ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION – INDUSTRIAL AND MUNICIPAL SECTIONS
NONCOMPLIANCE NOTIFICATION FORM

PERMITTEE NAME: Cahaba River WWTP PERMIT NO: AL0023027

FACILITY LOCATION: 3900 Veona Daniels Road, Hoover, AL (Jefferson County)

DMR REPORTING PERIOD: September 2014

1. DESCRIPTION OF DISCHARGE: (Include outfall number (s))

Outfall 0011 - There was an upset which resulted in a discharge that exceeded the permitted limit. The conditions of Provision II.C.2.a of the permit have been met. The County requests exemption from the discharge limitations specified in Provision 1. A.

2. DESCRIPTION OF NON-COMPLIANCE: (Attach additional pages if necessary):

LIST EFFLUENT VIOLATIONS (If applicable)			
Outfall Number (s)	NONCOMPLIANCE PARAMETER(S)	Result Reported (Include units)	Permit Limit (Include units)
Outfall 0011	TKN – weekly avg	3.70 mg/l	3.00 mg/l
Outfall 0011	Ammonia (Total as N) – weekly avg	3.28 mg/l	1.5 mg/l
LIST MONITORING / REPORTING VIOLATIONS (If applicable)			
Outfall Number (s)	NONCOMPLIANCE PARAMETER(S)	Monitoring / Reporting Violation (Provide description)	

3. CAUSE OF NON-COMPLIANCE (Attach additional pages if necessary): See attachment

4. PERIOD OF NONCOMPLIANCE: (Include exact date(s) and time(s) or, if not corrected, the anticipated time the noncompliance is expected to continue): The week including September 2-6, 2014

5. DESCRIPTION OF STEPS TAKEN AND/OR BEING TAKEN TO REDUCE OR ELIMINATE THE NONCOMPLYING DISCHARGE AND TO PREVENT ITS RECURRENCE (attach additional pages if necessary): See attachment

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Gary Nelson, Cahaba River WWTP Manager
NAME AND TITLE OF RESPONSIBLE OFFICIAL (type or print)

Gary Nelson / 9/16/2014
SIGNATURE OF RESPONSIBLE OFFICIAL / DATE SIGNED

ADEM Form 421 11/06 m2

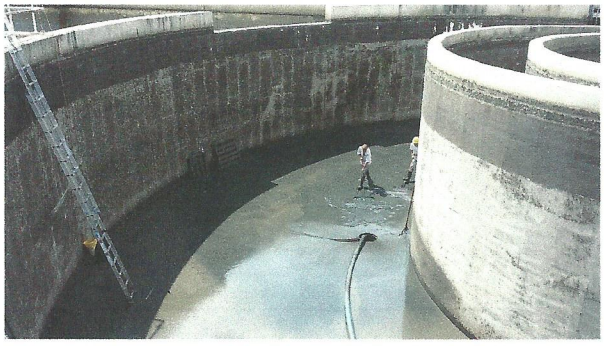
ATTACHMENT

3. CAUSE OF NON-COMPLIANCE (Attach additional pages if necessary):

The weekly average Total Kjeldahl Nitrogen (TKN) and weekly average ammonia violations were caused by a biological upset in the five-stage Bardenpho Biological Nutrient Removal process. The cause of the upset has been identified and is described below. The WWTP was properly operated at the time of the upset. The County took all reasonable steps to minimize any adverse impact on human health and the environment, and all required non-compliance notifications have been made. The non-compliance was the result of a process upset caused by a large septic solids load being introduced to the system from multiple points.

An active construction project is ongoing at the Cahaba River WWTP. The project includes replacement of the pneumatic gate operators with electric motor operators in the headworks, modification of the alum feed system, and installation of submersible mixers in the aerobic zone in the carousel in each of the two 6 MGD average daily flow five-stage Bardenpho Biological Nutrient Removal (BNR) reactors. To complete the mixer installation, each BNR system must be taken out of service and drained. This activity was planned in coordination with CDM-Smith, the design engineer, and Haren Construction, the contractor, to be completed during the low flow period of the late summer and early fall when flows can be effectively treated with one BNR system in service. A Maintenance of Plant Operations Plan (attached) was developed between the County, the professional design engineer, and the contractor to ensure the contractor's activities would not have an adverse impact to the WWTP processes and effluent quality.

The below photos were taken on September 4, 2014 showing the current sludge removal and dewatering activities on the eastern carrousel. The western BNR reactor is in service. In accordance with the plan, the average daily flow to the treatment plant was reduced to less than 6 MGD, the capacity of the western BNR reactor, by pumping more of the raw wastewater flow from the Al Seier pump station to the Valley Creek WWTP.



Beginning on August 19, 2014 and prior to the floor-level sludge removal, all five treatment zones in the eastern BNR system were drained to the WWTP's aerated peak flow holding basins. The liquid contents of the drained carousel were being slowly reintroduced into the active BNR reactor to minimize impact to the system. Increasing the hold time in the aerated holding basin was a conservative approach intended to minimize impacts to the active BNR; however, it led to septic conditions developing in the aerated holding basin which were observed on August 30, 2014. This liquid was heavy in MLSS and the aeration system within the peak flow basins proved incapable of supplying sufficient dissolved oxygen to keep the basin contents aerobic while daily high temperatures exceeded 90 degrees. The septic conditions contributed to the release of higher than normal ammonia and soluble CBOD in the holding basin return to the active BNR system. The sludge that remained in the carousel was being pumped to a geotube filter and the filtrate returned to the active BNR system. The filtrate also contains high levels of ammonia and CBOD.

On August 27, 2014, a hydraulic gate in the influent pump station was observed in a partially closed position. It was determined the hydraulic system had leaked and allowed the gate to partially close. The gate was returned to an open position. The gate is located within the multi-chambered structure and served to isolate the influent flow from the chamber housing the suction piping. The lowered gate had not caused the influent flow to decrease but had allowed a substantial amount of solids to be retained in the unaerated outer wet-well chamber and in the 84" influent tunnel, but was unknown at the time the gate was returned to fully open. Additionally, the drained carousel discharge retained in the aerated peak flow basin drains back to the influent pump station to be re-pumped into the treatment process. A rain event on the evening of 8/30/2104 also acted as a catalyst for a "first flush" phenomenon that washed the stored septic solids from the collection system as well as washing stored septic solids in the wet-well at an increased rate into the influent pump station.

The unforeseen storage of septic wastewater in the influent wetwell and collection system leading to the Cahaba WWTP likely caused the development of anaerobic conditions in the influent wastewater and resulted in the storage of solids that would have otherwise made it to the plant. Once the solids were flushed and conveyed into the BNR system, the collected solids reached the biological system as a shock load (mass load of CBOD, TSS, and ammonia was much higher than the average or expected conditions at the plant) which overwhelmed the system both from the influent load to mass of active microorganisms (F/M ratio) and the oxygen transfer equipment, leading to higher than normal ammonia and phosphorus concentrations at the effluent of the BNR system. This shock load coupled with the higher than normal loadings from the operational changes associated with the construction activities caused the upset.

Upon discovery, Plant staff immediately started effort to restore normal operations to the BNR system by increasing the return activated sludge (RAS) flow and the aerators' oxygen transfer to manage the increased ammonia load. In an effort to address the higher total phosphorous (TP) readings, plant staff started to feed more alum prior to the tertiary filters to remove the higher incoming TP load. However, the additional alum feed and the recirculation of flows after the filters to further help stabilize the BNR system appears to have resulted in a decrease of UV transmittance at the UV system, making the disinfection process less effective. This interference associated with the alum and UV system caused the UV system to provide inadequate disinfection and resulted in higher than allowable E. Coli discharges for September 3rd and September 4th, 2014. A public notice was provided on September 5, 2014 regarding the E. Coli levels present in the discharge.

The planned reduction in flow also limited the availability of plant water to perform a high frequency of backwashes. The filters had to be in service longer without a backwash especially after the additional loading from the aerated holding basins occurred. Additional filters were put in service to compensate, but eventually backwashes had to be completed to clean the filters. Solids are generally released during the backwash cycles when the effluent valves are opened. The dirtier the filter, the greater chance of some solids release into effluent. More frequent backwashing would have been preferable, but at lower flows, the flow must be built up or stored in the filter pump station to have sufficient flow to prevent shutdown of the UV system due to automated low flow protections and loss of plant water used in seal water systems in pumps and blowers. The flow for the backwashes is retrieved from the media filter clearwell which is source for plant water and UV flow. The condition of the filters resulting from the upset caused higher than normal TSS effluent discharges which negatively impacted TKN, TP, and other permitted parameters and contributed to the two E. Coli violations.

5. DESCRIPTION OF STEPS TAKEN AND/OR BEING TAKEN TO REDUCE OR ELIMINATE THE NONCOMPLYING DISCHARGE AND TO PREVENT ITS RECURRENCE (attach additional pages if necessary):

Timeline of Events

On Saturday August 30, 2014, at 1:40 PM., WWTP staff observed septic conditions in the headworks, grit/grease removal, and BNR system. The WWTP staff measured low dissolved oxygen (DO) readings in the active BNR basin and was unable to supply sufficient DO in the aerobic zone of the BNR. The DO was measured to be < 0 mg/l. After the operators were unable to raise the DO above 0 mg/l, the WWTP Manager was called into the plant at 5:24 PM. The staff took the following actions to correct the problem and prevent a full loss of active biology in the BNR process: mixed liquor suspended solids (MLSS) was transferred to the final clarifiers and waste activated sludge (WAS) rates from the final clarifiers were increased sending more WAS to the digester; sludge depth and consistency were monitored in the final clarifiers; ammonia levels were monitored from the BNR; process controls samples were collected and analyzed for DO, pH and ammonia; effluent flow was recirculated to increase DO into system. In spite of these efforts, no measurable DO was measured until Sunday morning at 6:00 AM (0.12mg/l).

Throughout Sunday, the WWTP staff continued to monitor the BNR and transfer solids from the BNR to the final clarifiers to achieve higher DO concentrations (0.16 mg/l).

Throughout Monday, the WWTP staff continued to monitor the BNR and continued monitoring and controlling MLSS and RAS rates. Measured DO levels were 1.9 mg/l and ammonia was 0.5 mg/l.

On Tuesday, the observed conditions and process grab samples indicated the treatment process was operating within expected range. The ammonia grab sample readings were between 0.5 to 2.0 mg/l and the BNR DO was between 0.8 and 1.5 mg/l. It was thought the WWTP was providing adequate treatment.

On Wednesday September 3, 2013, the previous day effluent composite sample lab results revealed there was an E. Coli violation and a higher than normal TSS discharge. The following steps were taken: two tertiary deep bed sand filters were backwashed for an extended period; alum dosage was reduced; flow was recirculated to flush alum from the treatment system; DO levels and ammonia levels were monitored; and grab samples taken to determine how the treatment system was recovering.

On Thursday September 4, 2014, Rick Newberg, Senior Operations Specialist with CDM-Smith and Lucas Botero, Process Engineer with CDM-Smith, provided guidance that the higher alum dosages in the tertiary filters coupled

with low flows to the UV system and its associated heat transfer increase to the wastewater effluent could be causing interference with the UV light transmittance, decreasing the UV system's effectiveness. The WWTP staff conducted a test by placing a sample of the effluent in the microwave and observed a resulting discoloration of the water sample. The County then tested the UVT of the water with a hand held meter and compared the results to the installed UVT meter on the UV system. The readings were 77 and 76. The UV system has been operated in manual mode at 100% intensity and is designed for a UVT of 65 at 25 MGD. The UV system has been well maintained and provided good disinfection in the days, weeks, and months prior to the upset and after.

On Thursday, it was decided to start draining the aerated peak flow basin and send the stored septic water to the Valley Creek plant via the Al Seier Pump Station. The influent flow to the Cahaba WWTP was diverted to the Al Seier Pump Station, and the aerated peak flow basins were drained about halfway. During this effort, there was no discharge from the WWTP. The BNR system was recirculating flow with RAS. The influent flow was returned to the Cahaba WWTP on Friday, September 5th at about 2:00 a.m.

On Friday September 5, 2014, the observed conditions and process grab samples indicated the treatment processes were operating within expected range. The plant staff monitored the BNR and continued controlling MLSS, and RAS. The DO levels in the BNR were measured to be 1.4 mg/l and ammonia grab samples indicated a level of 1.16 mg/l - both within expected operating parameters; however, the effluent composite samples were considerably higher than grab samples for ammonia. After receiving the effluent readings, it was decided to divert flow prior to disinfection (filter effluent flow) from the Cahaba River WWTP to the Al Seier Pump Station which sends flow to the Valley Creek WWTP to prevent any possibility of non-compliant discharges to the Cahaba River. All flow to the Cahaba River WWTP is processed through the BNR, clarifiers, and filters before routing to the Valley Creek WWTP for subsequent treatment and discharge. There was no effluent flow from the Cahaba River WWTP beginning Saturday, September 6, 2014 at approximately 8:00 AM and continued until September 13, 2014 at approximately 9:00 a.m. All processes were monitored and operated to improve treatment performance and ensure compliance with all NPDES permit limitations.

A portable composite sampler was set up to sample the filter effluent prior to it being routed to the Al Seier pump station. When the filter effluent sample indicated the treatment process had stabilized and was compliant with the permitted discharge limitations, the effluent flow was routed to the UV disinfection process and then discharged to the Cahaba River through the permitted outfall 0011. This occurred on September 13, 2014

In accordance with Provision I.D.1. of the NPDES permit, it is also anticipated that the facility will not achieve compliance with the monthly average limits for Total Phosphorous as a result of this upset. Additional notifications will be provided.

In accordance with Provision II.C.2. of the NPDES permit, the above document that an upset did occur at the plant. The combination of circumstances which lead to the upset were exceptional, and the upset was unintended and unforeseen. The presence of a Maintenance of Plant Operations Plan for the process changes associated with the solids load as well as the efforts to quickly correct the upset and discharge indicate the facility was being properly operated. Efforts to restore the process, provide public notification and cease discharge at the facility are also a clear demonstration that reasonable efforts were taken to minimize the adverse impact to public health and the environment. As the County is still gathering information regarding the circumstances of the upset, the County may amend this submittal as needed.

JEFFERSON COUNTY, ALABAMA
CAHABA RIVER AND TRUSSVILLE WWTPs PHASE I TMDL IMPROVEMENTS
Jefferson County Project No. E.01026.W.C / CDM Smith Project No. 73998-98293
SUBMITTAL REVIEW COMMENTS

Date: July 29, 2014
Submittal: D-01014-001-F
Title: Maintenance of Plant Operations – Cahaba River WWTP
Reviewer: B. Huguenard
Degree of Approval: *APPROVED AS NOTED*

SHOP DRAWING REVIEW

ENGINEER'S REVIEW	RESPONSE REQUIRED OF CONTRACTOR
☐ Approved ☐ Comments Attached ☑ Approved as Noted ☐ Not Approved	☐ Confirm ☐ Resubmit
☐ Receipt Acknowledged (Not subject to Engineer's Review or Approval)	

The Engineer's review of this shop drawing is limited to the review of dimensions, equipment and materials as presented in the Contract plans, specifications, and for design concept. This review does not relieve the Contractor from errors or omissions in the submittal or from the Contractor's responsibility of addressing any deviations from the Contract Documents. The Contractor is responsible for the details and dimensions of fabrication and manufacture, the means, methods, techniques, sequences or procedures of construction and performing its work in a safe manner.

CDM Smith By Keller W. Schuiv Date 7/29/14

Please provide a written response to each comment below.

1. Items C.9 and C.10 – A step needs to occur between these two steps. That step would be transfer of treated effluent from the aerated holding basins to the out of service BNR train by Haren.

Date: July 28, 2014

Contractor: Haren Construction Company, Inc.
309 N. Church Avenue, Suite 1
Dyersburg, TN. 38024

Owner's Name: Jefferson County, Alabama Environmental Services
Project Name: Cahaba River and Trussville WWTPs Phase 1 TMDL Improvements
Project Number: 73998-98293

HCC Submittal No: 84E
CDM Submittal No: D-01014-001-F

The first character shall be D, S, M, or I (Shop Drawing, Sample, O&M Manual, or Informational)
The next five characters shall be the applicable spec section
The next two characters shall be the sequential number of the items submitted under that spec section
The last character shall be a letter representing the number of times this particular item has been submitted ("A would represent the original submittal, and "B" would represent the first resubmittal)

Number of Copies Submitted to CDM : Electronically
Number of Copies to be returned to Haren: 0

Description: Cahaba River – Maintenance of Plant Operations During Construction – BNR System Imp.

This material conforms to Buy American requirements

Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

HAREN CONSTRUCTION CO., INC.

_X_ APPROVED
___APPROVED AS NOTED
_____RESUBMIT
Approval given subject to strict compliance with contract documents and/or Purchase Order, and does not relieve responsibility for design or accuracy.
By Steve Kirby
Date July 28, 2014

1.05 C. Cahaba River WWTP - BNR System Improvements

A. Description of the work to be performed.

The BNR Basins are to be drained, the sludge is to be removed, the basins are to be washed down, precast concrete walkways are to be installed, new submersible mixers are to be installed, new handrail is to be installed, and new HDPE alum lines are to be installed.

B. Definition of the start date, duration, and end date of the disruption.

Based on information presented in the 7/8/14 conference call and provided in the 7/24/14 email, Haren understands that there are some changes to the constraints specified for this work:

- There are no longer limits on the transfer pumping rates.
- When taking a train is out of service, it is no longer necessary to pump from each zone of the BNR train as all the water will be pumped to the same place (the aerated holding basin).
- When putting a train back in service all of the clean water can be pumped into the fermentation zone and it will simply overflow walls to fill up the entire train.
- This work cannot begin until after the modifications have been made to pump no. 3 at the Al Seier Pump Station. Haren completed the piping modifications on 7/24/14. The Owner is now going to move the motor from the other pump and place into operation.

Haren would like to begin this work as soon as possible and will closely coordinate with the plant management in order to do so. Once the Owner takes a BNR basin out of service, the specs say the duration of the disruption shall be limited to 30 days per basin, but we do not think this is enough time to drain, dewater, clean, form & pour concrete, allow concrete to gain strength, and then install precast walkways, hoist mounts, handrail, electrical, and field service. To reduce the time required, Haren plans to pour 5,000 psi concrete in order to reach the necessary strength to proceed in an estimated 3 days. Even with this change and with the constraint changes, we still do not think the 30 days allowed is enough time for everything required.

C. Definition of the activities to be performed by or witnessed by the Owner during the disruption and the date on which these activities are to be performed.

1. Owner is to reduce the flow rate to the treatment plant.
2. Owner is to reduce RAS flow to allow sludge blanket depth in the clarifiers to increase to around six feet. This is being done to avoid losing too much solids inventory when the train is taken out of service in the interest of not destabilizing the food/mass balance to too high of a degree.
3. Owner is to isolate the process train being taken out of service from influent and RAS flow once the clarifier sludge blankets reach six feet.
4. Owner is then to resume normal RAS pumping operations.
5. Owner is to lock-out/tag-out the equipment to prevent accidental restart of rotating equipment.
6. After Haren pumps the contents of the out of service train into the aerated holding basin, Owner is to operate the aerated holding basin in a normal manner with the aeration system on. The MLSS from the out of service train will be allowed to intermingle with raw wastewater flows diverted to the basin during the day.
7. Owner is to slowly pump MLSS and raw wastewater that is stored in the aerated holding basin back to the head of the treatment plant.
8. Owner is to divert secondary effluent to the Al Seier Pump Station (if necessary) in the event secondary effluent quality is noncompliant.
9. Prior to putting the inactive basin back in service, Owner will slowly fill one of the aerated holding basins with treated effluent.
10. Upon completion of mixer testing, Owner will start the mechanical surface aerators.
11. Owner will split the influent flow and RAS between the two trains so each train is receiving half the flow.
12. Owner will adjust the aerator speed and mixing equipment to maintain a consistent D.O.
13. In the event that secondary effluent quality is noncompliant, Owner will divert secondary effluent to the Al Seier Pump Station.

D. Details of all temporary connections to piping and structures required.

1. Initial dewatering will be pumping the entire train to the holding basin across the road. Haren will utilize one diesel driven hydraulic submersible pump, one gasoline powered hydraulic pump, and three gasoline powered trash pumps, all as required. While in the holding basin, the liquid will be mixed and aerated. As the plant has excess capacity, it will be fed through the active train.
2. After all excess liquid is pumped out, the above mentioned pumps will be used to pump the sludge to the dewatering area.
3. Placement of all pumps will be closely coordinated with plant management to maintain all necessary access and to mitigate tripping hazards. All fuel will be stored away from the basins in a bulk diesel tank mounted on a truck and smaller gasoline containers also kept on the truck.
4. Sump pumps will be used along with a valved plumbing system in order to convey the geotube filtrate into the on-line oxidation ditch just downstream of the discharge weir. Pumping rate will not exceed 400 gpm.
5. Temporary fire hoses will be connected to the plant water hydrants for washing down the basins. The location of these hydrants has been confirmed to be suitable.

E. Details of means, methods, techniques, and sequences to be used to establish a base element of surety against a wastewater spill, with at least one level of backup.

1. A temporary berm of natural earth brought to the site will be placed around the dewatering area located in the parking area north of the BNR basins. The location of the dewatering area will be closely coordinated with plant management to maintain necessary access to the basins. Our proposed location is shown on the attached plan. Once the dewatering work is complete, the berm will be removed.
2. The dewatering area will be lined with EPDM membrane. The storm drain inlets in the parking area will be blocked off and lined in order to use them as sumps. Sump pumps will direct the decant water back to the inactive BNR or to the basin of the Owner's choosing. A backup sump pump will be provided.
3. Dewatering of the sludge will be accomplished using geotubes. The sludge from the first basin should be dewatered by the time the second basin is ready to be taken down, but if not this area will accommodate enough geotubes for the sludge from both basins.
4. An overflow flume will be constructed to direct decant water back to the inactive BNR or to a zone in the active BNR as directed by the Owner in the event of a sump pump failure.
5. Once dewatered to the extent required by the Mount Olive Landfill, as measured by taking periodic composite core samples, the sludge will be loaded by tractor or skid steer loader. Care will be taken in order to avoid ripping the EPDM membrane and/or damaging the asphalt. As the geotubes will sit on top of more sturdy drainage grids, there should not be any damage to the liner. If the traffic causes any damage to the asphalt, appropriate repairs will be made.
6. An independent lab performed TCLP testing on the sludge. The results were forwarded to Santek Waste Services along with a waste profile for the project. Santek has submitted a request for a Special Waste Permit from ADEM. Once this is approved Santek will provide a letter stating that the Mt. Olive landfill can and will accept the waste.
7. Separate from the sludge drying process, Haren's work sequence in each basin will be as follows:
    a. Coordinate demolition with plant operator
    b. Install barricades to block access to walkway on both sides - only in the immediate area of the work
    c. Take down existing handrail in area of work
    d. Erect temporary handrail
    e. Saw cut concrete walkway at location of new cross walk
    f. Install plywood debris protection to prevent concrete from falling into basin
    g. Use jackhammer to break out concrete
    h. Remove and dispose of concrete
    i. Remove plywood debris protection
    j. Cover walkway opening with heavy duty plywood deck
    k. Install new precast walkways
    l. Install new handrail
    m. Remove barricades to reopen walkway.

8. Haren will work diligently to avoid sludge or filtrate spills. Should a spill occur, all processing and construction activities will be stopped and all efforts directed to containment and cleanup. We will keep on site scoops and containers for cleaning up small spills. A tractor and/or loader will be onsite to use in the event of any larger spills. Residue from spills on paved areas can be washed (directed to containment). Spills in grassy or earthen areas can be scraped. If scraping is required, affected area can be restored before project completion.

F. A complete list of equipment and materials required to perform the work.
1. Rebar and epoxy grout.
2. Precast concrete walkways.
3. Submersible mixers and supports.
4. Electrical boxes, conduit, and wire.
5. Miscellaneous metals (handrail and hoist supports)
6. Crane for setting precast and mixers.
7. Forklift for handling materials and equipment.
8. Concrete saw.
9. Jack hammer.
10. Drill & extension cords.
11. 3” trash pumps & hoses.
12. Hydraulic sludge pumps and hoses.
13. Sump pumps.
14. Clean fill dirt for building berms.
15. EPDM liner for dewatering area.
16. Geotubes for dewatering sludge.
17. Trucks for hauling dewatered sludge to landfill.
18. Landfill permit.
19. Safety gear for personnel.

G. Scheduling/timing of manufacturer’s field services, if applicable.
9. Mixer manufacturer shall provide start-up service once each BNR is placed back into service. The mixer will be started-up and tested with plant water. The manufacturer has advised that this will require a depth of 9’-10” above the mixer. Haren will pump treated effluent from the aerated holding basin back into the fermentation zone of the empty basin. From there it will overflow the walls to fill the entire train up to the required depth. The treated effluent will be used for the mixer start-up and field testing.