ABSTRACT

This research work aimed to assess the application of a pilot scale rotary scale dryer in dehydrating sludge alongside pathogen concentration. The experiments were developed at Santa Clara wastewater treatment plant, using the sludge obtained after centrifuge. The implementation of this technology intends to reduce transport cost of the sludge to the landfill and assess its possible reuse as a fertilizer.

The pilot scale dryer, installed in the plant was comprised by an initial agitation tank, a feeding screw conveyor, dryer drum, air heating system, cyclone, and a water filter. Al the system was controlled with an electronic panel where temperature and residence time of the sludge within the equipment were set up. The sludge was dried at different temperatures (120°C, 150°C and 200°C) and residence time (20 minutes, 40 minutes, and 1 hour). Additionally, the sampling was developed after 20-30 minutes to ensure representative sampling operation.

The experimental development consisted in the plant dryer (including replicate experiments), the plant laboratory analysis, chemical analysis, and microbiological analysis in external laboratory. The wet sludge had an initial average moisture of 86%, 9% suspended volatile solids and 5% non-suspended volatile solids, while the minimum moisture achieved was 17.74% at 200°C and 1 hour of residence time. Every operating condition showed a minimum moisture content between 150°C and 200°C, while the effect of time was not significant. The initial sludge did not contain Helminth Eggs, but a high content of Escherichia Coli (4e5 to 1.6e7), which required the addition of hydrated lime to stabilise the sample to 12 pH. Experimental tests were developed to determine the concentration of hydrated lime needed (9.09%). Finally, the nutrient and metal concentration were measured in the dehydrated sludge to assess advantages and disadvantages in its application as fertiliz