STUDY GUIDE

SPECIAL K

SUBCLASS K

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INTRODUCTION

Wisconsin DNR assigns the Special K category to those wastewater treatment facilities which are required to have a certified operator, but do not fit well into our existing subclass categories. In general, a facility with a specific WPDES permit that discharges to a surface water and uses a unique treatment system will require an operator certified in Special K. If you have any questions as to whether your facility requires a Special K operator, please contact your regional DNR engineer or operator certification coordinator.

The Special K subclass is specific to a certain treatment system, and generally cannot be transferred to another facility. Examples of systems that would require a Special K operator are: recirculating sand or gravel filters with a surface water discharge, river clean-up projects, an oil and grease separator followed by settling (in a pond or clarifier) with direct surface discharge, an elaborate industrial treatment process, or a landfill leachate treatment system with a direct surface water discharge.

Based upon the flow and process complexity at the facility, the DNR will classify the system as Grade 1, 2, 3, or 4. There is only one Special K exam for Grades 1 - 4. The general wastewater examination is not required for Special K certification.

Once the exam is passed, you will be a Grade T, operator-in-training. To go up in Grade levels, you would need to document the appropriate years of experience on the DNR’s wastewater operator experience form (Form 3400-066A). Please visit our website for more information at [http://dnr.wi.gov](http://dnr.wi.gov) and search keywords “Operator Certification”.

GENERAL GUIDANCE ON FINDING REFERENCES

The best two references for studying for a Special K exam are: the facility’s WPDES permit and the facility’s O&M Manual. The O&M manual should also list other references as it pertains to the particular treatment process. Further information may be obtained through your facility’s consultant, your DNR basin engineer, or through the internet.
KNOWLEDGE OF TREATMENT GOALS: THE DISCHARGE LIMITS

1. Name the pollutants controlled by your treatment plant’s discharge permit, for your liquid process discharge. For direct dischargers, these are in the WPDES permit. For pretreatment dischargers, these are either from federal and state categorical regulations or from the local sewer use ordinance. List all effluent pollutants for which monitoring is required. If you discharge to ground water, put the GW monitoring parameters after the treatment process testing.

2. Know the effluent limits for the pollutants listed above. Be sure to include the UNITS. Most discharges have a weekly or monthly average limit, a daily maximum or minimum limit and sometimes a total mass limit. You need to be aware of all of these, as they define the treatment goals you must reach.

3. Know the permit required sampling frequency and sample type, for the pollutants listed above.

KNOWLEDGE OF TREATMENT PROCESS: HOW IS IT DONE?

4. Know the frequency of testing for the pollutants or other parameters for process control purposes. Many facilities will measure a pollutant more frequently than required, to help operate the treatment process. Or they will do process control testing, which is not required to be reported in the permit.

5. Make a sketch showing flow through your plant’s treatment units. Use solid lines to show the liquid flow, and dashed lines to show the solids/sludge flow. If you have several treatment trains, show them separately. Show chemical addition points and any inline process monitoring points. If you have the ability to divert spills to a holding tank, show where the tank is in the flow scheme.

6. Describe each wastewater treatment process used at your facility and state the purpose of the process (what it is supposed to do). You may use the attached list of processes on p.6 to jog your memory. Include any specific chemicals which are added as part of that process. If you have a different process, be able to name and describe it.

7. List the tasks your substitute must perform to make sure the plant operates correctly (Assume you have to leave town for a day). Be specific. When an adjustment must be made, describe how the operator decides how much is enough.

8. Describe how equipment maintenance is handled at your facility.
| Pollutant or Process | Limit | Type* | Permit Req'd | Permit Req'd | Frequency | Control Parameter |   | D, W, | Sampling | Sample | of Process |    | (units) | or M | Frequency  | Type  | Control Testing |
|----------------------|-------|-------|--------------|--------------|-----------|------------------|---|------|----------|--------|------------|    |        |       |           |       |               |
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* Type means what kind of limit, D=Daily, W=Weekly, M=Monthly,
**24-FPC = 24-hr flow proportional composite  24-TC = 24-hr time composite  __-MC = an __-hr composite
6. Describe each wastewater treatment process used at your facility and state the purpose of the process (what it is supposed to do). You may use the attached list of processes on p. 6 to jog your memory. Include any specific chemicals which are added as part of that process. If you have a different process, be able to name and describe it.

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### Example List of Processes

#### Physical Treatment Processes
- Activated Carbon Filtration
- Ammonia Stripping
- Diatomaceous Earth Filtration
- Distillation
- Electrodiagnosis
- Evaporation
- Flocculation
- Flotation
- Flow Equalization
- Foam Fractionization
- Freezing
- Gas-Phase Separation
- Grinding (Comminutors)
- Grit Removal
- Microstraining
- Mixing
- Moving Bed Filters
- Multimedia Filtration
- Rapid Sand Filtration
- Recirculating Sand Filter
- Reverse Osmosis
- Screening
- Sedimentation (Settling)
- Slow Sand Filtration
- Solvent Extraction
- Sorption

#### Chemical Treatment Processes
- Carbon Adsorption
- Chemical Precipitation
- Coagulation
- Dechlorination
- Disinfection (Chlorine)
- Disinfection (Ozone or UV)
- Electrochemical Treatment
- Ion Exchange
- Neutralization (acid/base)
- Oxidation
- Reduction

#### Biological Treatment Processes
- Activated Sludge
- Aeration Lagoons
- Anaerobic Lagoons
- Anaerobic Digestion
- Nitrification-Denitrification
- Pre-Aeration
- Rotating Biological Contactors

#### Sludge Treatment & Disposal Processes
- Aerobic Digestion
- Anaerobic Digestion
- Belt Press
- Centrifugation
- Chemical Conditioning
- Chlorine Treatment
- Composting
- Drying Beds
- Elutriation
- Flotation Thickening
- Gravity Belt Unit
- Gravity Thickener (clarifier)
- Heat Drying
- Heat Treatment
- Incineration
- Land Application
- Landfill
- Pressure Filtration (Ex: plate-frame press)
- Pyrolysis
- Sludge Lagoons
- Vacuum Filtration
- Vibration
- Wet Oxidation

#### Other
- Effluent Recycle to Process Makeup
- Water
- Counter Flow Rinsing

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- Effluent Recycle to Process Makeup
- Counter Flow Rinsing
7. List the tasks your substitute must perform to make sure the plant operates correctly (Assume you have to leave town for a day). Be specific. When an adjustment must be made, describe how the operator decides how much is enough.
8. Describe how equipment maintenance is handled at your facility.
9. List the major process variables that can be controlled by the plant operator. [NOTE: These vary greatly depending upon the treatment process; for example, pH, filter loading rate, clarifier detention time, sludge concentration. WHAT ARE THE THINGS IN THE PROCESS THAT YOU CAN AFFECT OR CONTROL?]

10. Describe the operations that must be performed to control the variables listed in 9 (measurements, process control tests, valves turned, etc.) WHAT ACTIONS DO YOU TAKE TO DO THE CONTROLLING?

11. List the reasons why you have altered these process variables in your daily work.

Example: PROCESS VARIABLE: Sludge blanket [the thing you can affect]

ACTIONS NEEDED TO CONTROL IT: Measure sludge depth 2x/day, with sludge depth finder, measure sludge consistency with a settling test daily and a TSS test 3x/week, adjust sludge pump between ___ and ___. [what you do to affect it]

WHY ACTIONS WERE TAKEN: We keep the sludge blanket at 2-4 feet in order to get good compaction (a sludge concentration between ___ and ___) and clear effluent. Too much sludge causes ___________. Too little sludge causes ___________. [why you bother to control this process variable]
12. Describe the adjustments you make to the process when the influent loading changes (when it increases, and when it decreases):

13. Describe several operational problems which you experienced at your plant, and explain how they were solved.

14. Describe your plan of action to follow in case of a MAJOR problem/upset at your treatment plant.