From: DAVID PINCUMBE
To: DOWNING-JANE, PAPADOPOULOS-GEORGE
Date: 2/5/98
Subject: Wayland

I have been able to learn the following:

The phosphorus manual that Phil Soudol was referencing indicates that total phosphorus levels of 0.5 mg/l are achievable in conventional activated sludge plants through the use of chemical addition in the secondary clarifier and sand filtration. This is without biological nutrient removal that utilizes anaerobic zones. Chemical addition at a second location (primary clarifier) can achieve lower limits (0.1 - 0.3 mg/l). The problem with extended air plants like the one in Wayland is that there is no primary clarification. However, they intend to dose at both the aeration tank and the secondary clarifier.

With the $100,000 that is being proposed for improvements to enhance phosphorus removal the following will be accomplished:

a. Add the capability of measuring influent phosphorus levels on a real time basis in order to optimize chemical addition.

b. Add chemical dosing and improved mixing to the aeration tank.

c. Add chemical dosing to the clarifier.

One of the case studies in the manual is a secondary activated sludge plant that utilizes chemical addition at two points. This plant achieves total phosphorus levels of 0.36 mg/l without sand filters.

I was able to get detailed information from two of the Chesepeake Bay facilities:

Aberdeen - this is a two stage activated sludge without sand filters that utilizes chemical addition at two points. They are able to achieve 0.05 mg/l total phosphorus consistently. They have recently added a denitrification component that incorporates anaerobic zones but they were achieving the 0.05 mg/l total phosphorus before the denitrification was added.

Roanoke - This is a Biological Nutrient Removal (BNR) with ferric chloride added after the primary clarifiers and sand filters. The BNR was added recently to save on chemical costs. Total phosphorus levels range from 0.1 - 0.15 mg/l both before and after BNR was added.

Arlington - This is a 30 MGD two stage activated sludge treatment plant that doses ferric chloride at two points (13 mg/l and 10 mg/l) and utilizes sand filters. They do not denitrify and there is no BNR. They meet the permit limit of 0.18 mg/l before the sand filters and they consistently meet 0.05 mg/l after the sand filters.

EXHIBIT 12

It is difficult to project what the Wayland plant will be able to accomplish. While they are limited as far as chemical dosing sites, they do have the benefit of sand filtration. Good mixing is the key to good results from chemical addition and they are upgrading the mixing capability. Also, they have a fairly good secondary clarifier (replaced about 9 years ago) which is usually the weak link with extended aeration plants.

I think it is fair to expect that they can achieve 0.5 mg/l or less and recommend that we include this as a monthly average limit (or possibly a longer term average in order to give more flexibility). In addition, we should require an optimization study be developed and implemented after the plant is on line to determine what it is capable of achieving. Phil has indicated his willingness to do this but has asked that the 0.5 mg/l be incorporated as a goal and not a limit. If a limit is to be included, he would like to see it set a little higher.

The 60,000 gpd design is a sustained flow. The peak design flow is
1.5 - 2.0 times this flow. The sustained actual flow they anticipate is 23,000 gpd. This leaves significant capacity (much more than 17,000 gpd that was suggested at the last meeting) to tie in failing on-site systems. Wayland has told me that 17,000 would be the very minimum but that thye are interested in much more. They have asked me if we would be willing to increase the flow limit in order that they can tie in more areas. They would have to have ownership of the plant in accordance with local bylaws and have already talked to the developer about this. We should discuss this further.