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Data Sources and Methods for the Managing Metal Mining Effluent Quality in Canada Indicator

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1. Introduction

The Managing Metal Mining Effluent Quality in Canada indicator (www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=E6575C51-1) is part of the Canadian Environmental Sustainability Indicators (CESI) program (www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=47F48106-1), which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the Federal Sustainable Development Strategy (www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1).

2. Description and rationale of the Managing Metal Mining Effluent Quality in Canada indicator

2.1 Description

The Managing Metal Mining Effluent Quality in Canada indicator presents the percentage of reported monthly average monitoring results for deleterious substances, pH levels and acute lethality tests that did not exceed authorized limits from 2003 to 2012. The indicator helps Environment Canada evaluate the effectiveness of pollution prevention and control technologies, practices and programs within the metal mining sector. This indicator summarizes the results achieved since the *Metal Mining Effluent Regulations* (MMER) came into effect in 2002, replacing and expanding the scope of the 1977 *Metal Mining Liquid Effluent Regulations*.

2.2 Rationale

The *Metal Mining Effluent Regulations* (MMER) came into force on December 6, 2002. The MMER include provisions to allow the discharge of metal mine effluent into fish-frequented water bodies, subject to certain requirements. Mines that are subject to the MMER may deposit an effluent that contains a deleterious substance if: (a) the concentration of the deleterious substance in the effluent does not exceed the authorized limits; (b) the pH of the effluent is equal to, or greater than, 6.0 but is not greater than 9.5; and (c) the effluent is not acutely lethal. An effluent is deemed non-acutely lethal if it kills less than 50% of the rainbow trout subjected to it at 100% concentration over a 96-hour period. Table 1 summarizes the monthly mean concentration limits, in milligrams per litre (mg/L) or in becquerel per litre (Bq/L), for the deleterious substances listed in the MMER.

Table 1: Authorized limits for deleterious substances (monthly means)

Substances	Monthly mean concentration limits
Arsenic	0.50 mg/L
Copper	0.30 mg/L
Cyanide	1.00 mg/L
Lead	0.20 mg/L
Nickel	0.50 mg/L
Zinc	0.50 mg/L
Total suspended solids	15.00 mg/L
Radium 226	0.37 Bq/L

Note: mg/L = milligrams per litre. Bq/L = becquerel per litre. Monthly mean limits are one of three types of limits included in the MMER, the others being the maximum authorized concentration in a composite sample and the

maximum authorized concentration in a grab sample. More information about these is available in Schedule 4 of the Regulations.

3. Data

3.1 Data source

This indicator uses monthly mean compliance data provided by metal mines to Environment Canada under section 22 of the *Metal Mining Effluent Regulations* (MMER). Environment Canada makes these data available through the annual release of the Summary Review of Performance of Metal Mines Subject to the *Metal Mining Effluent Regulations* (www.ec.gc.ca/Publications/default.asp?lang=En&xml=2474D1A5-A3E2-4C32-8F90-672C75A9B808).

The frequency of test measurement varies depending on the individual mine and its performance. Under the MMER, operators are required to test the effluent at each discharge point weekly, and record the results for all deleterious substances. However, this frequency can be reduced to once per quarter for certain substances (arsenic, copper, cyanide, lead, nickel and zinc) if the concentration of the substance from a discharge point is less than 10% of the MMER monthly mean concentration limit for that substance over a period of 12 consecutive months. The reporting frequency for radium 226 can also be reduced to once per quarter for metal mines, other than uranium mines, provided that the concentration of radium 226 is less than 0.037 Bq/L in 10 consecutive tests.

3.2 Spatial coverage

This indicator uses data from all metal mines subject to the MMER. Table 2 presents the number of such mines by province and territory for the 2003–2012 period.

Table 2: Number of metal mines subject to the MMER by jurisdiction, 2003 to 2012

Province or territory	2003 (number of mines)	2004 (number of mines)	2005 (number of mines)	2006 (number of mines)	2007 (number of mines)	2008 (number of mines)	2009 (number of mines)	2010 (number of mines)	2011 (number of mines)	2012 (number of mines)
Newfoundland and Labrador	3	3	5	5	5	6	6	6	8	9
Prince Edward Island	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	0	1	1	1	1	1	1
New Brunswick	1	1	1	1	3	3	3	3	3	3
Quebec	20	21	21	26	28	30	31	28	28	31
Ontario	21	21	22	25	28	29	31	34	37	38
Manitoba	9	9	9	8	9	10	10	10	11	10
Saskatchewan	8	8	8	8	8	8	8	7	7	9
Alberta	0	0	0	0	0	0	0	0	0	0

British Columbia	5	5	5	5	6	6	8	9	10	8
Yukon	0	0	0	1	1	1	2	2	3	3
Northwest Territories	3	3	3	3	3	3	3	3	2	3
Nunavut	3	3	3	3	2	1	1	2	2	2
Canada	73	74	77	85	94	98	104	105	112	117

3.3 Temporal coverage

The indicator uses the quarterly and annual reports of metal mine effluent discharges submitted to Environment Canada under the MMER since the Regulations came into force on December 6, 2002.

3.4 Data completeness

The indicator includes all monthly mean compliance data derived from sampling results submitted to Environment Canada for the years reported in this indicator.

3.5 Data timeliness

The most recent data available at the time this indicator was produced are for 2012.

4. Methods

The indicator is calculated by measuring the percentage of tests for all metal mines that did not exceed authorized limits for the deleterious substances, pH levels and acute lethality. For each substance, this is done by dividing the number of monthly mean results that met authorized limits by the total number of monthly mean results reported.¹

5. Caveats and limitations

The data were compiled by staff of the Mining Section of Environment Canada based on effluent quality information provided by the metal mines in their submitted annual reports. In some cases, Environment Canada staff used quarterly reports to complete missing information that was not properly reported by the owners or operators of some mines.

6. References and further reading

6.1 References

Environment Canada (2012) Summary Review of Performance of Metal Mines Subject to the Metal Mining Effluent Regulations in 2012. Retrieved on 15 September, 2014. Available from: ec.gc.ca/Publications/default.asp?lang=En&xml=2474D1A5-A3E2-4C32-8F90-672C75A9B808.

Fisheries and Oceans Canada (2012) *Regulations Amending the Metal Mining Effluent Regulations*. Canada Gazette, Part II. March 2, 2012. Queen's Printer for Canada. Retrieved on

¹ For each substance, weekly test results reported by mines (the frequency of testing varies depending on regulatory conditions) are used to calculate a monthly mean concentration for each final discharge point.

16 September, 2014. Available from: www.gazette.gc.ca/rp-pr/p2/2012/2012-03-14/html/sor-dors22-eng.html.

6.2 Further reading

Fisheries and Oceans Canada (2012) *Metal Mining Effluent Regulations*. Retrieved on 15 September, 2014. Available from: laws-lois.justice.gc.ca/eng/regulations/SOR-2002-222/index.html.

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