GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

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Ms. Terry Simpson
Principal Environmental Scientist
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Rhode Island Department of Environmental Management (RIDEM)
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Re: Interim Submission
UIC Application for Wastewater Discharge
Charbert Division of NFA Corp.
Alton, Rhode Island

Dear Ms. Simpson:

GZA GeoEnvironmental Inc. (GZA) prepared this Interim Submission report on behalf of our client, Charbert, Division of NFA Corporation (Charbert). The report was prepared to respond to RIDEM's comments provided at our June 6, 2007 meeting regarding the UIC application for wastewater discharge at the Charbert facility located in Richmond, Rhode Island. We have provided you with two copies to facilitate the Department's review.

This Interim Submission is intended to provide RIDEM with the information to allow the construction of a Rapid Infiltration Basin (RIB) to the south of Lagoon No. 3 and the discharge to the RIB of up to 50,000 gallons per day (gpd) of wastewater from Lagoon No. 3. The new RIB is designated Area 1 on the attached Figure 1. The construction of this new RIB will allow for the closure and restoration of the portion of Lagoon No. 4 that lies within the 200-foot riverbank edge. The Area 1 RIB will also be used for disposal of treated wastewater when the treatment plant is constructed and has a hydraulic capacity to receive 120,000 gallon per day of treated wastewater.

Additional details regarding the UIC application are provided in:

- GZA's Hydrogeologic Study report dated March 2006;
- Charbert's April 14, 2006 letter to RIDEM entitled " Proposal to Construct a RIB for the Disposal of Process Wastewater"; and
- GZA's January 12, 2007 response letter to RIDEM's May 12, 2006 comments.

The following paragraphs provide our responses to the issues raised by RIDEM during our June 6, 2007 meeting.

TWO FOOT SEPERATION TO WATER TABLE

RIDEM expressed concern that the separation from the mounded water table (during the wet season) to the bottom of the RIBs was less than 2 feet. As described below, GZA raised the bottom of the RIB at Area 1 from elevation 62.0 to 62.8 feet; and, re-evaluated the mounding calculations. Our calculations indicate that the mounded seasonal high water table will be at least 2 feet below the RIB.

GZA's original mounding calculations provided in our March 2006 Hydrogeologic Report indicated that the seasonal high water table at Area 1 varied from elevation 46 feet on the downgradient (west) side to 51 feet on the upgradient (east) side. The seasonal high water table at the center of the RIB is estimated to be at elevation 48.5 feet. The mounded groundwater table for the 120,000 gpd design flow rate was 10.5 feet in the center of the RIB and 9.8 feet on the upgradient and downgradient sides of the RIB (See Appendix I – Area 1 in GZA's March 2006 Hydrogeologic Report).

This information reveals that the mounded seasonal high groundwater elevation beneath the Area 1 RIB will be 59.0 feet at the center of the RIB and 60.8 feet on the upgradient (east side) of the RIB. Therefore, in order to maintain a 2 foot separation from the water table for the 120,000 gpd design flow, the bottom of the RIB should be at elevation 62.8 feet. The revised layout of the Area 1 RIB is provided on the attached Figure 1 and revised cross sections are provided on the attached Figure 2. Note that on Figure 2, a geocomposite clay liner (GCL) membrane has been added to the RIB side slopes, where fill is required, in order to prevent water seeps along the perimeter of the RIB during periods of heavy loading.

As described below, additional subsurface explorations will be performed around RIB Areas 2 and 3; this information will be used to adjust either the design flow or the RIB elevation to accommodate the 2 foot water table separation requested by RIDEM.

OPERATION AND DOSING PLAN

As noted in the April 14, 2006 southern RIB request, Charbert is currently seeking approval for the discharge of 50,000 gpd of wastewater. However, at our recent meeting RIDEM requested an operation and dosing plan for the final RIB configuration. The conceptual operation and dosing schedule for the Area 1 RIB is as follows: Area 1 will be divided into two sides. Either side can handle a daily flow of 120,000 gallons. The discharge will alternate to either side of the RIB on a daily or weekly basis. Our supplemental mounding calculations provided in Attachment A, indicate that in order to maintain the two foot separation from the water table, the flow of 120,000 gpd should not be sustained on either side of the RIB for a duration of over 30 days (before switching to the other side). A flow meter with a totalizer will be used to measure the total daily flow to the RIB and a daily log will be used to keep track of which side of the RIB (i.e., north or south) is receiving the discharge.

When repairs or maintenance of the RIBs has to be performed the volume of water discharged to the remaining RIBs will have to be increased for a short period of time. As an example the flow to Area 1 could be increased to 120,000 gpd to both side of the RIBs at Area 1, for a combined flow rate of 240,000 gpd. Our supplemental mounding calculations provided in Attachment A, indicate that in order to maintain the two foot separation from the water table, the combined flow of 240,000 gpd should not be sustained for a duration of over 5 days.

Cleaning the top surface of the RIBs will occasionally be required to remove silty residue and leaf litter. The maintenance will be performed with either a small front end loader or using hand tools such as lawn rakes and shovels. The removed soil will be stockpiled, and evaluated for potential reuse or if necessary on-site or off-site soil disposal as appropriate based on testing results.

ADDITIONAL MONITORING WELLS AND WELL SCREEN DEPTH

RIDEM requested additional wells around Area 1 to serve as water-quality compliance monitoring points, and also requested that we provide the proposed depth of the monitoring wells. The new monitoring wells, located to the north and south of Area 1 are depicted on Figure 1 as RCW-4 and RCW-5. These wells will be used to gauge for water levels and collect groundwater samples. In addition, a new monitoring well located to the west of Area 1 (RCW-6) will only be used to measure water levels.

The subsurface conditions were generally comprised of 2 to 4 feet of silty topsoil and subsoil underlain by clean (relatively silt-free) sands with occasional gravelly seams to a depth of 12 to 17 feet below grade. The sandy deposits were underlain by a 5 to 15 foot thick stratum of predominantly silty fine sand. A discontinuous sand zone up to 9 feet thick was encountered in some of the borings beneath the silty sand strata. Glacial till (a dense well graded mixture of silt, sands, cobbles) and bedrock were encountered at depths ranging from 23 to 37 feet below grade.

The top elevation of the silty sand strata was generally encountered at elevation 45 feet to the south of the lagoons. The top of the silty sand strata rose to elevation 49 feet at boring GZ-11 (the southernmost exploration) and dropped to elevation 37 feet at boring GZ-10 located to the west of Lagoon 2. Note that at some of the explorations (such as TP-1, TP-3, and TP-7) the upper sandy soil zone was intermixed with a silty sand stratum.

Based on the stratified nature of the soil deposits and the development of a groundwater mound that will raise the water table, we propose to install 10-foot long well screens to depths of approximately 5 feet below the static (non-mounded) water table. The depth of the wells may be raised or lowered slightly depending on the presence and thickness of the silty sand strata encountered during well installation. Soil samples will be collected with a split-spoon sampler at 5-foot intervals during drilling to evaluate the soil profile at each monitoring well location. The wells will be constructed of 2-inch diameter, slotted (0.010-inch) well screen connected to solid PVC riser pipe. Filter sand will be backfilled around the well screen and a 2-foot thick bentonite seal will be placed two feet above the top of

the well screen. The wells will be secured with a locking protective steel casing cemented in place.

GROUNDWATER TRAVEL TIME

RIDEM requested an estimate of the travel time of groundwater in proximity to Area 1. The transmissivity of the aquifer in the proximity of Area 1 is 700 feet squared per day (see GZA's March 2006 Hydrogeologic Study). The thickness of the stratified sandy aquifer is approximately 10 feet. Therefore, the hydraulic conductivity of the aquifer is approximately 70 feet per day. The static slope of the groundwater table is approximately 0.05 feet per foot. We assume that the sand has a porosity of 0.3. Using the above information, we estimate that the groundwater transport rate is approximately 12 feet per day in proximity of Area 1. We note that most groundwater contaminants migrate at a significantly slower rate than groundwater due to soil adsorption.

SEISMIC REFRACTION SURVEY

RIDEM requested that the bedrock topographic information from the seismic refraction survey performed in the area of the Lagoons and Areas 2, and 3 be included on select site figures. Figure 3 shows the requested bedrock topography information along with the proposed RIB configuration and ground surface topography.

ADDITIONAL EXPLORATIONS – AREAS 2 AND 3

RIDEM requested additional explorations to be performed in proximity of RIB Areas 2 and 3 and the reserve areas. We propose to perform ten test pit explorations at the approximate locations shown on Figure 1. The test pits will be excavated using a track-mounted excavator with a reach of 18 feet. The test pit results will be used to finalize the groundwater mounding evaluation and RIB design for Areas 2 and 3. Note that the test pit explorations may reveal that deeper test borings, with monitoring well installations, may be required.

PROPOSED TREATMENT PLANT DETAILS

The wastewater treatment plant for Charbert will use a system of lined aerated lagoons designed and operated to have a theoretical detention time of 60 days. The sides of the lagoons will be constructed as near vertical as is practical to minimize the potential for odors. Odors are typically generated from stagnant water that, can occur in the shallow areas of a lagoons created by sloping sides. Charbert will convert existing Lagoons 1 and 2 to lined aerated treatment basins with near vertical sides.

The treated wastewater from the lined aerated basins will be further treated by a physical/chemical treatment system consisting of chemical addition, mixing, flocculation and settling. A clarifier, sludge storage tank and filter press will remove and dewater the suspended solids in the wastewater. This polishing step will reduce solids loading to the RIBs to a concentration of less than 10 mg/L.

The treated wastewater from the physical/chemical treatment system will be discharged to Rapid Infiltration Beds (RIB) to be constructed on Charbert property near the existing lagoons. Existing Lagoon 3 will be used as a combination RIB and treated water storage pond. The storage pond may be needed during periods when the RIBs are being cleaned or during cold weather when the efficiency of the RIBs may be reduced due to icing.

The treated wastewater will flow by gravity through a subsurface pipe system to the proposed RIBs where the water will flow onto the ground surface within the RIB and leach into the ground. The piping system will include a series of valves so that the treated wastewater can be diverted to the required RIB and the use of the RIBs can be staggered to extend the life of the RIBs.

Figure 1 depicts the systems described above including: the two aerated treatment basins (currently designated Lagoons 1 and 2), the proposed location of the physical/chemical treatment system, the conversion of existing Lagoon 3 to a RIB and treated water storage pond, and the proposed location of the three RIBs and reserve areas (designated Areas 1, 2 and 3).

FUTURE PLANS AND CONCEPTUAL TIME FRAME

The following project schedule is for planning purposes and is based on a number of assumptions, including the availability of sub-contractors and the length of regulatory review periods. We will update this schedule as the work progresses and provide RIDEM with routine progress reports.

ACTIVITY	ANTICIPATED START/SUBMISSION DATE	TASK DURATION	ESTIMATED COMPLETION DATE
Interim Submission (attached)	June 25, 2007	---	Completed
RIDEM Review/Approval of Interim Submission	June 25, 2007	2 weeks	July 6, 2007
Construction of Area 1 RIB/Supplemental Explorations	July 16, 2007	3 weeks	July 27, 2007
Submit Permit Application for RIB Areas 2 and 3/RIDEM review and approval	July 27, 2007	4 weeks	August 24, 2007
Construct RIB Areas 2 and 3 and construct Treatment Plant building including water polishing equipment	August 27, 2007	6 weeks	October 5, 2007

Reduction of Lagoon 1, 2 and 3 water levels	July 27, 2007	6 weeks	September 7, 2007
Restoration of Lagoon 4/Area 3 RIB construction	September 10, 2007	2 weeks	September 21, 2007
Liner Installation Lagoons 1 and 2	September 10, 2007	6 weeks	October 19, 2007
Treatment System start-up and testing	October 22, 2007	4 weeks	November 16, 2007
Full Operation and Maintenance of RIBs/wastewater treatment system.	November 19, 2007	---	---

We trust this information addresses your remaining concerns and look forward to receiving approval of the southern/Area 1 RIB proposal. Should you have any questions or require additional information please feel free to contact us at (401) 421-4140 or Michael Healey of Charbert at (401) 364-7751 (ext. 127).

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Anthony B. Urbano
Senior Project Manager

Edward A. Summerly, P.G.
Associate Principal

EAS/ABU:mac

Attachments: Figures 1 - 3

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