

# Crossville, TN Influent Drum Screen Evaluation 6/22/18

**FROM**

**Todd Petrie, PE**

**TO**

**Clark Annis, Project Manager  
David Wakefield, AM**

Re: Crossville, TN – Influent Drum Screen Evaluation

This memo is intended to outline the findings from physical examination of the north Parkson influent drum screen located at the headworks of the WWTP. From reports, neither the north nor south screen have operated for some months as overflows from the screens that flooded the compactor conveyor area and parking lot were experienced. The south screen was not examined as it is anticipated to have similar issues as it is in the same operating condition and location as the north screen.

Parkson, the equipment manufacturer, was contacted to obtain design criteria and clarification on some specific equipment issues. The installation was designed to handle 3.75 MGD per screen for a total of 7.5 MGD. The original specification apparently was 2.968 MGD (clean water). The design peak solids for the conveyor was 70 cubic feet per hour. In review of the last 24 months of flow data, there were 70 instances of total daily flow above 3.75 MGD with the most number of days over 3.75 MGD occurring in February 2018. There were no total daily flows observed over 7.5 MGD. Usually, one drum screen should be capable of handling the influent flow with two drum screens needed for high flow days and instantaneous peak flows exceeding 2,600 GPM.

On June 19, 2018, the north influent drum screen was physically examined. The side panels were removed. The spray bars (external and internal) were removed. The wedge wire drum is supported on four trunnion wheels and is turned by a drive chain from the gearbox drive spur gear to around the drum on gear teeth. The trunnion bearings are severely corroded and could cause damage to the wheels or drum if they fail. The bearings in all four trunnions need to be replaced. The wheels themselves appeared to be in satisfactory condition without the ability to rotate the drum. The chain is completely seized and must be replaced. Most if not all the spray tips are clogged. During removal of the tips from the spray bar, the threads on the tips themselves are damaged rendering the tip unusable. The tips will need to be replaced and the holes on the spray bar addressed. The teeth of the gears mounted on the drum show preliminary signs of wear with minor scalloping and notable surface corrosion. The majority of the steel of the teeth is still in place with a good shape at the point. It is suggested to reuse the existing drum gear teeth but a plan to replace them within the next two to three years should be implemented. The drive spur gear shows minor wear with significant surface corrosion. The spur gear should be

removed, cleaned, and reinstalled. It is suggested to reuse the existing drive spur gear but a plan to replace them within the next two to three years should be implemented. The drum is held in place by tracking wear pads that prevent movement of the drum from front to back. Both of these should be replaced. The chain automatic oiler has dried oil and accumulated debris at the discharge point. It will need to be removed and completely cleaned to a working condition. It appeared to be reusable but its functional condition is unknown until disassembly. The water receiving chamber under the drum screen and drain pipe from the screens if full of debris. All the debris should be removed prior to placing the unit(s) in service or the material will be washed into the aeration basins.

The actions below provide a suggested forward path.

Action Items:

1. Purchase new spray tips to replace the clogged tips on the existing spray bars. Prices from several vendors have been provided. Purchasing the same component from a supplier other than Parkson can save over \$465.
2. The threads on the spray bars appear to be damaged when the spray tips are removed. One option is to have a machine shop remove the existing spray tips and mount the correct size stainless steel nut over the hole and seal between the nut and spray bar. This will provide a clean thread to reinstall the new spray tips. Note that the spray tips need to be installed at a 10 to 15 degree angle from parallel to the spray bar. This will provide full spray against the drum for cleaning without interference from an adjacent spray tip pattern. See the operation and maintenance manual.
3. Install a Y strainer upstream of the spray bars to capture any debris that may be in the plant water. Debris caused the existing spray tips to fail and likely subsequent overflows. The strainer is intended to prevent the same failure from occurring. The long term plan should be to return the final disk screens to service to capture the debris prior to reaching the plant water pumps.
4. Obtain a minimum of one complete set of replacement bearings, retainers, and components for one trunnion from Parkson to ensure the proper bearings are purchased. Once it is received, a competitive price from another vendor, such as Kaman (corporate vendor), can be obtained. Otherwise, four complete sets of replacement bearings can be obtained. This is dependent on the final costs obtained from Parkson. All bearings should be replaced.
5. Purchase a new drive chain from Parkson and install after cleaning/dressing of the drive and drum gear teeth.
6. Purchase new guide pads, inner and outer, from Parkson and install.
7. Remove all the debris from under the drum screens and the receiving pipe leading to the aeration basins.
8. Remove and replace all oils and greases. Replace with new oils and greases per the O&M manual.

Depending on the desired path forward and Parkson pricing, the materials for the north drum screen could be purchased now and the more expensive materials for the south screen purchased later. The result is

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distribution of costs. Staff will need some time to conduct the rehabilitation due to the amount of work and complexity. It is suggested to start the rehabilitation as soon as replacement parts arrive and place the drum screen back into operation as soon as possible. Currently, paper and plastics are present in the final clarifiers where these materials should not exist.

Selected photos are provided below.



Corroded trunnion bearings.

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Spray bars with clogged spray heads.



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Clogged spray head.



Corroded drive spur gear, drum gear teeth, and chain.

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Corroded chain. Note that the link sleeves are partially or entirely gone from wear and corrosion.



Automatic oiler in need of cleaning. Trunnion bearing needing replacement. Inner and outer guide pads requiring replacement are beyond the trunnion under the drum. Access under the drum will be required to complete exchange.

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Debris in the catch basin after the drum screen. Debris from under both screens in addition to the discharge pipe should be removed to prevent discharge to the aeration basin.