

# Industrial Water Survey: Manufacturing Industries, 2015

**This document is confidential when completed.**

*Version française disponible*

Please provide your e-mail address.

0009 E-mail address

Correct pre-printed information, if necessary, using the corresponding boxes below:

0001 Legal name

0002 Business name

0021 C/O

0028 Last name of contact

0008 First name of contact

0004 Address

0005 City  0006 Province/Territory or State

0053 Country  0007 Postal code/Zip code

## Please read before completing

### Authority

This survey is conducted under the authority of the *Statistics Act*, Revised Statutes of Canada, 1985, Chapter S-19.

**COMPLETION OF THIS QUESTIONNAIRE IS A LEGAL REQUIREMENT UNDER THE ACT.**

### Survey Purpose

This survey collects detailed information on water use in Canada by the manufacturing, mining and electrical power generating industries. The survey asks information on who uses water, how much, where and at what cost. These data will be used in the development of environmental accounts and indicators.

Your information may also be used by Statistics Canada for other statistical and research purposes.

### Confidentiality

Statistics Canada is prohibited by law from releasing any information it collects which could identify any person, business, or organization, unless consent has been given by the respondent or as permitted by the *Statistics Act*. Statistics Canada will use the information from this survey for statistical purposes.

### Return of Questionnaire(s)

Please return the completed questionnaire(s) to Statistics Canada within 30 days of receipt by mail, using the enclosed envelope, or fax it to 1-888-883-7999. **If you are unable to do so, call 1-866-445-4323** (toll free) to inform us of the expected completion date. Lost the return envelope, need help to complete your questionnaire(s)? Call us at **1-866-445-4323** (toll free).

### Fax or E-mail Transmission Disclosure

Statistics Canada advises you that there could be a risk of disclosure during the transmission of information by facsimile or e-mail. However, upon receipt, Statistics Canada will provide the guaranteed level of protection afforded all information collected under the authority of the *Statistics Act*.

### Data-sharing Agreements

To reduce respondent burden, Statistics Canada has entered into data sharing agreements with provincial and territorial statistical agencies and other government organizations, which have agreed to keep the data confidential and use them only for statistical purposes.

Information on data-sharing agreements and record linkages can be found on page 8 of this questionnaire.

Person primarily responsible for completing this questionnaire, if different from above:

0026	1 <input type="radio"/> Mr.	2 <input type="radio"/> Mrs.	3 <input type="radio"/> Miss	4 <input type="radio"/> Ms	5 <input type="radio"/> Dr.	0017	Telephone number	0027	Extension
							<input type="text"/>		<input type="text"/>
0054	Last name					0016	Fax number		
	<input type="text"/>						<input type="text"/>		
0013	First name					0020	Website address		
	<input type="text"/>						<input type="text"/>		
0014	Title					0018	E-mail address		
	<input type="text"/>						<input type="text"/>		

**REPORTING YEAR: JANUARY 1, 2015 TO DECEMBER 31, 2015**

NOTE i) Water volumes are to be reported in the units in use at this facility; please **mark only one selection** and use this unit of measure throughout the questionnaire.

Line  
1

C0101

1  cubic metres

C0102

2  other – specify

**IMPORTANT**

If reporting in multiples of a unit of measure, please take care to enter the correct decimal values or number of zeros. (i.e., if *other*, above, is specified as *thousands* of litres, note that a reported quantity of 3 = 3,000 (*3 thousand*) litres, whereas a reported quantity of 3,000 = 3,000,000 (*3 million*) litres).

If reporting in gallons, please specify Imperial or U.S. gallons.

ii) Where data are not available, please estimate.

**SECTION 1: MONTHLY AND ANNUAL TOTAL WATER INTAKE AND DISCHARGE**

**INSTRUCTIONS**

- (i) In this section, under intake, please report by month the quantity of “new water” brought into your operation. For the purpose of this questionnaire “new water” is defined as water introduced for the first time into this establishment **regardless of source or quality** (including sanitary/domestic water intake).
- (ii) Where you supply water to adjacent or tenant industry(ies) or municipality(ies), please report estimated water intake for your establishment only.
- (iii) Under discharge, please report the quantity of water routed to its ultimate point of discharge (including sanitary/domestic discharge).
- (iv) Under discharge **do not report** the volume of water released to ponds, lagoons or basins and intended for recirculation or reuse until such water is actually discharged to a location beyond the control of the establishment.
- (v) Under discharge **do not include** any water lost in production through evaporation, permanently held in open or closed storage, or otherwise consumed (e.g. included in a final product).

Month	Volume per month	
	Intake	Discharge
2 January	C1001	C1101
3 February	C1002	C1102
4 March	C1003	C1103
5 April	C1004	C1104
6 May	C1005	C1105
7 June	C1006	C1106
8 July	C1007	C1107
9 August	C1008	C1108
10 September	C1009	C1109
11 October	C1010	C1110
12 November	C1011	C1111
13 December	C1012	C1112
14 <b>ANNUAL TOTAL</b>	C1013	C1113

15 If total discharge volume (C1113) is greater than total intake volume (C1013), please indicate reason:

C1201

**SECTION 2: WATER INTAKE BY SOURCE AND KIND**

**INSTRUCTIONS**

- (i) Please report your volumes of intake water by source and its usual characteristic.
- (ii) Freshwater is defined as water containing 900 parts per million, or less, of total dissolved solids.
- (iii) Saline / brackish water is defined as water containing more than 900 parts per million of total dissolved solids.

**Where data are not available, please estimate.**

Source		Volume per year	
		Freshwater	Saline / Brackish
16	Public water utility system .....	C2401	XXXX
17	Self-supplied surface water system (lake, river, etc.) .....	C2402	XXXX
18	Self-supplied groundwater system (well, spring, etc.) .....	C2403	C2203
19	Self-supplied tide water (salt water) body (estuary, bay, ocean, etc.) .....	XXXX	C2204
20	Other sources ( <i>specify</i> ) C2000	C2405	C2205
21	<b>TOTAL</b> .....	C2406	C2206

**NOTE:** The sum of C2406 and C2206 (line 21, above) should equal C1013 at line 14 on previous page.

**Estimated annual cost of water acquisition:**

22 Payment to public utility (for water volume at line 16, above)..... C2301 \$ 

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 .00  
Millions Thousands Hundreds

23 If reporting payment to a public utility (line 22, above), does this payment include a sewer surcharge? C2305 1  Yes 3  No

24 Estimated annual operating and maintenance costs of intake water acquisition (excluding water treatment costs which are covered on the next page). Operating and maintenance costs should only include your material, labour and energy costs incurred to operate and maintain your systems that bring water into your facility..... C2302 \$ 

--	--	--	--	--	--	--	--	--	--	--

 .00  
Millions Thousands Hundreds

25 Cost of your annual intake licence (estimate if permit not purchased annually)..... C2303 \$ 

--	--	--	--	--	--	--	--	--	--	--

 .00  
Millions Thousands Hundreds

26 Payment for purchase of water from another operator / industrial supplier..... C2304 \$ 

--	--	--	--	--	--	--	--	--	--	--

 .00  
Millions Thousands Hundreds

**SECTION 3: INTAKE WATER - TREATMENT**

27 Did this establishment treat any **intake** water?

C3001 1  Yes  
3  No → If no, go to Section 4

**INSTRUCTIONS**

(i) Indicate the volume of intake **water treated** within your establishment prior to initial use. Do not include treatment of water for re-use.

**Where data are not available, please estimate.**

Category of treatment	Volume per year
28 Screening.....	C3201
29 Filtration.....	C3202
30 Chlorination - disinfection (includes for process and for biological control).....	C3203
31 Corrosion and slime control.....	C3204
32 Alkalinity control.....	C3205
33 Hardness (or water softening).....	C3206
34 Coagulation / flocculation.....	C3207
C3213 Other (specify).....	C3210
C3214 Other (specify).....	C3211
C3215 Other (specify).....	C3212

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36 Estimated annual operating and maintenance cost of your intake water treatment. Operating and maintenance costs should only include your material, labour and energy costs incurred to operate and maintain systems to treat water brought into your facility.....

C3101 \$ 

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

 .00  
 Millions          Thousands          Hundreds





## SECTION 7: OTHER DETAILS

55 **Capital expenditures** on water intake, discharge or treatment facilities made at this establishment for 2015. Include all relevant outlays for machinery and equipment purchases, and their installation, as well as for construction related to water intake, discharge and treatment .....

C7010

\$

Millions			Thousands			Hundreds			

.00

### Comments

Approximately how long did it take to collect the data and complete this survey?

C9910

Hour(s)

C9909

Minutes

We invite your comments or suggestions on the following or any other topic related to the *Industrial Water Survey*. We appreciate your assistance.

- Questionnaire content
- New questions of interest to your industry
- Clarity of questions
- Order and flow of questions
- Timing of receipt of questionnaire and the period given for response
- Alternative sources of information to further reduce response burden

C9920

C9913

C9914

C9915

C9916

C9917

C9918

C9919

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## General Information

### Confidentiality

#### Your answers are confidential.

Statistics Canada is prohibited by law from releasing any information it collects which could identify any person, business, or organization, unless consent has been given by the respondent or as permitted by the *Statistics Act*. Statistics Canada will use the information from this survey for statistical purposes.

### Data-sharing agreements

To reduce respondent burden, Statistics Canada has entered into data sharing agreements with provincial and territorial statistical agencies and other government organizations, which have agreed to keep the data confidential and use them only for statistical purposes. Statistics Canada will only share data from this survey with those organizations that have demonstrated a requirement to use the data.

**Section 11** of the *Statistics Act* provides for the sharing of information with provincial and territorial statistical agencies that meet certain conditions. These agencies must have the legislative authority to collect the same information, on a mandatory basis, and the legislation must provide substantially the same provisions for confidentiality and penalties for disclosure of confidential information as the *Statistics Act*. Because these agencies have the legal authority to compel businesses to provide the same information, consent is not requested and businesses may not object to the sharing of the data.

For this survey, there are **Section 11** agreements with the provincial and territorial statistical agencies of Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, and the Yukon.

The shared data will be limited to information pertaining to business establishments located within the jurisdiction of the respective province or territory.

**Section 12** of the *Statistics Act* provides for the sharing of information with federal, provincial or territorial government organizations. Under **Section 12**, you may refuse to share your information with any of these organizations by writing a letter of objection to the Chief Statistician and returning it with the completed questionnaire. Please specify the organizations with which you do not want to share your data.

For this survey, there are **Section 12** agreements with the statistical agencies of Prince Edward Island, the Northwest Territories and Nunavut as well as with Environment Canada.

For agreements with provincial and territorial government organizations, the shared data will be limited to information pertaining to business establishments located within the jurisdiction of the respective province or territory.

### Record linkages

To enhance the data from this survey and to minimize the reporting burden, Statistics Canada may combine it with information from other surveys or from administrative sources.

If you have questions, please contact us.

Telephone (toll free): 1-866-445-4323

Fax: 1-888-883-7999 (within Canada)

Please return this questionnaire in the envelope provided.  
THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY!



## Reporting Guide

### FRONT PAGE

#### INSTRUCTIONS

##### Label

Enter any changes or corrections to the pre-printed label information on the lines to the right of the label.

Please ensure that the listed contact person is the person responsible for completion of the questionnaire, regardless of who is actually completing it.

##### 'Please read'

Please read all front page information before completing the questionnaire.

##### Respondent Information Blocks

In this area, please enter the contact information for the person completing the questionnaire **IF** different from the person responsible for ensuring completion of the questionnaire (listed on the mailing label).

### Page 2:

### REPORTING YEAR & NOTES

#### INSTRUCTIONS

##### Reporting year

All reported information should be for the calendar year from January 1<sup>st</sup> to December 31<sup>st</sup>, 2015.

##### Unit of measure

Please indicate the unit of measure used in the facility.

If the unit of measure is not cubic metres, check item 2 (other) and specify the unit of measure that is used.

If more than one unit of measure is used by the facility, select one unit of measure and convert all volumes from the other unit of measure into the selected one. If unable to do so, please clearly indicate the unit of measure used for each question.

If reporting in multiples of a unit of measure, be sure to enter the correct decimal values or number of zeros. For example, if the volume of water is 3,000 litres and the specified unit of measure is thousands of litres, the reported figure should be '3' because '3' in 'thousands of litres' = 3,000 litres.

Also, if reporting in gallons, please specify Imperial or U.S. gallons.

##### Cost reporting

All costs are to be reported in Canadian dollars. Please omit cents.

##### Estimates

Actual costs and quantities should be reported if these data are available; where unavailable, please estimate these figures to the best of your ability.

### SECTION 1: MONTHLY AND ANNUAL TOTAL WATER INTAKE AND DISCHARGE

#### GENERAL

This section gathers the volume of all water that enters and leaves the facility on a monthly basis.

Normally, though not always, discharge is less than or equal to intake.

#### INSTRUCTIONS

##### Intake

*Include:*

- sanitary / domestic water intake

*Exclude:*

- bottled drinking water

- water contained in other liquid products brought into the facility (e.g., paints, beverages)

- water brought in and distributed to other industries/ municipalities

It is not uncommon for public utilities to bill their customers on a basis that differs from the standard calendar month, for example, January 4 to February 3. Volumes from a Jan 4 – Feb 3 period would be acceptable as a 'January' entry.

Similarly, if billed bi-monthly (bill covers a 2-month period) or quarterly, simply divide the volume equally amongst all months covered by that billing period.

##### Discharge

*Include:*

- sanitary / domestic water discharge

*Exclude:*

- water supplied by the facility to other companies, industries or municipalities

- water released into a facility-owned holding tank, settling tank, pond or lagoon for re- (or alternate) use

- water lost in production through evaporation, water permanently held in open or closed storage or water otherwise consumed (i.e. included in a final product)

- water injected into deep-hole disposal wells **if** this water is considered irretrievable

**15** If discharge is greater than intake, please explain why on this line.

## GLOSSARY

### New water

Water introduced for the first time into the facility **regardless of source or quality**.

### Sanitary service / Domestic use:

Water used for such purposes as drinking, food preparation, flushing toilets, washing clothes and dishes, bathing and watering lawns and gardens.

### Water intake

New water brought into the facility.

### Supply of water to adjacent industries / municipalities

Some facilities that are equipped to draw water take in higher volumes of water than needed by their facility and supply the excess water to other nearby companies and, in some instances, to the municipality.

### Water discharge

Release or disposal of water, whether or not treated or used.

### Ultimate point of discharge

The final location at which the used water is released by the facility. This is the point at which the water ceases to be under the control of the facility.

## SECTION 2: WATER INTAKE BY SOURCE AND KIND

### GENERAL

This section gathers information on the source and type of intake water and its cost.

### INSTRUCTIONS

**21** Please ensure that all intake water is accounted for on lines **16** to **20** and that the sum of the totals on line **21** is equal to the volume of water reported at C1013 (on line **14**, Section 1).

**22** If a water source (**16** through **20**) is identified as a public water utility system (line **16**), the corresponding cost of acquisition should be entered here.

If the cost is unknown because it is included in your rent, please indicate this in the *Comments* section on the last page of the questionnaire).

Ideally, the amount reported at line **22** should include only the portion paid for water and exclude any sewer charges but, if the water-only cost cannot be determined, and the reported public utility payment includes both water and sewer charges, please tick YES at line **23**.

**24** If a water source is identified as one or more self-supplied systems (lines **17**, **18** or **19**), the corresponding operating and maintenance cost(s) of acquisition should be entered here. If your water is from a well and there is no corresponding cost for operation and maintenance for this reporting year, please indicate that in the *Comments* section on the last page of the questionnaire.

**25** If water sources include one or more of lines **17**, **18**, **19** or **20**, the cost of acquisition may include an annual intake licence.

### **26** Payment for purchase of water from another operator / industrial supplier

If water from other sources is reported at line **20**, report the purchase price, if applicable, here.

## GLOSSARY

### Water source

The location or place from which new water (see *Section 1 Glossary*) is obtained.

### Water type (intake)

For the purposes of the Industrial Water Survey (IWS), there are two types of intake water: freshwater and saline/brackish water.

#### a) Freshwater

Fresh water, at 900 parts per million (PPM, sometimes also reported in mg/L) or less of total dissolved solids (TDS), has a very low mineral or foreign-body content.

#### Include:

- water from public utility systems, water from wells and springs (unless saline) and water from lakes, streams and rivers.

#### b) Saline/Brackish (salt) water

Saline water, at over 900 PPM of TDS, is also called 'salt', 'brackish' or 'sea' water. The most common sources are oceans or seas and their estuaries, however, salt water can also be found in water on or near salt flats, as is the case in Alberta, where it is not uncommon for oil and gas wells to encounter saline water while drilling.

### **16** Public water utility system

A municipally-owned system of drawing, treating and distributing water to residences and business facilities within the municipality. A fee is usually charged, based on the volume of water intake.

### **17** Self-supplied surface water system

The facility draws water from a lake, river, pond or stream through their own system of pumps, pipes, hoses, etc.

### **18** Self-supplied groundwater

The facility draws water from a well or spring through their own system of pumps, pipes, hoses, etc. (Groundwater: water found under-ground, in the saturated zone below the water table).

### **19** Self-supplied tide water

The facility draws water from the ocean (including ocean bays or estuaries) through their own system of pumps, pipes, hoses, etc.

### **20** Other water sources

While uncommon, other sources include truck deliveries of water from a private supplier (either bulk or bottled), rain water (both cisterns and storm run-off holding tanks) and glacial/snow-melt run-off water. Do not include bottled water intended for personal consumption.

## 24 Operating & maintenance costs – water intake

These are the ordinary expenses of operating and maintaining the facilities, machinery or equipment (e.g. pumps) to bring water into your operation.

**NOTE:** If you are unable to separate (or estimate) your operating and maintenance costs between water intake, treatment, recirculation and discharge at lines 24, 36, 47 and 53, please enter the total amount on one of these lines and note which other categories it includes in the *Comments* section on the last page of the questionnaire.

## 25 Annual intake licence

Water is a Crown-owned resource in Canada, and provincial and territorial ministries of natural resources manage its use. Each province and territory has its own legislation. The requirement for a water licence varies between industries and between provinces/territories. Water licences are obtained from the provincial/territorial authority. Water-power projects require a water licence under the *Canada Water Act*.

## SECTION 3: INTAKE WATER – TREATMENT

### GENERAL

Section 3 collects information about specific treatments to intake water in preparation for use (treatment of used water in preparation for discharge is reported in Section 6, grouped by more general treatment categories).

Treatment of self-supplied intake water is often required before it can be used, whether for sanitary/domestic purposes or as process water. Treatment is required less often for intake water supplied by a public utility.

Some facilities treat all of their intake water; others treat only a portion of it, for specific uses.

### INSTRUCTIONS

#### 28 – 35 Exclude:

- treatment of used water, waste water or effluent.

**35** The type of treatment should be specified for any 'Other' volumes reported here.

#### 36 Include:

- only material, labour and energy costs incurred to operate and maintain systems to treat water brought into the facility.

Treatment for specific conditions not listed here (i.e., sludge, scale, etc.) should be categorized in this section according to the type of treatment used.

It is possible to have a combined dual-purpose chemical treatment that applies to more than one treatment category (e.g. a substance for scale control, which deals with both alkalinity and corrosion).

In such instances, the volume should be reported on both applicable lines (double-reported).

3<sup>rd</sup>-party water treatment – where intake water is routed to a treatment facility that belongs to a separate company (whether same or different ownership as the surveyed facility) – should be included in this section.

### GLOSSARY

*Treatments:*

#### 28 Screening

In the screening process, water is passed through a screen barrier that removes larger pieces of solid matter from the water.

#### 29 Filtration

In the filtration process, water is passed through a filter barrier (membrane, sand, charcoal, etc.) that removes smaller particles of solid matter from the water.

In many industrial operations, filtration and screening systems can be very similar. The defining difference is in the size of the particles removed by the process; filtered particles are much smaller than screened particles.

*Common purposes:* de-chlorination (beverage industry).

#### 30 Chlorination & disinfection

In this process, chlorine and/or other disinfectants (i.e., calcium hypo-chlorite) are added to the water.

*Common purposes:* sterilization, control of zebra mussels

#### 31 Corrosion and slime control

It is vital for heat exchange equipment to be kept free of insulating deposits that promote high energy consumption.

The four principal sources of these deposits in the case of water cooled systems are:

scale, corrosion, biological growths and sludge

(these factors have a direct effect on equipment life)

*Application:* heat exchange equipment

#### 32 Alkalinity control

A chemical treatment to attain a specifically-required pH level.

*Application:* cooling towers, boilers

### 33 Hardness (water softening)

The removal of calcium and magnesium from water to reduce hardness.

*Application:* cooling towers, boiler feed water

Hardness treatment can also involve the addition of minerals to correct for water that is too soft for its intended purpose.

*Can apply to:* breweries

### 34 Coagulation / flocculation

Coagulation is the de-stabilisation of colloid particles by the addition of a reactive chemical, called a coagulant. This happens through neutralization of the charges.

Flocculation is the accumulation of the de-stabilized particles and micro-flakes, and subsequently, the formation of sizeable flakes. One must add another chemical, called a flocculent, in order to facilitate the formation of flakes called flocs.

These combined processes serve to absorb unwanted particles in order to easily remove them from the water.

*Used in:* beverage industry

### 35 Other treatments

Only treatments not listed above should be listed here; they must be specified.

Other treatments can include: electrolysis, anaerobic, chelation, de-salination (usually accomplished by reverse osmosis & distillation), etc.

### 36 Operating and maintenance cost – water treatment

These are the ordinary expenses of operating and maintaining the facilities, machinery or equipment to treat water before it can be used in your operations.

## SECTION 4: WATER INTAKE BY PURPOSE

### GENERAL

Section 4 categorizes the volume of intake water according to its initial use.

The three categories of initial use are: process water, water used for cooling, condensing or steam and water used for sanitary or domestic use. Water for initial use outside of these three categories should be reported on line 40 (Other uses) and a description should be provided.

Many facilities use (or re-use) water in more than just one way.

### INSTRUCTIONS

Water for initial use outside of the three listed categories should be reported on line 40 (Other uses) and a description should be provided.

*Exclude:*

- re-circulated water (*for definition, see Section 5*)

Exception: water originally used for another purpose but now in use as process water

### GLOSSARY

#### 37 Process water

This is water that serves in any level of the manufacturing process.

*Include:*

all water **which comes in direct contact** with products and/or materials

water used in the sanitation of process equipment

water consumed in milling and special processes

water included in final output

water originally used for another purpose but now in final use as process water

#### 38 Cooling, condensing and steam

This is water **which does not come in direct contact** with the products, materials or by-products of the processing operation.

*Includes:* pass-through water used in the operation of cooling or process equipment (including air conditioning) and water introduced into boilers for the production of steam for either process operations or electric power.

#### 39 Sanitary service / Domestic use

(*for definition, see Section 1*)

#### 40 Other uses

Volumes for other uses, though unlikely, should be reported here, with the type of use clearly specified.

*Exclude:*

- water pumped by the facility, and intended for initial use outside the facility

## SECTION 5: WATER RECIRCULATED OR REUSED BY PURPOSE

### GENERAL

This section determines whether the facility re-circulates or re-uses water and, if so, the purpose and quantity, and the cost to do so.

### INSTRUCTIONS

Volumes of re-circulated/re-used water should be listed on lines **43** to **45**, according to the type of use, and their total reported on line **46**.

Volumes for other uses, though unlikely, should be reported on line **45**, with the type of use clearly specified.

The same water may be recycled many times, e.g. water discharged to a cooling pond and then re-used. Every time that volume of water is re-used it should be counted.

All material, labour and energy costs of operating and maintaining such water recirculation systems should be reported on line **47**.

### GLOSSARY

#### **42** Re-circulated (*re-used*) water

Water used more than once in an industrial facility; applies mainly to cooling and processing activities. It only refers to water that leaves a particular subsystem and re-enters it or is used in another subsystem.

#### *Exclude:*

- water used a number of times within a particular system (i.e. **closed-loop systems**).

#### **Closed-loop systems** (*excluded*)

Cooling systems where water is withdrawn from a source, circulated through heat exchangers, then cooled and recycled. Subsequent water withdrawals are used to replace water lost to evaporation, blow-down, drift, leakage and, accordingly, results in a much smaller return flow than once-through cooling.

#### **43** Process water

(For definition, see section 4.)

#### **44** Cooling, condensing and steam

(For definition, see section 4.)

#### **47** Operating and maintenance cost – water re-circulation / re-use

The ordinary expenses of operating and maintaining the facilities, machinery or equipment needed to re-circulate or re-use water in your operations.

## SECTION 6: WATER DISCHARGE AND ITS TREATMENT

### GENERAL

Section 6 determines the proportion of used (or surplus) water that is treated, and that which is untreated, in preparation for discharge. Information is gathered concerning the volumes and destinations of discharged water, classified by broad category (primary, secondary and tertiary) of treatment (unlike Section 3, which asks about specific treatments to intake water in preparation for use).

**Note :** The sum of all entries on the 'point of discharge' grid, lines **49** to **52**, should equal the volume reported in C1113, at line **14** in Section 1.

### INSTRUCTIONS

**48** (Measurement) - If the water discharge is not metered or otherwise measured, please provide estimated quantities.

**49** to **52** (Treatment) - include sewage treatment.

**50** to **52** (Treatment) - for water that is subjected to more than one type (primary, secondary or tertiary) of treatment in preparation for discharge, please report those volumes only at the most advanced treatment process that is applied; in other words, please do not double-report treated water volumes in this section.

### GLOSSARY

*Measurement* –

#### **48** Volume-metered discharge

Water that is discharged through pipes may be metered.

#### **Other discharge measurement**

*Example:*

- the number of times a holding tank is emptied, multiplied by the number of gallons the tank holds.

*Point of discharge* –

#### **Public utilities**

Water discharged into a municipally-owned sewer system.

#### **Surface freshwater bodies**

Surface water bodies include: streams, creeks, rivers, ponds and lakes.

#### **Tide water**

Discharge into salt-water bodies such as oceans or seas should be reported here.

#### **Ground water**

Ground water disposal generally refers to water that is discharged into a well.

#### **Other discharge points**

Any point of discharge not encompassed by the first four categories.



Treatment –

#### 49 Water not treated at this facility before discharge

The volume of water that is discharged without treatment after use is reported here.

#### 50 Primary / mechanical treatment

The physical removal of large suspended, floating and precipitated solids from untreated wastewater using grates, screens and/or settling tanks.

#### 51 Secondary / biological treatment

The removal or reduction of effluent contaminants from primary wastewater treatment through the promotion of bacterial growth and other microbes that break down organic waste.

#### 52 Tertiary (advanced) treatment

Advanced cleaning of wastewater that goes beyond the secondary or biological stage, removing nutrients such as phosphorus, nitrogen, and most BOD and suspended solids through biological or chemical processes.

#### 53 Operating and maintenance cost - treatment of discharged water

These are the ordinary expenses of operating and maintaining the facilities, machinery or equipment to treat water before it is discharged by your operation.

#### 54 Effluent monitoring

Effluent is monitored to determine the need for, or effectiveness of, effluent treatment in order to ensure that government standards are achieved prior to discharge.

##### Effluent

The sewage or industrial liquid waste that is released into natural water by sewage treatment plants, industry, or septic tanks.

##### Biochemical oxygen demand (BOD)

A measure of how much dissolved oxygen is being consumed as microbes break down organic matter. A high demand can indicate that levels of dissolved oxygen are falling, with potentially dangerous implications if such effluent is released to surface or groundwater. High biochemical oxygen demand is a result of poorly treated wastewater.

The biochemical oxygen demand test has been used widely by regulatory agencies to gauge overall treatment plant efficiencies. The traditional BOD measurement of the plant influent, grit removal influent, and the final effluent gives the most common measure of treatment plant efficiency. The BOD of wastewater is a common indicator of the fraction of organic matter that may be degraded by microbial action at a given time period at a temperature of 20 degrees Centigrade. The test is related to the oxygen that would be required to stabilize the waste after discharging to a receiving body of water. The drop in BOD from grit removal effluent to final effluent is usually used in calculating the solids growth rate in the aeration tank.

##### Chemical oxygen demand (COD)

Chemical oxygen demand is another means of measuring the pollutional strength of wastewater. By using this method, most oxidizable organic compounds present in the wastewater sample may be measured.

COD measurements are preferred when a mixed domestic-industrial waste is entering a plant or where a more rapid determination of the load is desired.

The chemical oxygen demand test has a major advantage over the biochemical oxygen demand analysis because of the short time required for performance - a few hours as opposed to five days for the standard BOD test. Since this test can be run in several hours, it gives the operator a more timely idea of what is entering the plant and how the plant is performing. This permits closer operational control of the treatment process.

##### Suspended solids (SS)

Defined in waste management, these are small particles of solid pollutants that resist separation by conventional methods. Suspended solids (along with biological oxygen demand) are a measurement of water quality and an indicator of treatment plant efficiency.

Laboratory determinations of suspended solids (SS) in the influent, primary effluent, and final effluent are standard measurements used to indicate treatment plant efficiency. The SS measurements are used in calculating the sludge volume index (SVI) and sludge density index (SDI) - both important control tools. There is a distinction between *total suspended solids (TSS)* and *total volatile suspended solids (TVSS)*. TSS measures both the active bacterial mass and the inert materials in the waste or mixed liquor. TVSS is a more accurate estimate of the mass of active microorganisms in the mixed liquor and is the parameter to be used in calculating the food-to-micro-organism (F:M) ratio.

##### Phenols

Phenols, organic compounds that are hydro-carbon derivatives, are by-products of many different refining and manufacturing processes. Often found in wastewater, they can irritate skin and eyes, cause taste and odour problems in water, produce a bad taste in fish and, in higher concentrations, can kill aquatic life and humans.

##### Metals

Heavy metals enter marine and estuarine ecosystems through the discharge of industrial waste, treated sewage, storm-water run-off, mining operations and other diffuse sources (such as from vehicles). The most common heavy metal pollutants are arsenic, cadmium, chromium, copper, nickel, lead and mercury.

Heavy metals persist in the environment and so tend to accumulate in soils, sediments and living organisms. Organisms accumulate heavy metals in their tissues and this contamination is concentrated in organisms higher up the food chain ('bioaccumulation').

Heavy metal contamination can affect marine biota, fisheries and other aqua-cultural operations and human consumers of seafood. When they are discharged in large quantities from sewage or industrial or agricultural run-off, they can be extremely harmful. Heavy metals can accumulate in sediments. Some heavy metals such as lead, mercury and cadmium can move up the food chain into human food sources.

#### **pH (Acidity/Alkalinity)**

An expression of both acidity and alkalinity on a scale of 0 to 14, with 7 representing neutrality; numbers less than 7 indicate increasing acidity and numbers greater than 7 indicate increasing alkalinity. PH is a vital tool of the wastewater treatment plant operator when determining unit operations.

Alkalinity is a measure of a wastewater's capacity to neutralize. The determination of alkalinity levels at various points in a plant will be an aid to the proper understanding and interpretation of the treatment process. For example, if chemical addition is used to coagulate wastewater for solids removal, hydrogen ions may be released and cause the pH to decrease. Alkalinity tends to neutralize acids and permit coagulation to proceed in the proper pH range. Some other processes dependent on pH are disinfection, digestion, and sludge preparation and conditioning.

#### **Temperature**

Temperature monitoring of effluent is conducted to avoid damage to plants or animals from the release of effluent that is overly hot or cold.

#### **Colour**

Colour can be an indicator of various effluent conditions that are evaluated prior to effluent release.

#### **Acute lethality**

Acutely lethal, in respect of effluent, means that the effluent at 100 per cent concentration kills more than 50 per cent of the rainbow trout subjected to it during a 96-hour period, when tested in accordance with the acute lethality test.

#### **Other effluent monitoring**

These could include: total organic carbon (TOC), total oxygen demand (TOD), sludge density, settling test.

## **SECTION 7: OTHER DETAILS**

### **INSTRUCTIONS**

Only those capital expenditures that apply to water intake, discharge or treatment facilities should be included here.

### **GLOSSARY**

#### **55 Capital expenditures**

**Money spent to add, expand or upgrade physical assets such as property, buildings, machinery and equipment** (with the expectation that they will benefit the company over a period of more than one year).

*Also called capital spending, capital outlay or capital expense.*

The most common capital expenses include:

- purchase / installation of new equipment
- purchase of new machinery or transportation equipment
- creation of a new well or ground water installation

### **For Further Information and Assistance**

Remember, if you are experiencing difficulty in completing the survey or if you are not sure how to respond to a specific question, please call us at toll-free at **1-866-445-4323** and someone will be happy to assist you.