



*Saskatchewan Water and  
Wastewater Works  
**Operator Certification  
Standards, 2002***



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EPB 139/02/2M



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# **Saskatchewan Water and Wastewater Works Operator Certification Standards, 2002**

EPB 139/02/2M

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## **FOREWORD**

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This document replaces The Saskatchewan Water and Wastewater Works Operator Certification Standards, 2000 and sets out the standards for the classification of water and wastewater works and the qualifications for the certification of the operators of those facilities.

These standards, adopted by *The Water Pollution Control and Waterworks Regulations* (WPC&WR), are intended for use by operators, municipalities, consultants and other persons involved with the operation of water and wastewater treatment facilities in Saskatchewan. The Operator Certification Board must base their certification decisions on these standards as well as the WPC&WR. These standards will be revised periodically to reflect changes in technology and certification issues.

Except for industrial wastewater treatment facilities, these standards apply to facilities regulated by Saskatchewan Environment and Resource Management (SERM). These systems are described in the WPC&WR

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<b>TABLE OF CONTENTS</b>		<b>PAGE</b>
1.0	Definitions	2
2.0	Facility Classification	3
2.1	Small System	3
2.2	Class I to Class IV	3
3.0	Certification Requirements	4
3.1	Small System	4
3.2	Class I	5
3.3	Class II	6
3.4	Class III	7
3.5	Class IV	8
3.6	Operator In Training	10
3.7	Temporary Relief Operators	10
<b>Appendix A:</b> Point Rating System for Water Treatment Facilities		11
<b>Appendix B:</b> Point Rating System for Wastewater Treatment Facilities		17
<b>Appendix C:</b> Education Course Assessment		22

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## **1.0 Definitions**

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**Continuing Education Unit (CEU)** means continuing education unit, as defined by the International Association for Continuing Education and Training (Washington, DC), awarded for various educational/training activities that an operator may have undertaken. One (1) CEU represents ten (10) contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction and qualified instructors.

**Contact** means two way communication and interaction between a learner and instructor in order for the learner to gain knowledge and to receive feedback.

**Direct Responsible Charge (DRC)** means experience gained through accountability for the performance of, or supervision of daily, on-site operational duties for a facility or operating shift. This can only occur when the facility owner designates a position held by an operator to be in DRC. The owner of a facility can designate a number of DRCs for that facility.

**General Education Development (GED)** means an adult education diploma issued by the Saskatchewan Education.

**Operating Experience** means the time spent working at a water or wastewater treatment facility in satisfactory performance of operating duties as approved by the Board.

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## 2.0 FACILITY CLASSIFICATION

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This section sets out the criteria for the classification of water and wastewater facilities. Facilities can be classified as Small System, Class I, Class II, Class III or Class IV. See Appendix A and Appendix B respectively for more detailed information about the classification of water and wastewater treatment facilities.

### 2.1 SMALL SYSTEM

- .1 Small Water Facilities include those Class I water treatment facilities and/or those Class I water distribution facilities serving 500 people or fewer. The Small System water treatment facilities include only Class I facilities connecting to groundwater sources. Surface water treatment plants are not included in the Small Water Facilities classification.
- .2 Small Wastewater Facilities include those Class I wastewater treatment facilities and/or those Class I wastewater collection facilities serving 500 people or fewer. Mechanical wastewater treatment facilities, regardless of size, are excluded from this facility classification.

### 2.2 Class I to Class IV

- .1 Class I to Class IV water treatment facilities (WT), water distribution facilities (WD), wastewater treatment facilities (WWT) and wastewater collection facilities (WWC) are classified in accordance with the Facility Classification Point System as shown in Table 1. See Appendix A and Appendix B for more detailed information on the rating systems for water and wastewater treatment facilities.

**Table 1. Facility Classification Point System for Class I to IV**

Facility	Units	I	II	III	IV
WT	Range of points	up to 30	31-55	56-75	76 & up
WD*	Population served	up to 1,500	1501-15000	15001-50000	50001 & up
WWT	Range of points	up to 30	31-55	56-75	76 & up
WWC*	Population served	up to 1500	1501-15000	15001-50000	50001 & up

\* In-line treatment (such as booster pumping, chlorination, fluoridation, sequestering agent, or odour control) is considered part of a distribution or collection system.

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### **3.0 Certification Requirements**

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This section sets out the qualifications for the certification of water and wastewater operators. The required formal education, experience and examination for the certification of Small System, Class I, Class II, Class III, Class IV and Operator in Training certificates are set forth in the following sections.

#### **3.1 SMALL SYSTEM**

For small systems only two (2) certificates are available, one (1) certificate for waterworks which combines water treatment and distribution facilities and one (1) certificate for wastewater works which combines wastewater treatment and collection facilities.

An applicant seeking certification in this Class shall:

- .1 Inclusively comply with clauses 2 to 6
- .2 Have completed Grade 10 or GED-10.
- .3 Be permitted to substitute for any missing education requirements as follows:
  - one (1) year of operating experience for two (2) years of grade school without limitation;
  - one (1) year of operating experience for one (1) year of high school without limitation; and
  - 45 CEUs of training in water, wastewater, engineering, science, and/or related fields for one (1) year of high school without limitation.
- .4 Have six (6) months of experience in:
  - water treatment and/or distribution facilities, if seeking certification in waterworks.
  - wastewater treatment and/or collection facilities, if seeking certification in wastewater works.
  - .
- .5 Be permitted to substitute the experience requirements specified in 3.1.3 with 22.5 CEUs of relevant training.
- .6 Obtain a mark of at least 70% on:
  - a Small System waterworks certification exam, if seeking certification in waterworks.
  - a Small System wastewater works certification exam, if seeking certification in wastewater works.
  - both Small System waterworks and wastewater works certification exams, if seeking certification in both small water and wastewater works.

### 3.2 CLASS I

An applicant seeking certification in this Class shall:

- .1 Inclusively comply with clauses 2 to 6.
- .2 Have a high school diploma or GED-12.
- .3 Be permitted to substitute for any missing education requirements as follows:
  - one (1) year of operating experience for two (2) years of grade school without limitation.
  - one (1) year of operating experience for one (1) year of high school without limitation.
  - 45 CEUs of training in water, wastewater, engineering, science, and/or related fields for one (1) year of high school without limitation.
- .4 Have one (1) year of experience in:
  - water treatment at Class I or higher facilities, if seeking certification in water treatment.
  - water distribution at Class I or higher facilities, if seeking certification in water distribution system.
  - wastewater treatment at Class I or higher facilities, if seeking certification in wastewater treatment.
  - wastewater collection at Class I or higher facilities, if seeking certification in wastewater collection.
- .5 Not be permitted to substitute education or training (CEUs) for the experience stated in 3.2.4.
- .6 Obtain a mark of at least 70% on:
  - a Class I water treatment certification exam, if seeking certification in water treatment.
  - a Class I water distribution certification exam, if seeking certification in water distribution.
  - a Class I wastewater treatment certification exam, if seeking certification in wastewater treatment.
  - a Class I wastewater collection certification exam, if seeking certification in wastewater collection.
  - all four (4) Class I certification exams, if seeking certification in all four (4) categories at the same time.

### 3.3 CLASS II

An applicant seeking certification in this Class shall:

- .1 Inclusively comply with clauses 2 to 6
- .2 Have a Class I certificate in:
  - water treatment, if seeking certification in water treatment.
  - water distribution, if seeking certification in water distribution system.
  - wastewater treatment , if seeking certification in wastewater treatment.
  - wastewater collection, if seeking certification in wastewater collection.
- .3 Have three (3) years of experience in:
  - water treatment at Class I or higher facilities, if seeking certification in water treatment
  - water distribution at Class I or higher facilities, if seeking certification in water distribution system.
  - wastewater treatment at Class I or higher facilities, if seeking certification in wastewater treatment
  - wastewater collection at Class I or higher facilities, if seeking certification in wastewater collection.
- .4 Be permitted to substitute for any missing operating experience as follows:
  - 45 CEUs or one (1) year of post high school education in water, wastewater, engineering, science, and/or related fields for one (1) year of facility experience (see Appendix C).
  - up to 1.5 years or 50% of required experience can be substituted with education or training (CEUs).
- .5 Obtain a mark of at least 70% on:
  - a Class II water treatment certification exam, if seeking certification in water treatment.
  - a Class II water distribution certification exam, if seeking certification in water distribution.
  - a Class II wastewater treatment certification exam, if seeking certification in wastewater treatment.
  - a Class II wastewater collection certification exam, if seeking certification in wastewater collection.
  - all four (4) Class II certification exams, if seeking certification in all four (4) categories at the same time.

### 3.4 CLASS III

An applicant seeking certification in this Class shall:

- .1 Inclusively comply with clauses 2 to 8
- .2 Have a Class II certificate in:
  - water treatment, if seeking certification in water treatment.
  - water distribution, if seeking certification in water distribution system.
  - wastewater treatment , if seeking certification in wastewater treatment.
  - wastewater collection, if seeking certification in wastewater collection.
- .3 Have two (2) years of post high school education in water, wastewater, engineering, science and/or related fields. Appendix C describes how post high school education will be applied and which types of courses are applicable.
- .4 Be permitted to substitute for any missing education requirements as follows:
  - 45 CEUs of training in water, wastewater, engineering, science and/or related fields for one (1) year of high school and/or post secondary school without limitation. These same CEUs shall not be used to substitute for the experience requirements.
  - one (1) year of DRC experience in Class II or higher facility (of the same works category in which the certification is requested) for one (1) year of post secondary education. This same DRC experience shall not be used to substitute for the experience requirements.
  - an extra five (5) years of DRC experience in a Class II or higher facility (of the same works category in which the certification is requested) for the second year of post secondary education. This same DRC experience cannot be used to substitute for the experience requirement.
- .5 Have four (4) years of operating experience in:
  - water treatment at Class II or higher facilities, if seeking certification in water treatment
  - water distribution at Class II or higher facilities, if seeking certification in water distribution system.
  - wastewater treatment at Class II or higher facilities, if seeking certification in wastewater treatment
  - wastewater collection at Class II or higher facilities, if seeking certification in wastewater collection.

- .6 Two (2) of the four (4) years operating experience shall be DRC at a Class II or Class III facility, for those seeking water and/or wastewater treatment facility certificates. The DRC requirements shall not apply to those operators currently working in Class IV facilities nor to those seeking certification in water distribution and/or wastewater collection.
- .7 Be permitted to substitute for any missing operating experience as follows:
  - each year of non DRC experience with an additional of 45 CEUs, or one (1) year of post high school education in water, wastewater, engineering, science and/or related fields. Substitutions for the non DRC experience shall not exceed two (2) years or 50%.
- .8 Obtain a mark of at least 70% on:
  - a Class III water treatment certification exam, if seeking certification in water treatment.
  - a Class III water distribution certification exam, if seeking certification in water distribution.
  - a Class III wastewater treatment certification exam, if seeking certification in wastewater treatment.
  - a Class III wastewater collection certification exam, if seeking certification in wastewater collection.
  - all four (4) Class III certification exams, if seeking certification in all four (4) categories at the same time.

### **3.5 CLASS IV**

An applicant seeking certification in this Class shall:

- .1 Inclusively comply with clauses 2 to 8
- .2 Have a Class III certificate in:
  - water treatment, if seeking certification in water treatment.
  - water distribution, if seeking certification in water distribution system.
  - wastewater treatment, if seeking certification in wastewater treatment.
  - wastewater collection, if seeking certification in wastewater collection.
- .3 Have two (2) more years of post secondary education in addition to the two (2) required for a Class III certificate (a total of four (4) years of post high school education) in water, wastewater, engineering, science and/or related fields. Appendix C describes how post high school education will be applied and which types of courses are applicable.

- .4 Be permitted to substitute for any missing education requirements as follows:
- 45 CEUs of training in water, wastewater, engineering, science and/or related fields for one (1) year of post secondary school without limitation. These same CEUs shall not be used to substitute for the experience requirements.
  - for an operator who obtained their Class III certificate using DRC experience gained while working in a Class III or higher facility for at least six (6) years:
    - one (1) year of DRC experience in Class III or higher facility (of the same works category in which the certification is requested) for one (1) year of post secondary education. Up to two (2) years of the required post secondary education in addition to that required for Class III certificate can be substituted. The same DRC experience shall not be used to substitute for the experience requirements.
  - for an operator who obtained their Class III certificate using DRC experience gained while working in a Class II facility for at least six (6) years or other combination of DRC experience gained while working in Class II or higher facility:
    - additional six (6) years of DRC experience in Class III or higher facility (of the same works category in which the certification is requested) for two (2) years of post secondary education in addition to the two (2) required for Class III certificate. The same DRC experience shall not be used to substitute for the experience requirements.
- .5 Have four (4) years of operating experience in:
- water treatment, if seeking certification in water treatment
  - water distribution, if seeking certification in water distribution system.
  - wastewater treatment, if seeking certification in wastewater treatment
  - wastewater collection, if seeking certification in wastewater collection.
- .6 Two (2) of the four (4) years operating experience shall be DRC at a Class III or higher facility, for those seeking water and/or wastewater treatment facility certificates. The DRC requirements shall not apply to those seeking certification in water distribution and/or wastewater collection.
- .7 Be permitted to substitute for any missing operating experience as follow:
- up to one (1) year or 50% of DRC experience with 45 CEUs, or one (1) year of post high school education in water, wastewater, engineering, science and/or related fields.
  - each year of non DRC experience with an additional of 45 CEUs, or one (1) year of post high school education in water, wastewater, engineering, science and/or related fields. Substitutions for non DRC experience shall not exceed two (2) years or 50%.

- .8 Obtain a mark of at least 70% on:
- a Class IV water treatment certification exam, if seeking certification in water treatment.
  - a Class IV water distribution certification exam, if seeking certification in water distribution.
  - a Class IV wastewater treatment certification exam, if seeking certification in wastewater treatment.
  - a Class IV wastewater collection certification exam, if seeking certification in wastewater collection.
  - all four (4) Class IV certification exams, if seeking certification in all four (4) categories at the same time.

### **3.6 OPERATOR IN TRAINING (OIT)**

An applicant seeking certification in this Class shall:

- .1 Be employed in a waterworks or wastewater works facilities classified as Small System, Class I, or Class II.
- .2 Have the education requirement as stated in Section 4.1 (Small System), Section 4.2 (Class I), or Section 4.3 (Class II).
- .3 Have the following experience:
- no experience required for an OIT Certificate in Small System
  - at least 50% of the required experience as stated in Sections 4.2 and 4.3 for Class I and Class II Operator in Training Certificates respectively.

### **3.7 TEMPORARY/RELIEF OPERATORS**

An applicant seeking certification in any class and is retained on a part-time, contractual, temporary or in a relief capacity as an operator must meet all the requirements as specified for the classification being sought.

For the purposes of determining a year of experience, the following formula will be used:

46 weeks	=	1 year
230 days	=	1 year
1840 hours	=	1 year

## **Appendix A**

### **Point Rating System for Water Treatment Facilities**

#### **Water treatment definitions**

##### **Aeration**

The process of adding air to water. Air can be added to water by passing air through water or passing water through air.

##### **Diatomaceous Earth Filters**

Filter technology using a thin layer of diatomaceous earth (a fine, siliceous material) that is deposited on a porous plate to serve as a filter. Mainly used in smaller systems because of its relative simplicity of units and maintenance requirements.

##### **Direct Filtration**

Filtration process where the sedimentation stage of conventional filtration is omitted. Filtration is performed directly after the flocculation stage of treatment. Filter aid is usually added before filtration.

##### **Dissolved Air Flotation**

Process of solids removal where dissolved air is added to the clarifier from the bottom of the basin and the air raises suspended particles to the top of the water where the particles are removed by skimming.

##### **Electrodialysis**

Process where brackish water flows between alternating cation-permeable and anion-permeable membranes. A direct electric current provides the motive force to cause ions to migrate through the membranes and either react to create a gas or remain in a separate solution as brine wastewater.

##### **Horizontal-flow**

Flow of water in a horizontal direction through a rectangular or round sedimentation/clarification basin as opposed to a vertical or upward flow that would be found in a solids-contact clarifier.

##### **Ion Exchange**

A chemical process involving reversible interchange of ions between a liquid and a solid but no radical change in structure of the solid.

**Injection Mixers**

Use of perforated tubes or nozzles to disperse the coagulant into the water being treated. Provides uniform distribution of the coagulant over the entire basin. Generally sensitive to flow changes and may require frequent adjustments to produce the proper amount of mixing.

**In-line Blender Mixers**

Used for coagulant mixing where coagulant is added directly to water being treated through a diffuser in a pipe. Provides rapid dispersion of the coagulant without significant head loss. Energy consumption is less than a comparable mechanical mixer.

**Mechanical Dewatering**

The use of mechanical devices such as centrifuges and rotational mechanisms to force the separation of solids (sludge) from liquids (water).

**Mechanical Mixers**

Paddles, turbines, and propellers frequently used in coagulation facilities. Use electrical energy for mixing the coagulant with the water being treated.

**Microfiltration**

A pressure-driven membrane filtration process. The membranes typically operate at about 34.5 to 207 kPa (5 to 30 psi) of transmembrane pressure and can be used to remove particulates such as turbidity, Giardia and Cryptosporidium protozoa, and bacteria.

**Mixed-media Filters**

A filter containing filtering media of different particle size or density

**Nanofiltration**

A pressure-driven membrane filtration process used to remove dissolved organic matters and multivalent ions such as calcium and magnesium hardness ions. The membranes typically operated at about 352 to 880 kPa (50 to 125 psi) of transmembrane pressure.

**pH Adjustment**

The alteration of the pH of the raw water or prefinished water by mechanical or chemical procedures to enhance the performance of the treatment process.

**Recarbonation**

The process of introducing carbon dioxide as a final stage in the lime-soda ash softening process in order to convert carbonates to bicarbonates and thereby stabilize the solution against precipitation of carbonates.

**Reverse Osmosis**

Passage of water from a concentrated solution through a semipermeable membrane to fresh water with the application of pressure.

**SCADA Instrumentation**

The **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition system is a computer-based system that monitors and controls remote water facility sites. A SCADA master control is typically located in a dedicated control center or treatment plant control room. Remote sites are equipped with remote terminal units to gather information and issue controls from the master station.

**Solids Composting**

Mixing of sludge with decaying organic material for eventual use as fertilizer.

**Stability or Corrosion Control**

The removal of dissolved gases, treatment of the finished water to make it noncorrosive and building of protective coating inside the pipe.

**Tube Sedimentation**

Tube settlers or high rate settlers are placed in rectangular or circular basins. Water enters the inclined settler tubes and is directed upward through the tubes. Each tube functions as a shallow settling basin. Particles collect on the inside surfaces of the tubes or settle to the bottom of the basin.

**Ultra-Filtration**

The process of removing colloidal and dispersed particles from a liquid by passing the liquid through a membrane under high pressure. Ultrafiltration membrane typically operated at about 138 to 517 kPa (20 to 75 psi)

**Up-flow Solid-Contact Sedimentation**

Unit which combines the coagulation, flocculation, and sedimentation processes into a single basin, which is either rectangular or circular in shape. Flow is in an upward direction through a sludge blanket or slurry of flocculated, suspended solids.

**Urban Runoff**

During dry periods, oil, grease, gasoline, and other residues accumulate on paved surfaces. When storms begin, this material is washed into local receiving water from roadway storm drainage systems. Urban runoff also contains animal droppings from pets and fertilizers used for landscaping. Contributes to taste and odor complaints.

## Waterworks Point Rating System

Item	Points
<b>Size (2 point minimum to 20 point maximum)</b>	
Maximum population or part served, peak day (1 point minimum to 10 point maximum)	1 pt per 10,000 or part
Design flow average day or peak month's flow average day, whichever is larger (1 point minimum to 10 point maximum)	1 pt per MGD or part
<b>Water supply sources</b>	
Groundwater	3
Groundwater under the influence of surface water	5
Surface water	5
Average raw water quality varies enough to require treatment changes 10% of the time – range of 0 to 10 points with the following guidelines: Little or no variation = 0 points High variation (Raw water quality subject to periodic serious industrial waste pollution) = 10 points	0–10 <sup>a</sup>
<b>Chemical Treatment/Addition Process</b>	
Fluoridation	5
Potassium permanganate (KmnO <sub>4</sub> )	5
Disinfection	
• Gaseous chlorine	5
• Liquid or powdered chlorine	5
• Chlorine dioxide	5
• Ozonization (on-site generation)	10
pH adjustment (Calcium carbonate, carbon dioxide, hydrochloric acid, calcium oxide, calcium hydroxide, sodium hydroxide, sulfuric acid, other)	5
Stability or Corrosion Control (Calcium oxide, calcium hydroxide, sodium carbonate, sodium hexametaphosphate, other)	10
<b>Coagulation &amp; Flocculation Process</b>	
Chemical addition (1 point for each type of chemical coagulant added, maximum 5 points) (Aluminum sulfate, bauxite, ferrous sulfate, ferric sulfate, calcium oxide, bentonite, calcium carbonate, carbon dioxide, sodium silicate, other)	0–5
Rapid mix units	
• Mechanical mixers	3
• Injection mixers	2
• In-line blender mixers	2
Flocculation tanks	
• Hydraulic flocculators	2
• Mechanical flocculators	3

<b>Clarification/Sedimentation Process</b>	
Horizontal-flow (rectangular basins)	5
Horizontal-flow (round basins)	7
Up-flow solid-contact sedimentation	15
Inclined-plate sedimentation	10
Tube sedimentation	10
Dissolved air flotation	30
<b>Filtration Process</b>	
Single media filtration	3
Dual or mixed media filtration	5
Microscreens	5
Diatomaceous earth filters	5
Cartridge filters	5
Slow sand filters	5
Direct filtration	5
Pressure or greensand filtration	20
<b>Other Treatment Processes</b>	
Aeration	3
Packed tower aeration	5
Ion-exchange/softening	5
Lime-soda ash softening	20
Copper sulfate treatment	5
Powdered activated carbon	5
<b>Special Processes (reverse osmosis, electro dialysis, other)</b>	15
<b>Residuals Disposal</b>	
Discharge to lagoons	5
Discharge to lagoons and then raw water source	8
Discharge to raw water	10
Disposal to sanitary sewer	3
Mechanical dewatering	5
On-site disposal	5
Land application	5
Solids composting	5

<b>Facility Characteristics</b>	
Instrumentation (0 point minimum to 6 point maximum)	
• The use of SCADA or similar instrumentation systems to provide data with no process operation	0
• The use of SCADA or similar instrumentation systems to provide data with limited process operation	2
• The use of SCADA or similar instrumentation systems to provide data with moderate process operation	4
• The use of SCADA or similar instrumentation systems to provide data with extensive or total process operation	6
Clearwell size less than average day design flow	5
<b>Laboratory control (0 point minimum to 15 point maximum)<sup>b</sup></b>	
Bacteriological/biological (0 point minimum to 5 point maximum)	
• Lab work done outside the plant	0
• Membrane filter procedures	3
• Use of fermentation tubes or any dilution method; fecal coliform determination	5
Chemical/physical (0 point minimum to 10 point maximum)	
• Lab work done outside the plant	0
• Push-button or visual methods for simple tests such as pH, settleable solids	3
• Additional procedures such as filtration, jar tests and alkalinity	5
• More advanced determinations such as numerous inorganics	7
• Highly sophisticated instrumentation such as atomic absorption, gas chromatography	10

### **\*Points for variation in raw water quality (0-10\*)**

The key concept is the variation or change in the quality of the raw water source. Suggested point values are:

- 0 for little or no variation; no treatment provided except chlorination
- 2 for raw water quality (other than turbidity) varies enough to require treatment changes approximately 10% of the time
- 5 for raw water quality (turbidity) varies severely enough to require pronounced and/or very frequent treatment changes
- 10 for raw water quality subject to periodic serious industrial waste pollution

<sup>b</sup> The key concept is to credit laboratory analyses done on-site by plant personnel under the direction of the operator in direct responsible charge with points from 0 to 15.

## **Appendix B**

### **Point Rating System for Wastewater Treatment Facilities**

#### **WASTEWATER TREATMENT DEFINITIONS**

##### **Activated sludge**

Wastewater treatment by aeration of suspended organisms followed by clarification, including extended aeration, Intermittent Cycle Extended Aeration System (ICEAS), and other similar processes. A sequencing batch reactor with the purpose of providing this form of treatment would be rated under this category.

##### **Biological or chemical/biological advanced waste treatment**

The advanced treatment of wastewater for nutrient removal including nitrification, denitrification, or phosphorous removal utilizing biological or chemical processes or a combination. If the facility is designed to nitrify based solely on detention time in an extended aeration system, only the points for nitrification by designed extended aeration should be given.

##### **Chemical addition**

The addition of a chemical to wastewater at an application point for the purposes of adjusting pH or alkalinity, improving solids removal, dechlorinating, removing odors, providing nutrients, or otherwise enhancing treatment, excluding chlorination for disinfection of effluent and the addition of enzymes or any process included in the Tertiary Chemical/Physical Processes. The capability to add a chemical at different application points for the same purpose should be rated as one application; the capability to add a chemical(s) to dual units should be rated as one application; and the capability to add a chemical at different application points for different purposes should be rated as separate applications.

##### **Chemical/physical advanced treatment following secondary**

The use of chemical or physical advanced treatment processes following (or in conjunction with) a secondary treatment process. This would include processes such as carbon adsorption, air stripping, chemical coagulation, and precipitation, etc.

##### **Chemical/physical advanced treatment without secondary**

The use of chemical or physical advanced treatment processes without the use of a secondary treatment process. This would include processes such as carbon adsorption, air stripping, chemical coagulation, precipitation, etc.

##### **Effluent treatment and disposal**

The ultimate treatment and disposal of the effluent onto the surface of the ground by rapid infiltration or rotary distributor or by spray irrigation. Subsurface treatment and disposal would be accomplished by infiltration gallery, injection, or gravity or pressurized drain field.

##### **Fixed-film reactor**

Biofiltration by trickling filters or rotating biological contactors followed by secondary clarification.

##### **Imhoff tanks (or similar)**

Imhoff tanks, septic tanks, spirogesters, clarigesters, or other single unit for combined sedimentation and digestion.

##### **Land application of biosolids by contractor**

The land application or beneficial reuse of biosolids by a contractor outside of the control of the operator in direct responsible charge of the wastewater treatment facility.

##### **Mechanical dewatering**

The removal of water from sludge by any of the following processes and including the addition of polymers in any of the following: vacuum filtration; frame, belt, or plate filter presses; centrifuge; or dissolved air flotation.

##### **Mechanical post-aeration**

The introduction of air into the effluent by mechanical means such as diffused or mechanical aeration. Cascade aeration would not be assigned points.

##### **Media filtration**

The advanced treatment of wastewater for removal of solids by sand or other media or mixed media filtration.

**Operator in Direct Responsible Charge**

Direct Responsible Charge (DRC) is accountability for and performance of active daily, on-site operation of a plant/system.

**Solids composting**

The biological decomposition process producing carbon dioxide, water, and heat. Typical methods are windrow, forced air-static pile, and mechanical.

**Solids stabilization**

The processes to oxidize or reduce the organic matter in the sludge to a more stable form. These processes reduce pathogens or reduce the volatile organic chemicals and thereby reduce the potential for odor. These processes would include lime (or similar) treatment and thermal conditioning. Other stabilization processes such as aerobic or anaerobic digestion and composting are listed individually.

**Waste Stabilization Ponds or Lagoons**

Open basins or reservoirs designed to treat or store wastewater.

## Wastewater Works Point Rating System

Item	Points
<b>Size (2 point minimum to 20 point maximum)</b>	
Maximum population equivalent (PE) or part served, peak day (1 point minimum to 10 point maximum)	1 pt per 10,000 or part
Design flow average day or peak month's part flow average day, whichever is larger (1 point minimum to 10 point maximum)	1 pt per MGD or part
<b>Variation in raw waste (0 point minimum to 6 point maximum)<sup>1</sup></b>	
Variations do not exceed those normally or typically expected	0
Recurring deviations or excessive variations of 100 to 200% in strength and/or flow	2
Recurring deviations or excessive variations of more than 200% in strength and/or flow	4
Raw wastes subject to toxic waste discharges	6
Impact of septage or truck-hauled waste (0 point minimum to 4 point maximum)	0–4
<b>Preliminary treatment</b>	
Plant pumping of main flow	3
Screening, comminution	3
Grit removal	3
Equalization	1
<b>Primary Treatment</b>	
Clarifiers	5
Imhoff tanks or similar	5
<b>Secondary Treatment</b>	
Fixed-film reactor	10
Activated sludge	15
Stabilization ponds without aeration	5
Stabilization ponds with aeration/Aerated lagoons	8
<b>Tertiary Treatment</b>	
Polishing ponds for advanced waste treatment	2
Chemical/physical advanced waste treatment w/o secondary	15
Chemical/physical advanced waste treatment following secondary	10
Biological or chemical/biological advanced waste treatment	12
Nitrification by designed extended aeration only	2
Ion exchange for advanced waste treatment	10
Reverse osmosis, electrodialysis and other membrane filtration techniques	15
Advanced waste treatment chemical recovery, carbon regeneration	4
Media filtration	5

<b>Additional Treatment Processes</b>	
Chemical additions (2 points each for a maximum of 6 points)	0–6
Dissolved air flotation (for other than sludge thickening)	8
Intermittent sand filter	2
Recirculating intermittent sand filter	3
Microscreens	5
Generation of oxygen	5
<b>Solids Handling</b>	
Solids stabilization	5
Gravity thickening	2
Mechanical dewatering	8
Anaerobic digestion of solids	10
Utilization of digester gas for heating or cogeneration	5
Aerobic digestion of solids	6
Evaporative sludge drying	2
Solids reduction (including incineration, wet oxidation)	12
On-site landfill for solids	2
Solids composting	10
Land application of biosolids by contractor	2
Land application of biosolids under direction of facility operator in direct responsible charge	10
<b>Disinfection (0 point minimum to 10 point maximum)</b>	
Chlorination or ultraviolet irradiation	5
Ozonation	10
<b>Effluent disposal (0 point minimum to 10 point maximum)</b>	
Mechanical post aeration	2
Direct recycle and reuse	6
Continuous discharge into non-sensitive receiving water body	6
Controlled or intermittent discharge into non-sensitive receiving water body	4
Effluent irrigation	4
Evaporation	2
Subsurface	4
<b>Instrumentation (0 point minimum to 6 point maximum)</b>	
The use of SCADA or similar instrumentation systems to provide data with no process operation	0
The use of SCADA or similar instrumentation systems to provide data with limited process operation	2
The use of SCADA or similar instrumentation systems to provide data with moderate process operation	4
The use of SCADA or similar instrumentation systems to provide data with extensive or total process operation	6

<b>Laboratory control (0 point minimum to 15 point maximum)<sup>2</sup></b>	
Bacteriological/biological (0 point minimum to 5 point maximum)	
• Lab work done outside the plant	0
• Membrane filter procedures	3
• Use of fermentation tubes or any dilution method; fecal coliform determination	5
Chemical/physical (0 point minimum to 10 point maximum)	
• Lab work done outside the plant	0
• Push-button or visual methods for simple tests such as pH, settleable solids	3
• Additional procedures such as DO, COD, BOD, gas analysis, titrations, solids, volatile content	5
• More advanced determinations such as specific constituents; nutrients, total oils, phenols	7
• Highly sophisticated instrumentation such as atomic absorption, gas chromatography	10

- 1 The key concept is frequency and/or intensity of deviation or excessive variation from normal or typical fluctuations; such deviation can be in terms of strength, toxicity, shock loads, I/I, with points from 0 to 6.
- 2 The key concept is to credit laboratory analyses done on-site by plant personnel under the direction of the operator in direct responsible charge with points from 0 to 15.

## **Appendix C**

### **Educational Course Assessment for The Operator Certification Program**

#### **Equivalent Time Calculation**

For the purpose of calculating time allocation, one year of post high school is equal to 30 credit hours of university courses based on five classes each of 3 credit hours per semester over two semesters; 1,200 hours of course content from a technical school; 45 CEU's of training in an appropriate field; or completion of a full year of course content in an appropriate field of study as defined below.

#### **Appropriate Field of Studies - Completed Degrees and Diplomas**

For the purpose of completed degrees and diplomas a DACUM will be used to assess the acceptability of the program. The DACUM establishes the minimum course content requirements to meet the training needs of an operator. The DACUM for water and wastewater operators requires that any degree or diploma include the minimum of:

- ◆ courses in mathematics or physics
- ◆ courses in environmental studies, water/wastewater or related fields
- ◆ courses in a natural science (Biology, Chemistry...)
- ◆ courses in administration or management

In general, the following areas of study are appropriate as post secondary education fields:

- ◆ A Bachelor Degree in Science, Medicine or Engineering resulting in a B.Sc., B.A.Sc. or B.Eng. This can include Agriculture, Biology, Laboratory Studies and Chemistry degrees.
- ◆ A diploma in the field of Applied Science and Technology, Laboratory Studies, Medical Studies, or Engineering Technology.

If a degree or diploma does not meet the minimum DACUM requirements, the applicant will be advised of the missing component(s) and be required to supplement their education by attending CEU accredited courses or by other education means.

The Certification Board will review and assess non-traditional education programs not addressed by this policy as required. The assessment will be based on a common understanding of educational requirements needed for an operator to perform their duties.

## **Appropriate Field of Studies - Partial Degrees and Diplomas**

For the purpose of partially completed degrees and diplomas, the following classes will be counted towards the post secondary educational requirements:

- ◆ any and all courses included in Table 1.
- ◆ no more than seven (7) courses from a University or Technical College included in Table 2.
- ◆ no more than three (3) courses from a University or Technical College included in Table 3.

For partial degree/diploma credit, the applicant must provide sufficient information concerning courses taken and the contact hours received and passed, for the Operator Certification Board to review and rule on. With the variability of education criteria, no one submission format has been developed. In general, submission of educational information for assessment by the Board needs to be submitted in a detailed and assessable format. This should include presenting the information in a tabular form that includes information identifying the class name, a class description/outline, calculation of course credit (contact hours, credit hours, etc). The applicant should work closely with the educational institution to ensure sufficient supporting documentation is submitted to the Board for review as to the acceptability of the course content as defined under Tables 1, 2 and 3.

The Board's responsibility rests with the assessment of an operator's qualifications and not with compiling the information in a coherent and manageable format. If the submission is unclear or raises new questions, the Board has the right to address these issues with the applicant and hold off on issuing any certificate until satisfied of course integrity.

The Certification Board will review and assess non-traditional courses not addressed in the following tables as required. The assessment will be based on a common understanding of educational requirements needed for an operator to perform their duties.

**TABLE 1**

Engineering	Any class listed under the Faculty, Department or College of Engineering Calendar from a University or Technical College
Natural Sciences	Biology, Microbiology, Biochemistry, Chemistry as listed by a University or Technical College.
General Sciences	Computer Science, Mathematics, Statistics, Physics, Laboratory Procedures, Medical Field as listed by a University or Technical College.

**TABLE 2**

Administration	Courses relating to accounting, finance, production, operational management or public sector management as listed by a University or Technical College.
Economic	Any economic course as listed by a University or Technical College.
Education	Science related (per definition under Table 1) courses for high school education requirements as listed by a University or Technical College

**TABLE 3**

Arts	English, Geography, Geology, Sociology, Psychology, Anthropology, History or Political Science as listed by a University or Technical College. NOTE: language courses or fine art program courses are not acceptable.
Education	Business related courses for high school education requirements as listed by a University or Technical College.

### **Journeyman, Technician and Apprentice Courses**

Due to the variability of course content, length and applicable subject matter in these types of programs, the Certification Board will require that detailed information concerning the program be submitted along with a copy of the transcript. This will include sufficient information to support the claim that the program studies is applicable to the fields of knowledge required by an operator.

Completed certificates may be allowed for credit towards post secondary education if the course length and content are applicable as determined by the Board. An assessment as to the percentage towards education credit will be provided by the Board after assessment is complete. Fields which may be appropriate include the following areas:

- ◆ electrician/electronics or instrumentation.
- ◆ pipe fitter/pump mechanic/plumber.
- ◆ pressure vessels/steam engineer certificate.

Typically, a Journeyman's certificate in areas such as carpentry, masonry or other general construction will not be accepted as equivalent educational knowledge under the Standards.