

Eliminating bacterial bloom

The only way to effectively regain control of a (GCC) storage tank, after a serious bacterial “bloom,” is to empty and sterilize it.

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With the advent of alkaline papermaking comes the realization that the storage of calcium carbonate fillers and pigments cannot be conveniently lumped together with other materials in terms of what constitutes an effective bacteria prevention program. As opposed to other fillers and pigments, alkaline calcium carbonate slurries are not as tolerant of high bacteria populations (i.e., >20,000 CFU/ml) over an extended period and support a different suite of flora. In the long run, it is better to prevent or remediate bacteria in the storage tank than to pay to repeatedly treat a paper machine circuit or coating kitchen that is continuously being insulted with bacteria-contaminated filler or pigment.

Tank cleanout-sterilization and biocide addition procedure

The following steps can help control bacterial contamination:

Step 1: Thoroughly clean the tank including the tank roof—remove all residue. If the inside tank wall is porous (e.g., concrete or grout), it should be completely refilled with water after manual cleaning and strongly shock-dosed with a contact sterilizer, such as a chlorine compound or hydrogen peroxide. This is done in order to reach and eliminate entrenched bacteria. Consult your chemical supplier for recommended dosages, contact times and safe handling procedures. It may also prove advantageous to recirculate the water/sterilizer through the pump and piping system, especially if serious contamination is suspected. Be sure that any exposed surfaces are suitably compatible and chemically resistant to the sterilizer used. After a sufficient contact time, drain the tank. Be sure to flush out any water remaining at the bottom of the storage tank and product transport lines, because any residual chlorine compounds or hydrogen peroxide can chemically attack the dispersant in calcium carbonate slurry.

Step 2: Refill the tank with fresh product.

Step 3: Dose the tank initially with 700–900 ppm (on a volume basis) of a proven, effective liquid biocide such as tetrahydro-3, 5-dimethyl-2H-1, 5-thiadiazine-2-thione, which is readily available from several manufacturers under various trade names. The proper amount will be approximately 9.5–

I. Tank clean-out checklist

1. Thoroughly drain tank. Flush out metering pump and piping.
2. Turn off and lock out agitator.
3. Obtain tank entry permit.
4. Remove all residue and rinse.
5. Have tank inspected for leaks, cracks or structural damage. Repair if necessary.
6. Notify maintenance for metering system or agitator maintenance while tank is out of service.
7. Refill the tank with water. Use as clean a water source as possible.
8. Restart agitator.
9. Dose tank with the proper amount of contact sterilizer.
10. Allow system to run for the required contact time. Circulate through metering system if possible.
11. Turn off agitator and lock out.
12. Drain tank thoroughly. Drain metering system (if applicable). Flush residue from tank floor.
13. Refill with fresh product. Restart agitator.
14. Add proper dose of biocide.
15. Restart system.

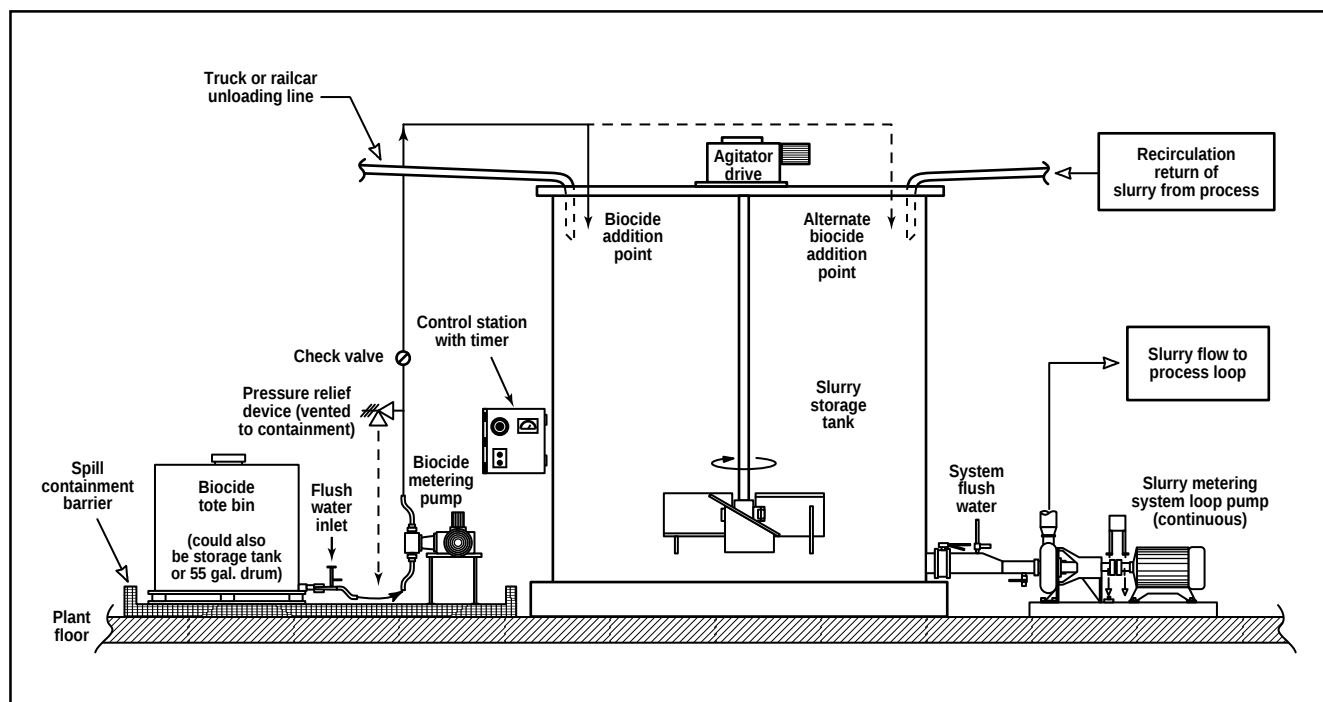
12.2 gallons per railcar, 2.3–3.0 gallons per tank wagon. This biocide dose will absorb the average bacteria insult associated with unloading, storage and handling. Consult with your calcium carbonate supplier before use if an alternate biocide is used.

Be sure the tank agitator is running during the addition of the biocide. Always add biocide slowly at a point of turbulence. Biocide in dry form should be made down with water before addition.

Recommendations

- For future shipments, dose the tank with 300–500 ppm (on volume basis) of the biocide after the unloading of each railcar (4.1–6.8 gallons per railcar, 1.0–1.7 gallons per tank wagon). Again, confirm that the agitator is running during

1. Typical biocide metering system diagram



any biocide additions to the storage tank. You can eventually optimize the biocide dosage with experience and routine bacterial assay results. The indiscriminate addition of biocide to the slurry without regard to actual slurry volume is specifically not recommended. In addition to being uneconomical, possible over-dosing can occur which can impact product physicals and end-use performance.

- It is a good practice to alternate the biocide to a chemically different type every 3–4 months for two or three shipments. This will effectively short-circuit any natural selection occurring in the tank over time. Routine weekly or bi-weekly

storage tank bacteria monitoring by mill or chemical vendor personnel is highly recommended.

- It is strongly recommended that the biocide pump and lines be briefly flushed to the tank with water before switching to biocides. It is not good practice to mix different biocides at full (neat) concentration in the same delivery system. An exothermic, chemical reaction or line plugging is often the result. 

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