Additional Guidance for the Plant Section of the Class IV Wastewater Treatment Examination

Plant

Provide a description of the physical characteristics of each treatment process in addition to a detailed ***discussion*** of the various operational control method(s) used for each type of individual treatment process throughout your facility. Each treatment process also has associated parameters and/or analyses that need to be monitored for control purposes and to determine process performance. Discuss in detail how each separate treatment process is operated and controlled. Provide a comparison of the design vs. actual operating parameters of each treatment unit. Use the following examples to help structure your response:

Example 1:

Clarifier(s)

Identify the physical characteristics of the clarifier(s) (i.e. number of tanks, diameter, depth, volume, raking mechanism, pumping equipment, etc.)

Identify the process control parameters and/or analyses for a primary clarifier which could include (but not be limited to) the hydraulic loading rate, solids loading rate, detention time, weir overflow rate, sludge blanket depth, method of blanket measurement, sludge removal rate, method of sludge removal, sludge concentration, sludge volatile content, % removal of carbonaceous biochemical oxygen demand (CBOD) and total suspended solids (TSS), chemical dosing rates, operational problems, etc.

Discuss the current operating conditions compared to how the clarifier was designed to operate. For example, if a primary clarifier was designed to remove a certain organic load (lbs. of CBOD and/or TSS), treat a certain flow rate (mgd or gph) or operate with a certain hydraulic detention time or surface overflow rate, identify how much of that design parameter is currently being utilized? A thorough understanding of this information must be provided as it will assist you during operational troubleshooting and/or planning for future infrastructure expansion.

Example 2:

Aeration Basin(s)

Identify the physical characteristics of the aeration basin(s) (i.e. number of basins, linear dimensions, volume).

Identify operational characteristics of the activated sludge process which could include (but not be limited to) the current operating mode, flow scheme, detention time, organic loading rate, hydraulic loading rate, microbial activity, physical/chemical/biological reactions, influent CBOD, influent SS, mixed liquor suspended solids (MLSS), mixed liquor volatile suspended solids (MLVSS), sludge volume index (SVI), total sludge units, mean cell residence time (MCRT), F/M ratio, D.O., pH, alkalinity, filamentous bacteria, phosphorus removal, nitrification/de-nitrification, oxygen reduction potential (ORP), oxygen uptake rate, chemical dosage rates, operational problems, etc.

For the activated sludge process, include a detailed explanation of how the process is controlled. For instance, how are the return activated sludge rates (RAS) and waste activated sludge (WAS) rates determined? What are the solids concentrations? What are the flow rates and how do you determine when and by how much they should be adjusted?

The current operational information should then be compared to the design criteria for the activated sludge system to determine if it is operating within design parameters.

Note: Some secondary treatment parameters apply to only the aeration tanks or final clarifiers, however other parameters, such as pollutant removal rates, apply to the secondary treatment as a whole unit. Provide this information accordingly.

Example 3:

Digester(s)

Identify the physical characteristics of the digester(s).

Discuss the type of digestion process that you are operating (i.e. aerobic/anaerobic). Discuss the process control parameters and/or analyses that you use to operate the digestion process. It is important to provide detailed information about the biological and chemical changes that occur as the solids move through the digestion process.

Parameters may include (but are not limited to) gallons of sludge per day, solids loading rate, solids concentration, % volatile solids, pH, D.O., aeration requirements, volatile acid/alkalinity ratio, % solids reduction, ft^3 of gas produced, sludge heating methodology, sludge mixing, supernatant characteristics, chemical dosage rates, hydraulic detention time, solids retention time, etc.

Dewatering/Storage/Disposal

Provide information on dewatering methodology, chemical feed rates, solids concentration, solids removal rate, sludge production, wet tons, dry tons, days of storage, capacity (liquid or cake), ultimate disposal and/or reuse destination.

The current operational information should then be compared to the design criteria for all phases of the solids handling process to determine if they are operating within design parameters.

Provide information describing the methodology used to meet the requirements of Ohio Administrative Code 3745-40 “Sewage Sludge”.

This type of information and analysis should be provided in a ***discussion format*** and is required to be applied to each wastewater treatment process within your facility.