Technology for Odor Abatement

Process Design

Significant effort and intentionality are included with design of the entire system operation. Wholestone Farms will be designed to **exceed current state and federal air emissions requirements** at the intended location. Combining all the technologies below will create a "best in class" odor abatement strategy.

A. Enclosure + Ventilation

Containment of potential odor(s) emissions with covers and buildings helps to concentrate potential odor producing source(s), reducing uncontrolled odor emissions.

Receiving

The receiving area is fully enclosed and ventilated. This environmental control will further odor abatement and filtration to insure both air quality and temperature control for inside building and exhaust.

Wastewater Treatment

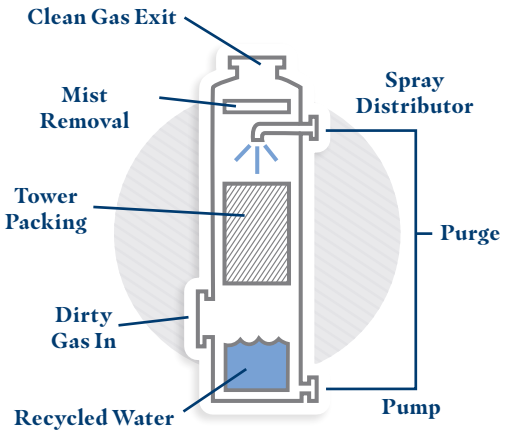
State-of-the-art treatment technology.

Wastewater biosolids dewatering and solids storage in an enclosed building; environmental control to further odor abatement and filtration to insure both air quality and temperature control for inside building and exhaust.

Wastewater treatment tanks are covered.

Rendering

Rendering operations and storage of byproducts in enclosed building; environmental control to further odor abatement and filtration to insure both air quality and temperature control for inside building and exhaust.



B. Air Scrubbers

Exhaust air from buildings or point sources is directed through a control technology to remove particulate, chemical compounds, and odorous emissions. The basic objective of a scrubber is to provide contact between the odorous air, water, and chemicals to provide oxidation or absorption of the odorous compounds. The odorous compounds are absorbed into the scrubber liquid, where they are oxidized and/or removed from the scrubber as an overflow or blow-down stream.

Details

a. Venturi scrubber to remove particulate from exhaust from blood dryer and bone milling
b. Packed media scrubber to absorb volatile organic compounds from hydrolyzer and rendering room air; further exhaust from venturi scrubber will be directed through this packed scrubber for further air scrubbing

C. Thermal Oxidation

A thermal oxidizer is a combustion system used to control air pollution by destroying hazardous air pollutants (HAP), VOC, and odorous emissions discharged from industrial processes. A thermal oxidizer is designed to oxidize hydrogen-based pollutants into CO_2 and H_2O before exhausting to atmosphere. Regenerative thermal oxidizer (RTO) systems are designed to provide the most advanced and efficient thermal destruction, considered a best-available control technology throughout industries.

Area Specific Odor Mitigation

Animal Receiving

A modern facility is designed to focus on safe, humane treatment of animals to ensure both animal and worker welfare, but also the quality of the finished product(s). Unsafe, unsanitary conditions directly correlate with an increase in injury, bruises, or falls. Calm animals are easier to move and manage to reduce injury. Further, careful, quiet handling directly impacts meat quality. Adrenaline produced during stressful situations increases the toughness and decreases meat quality and final yield.

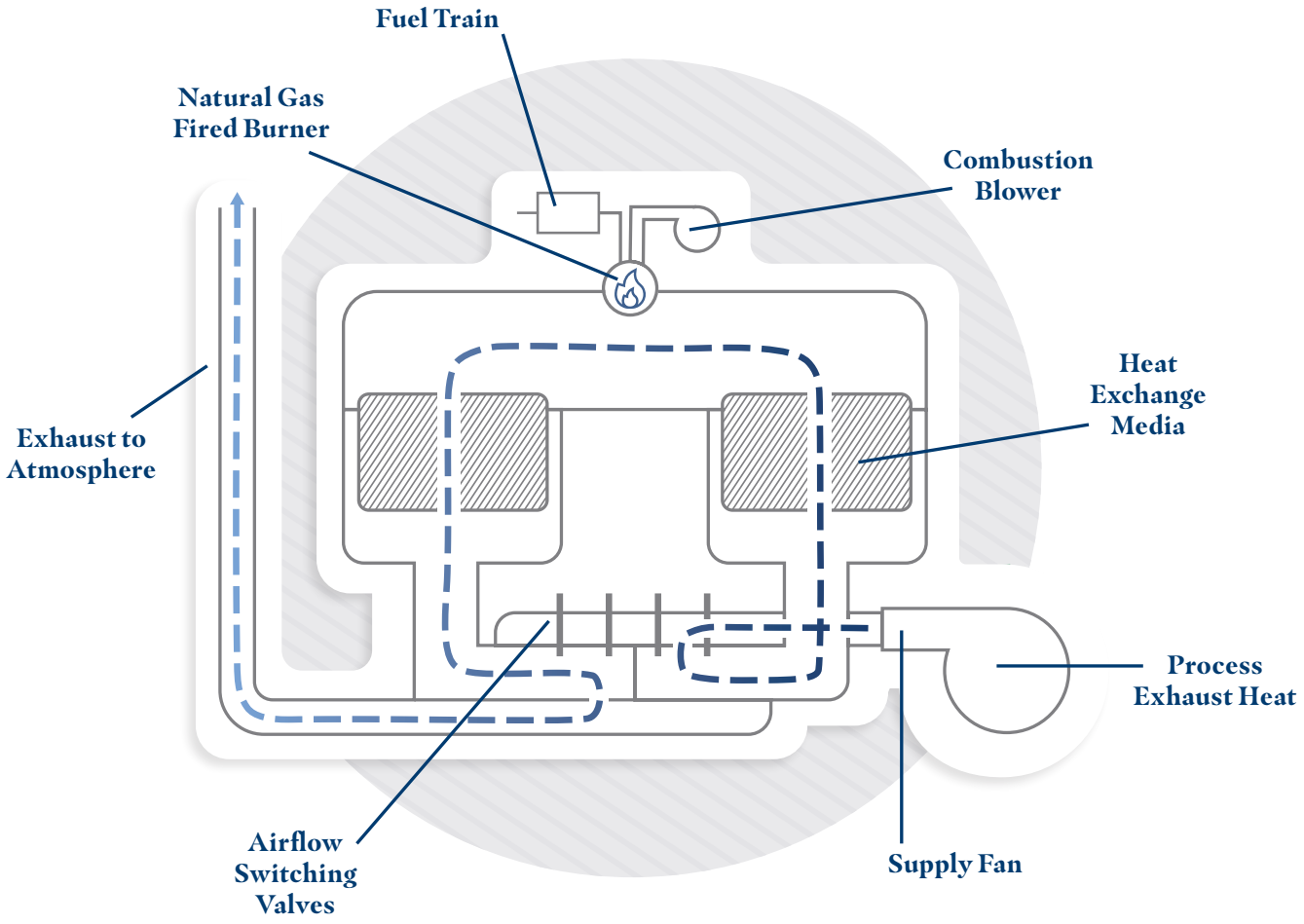
Design

Hog receiving will be designed to be completely enclosed with a ventilation system to control temperature and humidity for optimized animal and personnel conditions. Floors and flow will be designed to minimize slipping and maximize drainage efficiency.

Control Technology

Exhaust from hog receiving will be further processed through the plant's scrubber system and/or integrated directly into a Regenerative Thermal Oxidation (RTO) system.

RTO System



Wastewater

The wastewater treatment system will be designed to treat 100% of process wastewater collected on the campus. The pretreatment system with include an enclosed headworks and solids screening building, as well as a two-stage dissolved air flotation (DAF) system to remove suspended solids and recover valuable fats, oils and grease.

After pretreatment, the wastewater will enter a covered anaerobic digestion system, this process is designed to operate without oxygen and produce renewable methane gas as a biproduct of the biological digestion of organics in wastewater. The system is covered, and methane is captured and utilized as fuel to offset natural gas usage in the facility.

Upon completion of initial anaerobic digestion, the wastewater is then further treated in aerobic moving bed biofilm reactor (MBBR). This state-of-the-art technology further digests organics, ammonia and phosphorus in the pretreated wastewater. The MBBR system operates with residual dissolved oxygen and mixing, significantly improving digestion capacity and eliminating odor producing conditions. Suspended solids and biosolids recovered as part of this process are recycled for optimal digestion, but then finally dewatered. Since the biosolids have been completely digested and minimal organic residual remains, the biosolids sludge is stabilized and will not continue to degrade and thus odor is insignificant. Even so, biosolid sludge before and after dewatering is stored within ventilation controlled building(s). Wastewater after tertiary treatment with the MBBR, is then disinfected before release to discharge point.

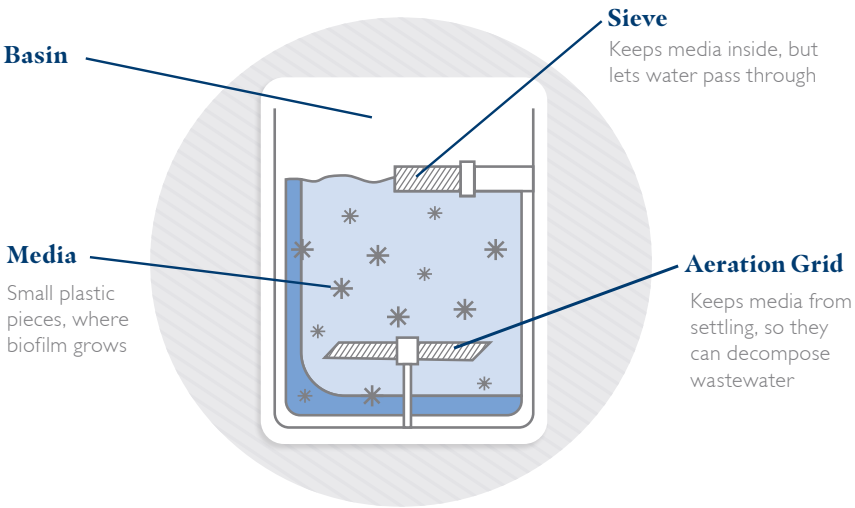
Design

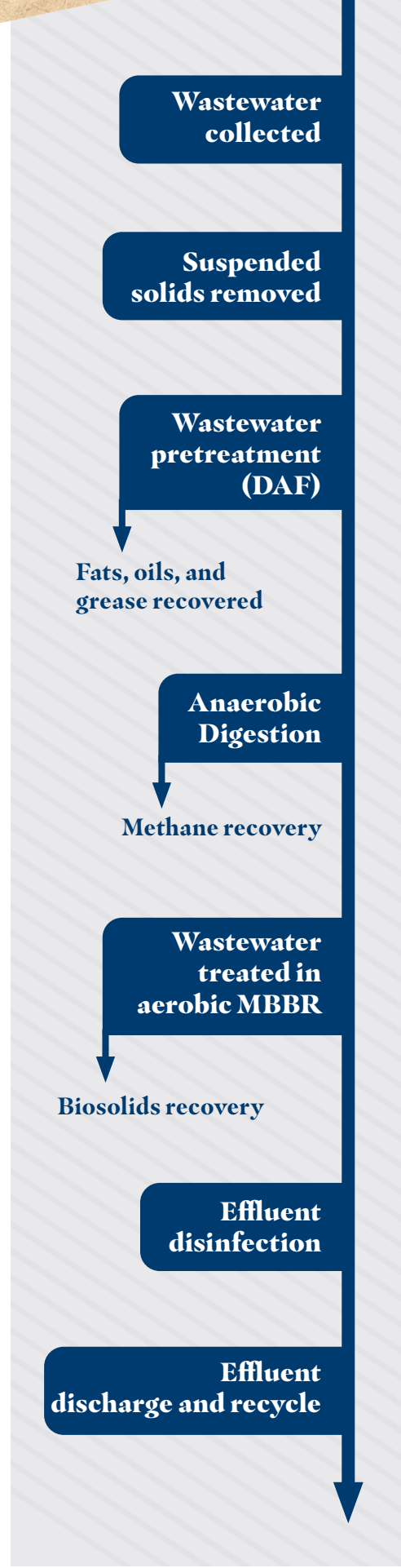
A wastewater system will be designed with robust and industry-forward technology, considering process upset conditions, emergency upsets, and unexpected flows. Redundancy in pumps, collection, and treatment trains allows for preventative and reactive maintenance without impacting operations. The system is covered or enclosed in a ventilated building. Equalization storage volume insures stabilization of waste stream and normalization of treatment flow.

Control Technology

Treatment tanks are covered with gas recovery system.

Aerobic MBBR





Rendering

Rendering is the recovery of valuable by-products from the waste stream of processing. The rendering system is designed to recover solids like bone and hair, as well as blood, organs and fats, oils, and greases. These recovered products not only reduce the level of loading in the waste stream, but are precursors to valuable co-products. The design of the rendering system is essential to optimize recovery of these valuable co-products.

Blood is collected separately and processed through the blood dryer. Exhaust from the blood dryer is directed through a venturi scrubber for particulate removal, to a packed bed scrubber to remove volatile organic compounds and odor-contributing compounds, then finally through a thermal oxidizer designed specifically for residual odor abatement.

General rendering separation equipment and bone milling exhaust is directed through a venturi scrubber for particulate removal, to a packed bed scrubber to remove volatile organic compounds and odor-contributing compounds, then finally through a thermal oxidizer designed specifically for residual odor abatement.

The hydrolyzer is part of the dehairing process, the exhaust from this unit to directed to packed bed scrubbers to remove volatile organic compounds and odor-contributing compounds, then finally through a thermal oxidizer designed specifically for residual odor abatement.

The rendering building is also climate controlled and ventilated to exhaust to a packed scrubber then to the thermal oxidizer.

Rendering Air Emission Process