system. Phase 1 would be constructed pending successful marketing of the FGD-derived gypsum. The footprint for Phase 1 includes an area of approximately 35 acres of the total 125 acres. If efforts to market the gypsum were unsuccessful, the disposal facility would be expanded laterally under Phase 2. Phase 2 includes an additional area adjacent to the site and encompasses approximately 80 acres (total for both Phases 1 and 2). If approved, approximately 1 million yd^3 of gypsum is tentatively scheduled to be deposited in Phase 1 between 2009 and 2029. If the facility is expanded to include Phase 2, approximately 8 million yd^3 of gypsum would be deposited in the facility between 2009 and 2029. Estimates of FGD wastes for disposal are approximate and depend on the sulfur content of coal utilized by the plant, as well as TVA's ability to market the FGD-derived gypsum successfully for other uses. Current design plans for the disposal facility include a low-permeability liner and underdrain system. Hydrogeologic evaluations of the proposed facility were performed to examine its suitability relative to the appropriate standards of TDEC Rule 1200-1-7. Evaluations addressed effects of proposed disposal facilities on local groundwater and surface water resources.

Hydrogeologic data used to support the site evaluation were derived from recent geotechnical investigations at the site conducted by MACTEC Engineering and Consulting, Inc., from single-well aquifer testing and from several previous site investigations. Recent investigations included 26 geotechnical soil borings, bedrock coring at 14 locations, and installation of 13 wells for the purposes of single-well aquifer testing and to supplement water level data provided by five existing piezometers. Cone penetrometer surveys were performed at 10 locations and 55 Geoprobe borings were installed within the proposed disposal site to supplement boring data.

The proposed disposal site is topographically bounded by a relatively high ridge along the northeast margin and hydraulically by the Clinch River along the south-southeast. A mantle of predominantly residual soil resides above bedrock. Soil thickness is highly variable, ranging from 8.5 to 120 feet and averaging 40.5 feet based on all available data (139 holes) within the confines of the proposed disposal area. Residuum primarily consists of clay and silt with variable chert gravel content. Silty alluvial soils (clayey to

sandy silt) were encountered along a small, low-lying area on the western margin of the site.

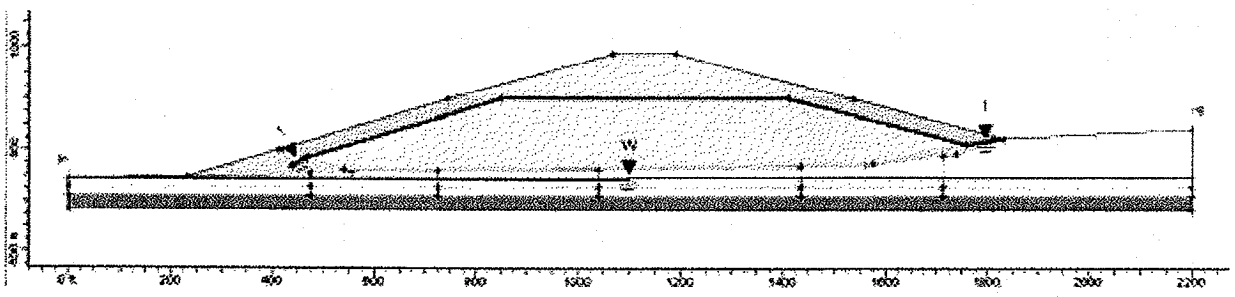

Figure 3-2. Typical Cross-Section Geometry for End of Dry Stack Operation

The Knox Group comprises bedrock beneath the proposed disposal area, and the general variation in lithology of the Knox is from massive, crystalline, very cherty dolomite at the base to generally less massively bedded, dense to fine crystalline, less cherty dolomite at the top. Core samples of the Knox bedrock at the site exhibit slight to highly fractured conditions. Most cavities and joints were also observed to be completely or partially filled with clays or sands. An exception was at New Boring-66 where open cavities were observed. Cavity thicknesses ranged from 0.4 to 8.0 feet. Cavities of measurable thickness were observed at half of the core hole locations.

Groundwater movement at the site generally follows topography with groundwater flowing southeasterly from the site ridgeline toward the Clinch River. All groundwater originating on, or flowing beneath, the proposed disposal site ultimately discharges to the Clinch River without traversing private property.
Hydrogeologic conditions at the proposed disposal site appear to satisfy geologic and hydrologic standards for Class II disposal facilities. Key findings and recommendations are summarized as follows:

- A survey of water use in June 2005 indicates that there are no surface water or groundwater supplies located within a 1-mile radius of the site. Furthermore, considering that the site is hydraulically bounded on virtually all sides, there is no potential for off-site impacts to residential or municipal groundwater supplies. The facility poses no risk to existing or future groundwater users because there are no existing groundwater wells downgradient of the proposed facility. There is no potential for future development of such wells, since all downgradient property between the disposal site and surface water boundaries lies within the plant reservation.

- There is no evidence of Holocene-age faulting within the 200-foot facility exclusion zone. Although topographic expressions of dolines (enclosed depressions) are exhibited at the site, these features do not possess open throats or avenues for reception of incipient recharge. Rather, the dolines are thickly mantled by soil thicknesses ranging from about 35 to 75 feet. Visual and

laboratory classifications of these soils indicated that they are of residual origin except in the area of NB-21 and NB-44 (site pond) where alluvial deposition has occurred. There were no voids detected immediately above bedrock that would indicate stooping of soil into the deeper bedrock system.

- Two small areas within the proposed facility boundary reside within the 100-year flood stage of the Clinch River, and the natural geologic buffer zone within these areas is lacking. However, the proposed facility design includes plans for filling of these areas with suitable borrow soil. Furthermore, the current facility plan includes a bottom liner residing above the seasonal high groundwater elevation and an under-drain system to intercept leachate.

where are these areas

- Groundwater monitoring for potential CCB leachate contaminants is anticipated to include several discrete locations within the geologic buffer zone immediately beneath the landfill liner. Although design of the complete groundwater-monitoring network is dependent on the features of the final landfill design, it is expected that monitoring ports beneath the landfill would be situated at centroid and peripheral locations with horizontal conduit runs to sampling ports. Perimeter monitoring wells would be installed at critical locations to complement those monitoring locations beneath the landfill. Upgradient wells are currently being installed at higher elevations of the site (ridgeline) that should serve to gauge background groundwater quality. The final groundwater-monitoring plan will be detailed in the facility operations plan.

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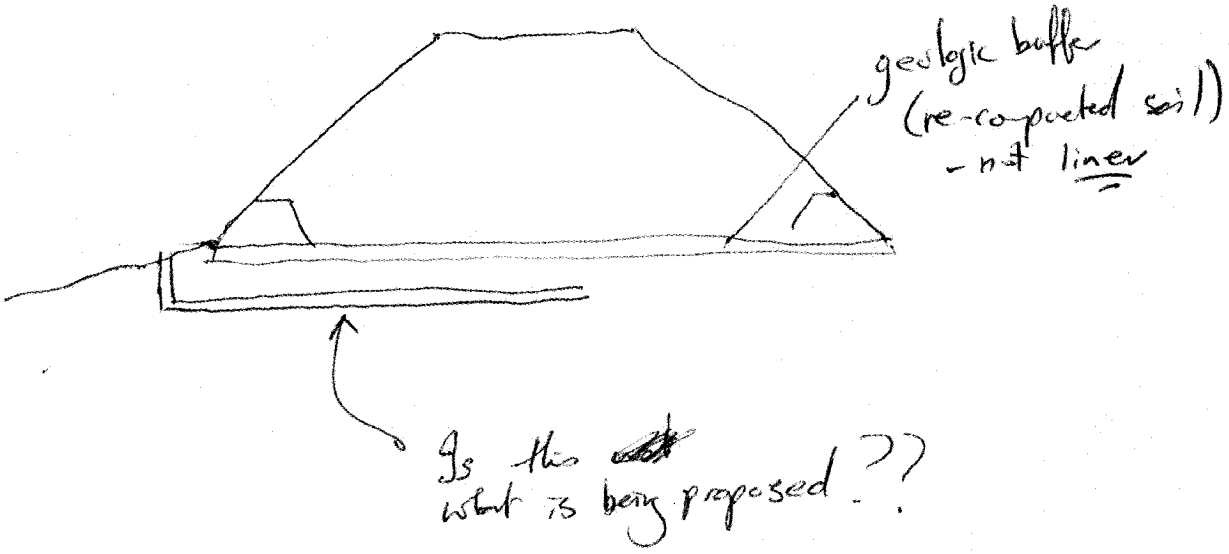
- Consequently, potential impacts to groundwater from any of the options considered under the Action Alternative for disposal of gypsum are insignificant.



No Action Alternative
Adoption of the No Action Alternative would not have an adverse impact on wetlands in the project area.

Action Alternative
The proposed use of the site would require filling all four wetlands within the project area, resulting in total wetland impacts of approximately 5.85 acres (Table 3-6). The wetland impacts associated with this project may be subject to Section 404 federal permit requirements as well as Section 401 state water quality certification. TVA would request a final jurisdictional determination from the USACE for these wetlands and obtain all necessary permits. Because there is no practical solution within the scope of the proposed project for minimizing or avoiding impacts to the on-site wetlands, TVA would mitigate for all wetland loss in compliance with the Clean Water Act. Mitigation would be accomplished through on-site preservation and enhancement of existing wetlands or through the purchase of wetland credits.

3.9. Floodplains and Flood Risk

3.9.1. Affected Environment

Gypsum Barge Loading Facility

The potential area of impact from the proposed barge terminal would extend from about CRM 2.9 to 3.1 on Watts Bar Reservoir in Roane County, Tennessee. The 100-year floodplain for this reach of the Clinch River would be the area below elevation 747.1. The TVA Flood Risk Profile (FRP) elevation would be 748.4 at the upstream end of the proposed barge terminal site. The FRP is used to control flood-damageable development for TVA projects and residential and commercial development on TVA lands. At this location, the FRP elevation is equal to the 500-year flood or "critical action" elevation. Roane County participates in the National Flood Insurance Program (NFIP), which regulates floodplain development and requires demonstration that a project within the floodway would not increase flood elevations. There is a published floodway on this portion of the Clinch River.

Gypsum Disposal Area

The proposed gypsum disposal area would be constructed on the right bank of the Clinch River on Watts Bar Reservoir between CRMs 3.3 and 3.9. At this location, the 100-year flood elevation varies from 747.1 to 747.4, and the FRP (500-year flood) elevation varies from 748.6 to 749.1. The gypsum disposal area would reside completely outside of the published 100-year floodway on this portion of the Clinch River.

3.9.2. Environmental Consequences

No Action Alternative
If the No Action Alternative were chosen, no floodplain impacts would occur.

Action Alternative
Gypsum Barge Loading Facility

The proposed project involves the construction of a gypsum loading barge terminal on the Clinch River in the vicinity of the KIF. Dredging to provide adequate water depth for barge mooring is also proposed. Consistent with Executive Order 11988, a barge terminal facility falls into a special category of the order, called a functionally dependent