

Taylor, Dianna

From: McWilliams, Clark
Sent: Tuesday, January 12, 2016 1:41 PM
To: Taylor, Dianna
Subject: NABORS: 100% Design Review

DT-
AFIN: 03-00051
Permits: 0249-S1-R2 and 0249-S4

<G:\Shared Folders\SolidWaste\NABORS Design Review Letter Report.pdf>

Thanks,
Clark McWilliams P.E. 501-682-0510
ADEQ – Solid Waste Management Division
1/12/16

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AFIN: 03-00051

PMT#: 0249-S1-R2

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By Dianna Taylor at 2:14 pm, Jan 12, 2016

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January 11, 2016

Mr. Bryan Leamons, P.E.
Arkansas Department of Environmental Quality
Solid Waste Management Division
5301 Northshore Drive
North Little Rock, Arkansas 72118

Re: Closure Design Review
Construction Documents for NABORS Landfill Closure
Three Brothers, Arkansas
AFIN: #03-00051 Permits: 0249-S1-R2, 0249-S4
Design Professional Services Contract 4600021812
EnSafe Project Code: 0888818233

Dear Mr. Leamons:

EnSafe is pleased to submit this letter report on our design review of construction documents for the NABORS landfill closure. It presents our findings and recommendations, which were communicated verbally to Mr. Clark McWilliams and you during an informal debrief meeting on January 7, 2016.

The purpose of the closure design review is to ensure fiscally responsible, proper closure of the inactive landfill units at the NABORS landfill site. As specified in the scope of work provided by ADEQ, our scope of work consisted of:

- Evaluating the design to ensure compliance with Arkansas Regulation 22 closure requirements (including groundwater evaluation of corrective measures).
- Evaluating the design documents to assess correction of landfill deficiencies in preparation for closure under existing permit options (waste overfill, inoperative leachate collection system components, inadequate access roads, etc.).
- Reviewing the design documents to ensure construction costs are minimized while achieving adequate closure and minimizing post closure care costs (i.e., closure is designed and can be constructed to function reliably and with minimum day-to-day care).

On January 5 through 7, 2016, Tom Green of EnSafe reviewed closure design documents compiled by ADEQ in your offices in North Little Rock. The files provided by ADEQ included correspondence, news clippings, design criteria reports, and progressive versions (50%, 75%, 100%) of design plans. In addition, on January 6, Mr. McWilliams and you arranged and

participated with Mr. Green in a conference call with Mr. Floyd Cotter and Mr. Dillon Baird of SCS Aquaterra, the firm retained by ADEQ to prepare the design, to assist our understanding of elements of the project.

EnSafe focused its review on the most pertinent documents, in particular, the following prepared by SCS Aquaterra:

- *Design Criteria Report, Design Professional Services, Closure of Inactive NABORS Landfill* ("Design Criteria Report"), April 2015
- *Project Manual – Specifications, Closure of Inactive N.A.B.O.R.S. Landfills* ("Project Manual"), November 17, 2015
- Engineering Drawings, titled *Closure of Inactive NABORS Landfills*, November 20, 2015
- Engineer's Estimate, November 2015

Findings and Recommendations

In EnSafe's opinion, the design as formulated in the Design Criteria Report and presented in the Project Manual and 100% Engineering Drawings complies with Arkansas Regulation 22 closure requirements, namely:

- The capping of Class 1 wastes with a final cover meeting Reg.22.428. Use of a geosynthetic clay liner in lieu of 18 inches of low permeability clay (1×10^{-7} cm/sec) is a proven alternative that is cost effective when suitable clay soil is unavailable at or near the landfill. Its equivalency was documented by SCS Aquaterra in the Design Criteria Report. The cover system with its integral 40-mil LLDPE geomembrane helps minimize leachate generation and gas migration.
- The capping of Class 4 wastes with a final cover meeting Reg.22.624.

The design addresses correction of identified deficiencies:

- Waste overfill – wastes in Class 1 areas 1-2 and 1-3 and in the Class 4 area will be relocated within the respective permitted footprints and airspaces.
- Inoperative leachate collection system components – leachate collection sumps are being upgraded with new pumps and sumps with pumps are being added, where needed. New force mains will convey leachate from the sumps to a new central leachate tank farm. From the tank farm, leachate can be pumped to a proposed gas-fired evaporator, re-injected into the landfill, or hauled to an offsite facility for treatment and disposal.
- Inadequate access roads – the main access road will be improved and the central leachate tank farm will eliminate the need for tanker trucks to access leachate sumps at the perimeter of the fill areas. Perimeter access roads will be upgraded to accommodate maintenance vehicles.

- Control of gas migration – capping with a system that includes a geomembrane layer and the installation of an active gas collection system will minimize the migration of landfill gases beyond the waste footprints and reduce the concentration of water soluble volatile substances (volatile organic compounds, etc.) in leachate. The proposed flare will reduce the emissions of methane and non-methane organic compounds to the atmosphere.

The proposed design offers a reasonable approach to minimizing long-term project costs (construction costs plus post-closure operating and maintenance costs) while achieving regulatory requirements and site-specific closure objectives. The selected final cover systems are designed in accordance with generally accepted practice for side slopes (3 horizontal: 1 vertical or flatter) and surface water management (benches or terraces at suitable intervals leading to down chutes) to minimize erosion. Installation of the final caps should lead to a decrease in leachate generation and its associated disposal costs, although the actual quantity is difficult to predict accurately.

On the subject of construction costs, our review revealed several inconsistencies and ambiguities in the plans and project manual that could create uncertainty among bidding contractors and consequently increase construction bid prices. These are noted in detail in the attached red-lined copy of these documents. Specific findings are described as follows.

The names used to describe the various soil layers are not consistent. For example:

- Structural fill is defined in Section 310513 to be free of stones having any dimension greater than 2 inches, but is included in Section 329113 as one of the soils that is to be screened to remove particles larger than 1 inch.
- The Section 310513 specifications for Barrier Soil materials state at paragraph 2.3.A that they are for the construction of the “compacted soil layer,” which seems to be intended to define the “low permeability soil layer” of the Class 4 cap shown in the Engineering Drawings.
- The terms “protective layer” and “grading layer” are used, but their soil characteristics are not defined other than that protective cover soil is included in Section 329113 as a soil to be screened.

Temporary Leachate Disposal – The bid form asks for a lump sum price to “provide leachate disposal from the existing leachate collection system until the new leachate collection system is operational”. The volume of leachate generated during construction will be a function of many factors, several of which - especially the weather, are beyond the control of the contractor. Therefore, it would appear more appropriate for this item to be bid, measured and paid on a volumetric basis (by the gallon or tanker truck load).

We note that the cost and basis included in the Engineer’s Estimate (\$233,080 for 29,000 gallons per week for 1 year) equate to a unit cost of \$0.15 per gallon, while a cost of \$0.26 per gallon was presented in the Design Criteria Report. We understand ADEQ is currently paying approximately \$0.19 per gallon plus a handling fee.

Leachate Evaporator — On the subject of long-term leachate disposal we recognize there are many variables, including the availability and cost of offsite disposal, that make evaluation of alternatives a somewhat subjective process. We further recognize that the Design Criteria Report was completed in April 2015 and the latest Engineer's Estimate in November 2015, but we suggest that the comparison between offsite disposal and onsite evaporation presented in the Design Criteria Report be re-visited if it is now believed that the cost of offsite disposal will vary much from \$0.26 per gallon. Preliminary calculations (see attached spreadsheet) indicate the comparison is sensitive to this unit cost and the long-term cost savings of an evaporator may not be realized if offsite disposal is and remains available for \$0.20 or less per gallon and the installed cost of an evaporator with its foundation equals or exceeds its estimated value of \$1,050,000.

Soil Screening – The estimated quantity of 193,600 cubic yards approximates the volume of in-place soil needed for intermediate cover and the various soil layers of final cover, adjusted for the re-use of 36,000 cubic yards of topsoil in area 1-2, but this may be merely a coincidence. Measurement and Payment defines this item as soil prior to screening, but does not specify if it is to be measured as excavated from the borrow area or as loosely placed into the screen. The estimated quantity, definition and basis of measurement of this item should be reviewed and revised, as appropriate.

Waste relocation – This work is identified in the Unit Price Bid Form as three discrete lump sums, one each for areas 1-2, 1-3, and 4. The specifications (Section 312324) state this work is to be done in accordance with applicable sections of Arkansas Regulation 22 and that a daily cover layer 12 inches thick is to be applied over exposed surfaces from which waste has been removed and waste surfaces newly created by the placement of relocated waste. The specifications further state that relocated waste is to be compacted by two to three passes with a sheepfoot roller.

We note that Regulation 22 calls for daily cover to be a minimum thickness of 6 inches rather than 12 inches. Regulation 22 is silent as to the thickness at which waste can be placed prior to compaction; we suggest the designer consider specifying 3 feet or less. We also question whether two or three passes of a sheepfoot roller will provide adequate compaction to return the waste to its pre-excavation volume or to provide sufficient stability when construction of intermediate and final covers are to commence in days or weeks rather than in months or years. We suggest the designer review this matter and revise the specifications as deemed appropriate.

EnSafe did not independently verify the estimated quantities given in the Engineer's Estimate or the airspace available for waste in each landfill area. We deduce that the quantities to be relocated are of the existing waste/soil mixture (assumed to be re-compacted to the same or lesser volume) and do NOT include the daily cover required by Section 312324. We suggest the designer verify that available airspace will accommodate the relocated wastes plus appropriate volumes of daily cover.

Interim (or Intermediate) Cover – The plans define this layer as being 12 inches thick. The Bid Form items 41 and 49 listed as "Prepare Subgrade" are shown to be priced by the acre and the Engineer's Estimate is approximately \$2,100 per acre. In Section 012010 Measurement and

Payment of the Project Manual, however, these items are defined as "materials, equipment, and labor required to place and compact intermediate cover." The costs estimated for placing and compacting other soil layers make it likely that the cost for this layer will be much greater than \$2,100 per acre.

Contract Time – The Bid Form and the Agreement Form both state the work is to be completed in 120 calendar days. We suspect this is a placeholder number that will be changed prior to formal issuance of the bidding documents.

Insurance Requirements – The required aggregate amount of Pollution Liability insurance is listed as \$50,000,000. This is much greater than we customarily see in projects of this magnitude.

Construction Quality Assurance Plan (CQA Plan) – There are numerous references to this plan throughout the documents, but it is unclear which entity is to prepare such a plan. Reg.22.428 requires final covers to be constructed in accordance with written quality assurance plans. Under the circumstances of this closure, the technical specifications of the Project Manual could be considered to function as the CQA Plan. If so, references to a separate CQA Plan should be removed from the documents.

We sincerely appreciate the hospitality and cooperation extended to us by the ADEQ staff during our time in your office. If you have questions or wish to discuss our report, please contact Claire Barnett or me at (901) 372-7962, cbarnett@ensafe.com, or tgreen@ensafe.com.

Sincerely,
EnSafe Inc.



By: Thomas B. Green, Jr., PE (Tennessee)
Associate Principal



Claire Barnett, PE
Project Manager

cc: Mr. Clark McWilliams, PE, ADEQ
Paul Stoddard, EnSafe

Enclosures: Red-lined Copy of Project Manual
Red-lined Copy of Engineer's Estimate
Cost Analysis of Leachate Evaporator vs Hauling



1-11-2016