RIDEM
Rhode Island
Department of Environmental Management
Office of Air Resources
235 Promenade Street, Room 330
Providence, Rhode Island 02908

January 23, 2026

Mr. Mark De Pasquale
Managing Member
QSS Biosolids, LLC
2000 Chapel View Blvd, Suite 500
Cranston, RI 02920

Dear Mr. De Pasquale:

The Department of Environmental Management, Office of Air Resources has reviewed and approved your application for a new facility which will convert dewatered sewage sludge material through pyrolysis to high-carbon-content biochar.

Enclosed is a minor source permit issued pursuant to our review of your application (Approval Nos. 2652-2662).

Any source with the potential to emit greater than major source thresholds as defined under Operating Permits, 250-RICR-120-05-29, is subject to the Operating Permit Program. With the issuance of this permit your facility located at 135 All American Way, North Kingstown is subject to the Operating Permit Program as an Emissions Cap Source, with allowable emissions restricted to below the major source thresholds. An emissions cap means any emission limitation or physical or operational limitation, imposed in a federally enforceable document that establishes the maximum quantity of emissions which may be released from a stationary source. The Office of Air Resources considers this minor source permit an emissions cap. Operating Permit Fees, 250-RICR-120-05-28, requires stationary sources with an emissions cap to pay an annual compliance/assurance fee of $350.00. Notification concerning the payment of this fee will be mailed to you this upcoming fall.

If there are any questions concerning this permit, please contact me by telephone at 401-537-4391 or by email at ruth.gold@dem.ri.gov.

Sincerely,

Ruth Gold
Digitally signed by Ruth Gold
Date: 2026.01.23 11:51:39 -05'00'

Ruth A. Gold
Air Quality Specialist II
Office of Air Resources

cc: Quonset Development Corporation
Rick Mandile – Sage Environmental, Inc.
Lacy Reyna – Sage Environmental, Inc.
Travis Knisely – Terracon Consultants, Inc.

STATE OF RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

MINOR SOURCE PERMIT

QSS Biosolids, LLC

APPROVAL NOs. 2652-2662

Pursuant to the provisions of *Air Pollution Control Permits*, 250-RICR-120-05-9, this minor source permit is issued to:

QSS Biosolids, LLC

For the following:

Installation of an Odor Control Plant consisting of a biotrickling filter, (Approval No. 2652), a caustic scrubber (Approval No. 2653), an acid scrubber (Approval No. 2654), and a carbon adsorber (Approval No. 2655) to treat emissions generated from Sewage Sludge Processing Equipment (Approval No.2656). Installation of an Emissions Control Plant consisting of two (2) thermal oxidizers, each equipped with a 38.6 MMBtu/hr natural gas-fired start-up burner/42.2 MMBtu/hr pyrolysis gas burner (Approval Nos. 2657 & 2658) and two (2) catalytic filters (Approval Nos. 2659 & 2660) to treat emissions generated from two (2) electric pyrolysis reactors (Approval Nos. 2661 & 2662).

Located at: *135 All American Way, Plat 180, Lots 19, 20, 21, and 22*
Quonset Development Park, North Kingstown, RI 02852

This permit shall be effective from the date of its issuance and shall remain in effect until revoked by or surrendered to the Department. This permit does not relieve *QSS Biosolids, LLC* from compliance with applicable state and federal air pollution control rules and regulations. In addition, the permittee is responsible for obtaining any other federal, state or local permits and approvals that may be required to carry out the activities that are authorized by this permit. The issuance of this permit does not resolve prior instances of noncompliance, release the owner/operator from any liability, or otherwise prohibit DEM from undertaking actions deemed necessary to address previous instances of noncompliance. The permittee shall comply with all other applicable laws, regulations and ordinances. The design, construction, and operation of this equipment shall be subject to the attached permit conditions and emission limitations.

Laurie Grandchamp
Digitally signed by Laurie Grandchamp
Date: 2026.01.23 09:53:22 -05'00'

Laurie Grandchamp, P.E., Administrator
Office of Air Resources
Date of issuance: 01/23/2026

STATE OF RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

Permit Conditions and Emissions Limitations

QSS BIOSOLIDS, LLC

APPROVAL NOs. 2652-2662

I. The Following Requirements are Applicable to:

Sewage sludge process equipment:
- Two (2) reception buildings: RB-01 and RB-02
- Four (4) wet feedstock storage silos: WSS-01, WSS-02, WSS-03, and WSS-04
- Two (2) disc dryers: DD-01 and DD-02
- Two (2) dried feedstock storage silos: DSS-01 and DSS-02
- Two (2) pelletizing units: PE-01 and PE-02, and
- All associated conveyance equipment

Odor Control Plant:
- One (1) biotrickling filter: BTF-01
- Two (2) wet scrubbers (acid and caustic): WS-01 and WS-02, and
- One (1) activated carbon adsorber: CA-01

A. Emission Limitations

1. Particulate Matter

   The total quantity of particulate matter emissions discharged to the atmosphere from the Odor Control Plant shall not exceed 20 mg/m^3 (0.01 gr/dscf) or 0.273 lbs/hr whichever is more stringent.

2. Volatile Organic Compounds (VOC)

   VOC emissions generated from the process equipment specified in this section shall be reduced by 75% or greater before discharge to the atmosphere.

3. Hazardous Air Pollutants (HAP)

   HAP emissions generated from the process equipment specified in this section shall be reduced by 75% or greater before discharge to the atmosphere. HAP shall mean an air pollutant which has been listed pursuant 42 U.S.C. §§ 7412(b) (CAA § 112(b)).

4. Ammonia (NH_3) and Hydrogen sulfide (H_2S)

   a. NH_3 and H_2S emissions discharged to the atmosphere from the Odor Control Plant shall not exceed the emission limitations specified in **Table 1** of this permit.

b. NH_3 emissions generated from the process equipment specified in this section shall be reduced by 99% or greater before discharge to the atmosphere.

c. H_2S emissions generated from the process equipment specified in this section shall be reduced by 99.5% or greater before discharge to the atmosphere.

5. Opacity

There shall be no visible emissions from the Odor Control Plant exhaust. Where the presence of uncombined water is the only reason for failure to meet this requirement, such failure shall not be a violation of this requirement.

B. Operating Requirements

1. The owner/operator shall only accept and process municipal sewage sludge. For purposes of this permit, municipal sewage sludge shall be defined as sewage sludge that is obtained from a municipal wastewater treatment facility and was not obtained from an industrial wastewater pre-treatment system.

2. All emissions generated from the sewage sludge processing equipment shall be captured, contained and routed to the Odor Control Plant for treatment prior to discharge to the atmosphere. The Odor Control Plant shall consist of a biotrickling filter, a caustic wet scrubber, an acid gas wet scrubber and an activated carbon adsorber arranged in series.

3. Each Wet Feedstock Reception Building shall be a structure that consists of a roof, walls and doors, all constructed of solid building material, that is designed to contain all odors from the unloading and transporting of sewage sludge. Further, the buildings shall be capable of enclosing the sewage sludge delivery trucks completely when the delivery trucks are inside the building. In addition, each of the following conditions shall be met when constructing both Wet Feedstock Reception Buildings:

a. Each Reception Building shall be equipped with a ventilation system designed to provide a negative air pressure condition to effectively remove odors from leaving the building. The ventilation system shall provide a minimum of four building air changes per hour, or one building air exchange every fifteen minutes

b. The truck access door for each Reception Building shall remain closed except when trucks are entering and leaving the building.

c. The emptying of the trucks will only occur when the truck access door of building is closed.

d. The delivery trucks will empty the sewage sludge into the reception bin. Each reception bin will have a lid which opens when the truck is ready to discharge the sewage sludge and close once the truck has finished emptying.

e. The lid of the reception bins shall remain closed between each filling.

f. Each Reception Building will be equipped with a truck cleaning zone. The exterior surfaces of each delivery truck will be cleaned prior to exiting the Reception Building to avoid any spill and odors to the environment outside of the Reception Building.

g. The airflow through each Reception Building shall be set sufficiently to create a negative pressure at all times, including when the access doors are opened. The airflow shall be directed away from the access doors of each building and shall discharge to the Odor Control Plant.

4. The maximum combined throughput of sewage sludge material accepted and processed through the two Reception Buildings shall not exceed 208,575 tons/yr (189,216,320 kg/yr) at 75% moisture content (MC) in any consecutive 12-month period.

5. The maximum throughput of sewage sludge material processed through each disc dryer shall not exceed 23,810 lbs/hr (10,800 kg/hr) at 75% MC.

6. The maximum throughput of dried feedstock processed through each pelletizer shall not exceed 6,614 lbs/hr (3,000 kg/hr) at 10% MC.

7. The disc dryers shall be equipped with a closed-loop thermal oil system that is externally heated via heat exchangers associated with the combustion downstream of the thermal oxidizer units that treat the pyrolysis gas. No combustion gas shall be utilized to directly dry the sewage sludge feedstock material in either disc dryer.

8. Each disc dryer shall be equipped with an integral cyclone and three-stage scrubber unit that is inherent to the disc dryer's design for exhaust conditioning to meet the requirements of the odor control system. This equipment shall not be bypassed to prevent failure of the odor control system.

9. In the event that a disc dryer is not operational, materials received must be adjusted so as not to exceed plant storage capacity.

10. Each dried feedstock storage silo shall be equipped with a top-mounted filter that is inherent to the storage silo's design for exhaust conditioning to meet the requirements of the odor control system. This filter shall not be bypassed to prevent failure of the odor control system.

11. Each pelletizer unit shall be equipped with an in-line filter that is inherent to the pelletizer's design for exhaust conditioning to meet the requirements of the odor control system. This filter shall not be bypassed to prevent failure of the odor control system.

12. The pelletizers may be bypassed in the event of a maintenance activity. In such an event, maintenance of downstream equipment shall be adjusted accordingly to prevent equipment malfunctions.

13. The activated carbon adsorption system shall consist of two carbon adsorption vessels arranged in series.

14. The primary canister of the activated carbon adsorber shall be monitored for breakthrough and replaced if breakthrough is detected. For purposes of this permit, breakthrough shall be defined when the H_2S concentration of the gases exiting the primary carbon vessel exceeds 0.5% of the inlet H_2S concentration and a concentration greater than 0.05 ppmv at the outlet. The primary vessel shall be removed from service when breakthrough occurs. The owner/operator shall replace the primary vessel with the secondary vessel and replace the secondary vessel with a new carbon adsorber vessel containing fresh activated carbon.

15. The activated carbon or the entire carbon adsorber unit shall be replaced at a minimum every third year. The owner/operator shall maintain an active contract or account with a vendor, to supply or replace the activated carbon or the complete activated carbon vessel at all times.

16. Operation of the scrubber liquid recirculation pumps is required for the odor control plant to be in operation.

17. There shall be no bypassing of the Odor Control Plant during times when air pollutants are being discharged from the sewage sludge processing equipment.

18. As an exception to Condition I.B.17, bypassing to perform periodic maintenance of the Odor Control Plant shall be allowed in accordance with the following conditions:

    a. Periodic maintenance should be scheduled in the period of the annual shut-down of the plant. Before the annual shut-down all Wet Feedstock should be processed before the shut-down, leaving the Wet Feedstock Reception Bin and the Wet Feedstock Silos empty.

    b. Periodic maintenance shall be performed on the biotrickling filter and/or the two wet scrubbers while the carbon adsorber remains in operation.

    c. Periodic maintenance shall be performed on the carbon adsorber only while the biotrickling filter and two wet scrubbers both remain in operation.

    d. At any time, all three components of the Odor Control Plant shall not be offline concurrently for periodic maintenance purposes.

    d. The total periodic maintenance bypass time for the biotrickling filter ***and*** the two wet scrubbers combined shall not exceed 24 hours in any 12-month rolling period.

    e. The total periodic maintenance bypass time for the carbon adsorber shall not exceed 24 hours based in any 12-month rolling period.

    f. Periodic maintenance is to be performed in an expeditious fashion. Off-shift labor and overtime should be utilized, to the extent practicable, to ensure that such maintenance is completed as expeditiously as practicable. All possible

steps shall be taken to minimize emissions and odors during the period of time that the maintenance will be performed.

19. The Odor Control Plant shall vent through an individual stack each not less than 54 feet above ground level with a 28-inch inner diameter and shall not be equipped with rain caps. The aforementioned parameters were utilized in the air quality dispersion modeling submitted with the permit application to determine the increase in the ground level ambient concentrations. Any deviation from these parameters would require the owner/operator to notify the Office of Air Resources.

C. Monitoring Requirements

1. The following parameters for the Odor Control Plant shall be monitored continuously and checked a minimum of once per day and the date, time, and measurement shall be recorded.

   a. The pressure drop across the biotrickling filter,

   b. The liquid flow rate in the biotrickling filter,

   c. The pH of the scrubbing liquid in each wet scrubber,

   d. The scrubbing liquid flow rate in each wet scrubber, and

   e. The pressure drop across each wet scrubber.

2. The owner/operator shall install, maintain and monitor a mass-flow monitoring system to measure the mass quantity of feedstock entering each dryer and each pelletizer. The quantity of feedstock entering each dryer and each pelletizer shall be monitored and recorded.

3. Test ports shall be provided to allow for the sampling of the inlet and outlet gases of the carbon adsorber system.

4. The concentration of H_2S at the outlet of the primary vessel of the carbon adsorber shall be measured a minimum of once per month. The date, time, and measurement shall be recorded. If the measured outlet concentration of H_2S exceeds 0.05 ppmv, the inlet H_2S concentration shall also be measured, and the breakthrough evaluation shall also be recorded.

5. The owner/operator shall, on a daily basis, measure and record pressure upstream of the Odor Control Plant. The upstream pressure shall be controlled by the downstream fan. The speed of the fan and upstream pressure shall be monitored and recorded in the supervisory control and data acquisition (SCADA) system.

6. The owner/operator shall monitor the hours of operation of each dryer and each pelletizer.

7. The scrubbing liquid recirculation pumps operation shall be monitored and recorded in the SCADA system.

D. Recordkeeping and Reporting

1. The owner/operator shall collect, record, and maintain the following records on a daily basis and provide such records to the Office of Air Resources upon request:

    a. The quantity of sewage sludge received for each delivery, the moisture content, the date and time the sludge was received, and the source of the sludge.

    b. The quantity of sewage sludge processed through the disc dryers and the pelletizers for each hour of operation.

    c. The liquid flow rate and the pressure drop across the biotrickling filter.

    d. For each wet scrubber, the liquid flow rate, the pH of the scrubbing liquid, and the pressure drop.

2. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine the total quantity of Ammonia (NH_3) and Hydrogen Sulfide (H_2S) discharged to the atmosphere from the Odor Control Plant. Hourly, daily and annual emissions shall be calculated. Hourly emission rates are ***not*** to be calculated as averages, i.e., averaging with periods of no operation is not allowed. Daily emission totals shall be calculated. Annual emissions rates shall be determined for a consecutive 12-month period. These emission rates shall be used for comparison to emission limitations in **Table 1** of this permit. The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

3. The owner/operator shall notify the Office of Air Resources within 15 days of the determination, whenever the total quantity of NH_3 and H_2S discharged to the atmosphere from the Odor Control Plant exceeds the respective hourly, daily or annual limitations specified in **Table 1** of this permit.

4. The owner/operator shall maintain a log of the periodic maintenance performed on the Odor Control Plant. The log shall contain the following records:

    a. The date,

    b. The time when the periodic maintenance began,

    c. The time when the periodic maintenance was complete,

    d. The total hours required for this periodic maintenance,

    e. The type of periodic maintenance performed, and

    f. The condition of the Wet Feedstock bins and the Wet Feedstock silos, specifically whether the bins or silos contained Wet Feedstock and if so, the quantity of Wet Feedstock stored during the maintenance period.

5. The owner/operator shall notify the Office of Air Resources within 48 hours of determining that the total hours of periodic maintenance activities allowed under Condition I.B.18 of this permit exceed the allowable bypass hours specified for the biotrickling filter, the two wet scrubbers, or the carbon filter.

6. The owner/operator shall collect, record, and maintain the following records on a monthly basis, no later than 15 days after the first of each month, for the month prior and provide such records to the Office of Air Resources upon request:

   a. The total quantity of sewage sludge received through the Reception Buildings.

   b. The gross throughput of sewage sludge to each disc dryer and each pelletizer.

   c. The hours of operation for each disc dryer unit for the previous month and the total hours of operation for the prior consecutive 12-month period.

   d. The hours of operation for each pelletizer unit for the previous month and the total hours of operation for the prior consecutive 12-month period.

   e. The outlet H_2S concentration of the carbon adsorber's primary vessel. The date, time, and measurement shall be recorded. If an inlet concentration was collected to evaluate breakthrough as defined in Condition I.B.14 of this permit, the inlet concentration and the breakthrough evaluation shall also be recorded.

   f. Carbon replacement activities - specifically documenting the date of carbon change, the mass of carbon changed, which vessel was changed, and the duration of shutdown during replacement.

7. The owner/operator shall notify the Office of Air Resources within 15 days of determining that:

   a. The combined throughput of sewage sludge material processed through the Reception Buildings exceeds 208,575 tons/yr (189,216,320 kg/yr) at 75% moisture content (MC) in any consecutive 12-month period.

   b. The throughput of sewage sludge material processed through each disc dryer exceeds 23,810 lbs/hr (10,800 kg/hr) at 75% MC.

   c. The throughput of dried sewage sludge material processed through each pelletizer exceeds 6,614 lbs/hr (3,000 kg/hr) at 10% MC.

   d. The H_2S concentration of the gases exiting the primary carbon canister(s) exceeds 0.05 ppmv and 0.5% of the inlet H_2S concentration.

8. The owner/operator shall notify the Office of Air Resources within 15 days of the date that the carbon was replaced. The notification shall include the date the carbon was replaced, the mass of carbon replaced, which carbon vessel was changed, and the duration of shutdown during replacement. Also, indicate whether the carbon

replacement was due to an H_2S breakthrough condition as measured and defined in Condition I.B.14 or due to a scheduled replacement.

II. The Following Requirements are Applicable to:

Process equipment:

- Two (2) Pyrolysis reactors: PY-01 and PY-02

Emissions Control Plant:

- Two (2) thermal oxidizers (38.6 MMBtu/hr natural gas/42.2 MMBtu/hr pyrolysis gas): TO-01 and TO-02
- Two (2) catalytic filter units (also containing dry sorbent injection and ammonia injection): CF-01 and CF-02

A. Emission Limitations

1. Nitrogen Oxides (as Nitrogen Dioxide (NO_2))

   a. NOx emissions discharged to the atmosphere from the Emissions Control Plant shall be reduced by 80% or greater before discharge to the atmosphere.

   b. The emission rate of NOx discharged to the atmosphere from the Emissions Control Plant shall not exceed:

      (1) 2.97 pounds per hour, and

      (2) 25,976 pounds per 12-month rolling total.

2. Carbon Monoxide (CO)

   a. Each thermal oxidizer shall reduce the concentration of CO in the exhaust gas to less than 50 ppmv.

   b. The emission rate of CO discharged to the atmosphere from the Emissions Control Plant shall not exceed:

      (1) 4.19 pounds per hour, and

      (2) 36,739 pounds per 12-month rolling total.

3. Sulfur Dioxide (SO_2)

   a. SO_2 emissions discharged to the atmosphere from the Emissions Control Plant shall be reduced by 85% or greater before discharge to the atmosphere.

b. The emission rate of SO_2 discharged to the atmosphere from the Emissions Control Plant shall not exceed:

(1) 8.41 pounds per hour, and

(2) 73,682 pounds per 12-month rolling total.

4. Particulate Matter (as PM)

a. The Emissions Control Plant shall reduce the concentration of PM in the exhaust gas to less than 0.005 gr/dscf.

b. The emission rate of PM discharged to the atmosphere from the Emissions Control Plant shall not exceed:

(1) 1.22 pounds per hour, and

(2) 10,696 pounds per 12-month rolling total.

5. Volatile Organic Compounds (VOC)

a. VOC emissions generated from the process equipment specified in this section shall be reduced by 99.9% or greater before discharge to the atmosphere.

b. The emission rate of volatile organic compounds discharged to the atmosphere from Emissions Control Plant shall not exceed 1.15 pounds per hour.

c. The emission rate of volatile organic compounds discharged to the atmosphere from the Emissions Control Plant shall not exceed 10,080 pounds in any 12-month rolling total.

6. Hydrogen Fluoride (HF) and Hydrochloric acid (HCl)

Hydrogen Fluoride (HF) and Hydrochloric acid (HCl) emissions generated from the process equipment specified in this section shall be reduced by 95% or greater before discharge to the atmosphere.

7. Listed Toxic Air Contaminants

The emissions of the listed toxic air contaminants discharged to the atmosphere from the Emissions Control Plant shall not exceed the levels specified in **Table 2** of this permit.

8. Opacity

There shall be no visible emissions from the Emissions Control Plant exhaust. Where the presence of uncombined water is the only reason for failure to meet this requirement, such failure shall not be a violation of this requirement.

B. Operating Requirements

1. All emissions generated from each pyrolysis reactor shall be captured, contained and routed to a dedicated thermal oxidizer followed by a dedicated catalytic filter for treatment prior to discharge to the atmosphere.

2. The maximum throughput of dried feedstock processed through each pyrolysis reactor shall not exceed 6,614 lbs/hr (3,000 kg/hr) at 10% MC.

3. The maximum combined throughput of dried sewage sludge material processed through the two pyrolysis reactors shall not exceed 57,937.50 tons per year at 10% MC.

4. There shall be no bypassing of the Emissions Control Plant during times when air pollutants are being discharged from the pyrolysis reactors.

5. Airlock systems on the pyrolysis infeed system and after the biochar cooling screw shall always be operational when the pyrolysis reactors are receiving sewage sludge feedstock materials.

6. Pyrolysis gas and natural gas shall be the only fuels fired in the thermal oxidizers.

7. Each thermal oxidizer shall be operated at all times when pyrolysis gas is being sent to it.

8. The minimum operating temperature of the combustion chamber of each thermal oxidizer shall be maintained at or above 1,832°F when receiving pyrolysis gas from the pyrolysis process. This minimum temperature may be revised based on the results of emission testing.

9. Pyrolysis gas shall not be vented to the thermal oxidizers if the combustion chamber's operating temperature is less than 1,832°F.

10. Each thermal oxidizer shall be equipped with an interlock system that ensures the operating temperature of the combustion chamber is at or above 1,832°F before pyrolysis gas is discharged to the device.

11. The minimum residence time of pyrolysis gas in each thermal oxidizer shall be 2.0 seconds.

12. The owner/operator shall shut down the pyrolysis reactor in the event of a malfunction of the dedicated thermal oxidizer that results in or that could result in emissions in excess of the permit limits. The pyrolysis unit shall remain shut down until the malfunction has been identified and corrected.

13. The dry sorbent injection, ammonia injection, and catalytic filter systems shall be operated at all times that pyrolysis systems (including the thermal oxidizers) are operating.

14. The dry sorbent material shall be injected into the upstream piping of the catalytic filter system.

15. The pressure drop across each catalytic filter shall not exceed the manufacturer specifications. The specific operating pressure range is to be established during the detailed design phase.

16. Each thermal oxidizer shall be equipped with a failure monitoring system and safety programable logic controller (PLC). During normal shutdown, the unit shall be designed to ensure combustion of the pyrolysis gas is treated by the air pollution control equipment completely, before being discharged to the atmosphere.

17. Both catalytic filters shall vent to a single combined stack not less than 120 feet above ground level with a 25.6-inch inner diameter and shall not be equipped with rain caps. The aforementioned parameters were utilized in the air quality dispersion modeling submitted with the permit application to determine the increase in the ground level ambient concentrations. Any deviation from these parameters would require the owner/operator to notify the Office of Air Resources.

C. Monitoring Requirements

1. The owner/operator shall install, operate and maintain a thermocouple to continuously monitor and record the operating temperature in the combustion chamber of each thermal oxidizer.

    a. The equipment to continuously monitor the operating temperature of the thermal oxidizer must be calibrated and maintained according to the manufacturer's specifications. The device must be capable of monitoring temperature with an accuracy of ±1 percent of the temperature being monitored in °C or ±1°C, whichever is greater.

    b. The calibration of the thermocouple must be verified once per year.

2. The owner/operator shall install, operate and maintain the following:

    a. Equipment to continuously measure the feedstock flow rate to each pyrolysis reactor,

    b. Equipment to continuously measure the biochar yield from each pyrolysis reactor,

    c. Equipment to continuously measure and record the natural gas flow to each thermal oxidizer,

    d. A flue gas oxygen concentration controller for each thermal oxidizer,

    e. A thermocouple to continuously measure inlet temperature to the injection/catalytic filter system,

    f. Equipment to continuously monitor overall dry sorbent consumption,

g. Equipment to continuously monitor overall ammonia consumption,

h. A differential pressure transmitter to continuously monitor pressure drop across the catalytic filter, and

i. An alarm system on each dry sorbent injector and ammonia injector unit in such a manner that an operator will be alerted if the dry sorbent or ammonia flow is outside the manufacturer's design range.

3. Pyrolysis gas flow rate shall be calculated based on feedstock flow rate and biochar yield for each thermal oxidizer.

D. Recordkeeping and Reporting

1. Prior to the initial startup of each thermal oxidizer, the owner/operator shall submit to the Office of Air Resources a manufacturer's guarantee demonstrating that the oxidizers are capable of achieving a VOC destruction efficiency of 99.9%.

2. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine the total quantity of NOx, CO, SO_2, PM, VOCs, and HAPs discharged to the atmosphere from the Emissions Control Plant. These emission rates shall be used for comparison to emission limitations specified in Conditions II.A.1- 6 of this permit. Hourly, daily and annual emissions shall be calculated as applicable. Hourly emission rates are *not* to be calculated as averages, i.e., averaging with periods of no operation is not allowed. Daily emission totals shall be calculated. Annual emissions rates shall be determined for a consecutive 12-month rolling period. The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

3. The owner/operator shall notify the Office of Air Resources within 15 days of the determination, whenever the total quantity of NOx, CO, SO_2, PM, VOCs, and/or HAPs discharged to the atmosphere from the Emissions Control Plant exceeds the emission limitations specified in Conditions II.A.1- 6 of this permit.

4. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine the total quantity pollutants as specified in **Table 2** of this permit discharged to the atmosphere from the Emissions Control Plant during the previous month. Hourly, daily and annual emissions shall be calculated as applicable. Hourly emission rates are *not* to be calculated as averages, i.e., averaging with periods of no operation is not allowed. Daily emission totals shall be calculated. Annual emissions rates shall be determined for a consecutive 12-month rolling period. These emission rates shall be used for comparison to emission limitations in Table 2 of this permit. The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

5. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of pollutants discharged to the atmosphere from Emissions Control Plant exceeds the applicable hourly, daily or annual emission limitations specified in **Table 2** of this permit.

6. The owner/operator shall collect, record, and maintain the following records on a monthly basis, no later than 15 days after the first of each month, and provide such records to the Office of Air Resources upon request:

    a. The hours of operation for each pyrolysis unit for the previous month and the total hours of operation for the prior consecutive 12-month period.

    b. The operating temperature of each thermal oxidizer's combustion chamber.

    c. Natural gas usage in each thermal oxidizer unit during the month.

    d. The calculated pyrolysis gas flowrate and total pyrolysis gas combusted in each thermal oxidizer during the month.

    e. Pressure drop across the catalytic filter unit.

    f. An operating log for each pyrolysis reactor, including the date(s) and time(s) each reactor is in operation.

    g. The total dried sewage sludge feedstock processed by each pyrolysis reactor.

    h. The flow rate on the dry sorbent supply line.

    i. The flow rate on the ammonia supply line.

    j. The biochar yield from each pyrolysis reactor.

7. The owner/operator shall notify the Office of Air Resources within 15 days of determining the quantity of sewage sludge processed through each pyrolysis reactor exceeds 6,614 lbs/hr (3,000 kg/hr) at 10% MC.

8. The owner/operator shall notify the Office of Air Resources within 15 days of determining the total combined quantity of sewage sludge processed through the pyrolysis reactors exceeds 57,937.5 tons/yr at 10% MC on a 12-month rolling period.

9. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the dry sorbent or ammonia solution injection rate was outside of the range recommended by the manufacturer. The date, time, duration of exceedance, and the measured injection rate shall be provided.

10. The owner/operator shall notify the Office of Air Resources within 15 days of the date that the tubes within each catalyst filter are replaced.

III. The Following Requirements are Applicable to Operations on a Facility-Wide Basis:

A. Emission Limitations

1. Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOC)

   a. The total quantity of NOx or VOC emissions discharged to the atmosphere from all operations conducted at the entire facility shall not exceed 8,167 pounds per pollutant per calendar month based upon a 12-month rolling average.

   b. The total quantity of NOx or VOC emissions discharged to the atmosphere from all operations conducted at the entire facility shall not exceed 98,000 pounds per pollutant per year based upon a 12-month rolling total.

2. Carbon Monoxide (CO), Sulfur Dioxide (SO_2), and Particulate Matter (PM)

   a. The total quantity of CO, SO_2, or PM emissions discharged to the atmosphere from all operations conducted at the entire facility shall not exceed 16,500 pounds per pollutant per calendar month based upon a 12-month rolling average.

   b. The total quantity of CO, SO_2, or PM emissions discharged to the atmosphere from all operations conducted at the entire facility shall not exceed 198,000 pounds per pollutant per year based upon a 12-month rolling total.

3. Hazardous Air Pollutants (HAPs)

   a. The total quantity of HAP emissions discharged to the atmosphere from the entire facility shall not exceed 1,500 pounds of any one (1) HAP or 4,000 pounds of any combination of HAPs per calendar month based upon a 12-month rolling average.

   b. The total quantity of HAP emissions discharged to the atmosphere from the entire facility shall not exceed 18,000 pounds of any one (1) HAP or 48,000 pounds of any combination of HAPs per year based upon a 12-month rolling total.

4. Listed Toxic Air Contaminants

   The total quantity of emissions discharged to the atmosphere from the entire facility, of any listed toxic air contaminant, with the exception of those listed in Table 1 and Table 2 of this permit shall not exceed the minimum quantity for that contaminant as specified in 250-RICR-120-05-9.17, Appendix A, based upon a 12-month rolling total. Emissions from activities exempted from the provisions of *Air Toxics,* 250-RICR-120-05-22.5(B) are not included in this limitation.

5. Odors

Any air contaminant or combination of air contaminants discharged to the atmosphere from the entire facility shall not create an objectionable odor beyond the property line of this facility. Odor evaluations shall be conducted according to the provisions of *Odors* 250-RICR-120-05-17.

6. The emission limitations of this permit shall apply at all times.

B. Operating Requirements

1. The owner/operator shall operate and maintain all process and air pollution control equipment under this permit according to the manufacturer's design specifications and operating procedures.

2. The owner/operator shall ensure that the installation, operation, and maintenance of the conveyance equipment used to transport sewage sludge material in the facility are properly designed, constructed, and maintained to prevent odors.

3. The owner/operator shall ensure that the installation, operation, and maintenance of the ductwork, pipes, connections, conduits, vessels, etc., that are used to convey emissions are properly designed, constructed, and maintained to prevent leaks.

4. The owner/operator shall, on a monthly basis, conduct visual inspections of RB-01, RB-02, WSS-01, WSS-02, WSS-03, WSS-04, DD-01, DD-02, DSS-01, DSS-02, PE-01, PE-02, BFT-01, WS-01, WS-02, CA-01, PY-01, PY-02, TO-01, TO-02, CF-01, CF-02 and all associated conveyance equipment to evaluate these systems for leaks. If leaks or abnormal conditions are detected, action to correct the abnormal conditions shall be implemented before any system is put back into service.

5. The owner/operator shall develop, maintain, and follow a preventative maintenance procedure (e.g., periodic inspections and filter changes) for RB-01, RB-02, WSS-01, WSS-02, WSS-03, WSS-04, DD-01, DD-02, DSS-01, DSS-02, PE-01, PE-02, BFT-01, WS-01, WS-02, CA-01, PY-01, PY-02, TO-01, TO-02, CF-01, and CF-02 in accordance with manufacturer's instructions.

C. Monitoring Requirements

1. All monitoring equipment used for measuring the operational parameters required by this permit shall be calibrated and maintained in accordance with the manufacturer's recommendations.

D. Compliance Demonstration/Stack Testing

1. Compliance with the emission limitations specified in Conditions I.A.1, I.A.2, I.A.4 (b) & (c), and Table 1 from the Odor Control Plant and II.A.1.b.1, II.A.2.a, II.A.2.b.1, II.A.3.b.1, II.A.4.a, II.A.4.b.1, II.A.5.b, and Table 2 from the Emissions Control Plant shall be demonstrated by stack testing within 60 days of reaching maximum production or capacity of each Control Plant, not to exceed 180 days from the start-up of each Control Plant.

In addition, to substantiate the projected emission rates found in the minor source permit application and for recordkeeping and reporting purposes, emissions testing shall also be conducted for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from the Emissions Control Plant.

Thereafter, performance testing shall be conducted every 10 years to demonstrate compliance with the PM limitations specified in I.A.1, the NH_3 control efficiency specified in I.A.4.b, the H_2S control efficiency specified in I.A.4.c, and the VOC emission limitation specified in Condition II.A.5.b of this permit.

2. A stack testing protocol shall be submitted to the Office of Air Resources at least 60 days prior to the performance of any stack tests. The owner/operator shall provide the Office of Air Resources at least 60 days prior notice of any performance test.

3. All test procedures used for stack testing shall be approved by the Office of Air Resources prior to the performance of any stack tests.

4. The owner/operator shall install any and all test ports or platforms necessary to conduct the required stack testing, provide safe access to any platforms and provide the necessary utilities for sampling and testing equipment.

5. All testing shall be conducted under operating conditions deemed acceptable and representative for the purpose of assessing compliance with the applicable emission limitations. The test shall be run at full operating conditions and flow rates.

6. All stack testing shall be observed by a representative of the Office of Air Resources or its authorized representatives to be considered acceptable unless the Office of Air Resources provides prior authorization to the owner/operator to conduct the testing without an observer present.

7. A final report of the results of stack testing shall be submitted to the Office of Air Resources no later than 60 days following completion of testing.

E. Recordkeeping and Reporting

1. Prior to installation of any equipment permitted under this approval, the owner/operator shall submit to the Office of Air Resources the name of the manufacturer/vendor, model number and specifications of the selected equipment and indicate if any of the specifications of the selected equipment is different from the proposed equipment in the permit application. If any of the specifications are different and could have an effect on the emission rates or the modeling analysis, a revision to the permit conditions and emission limitations of this permit may be necessary. The owner/operator shall not install any equipment permitted under this approval until the selected equipment has been reviewed and approved by the Office of Air Resources.

2. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine the total quantity of NOx, CO, SO_2, PM, VOCs, and HAPs, discharged to the atmosphere from all operations at the entire facility. Monthly rolling averages shall be calculated. Annual emission rates shall be determined for

a consecutive 12-month rolling period. The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

3. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of NO_x or VOCs discharged to the atmosphere from all operations at this facility exceeds 8,167 pounds per pollutant per calendar month based upon a 12-month rolling average or 98,000 pounds per pollutant per year based upon a 12-month rolling total.

4. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of CO, PM, or SO_2 discharged to the atmosphere from all operations at this facility exceeds 16,500 pounds per pollutant per calendar month based upon a 12-month rolling average or 198,000 pounds per pollutant per year based upon a 12-month rolling total.

5. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of individual HAPs discharged to the atmosphere from all operations at this facility exceeds 1,500 pounds or 4,000 pounds of any combination of HAPs per calendar month based upon a 12-month rolling average or 18,000 pounds of any one (1) HAP or 48,000 pounds of any combination of HAPs per year based upon a 12-month rolling total.

6. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine the total quantity of each Listed Toxic Air Contaminant found in Appendix A of 250-RICR-120-05-9.17 discharged to the atmosphere from all operations at the entire facility based upon a 12-month rolling total excluding those listed in **Table 1** and **Table 2** of this permit. The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

7. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of emissions discharged to the atmosphere from the entire facility of any Listed Toxic Air Contaminant, excluding those listed in **Table 1** and **Table 2** of this permit, exceeds the minimum quantity for that contaminant as specified in 250-RICR-120-05-9.17, Appendix A. In accordance 250-RICR-120-05-22, this notification shall be included in the annual air pollution inventory.

8. The owner/operator shall, on a monthly basis, no later than 15 days after the first of the month, determine total quantity of CO_2 equivalent emissions (CO_2e) discharged to the atmosphere from all operations at the entire facility based upon a 12-month rolling total. CO_{2e} is defined in *Operating Permits*, 250-RICR-120-05-29.5.A.28. For purposes of this permit, CO_{2e} emissions shall include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The owner/operator shall keep records of this determination and provide such records to the Office of Air Resources upon request.

9. The owner/operator shall notify the Office of Air Resources within 15 days of determining that the total quantity of CO_{2e} equivalent emissions discharged to the

atmosphere from the entire facility exceeds 100 tpy CO_{2e} (see 250-RICR-120-05-29.5.A.28 and 250-RICR-120-05-29.5.A.15.c).

10. The owner/operator shall notify the Office of Air Resources of the date of actual initial start-up of each device permitted under this approval no later than fifteen days after such date.

11. The owner/operator shall collect, record, and maintain the following records on a monthly basis, no later than 15 days after the first of each month, and provide such records to the Office of Air Resources upon request:

    a. Inspection logs of the inspections conducted for RB-01, RB-02, WSS-01, WSS-02, WSS-03, WSS-04, DD-01, DD-02, DSS-01, DSS-02, PE-01, PE-02, BFT-01, WS-01, WS-02, CA-01, PY-01, PY-02, TO-01, TO-02, CF-01, CF-02, and all associated conveyance equipment. The date, name of unit inspected, and results of the inspection shall be recorded in the log.

    b. A maintenance log for RB-01, RB-02, WSS-01, WSS-02, WSS-03, WSS-04, DD-01, DD-02, DSS-01, DSS-02, PE-01, PE-02, BFT-01, WS-01, WS-02, CA-01, PY-01, PY-02, TO-01, TO-02, CF-01, CF-02, all associated conveyance equipment, and all monitoring equipment detailing all routine and non-routine maintenance. The log shall include the date, identity of the unit undergoing maintenance, type of maintenance, and duration of any outages.

    c. Records of all calibration checks performed on the monitoring equipment required by this permit. The date of calibration and description of monitoring device shall be recorded.

12. The owner/operator shall notify the Office of Air Resources within 15 days of identifying a leak or abnormal condition within BFT-01, WS-01, WS-02, CA-01, TO-01, TO-02, CF-01, and CF-02. The date, time, and corrective and potential preventative actions taken shall be provided.

13. The owner/operator shall maintain appropriate records of the emission factors or calculation procedures, as determined by QSS BioSolids, LLC for each pollutant emitted from the facility sufficient to determine compliance with the emissions limitations found in this permit.

14. Any breakdown or malfunction of any air pollution control system resulting in the discharge of uncontrolled emissions shall be reported to the Office of Air Resources within 24 hours after the occurrence. A report of any breakdown or malfunction shall be submitted within five (5) days of the breakdown or malfunction. The following information shall be provided in each report:

    a. The date the breakdown or malfunction occurred,

    b. The suspected reason for the malfunction,

    c. The corrective action taken,

d. The time needed to make repairs,

e. Preventative measures taken or planned, if needed, and

f. The name and amount of pollutants emitted to the atmosphere uncontrolled.

A copy of each report shall be kept at the facility.

15. The owner/operator shall notify the Office of Air Resources of any anticipated noncompliance with the terms of this permit or any other applicable air pollution control rules and regulations.

16. The owner/operator shall notify the Office of Air Resources of any planned physical or operational change to any equipment that would:

a. Change the representation of the facility in the application.

b. Alter the applicability of any state or federal air pollution rules or regulations.

c. Result in the violation of any terms or conditions of this permit.

d. Qualify as a modification under 250-RICR-120-05-9.

Such notification shall include:

- Information describing the nature of the change.
- Information describing the effect of the change on the emission of any air contaminant.
- The scheduled completion date of the planned change.

Any such change shall be consistent with the appropriate regulation and have the prior approval of the Director.

17. The owner/operator shall notify the Office of Air Resources of any noncompliance with the terms of this permit within 30 calendar days of becoming aware of such occurrence and supply the Director with the following information:

a. The name and location of the facility.

b. The subject source(s) that caused the noncompliance with the permit term.

c. The time and date of first observation of the incident of noncompliance.

d. The cause and expected duration of the incident of noncompliance.

e. The estimated rate of emissions (expressed in lbs/hr or lbs/day) during the incident and the operating data and calculations used in estimating the emission rate.

f. The proposed corrective and preventative actions and schedule to correct the conditions causing the incidence of noncompliance.

18. The owner/operator shall maintain properly signed, contemporaneous operating logs or other relevant evidence to document actions during startup/shutdown periods.

19. All records required in this permit shall be maintained for a minimum of five years after the date of each record and shall be made available to representatives of the Office of Air Resources or its authorized representative and the USEPA upon request. All records required by this permit shall be maintained onsite or be accessible onsite electronically.

20. The owner/operator shall submit all notifications and reports as required by this permit to the following emails: DEM.AirCompliance@dem.ri.gov and DEM.AirPermits@dem.ri.gov.

F. Other Permit Conditions

1. To the extent consistent with the requirements of this permit and applicable federal and state laws, the equipment shall be designed, constructed, and operated in accordance with the representation of the equipment in the permit application. The owner/operator shall maintain the permit application and all materials supporting the permit application for the duration of time the equipment covered by this permit are installed at this site.

2. Employees of the Office of Air Resources and its authorized representatives shall be allowed to enter the facility at all times for the purpose of inspecting any air pollution source, investigating any condition it believes may be causing air pollution or examining any records required to be maintained by the Office of Air Resources.

3. At all times, including periods of startup, shutdown and malfunction, the owner/operator shall, to the extent practicable, maintain and operate the facility in a manner consistent with good air pollution control practice for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this permit have been achieved. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Office of Air Resources which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures and inspection of the source.

4. The emission and dispersion characteristics of all sources of the pollutants listed in **Table 1** and **Table 2** of this permit at the facility shall be consistent with the parameters used in the air quality modeling to demonstrate that the emissions of air toxics do not cause an impact, at or beyond the property line of the facility, which exceeds the Acceptable Ambient Level for the air toxics. The Office of Air Resources, in its sole discretion, may reopen this minor source permit if it determines that the emission and dispersion characteristics have changed significantly and that

emission limitations must be revised and/or added to this permit to ensure compliance with 250-RICR-120-05-22.

5. If the construction, installation, or modification of the equipment for which this permit has been issued has not commenced within 12 months from the date of issuance of this permit or has been interrupted or suspended for 12 months, this permit shall become void unless the owner/operator applies for an extension of the time limit not to exceed 6 months. Furthermore, the owner/operator shall submit a notification to the Office of Air Resources, if it is decided not to pursue the construction, installation, or modification of the equipment allowed by this permit. Extension request and/or notification shall be submitted to the Office of Air Resources.

6. The owner/operator may not transfer this permit without prior notification to the Office of Air Resources.

7. The Office of Air Resources may reopen and revise this permit if it determines that:

   a. a material mistake was made in establishing the operating restrictions; or,

   b. inaccurate emission factors were used in establishing the operating restrictions; or,

   c. emission factors have changed as a result of stack testing or emissions monitoring; or,

   d. revisions that are necessary due to additional applicable requirements pursuant to state or federal law or from any regulatory agency.

G. Malfunctions

1. A malfunction of any air pollution control system that would result in the exceedance of any emission limitation applicable to this facility will necessitate the shutdown of the process discharging to the associated air pollution control equipment. The process must remain shut down until the malfunction has been identified and corrected.

TABLE 1 – ODOR CONTROL PLANT			
Pollutant	**Allowable Emissions**		
	lbs/hour	**lbs/day**	**lbs/year**
Ammonia (NH_3)	2.83	67.94	24,799
Hydrogen sulfide (H_2S)	6.04E-03	0.145	52.92

TABLE 2 – EMISSIONS CONTROL PLANT			
Pollutant	**Allowable Emissions**		
	lbs/hour	**lbs/day**	**lbs/year**
Acetaldehyde	---	---	126.86
Acetamide	---	---	2019.90
Ammonia (NH_3)	0.593	14.24	5195.95
Aniline	---	0.630	230.04
Antimony & compounds, including antimony trioxide	---	0.030	---
Arsenic & compounds (inorganic)	1.18E-04	---	1.04
Benzene	0.022	0.534	194.87
Boron & borates	4.85E-04	---	---
Cadmium & compounds	---	3.90E-03	1.43
Cobalt & compounds	---	---	0.429
Copper & compounds, except copper cyanide	6.48E-03	---	56.78
Fluorides & compounds, including Hydrogen Fluoride	0.274	6.57	---
Formaldehyde	5.68E-03	0.136	49.76
Hydrochloric acid (hydrogen chloride) (HCl)	0.196	---	1,717.14
Hydrogen cyanide (HN)	0.229	---	2005.58
Hydrogen sulfide (H_2S)	5.09E-03	0.122	44.63
Lead & compounds (inorganic)	---	---	10.42
Manganese & compounds	---	0.151	55.20
Mercury & compounds (elemental & inorganic)	9.52E-03	0.229	83.43
Naphthalene	---	0.453	165.19
Nickel & compounds, except nickel subsulfide	8.09E-04	0.019	7.09
PCDDs, PCDFs, PCBs*	---	---	3.80E-06
Phenol	0.026	---	225.30
Quinoline	---	---	20.38
Vanadium & compounds	3.00E-04	---	---

Notes:
* Polychlorinated dibenzo dioxins (PCDDs), polychlorinated dibenzo furans (PCDFs), and dioxin- like polychlorinated biphenyls (PCBs). In terms of 2,3,7,8-tetrachlorobenzodioxin equivalents.

--- No Acceptable Ambient Air Level has been established for that time period.