

Composting Design Narrative

The following information is required for the Arkansas Department of Environmental Quality (ADEQ) Solid Waste Processing Facility permit application for the City of Hot Springs composting facility. This design narrative was prepared in accordance with the requirements of the ADEQ Solid Waste Management Division Regulation 22.806(b).

1. Project Location

The composting site is located in the SW1/4 of the SW1/4 of Section 23, Township 3 South, Range 19 West, Garland County, Arkansas. The facility is southeast of the City of Hot Springs approximately ½ mile from the city limits at 318 Davidson Drive.

2. History of Composting Operations

For the purpose of disposing of sludge at the City's wastewater treatment plant (WWTP), Hot Springs Utilities (HSU) operates a facility to compost biosolids produced from plant together with used straw bedding from Oaklawn Park, the local horse racing track, and wood chips produced from tree trimmings disposed on-site. Hot Springs is a city of 35,750 located in central Arkansas. HSU has been composting these materials using the conventional windrow method since 1994. Composting of sewage sludge and distribution of the composted produce has been determined to be the most cost-effective method of sludge disposal considering capital and operating costs, avoided costs of wood waste disposal by other city departments, product acceptance and service to the community.

To provide better capability for controlling odors that occur in initial turnings of composting windrows, and to allow composting to continue unhindered during cold and wet weather conditions, the City of Hot Springs has converted to the aerated static pile method of composting. A schematic of the new composting process for Hot Springs is provided on Figure 1.

3. New Aerated Static Pile Composting Facility

A layout of the composting facility as modified to incorporate aerated static piles is shown on Figure 2. The aerated static pile method of composting involves using a forced aeration system to maintain aerobic conditions in the composting piles in lieu of mechanical turning. After the piles are initially constructed, the forced air system is operated in a negative mode such that air is drawn into the piles and then routed to odor treatment, in this case, a biofilter. After composting of the raw materials has proceeded for several days, the airflow can be reversed to push air through the composting piles without causing odor problems. This method allows better control of the composting process. Active aeration is continued for at least 3 days, after which the compost is moved to a curing pile. Here it is kept for at least 6 weeks to allow the composting process to continue until it naturally ceases. A schematic of the aerated static pile composting method is shown on Figure 3.

4. Description of Compost Site

The existing compost site contains a 3.7-acre asphalt paved pad and storage shed for equipment. Area is provided for storage of incoming biosolids and straw amendment, and for storage of finished compost. The principal feature of the new aerated static pile system is a 150' x 175' roof structure. All active composting will take place underneath the roof structure. The aeration system consists of 8 blowers that supply perforated pipe underneath the compost piles. Equipment is also provided for mixing feedstocks, baling hay from the racetrack for storage, and screening the finished compost. The odor treatment biofilter incorporates a humidifier, booster fan, air distribution system, and wood chip/compost odor treatment media.

Drainage from the paved pad is directed by perimeter berms to a sump, where collected flow drains by gravity into the WWTP influent sewer pipe. Straw bedding from the racetrack is baled and stored on the paved pad; a covered hay storage shed will be constructed in the future for this material. Tree trimmings deposited by the public are stored in large piles on or adjacent to the paved pad. Approximately once per year, a contractor is retained to grind accumulated wood waste into wood chips. The straw bales and wood chips are incorporated into the aerated static piles without further processing, together with biosolids from the WWTP. The piles are constructed using an approximate 3:1:1 ratio of hay/wood chips/biosolids.

5. Compost Product

The straw/wood chip/biosolids compost produced by the HSU is an excellent product that is in high demand by local landscape contractors, garden centers, and the general public. A trammel screen is used to separate the wood chips from the finished product, which is attractive, fine-grained, uniform compost. HSU charges a fee of \$6.00 - \$15.00/cy for the compost products, except for local residents the first 3 cy require only payment of a loading fee. Currently, demand for the compost products greatly exceeds compost supply.

6. Description of Feedstocks

A description of the various feedstocks used by the composting facility is described below.

Biosolids

Existing sludge production from the WWTP is 2.8 tons/day on a dry weight basis (DT/day). After digestion and stabilization in the plant, the material is referred to as biosolids. The 2.8 DT/day of biosolids are consistently dewatered to 20% total solids by weight, yielding 14 tons/day on a wet weight basis. After dewatering, the biosolids are trucked to the compost pad and deposited in a designated staging area, ready to be incorporated into aerated static piles. The staging area has room to contain several weeks' supply of biosolids.

Straw Bedding

Used straw bedding from the horseracing track is delivered to the compost site on a daily basis from early December through mid-May. The racing season lasts from mid-February to the end of April, when as many as 1,200 horses are stabled at the track. Used bedding is placed into “hay boxes” located around the stables. Daily delivery rates to the composting site peak at 16 dump truck loads containing 14 cy of straw each.

Wood Chips

HSU allows citizens and City Departments to deposit tree trimmings on-site throughout the year. Periodically a contractor is hired to furnish a grinder and reduce the accumulated wood waste piles into wood chips. The wood chips are stored in piles until they are needed in the composting operation.

7. Materials Balance

The compost facility will generate an estimated 17,500 cy of finished compost per year at full design capacity. Current production is less than this, and is estimated at 35 cy/day or about 12,800 cy/year. A materials balance on the composting process is provided in Table 1 below.

Table 1
Hot Springs Composting Facility
Aerated Static Pile Compost Characteristics¹

<i>Operational Parameters</i>	<i>Units</i>	<i>Average</i>
Biosolids production, dry weight tons/day	DT/day	3.5
Biosolids, dry weight fraction	%	20%
Biosolids density, wet weight	lb/cy	1,490
Straw density, wet weight	lb/cy	423
Straw moisture	%	35%
Wood chip density, wet weight	lb/cy	360
Wood chip moisture	%	35%
Volume reduction during composting	%	55%
Design straw/biosolids mix ratio by volume		2.5
Design wood/biosolids mix ratio by volume		1.0
<i>Compost Production</i>	<i>Units</i>	<i>Average</i>
Wet weight of biosolids	tons	17.5
Volume of biosolids	cy	23.5
Volume of straw	cy	58.7
Weight of straw	tons	12.4

Volume of wood chips	cy	23.5
Weight of wood chips	tons	4.2
Total daily mix volume	cy	105.7
Total daily mix weight	tons	34.1
Bulk density of mix	lb/cy	1,436
Estimated daily compost production	cy/day	48

¹ Biosolids, straw and wood chips static mix.

8. Stormwater and Leachate Control

The existing composting facility is surrounded on two sides by an earthen berm, which prevents any run-on from entering the site. Storm flow run-off is collected in a stormwater inlet and routed to the plant via the main influent wastewater sewer. All collected stormwater flow is pumped into the plant for treatment.

The compost pad is constructed of asphalt paving to provide an impervious material for leachate control. The asphalt paving underlies all receiving, processing, and compost storage areas. The presence of the impervious cover prevents any leachate from appearing beneath the site. Any leachate emanating from the receiving, processing, or storage areas will flow over the surface of the impervious cover to the stormwater collection system. From here the collected leachate will travel to the wastewater plant for treatment.

9. Control of Nuisances

The techniques used at the Hot Springs Composting Facility to minimize noise, windblown material, odor and vector control are described below.

Noise

Generation of noise is not a major issue at the composting facility since equipment use is limited to the small 3 HP aeration blowers, a shop-sized air compressor, a 15 HP exhaust fan, front-end loader, trucks, and occasional use of a compost turning machine. This equipment does not generate appreciable noise, and operation of the equipment is generally limited to normal working hours Monday through Friday. For a couple of weeks during the year, a portable grinder is brought on-site and operated by a private contractor. The grinder is used to reduce accumulated tree trimmings and produce wood chips. This machine is somewhat noisier than the other equipment on-site, however, the noise is temporary and historically has not caused a problem with neighbors. An adequate buffer zone exists around the working area to prevent noise problems.

Windblown Material

Application of moisture is adopted as the primary strategy for minimizing windblown material from the receiving, processing, and compost storage areas. In general, adequate moisture content is always present in sludge receiving areas to prevent any friable material from being generated. Similarly, active composting aerated static piles typically contain adequate moisture to prevent the formation of friable material. Sufficient moisture is generally always present to minimize windblown material from the receiving, composting and curing areas.

During dry periods or excessively windy days potable water can be applied to the site to minimize fugitive dust generation. In general, the facility has not experienced problems with windblown litter or dust.

Odors

Odor mitigation is currently provided by adoption of odor-minimizing management practices, and is supplemented as needed with a perimeter fogging system. The aerated static pile composting method was specifically selected as a means of minimizing odors from the composting process. Odors can also occur from handling of used straw bedding from the racetrack. A large baling machine has been purchased to allow the staff to bale the hay as it is delivered from the track. The baler was purchased primarily as a means of odor control. Baling the hay will aid in expelling any rainwater falling on the bales and prevent significant anaerobic activity. In summary, the facility staff is keenly aware of the need to minimize odors, and all feasible efforts are made to keep odors to a minimum.

Vectors

The beneficial reuse of biosolids by composting is regulated by the USEPA under the Part 503 rules (40 CFR 503). According to EPA terminology, the compost produced at the Hot Springs Composting Facility meets the criteria for **Exceptional Quality**. This means that the compost “meets low pollutant and Class A pathogen reduction limits and has a reduced level of degradable compounds that attract vectors” (EPA/832/R-93/003). Compost of this quality is basically unregulated for use.

Class A pathogen reduction is achieved through Alternative 5: Biosolids treated by a Process to Further Reduce Pathogens (PFRP). The specific process used by HSU to further reduce pathogens is the aerated static pile composting method. With this method, the regulations require that the temperature of the biosolids is maintained at 55°C (131°F) or higher for 3 days or longer. HSU closely adheres to this procedure during their composting operation. Additionally, HSU performs a laboratory test of every completed aerated static pile to insure that the required pathogen reduction standard is achieved.

Vector attraction reduction is achieved under Option 5 of the regulations. Option 5 requires maintaining an aerobic process at a temperature greater than 40°C for 14 days or longer (EPA/832/R-93/003). According to Option 5, the temperature must not be

allowed to drop below 40°C and the average must be maintained above 45°C for the 14-day period. In meeting the requirements for Class A pathogen reduction, the vector attraction reduction requirements are simultaneously met.

In addition to meeting the minimum requirements in the regulations for pathogens and vector attraction reduction, HSU practices additional extended composting or curing of the product for an additional 21 days or more depending on the season. This provides additional stabilization and further reduces vector attractiveness over and beyond what the regulations require.

10. Site Access and Security Measures

An 8-ft high wood and chain link fence surrounds the entire plant facility, including the composting area. Vehicles entering the composting facility must pass through a gate, which is kept closed after daylight/working hours. The compost facility is manned by one or two operators at all times during the day shift. Operators are on duty 24 hours a day at the Wastewater Treatment Plant and make regular trips after hours across the entire facility as part of their rounds.