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Les enjeux de la filière uranifère au Québec

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# Overview of the *Metal Mining Effluent Regulations*

**Mining and Processing Division  
Environment Canada  
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# Background

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- Environment Canada (EC) regulates the effluent produced by metal mines under the *Fisheries Act* and the associated *Metal Mining Effluent Regulations* (MMER).
- The goal of these Regulations is to minimize the effect of mine effluent on waters frequented by fish.
- Environment Canada also has an *Environmental Code of Practice for Metal Mines*
  - The Code is designed to support the *Metal Mining Effluent Regulations*, by promoting recommended best practices throughout all phases of the mine life cycle.



# Section 36 of the *Fisheries Act*

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- Section 36 of the *Fisheries Act* is intended to prevent pollution:
  - subsection 36(3) prohibits the deposit of deleterious substances in waters frequented by fish;
  - section 36 also gives the authority to develop regulations to permit discharges of certain concentrations of deleterious substances into waters frequented by fish (i.e., MMER);
  - deleterious substances are substances that could cause harm to fish, fish habitat and fish use, and can include a broad range of substances.
- EC administers *Fisheries Act* s. 36 and related provisions, including:
  - regulatory development and program implementation;
  - compliance promotion and enforcement.
- Fisheries and Oceans Canada retains overall responsibility for the *Fisheries Act*.



# *Metal Mining Effluent Regulations (MMER)*

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- The MMER:
  - are regulations developed primarily under subsection 36(5) of the *Fisheries Act*;
  - are designed to protect fish, fish habitat and fish use from effects in receiving waters due to the release of effluent from metal mines;
  - apply to metal mines, milling facilities and hydrometallurgical facilities with an effluent flow rate of 50 m<sup>3</sup>/day and which deposit deleterious substances as defined in the Regulations;
  - currently apply to about 120 metal mines and milling facilities across Canada (31 mines in Quebec and 5 uranium mines in Saskatchewan).
- New mines become subject to the Regulations once construction starts.
- Regulations continue to apply until specified conditions are met to become a recognized closed mine.

# *Metal Mining Effluent Regulations (MMER)*

## *(cont'd)*

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- Designed to protect fish, fish habitat and fish use by setting standards for effluent released from metal mines into the environment:
  - prohibit discharge of effluent which is acutely lethal to fish;
  - set limits for pH of effluent and concentrations of arsenic, copper, cyanide, lead, nickel, zinc, radium-226 and total suspended solids.
- Effluent also includes all seepage and surface drainage from a site.
- All effluent from the mine site must be deposited through an identifiable final discharge point.



# Key Monitoring Requirements – Effluent Quality and Flow

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- Owners or operators are required to monitor effluent quality and flow not less than once per week.
- There are provisions to enable reduction in frequency of analysis for metals to once per quarter if specified conditions are met
  - frequency of analysis returns to weekly if specified conditions are no longer met.
- Owner or operator must calculate and record the monthly mean concentration and monthly loading for each of the deleterious substances that are listed on Schedule 4 of the Regulations.



# Key Monitoring Requirements – Acute Lethality Testing

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- Acute lethality testing of effluent must be conducted on a monthly basis:
  - standard 96-hour test using rainbow trout;
  - also required to conduct test using *Daphnia magna*, but effluent is not required to be non-acutely lethal to *Daphnia magna*.
- Frequency of testing can be reduced to once per quarter if effluent has been demonstrated to be non-acutely lethal for 12 consecutive months.
- Frequency of testing must increase to twice per month if effluent is acutely lethal.
- This frequency must be maintained until three non-acutely lethal results are obtained, at which time monthly testing can be resumed.



# Key Reporting Requirements

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- Environment Canada (EC) must be notified without delay of any effluent result exceeding the prescribed limits, effluent that is acutely lethal or deposits that are out of the normal course of events.
- Owner or operator must submit quarterly reports of effluent monitoring and acute lethality testing results.
- Summary annual reports must also be submitted.
- Quarterly and annual reports are submitted electronically to EC through the Regulatory Information Submission System (RISS).
- Summary review of performance of metal mines are made publicly available (EC's web site).





# Provisions for Development of Tailings Impoundment Areas (TIAs)

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- MMER include provisions to authorize the disposal of mine waste into natural, fish-frequented water bodies.
- Authorization granted by amending the Regulations to add the water body to Schedule 2 of the Regulations, designating the water body as a TIA.
- Proponent needs to assess alternatives for mine waste disposal to demonstrate that the proposed TIA is what makes the most environmental, technical and socio-economic sense.
- Proponent must also implement a fish compensation plan to offset the habitat loss in the water body.
- Environment Canada has guidelines for undertaking such assessments.
- Effluent from the TIA must meet the criteria that are specified in Schedule 4 of the Regulations and other requirements.



# Compliance Rate Summary of Metal Mines Subject to the MMER (2003-2012)

	Uranium Sector (%)	Other Sectors (%)
Total Suspended Solids	>99,9	>95
Radium-226	100	99,7
Other Parameters	>99,9	>99
Rainbow Trout	99,4	96,9
<i>Daphnia magna</i>	98,4	93,1



# Environmental Effects Monitoring (EEM)

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- Objective: EEM is a regulatory and science based tool designed to evaluate the performance of the Regulations in protecting fish, fish habitat and fish use. Information contributes to refining the Regulations (dynamic process).
- Effluent and Water Quality Monitoring Studies:
  - chemical analysis of effluent and water from exposed and reference areas.
- Sublethal toxicity testing on effluent.
- Biological Monitoring Studies in receiving environment to determine if effluent has an effect on:
  - fish: fish population survey;
  - fish habitat: benthic invertebrate community survey;
  - fish use: mercury in fish tissue survey (if mercury concentration  $\geq 0.10$   $\mu\text{g/L}$  in effluent).
- If mines report biological effects that are confirmed in two studies, they must investigate the causes of these effects.



# EEM Biological Results for Five Existing Uranium Mines

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- Sublethal toxicity of mine effluent: inhibition of aquatic plant growth and invertebrate reproduction.
- Biological effects reported:
  - 1 mine reported confirmed effect on fish only
  - 2 mines reported confirmed effect on benthos only
  - 2 mines reported confirmed effect for both fish and benthos
  - 0 mines reported confirmed effect on fish tissue
- Investigation of cause studies (5 mines): causes identified are effluent or sediment constituents (major ions, metals, and nitrogen) and natural variability.
- EEM results from all mines contribute to the refinement of the Regulations when being reviewed.



# References

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- The *Fisheries Act*:

<http://laws-lois.justice.gc.ca/eng/acts/F-14/index.html>

- The *Metal Mining Effluent Regulations*:

<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2002-222/index.html>

- Annual Reports Summarizing the Performance of Metal Mines Subject to the MMER:

<http://www.ec.gc.ca/pollution/default.asp?lang=En&n=C6A98427-1>

- Environmental Effects Monitoring (EEM):

<http://www.ec.gc.ca/ese-eem/default.asp?lang=En&n=4B14FBC1-1>

