



***Metal Mining Effluent Regulations
(MMER)
10-Year Review:
An Industry Perspective***

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Fisheries Act (S.36)

- Metal Mining Effluent Regulations
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Section 36 of the Fisheries Act

Administered by Environment Canada

Intended to prevent pollution

- Prohibits the deposit of “*deleterious substances*” in waters frequented by fish
 - **Deleterious substances are substances that could cause harm to fish and/or fish habitat**
- Provides the authority to develop **regulations** to permit discharges of certain concentrations of deleterious substances into waters frequented by fish
 - ***Metal Mining Effluent Regulations (MMER)***



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Fisheries Act and Effluent Regulations

- **Regulations currently in place:**
 - Metal mines, pulp and paper mills, municipal wastewater and petroleum refineries
- **1977 - *Metal Mining Liquid Effluent Regulations***
 - Applied only to some metal mines.
 - Tailings facilities required Ministerial designation.
- **2002 - *Metal Mining Effluent Regulations (MMER)***
 - Expanded application to all (& **only**) metal mines.
 - Tailings facilities now designated via Governor-in-Council process (**Schedule 2**) - subject to a robust assessment of alternatives.



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Metal Mining Effluent Regulations (MMER)

- Apply to all metal mines in Canada
- Prohibit discharge of effluent acutely lethal to fish
 - (Testing on Rainbow Trout)
- Two Key Management Components:
 - **Effluent Monitoring - Schedule 4**
 - Final Discharge Point – **“End of pipe”**
 - **Environmental Effects Monitoring (EEM) - Schedule 5**
 - Applies to Receiving Environment - **Downstream**



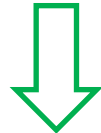
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Fisheries Act (s.36)



**Metal Mining Effluent
Regulations**



Effluent Monitoring
Quality & Flow Volume
(Sched 4)

Environmental Effects Monitoring
(Sched 5)



Water Quality Monitoring
Effluent Characterization &
Sublethal Testing on fish

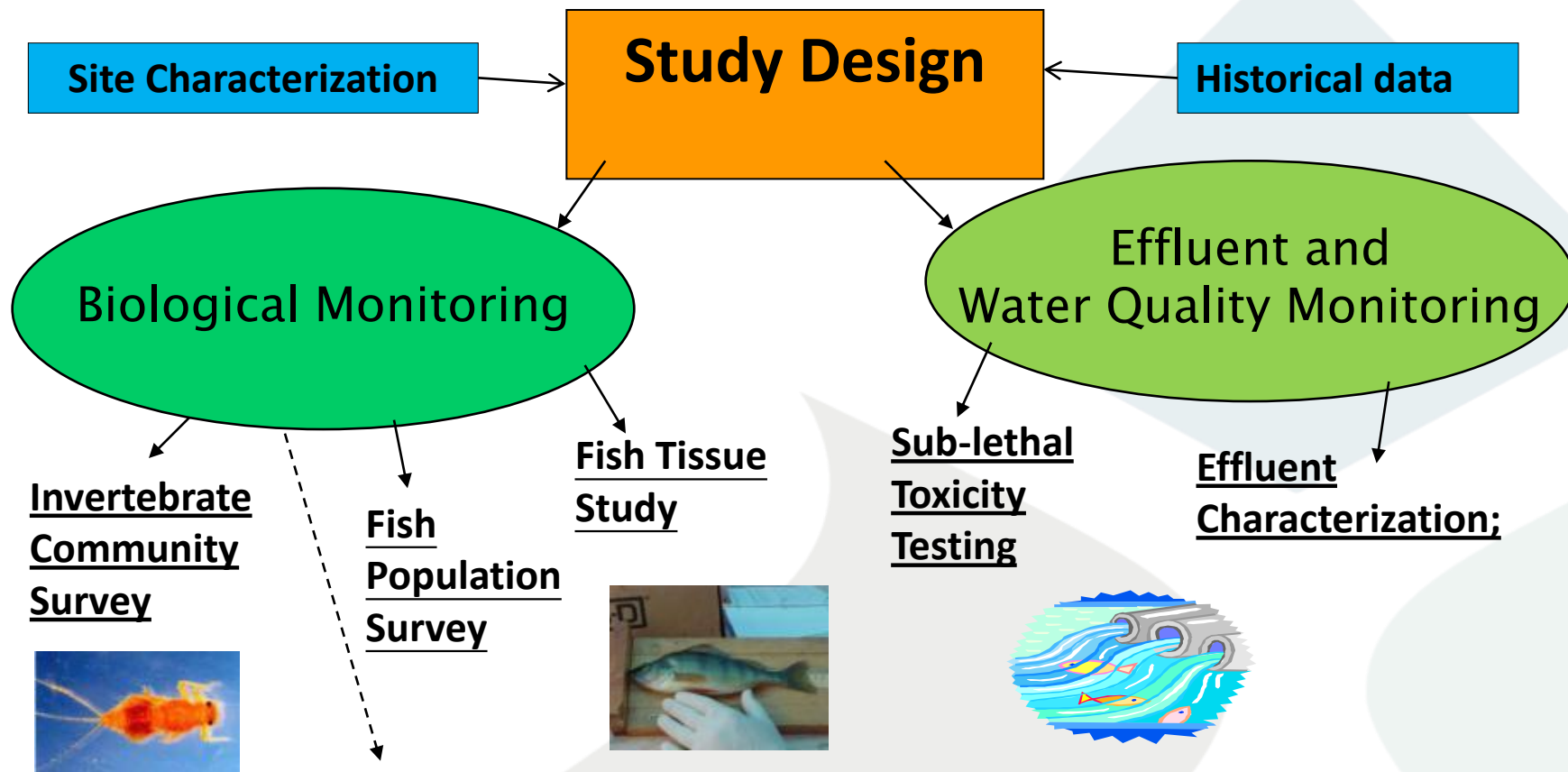
Biological Monitoring
Statistical Assessment of
“Effects” (exposed vs. unexposed)

MMER Current Discharge Limits (Schedule 4)

Apply to flow rates ≥ 50 m³/day

Parameter	Monthly (mean)	Composite	Grab
Arsenic (mg/l)	0.5	0.75	1.0
Copper (mg/l)	0.3	0.45	0.6
Cyanide (mg/l)	1.0	1.5	2.0
Lead (mg/l)	0.2	0.3	0.4
Nickel (mg/l)	0.5	0.75	1.0
Zinc (mg/l)	0.5	0.75	1.0
pH	In range of 6.0 to 9.5		
Radium-226 (Bq/l)	0.37	0.74	1.11
TSS (mg/l)	15	22.5	30
% Non-acutely lethal effluent	100%		

EEM Requirements Summary



If an effect is confirmed, there must be:
a magnitude and extent study; and
an investigation of cause study

MMER – 10 Year Review

- December 2012 EC published Discussion Paper
 - Announced multi-stakeholder consultation process.

Amendments Include...

- Expansion to diamond and coal mines
- Existing Schedule 4 effluent limits to be lowered
- New substances and limits introduced - Sched 4 & 5
- New toxicity test (*Daphnia magna*)
- Changes to monitoring requirements.

Proposed Changes to MMER Schedule 4

Existing Limits (no change)	More Stringent Limits	New Substances and Limits
<ul style="list-style-type: none"> • Acute Rainbow Trout • pH • Radium 226 • TSS 	<ul style="list-style-type: none"> • Arsenic • Copper • Cyanide • Lead • Nickel • Zinc 	<ul style="list-style-type: none"> • Aluminium • Ammonia • Iron • Selenium • Chloride • Manganese • Phosphorus • Acute Daphnia Magna

- **EC primary rationale for proposed amendments based on interpretation of the 2012 (EC) *Second National Assessment of Data from Mines Subjected to the MMER***

Proposed Amendments to MMER Schedule 4 Limits in Mine Effluent

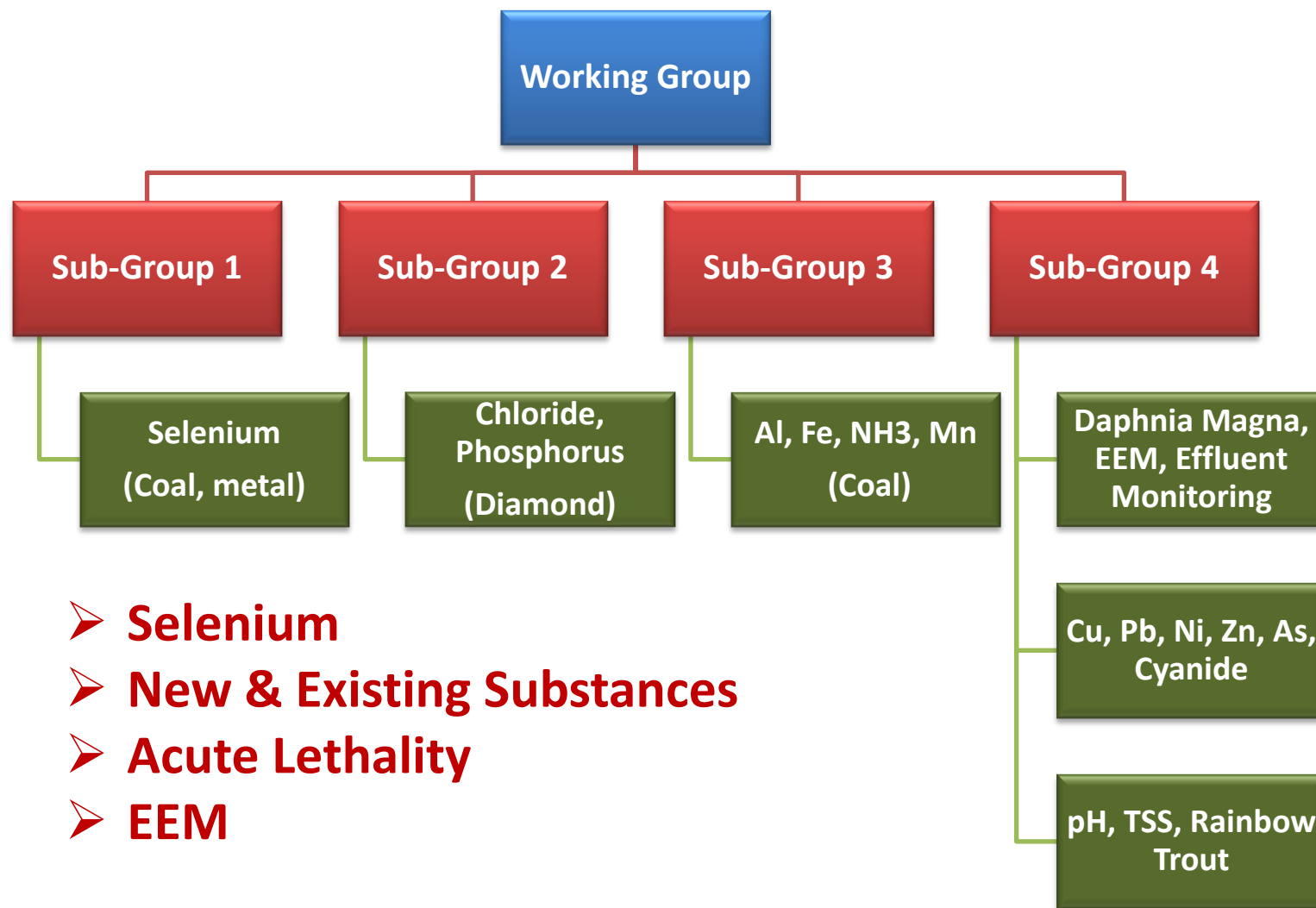
Substance/ Parameter	Current MMER	Proposed Amendment
	Monthly Mean	Monthly Mean
Arsenic	0.50 mg/L	0.100 mg/L
Copper	0.30 mg/L	0.050 mg/L
Cyanide	1.00 mg/L	0.500 mg/L
Lead	0.20 mg/L	0.050 mg/L
Nickel	0.50 mg/L	0.250 mg/L
Zinc	0.50 mg/L	0.250 mg/L
Radium 226	0.37 Bq/L	0.37 Bq/L
Suspended Solids	15mg/l	15 mg/l
Ammonia (Total as N)	-	6.0 mg/L
Aluminum (total?)	-	1.0 mg/L
Iron (total)	-	3.0 mg/L
Manganese	-	2.0 mg/L
Phosphorus	-	0.2 mg/L
Chloride	-	500 mg/L
Selenium		?
Daphnia magna acute lethality		Add

Proposed Amendments to MMER

Schedule 5 (Effluent Characterization)

Current MMER	Proposed Amendment
• Aluminum*	➤ Chromium
• Cadmium	➤ Cobalt
• Iron*	➤ Manganese
• Mercury	➤ Thallium
• Selenium*	➤ Uranium
• Ammonia*	➤ Chloride*
• Nitrate	➤ Sulphate
	➤ Phosphorus*

MMER Review Process



MMER Review

Working & Sub-Groups Membership



Process Committee: Provides advice to the MMER Working Group

- Setting priorities for agenda items and scheduling
- Addressing process-related issues

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MMER Review - Activities in 2013

Date	Event	Date	Event
Mar 19-21	Working Group	Aug 22	Selenium Task Team
May 15	Existing Substances SG	Sept 4	New & Existing Substances SG
May 22	New Substances SG	Sept 16	Acute Lethality Workshop
May 27	EEM SG	Sept 17	EEM Workshop
June 6	New & Existing Substance SG	Sept 26	Selenium SG
June 11-12	Selenium Workshop	Oct 2	Working Group
June 14	Acute Lethality SG	Oct 25	EEM SG – Investigation of Solution
June 17	Acute Lethality & EEM	Nov 5	New & Existing Substances SG
June 20	Working Group	Nov 21	EEM – Critical Effects Size
July 24	Selenium Task	Dec 5	Selenium SG
Aug 20	Process Committee	Dec 11	EEM SG – Additional Parameters

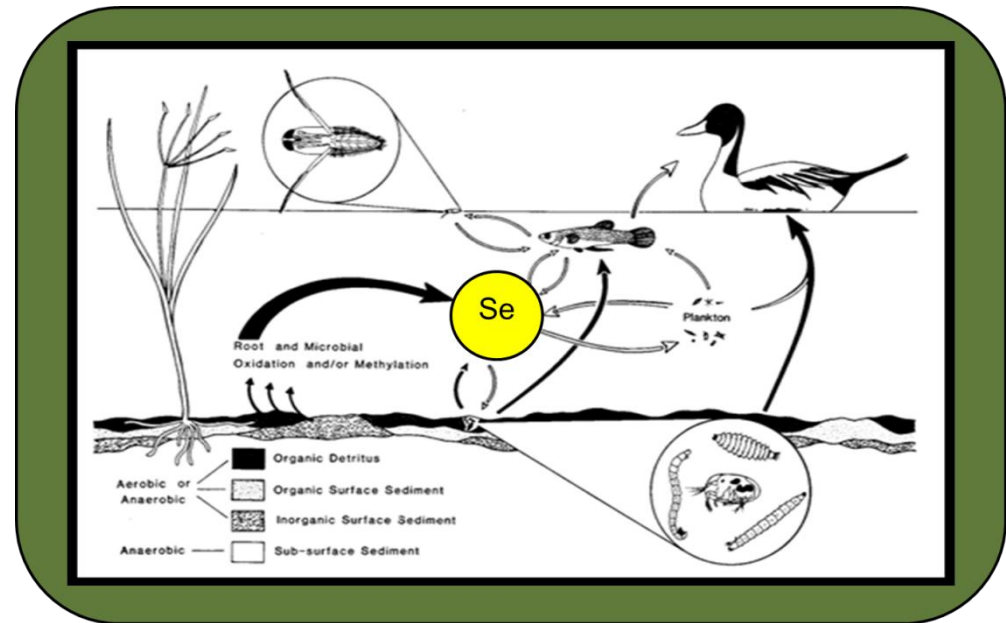
Selenium

- **Environmental behaviour different from most substances**

- Best measured in fish tissue vs. water

- **Two workshops in 2013**

- Focus on importance of **fish tissue** as the monitoring medium and **site-specific factors** for limits (e.g. USA)
- No major precedent in Canada (USEPA, Kentucky, BC)



- **Potential treatment costs huge**

- BATEA study v.1: Capex > \$150 M; Opex >\$10 M

- **Challenge: Confirming regulatory monitoring approach and limit**

Acute Lethality - *Daphnia magna*

- **Polarized discussion; but still in dialogue with EC on 'options'**
- **Industry perspective:**
 - DM test on effluent can be inconclusive, with inconsistent results
 - Industry is already 95.5% 'compliant', (EC MMER Annual Report), but some operations unable to pass despite extensive studies
- **Alternate option(s):**
 - Keep Rainbow Trout as the primary acute lethality indicator
 - Monitor *Daphnia magna* as a trigger for action for resolving failures
 - Strategizing on other approaches



Water Treatment Study

Best Available Technology Economically Achievable (BATEA)

- Independent study to **assess possible treatment methods** that could achieve the proposed new effluent limits
- Commissioned by **MEND**; 3rd party contract awarded to Hatch consultants
 - **Survey** of current and developing methodologies, their **costs and potential success rates**
 - First version distributed mid-January; second draft underway, expected in early May
- Results intended to clarify both **technical and economic limitations** in responding to regulatory objectives



Industry Perspectives...

Urgency for more stringent regulation is not evident and more detailed analysis is needed to correlate substances with effects

- ***Second National Assessment of MMER Data - 2012***
 - 3 Peer Reviews confirmed flaws in methodology and interpretation
 - No direct correlation of “effects” with any specific substances
 - Uses ‘statistical differences’ in sampling results where there is no physically demonstrable environmental effect
 - No confirmation that more stringent limits will improve the environment
- Significant **economic impact** to the mining sector
 - Imposing unfocused, or non-specific additional treatment requirements with no targeted mitigation will result in major economic impacts, but no guaranteed solutions

Industry Perspectives

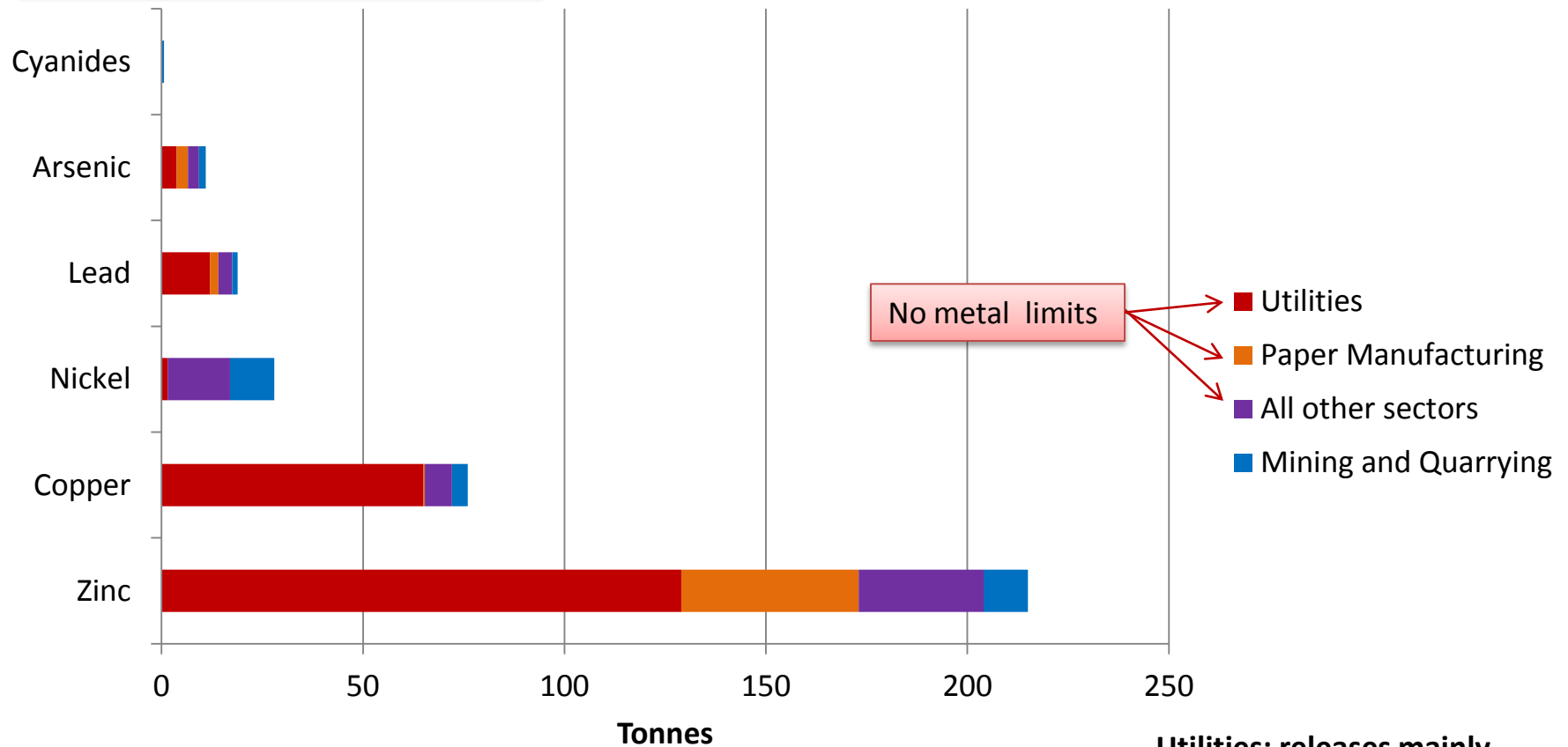
- Proposed amendments out of proportion
 - **Inconsistency** with regulation of effluent from other sectors
 - **Mining is a small contributor** to national releases to water for many of the substances being considered.
- For all but one substance mining is not a major source of release
 - **BUT mining is the only sector regulated for the majority of substances**

Proportionality – The Picture

National Pollutant Release Inventory

Excludes diffuse sources like agriculture which may be 10x bigger

NPRI 2010 Releases to Water



No metal limits

- Utilities
- Paper Manufacturing
- All other sectors
- Mining and Quarrying

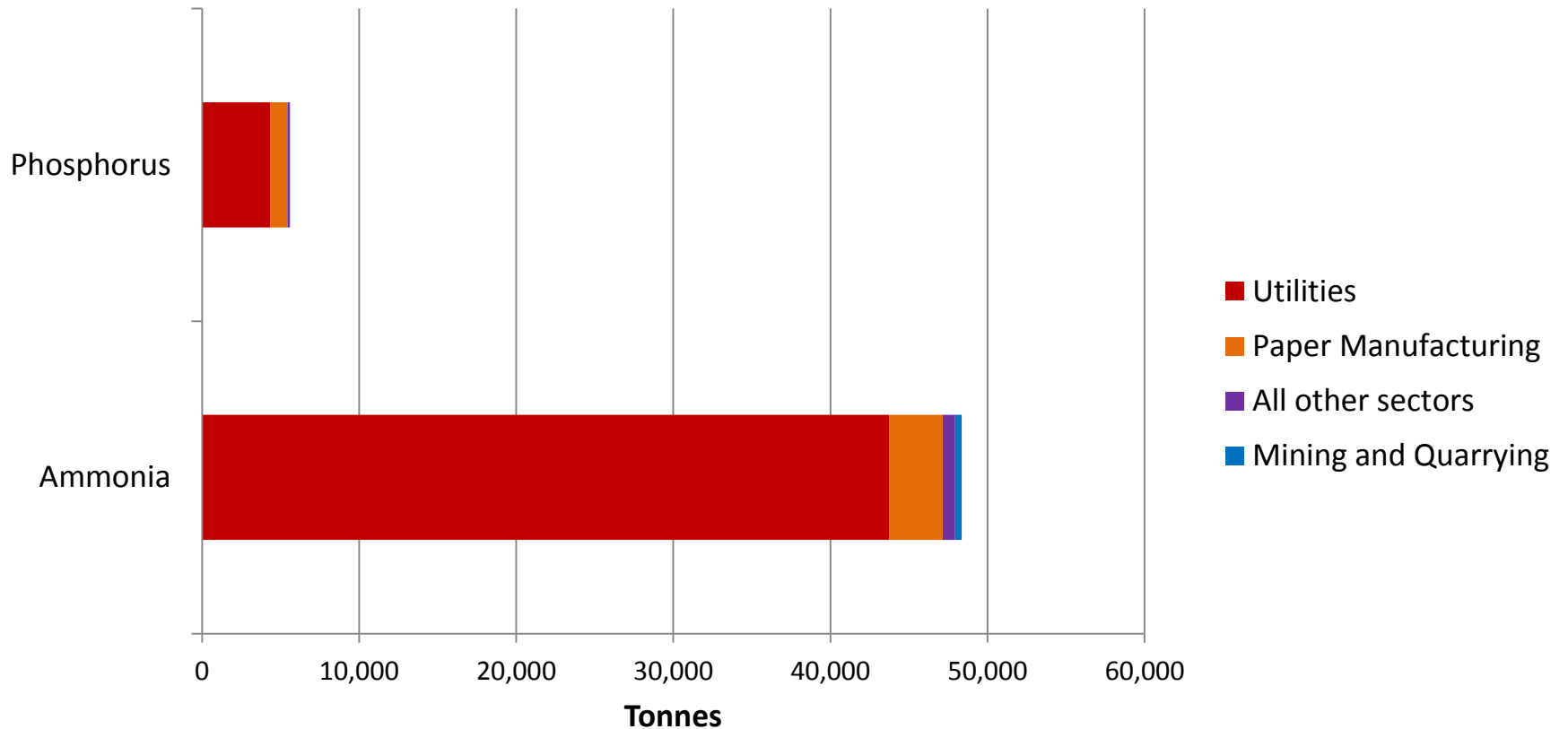
Utilities: releases mainly from municipal wastewater.

Phosphorus and Ammonia

National Pollutant Release Inventory

Excludes diffuse sources like agriculture which may be 10x bigger

NPRI 2010 Releases to Water

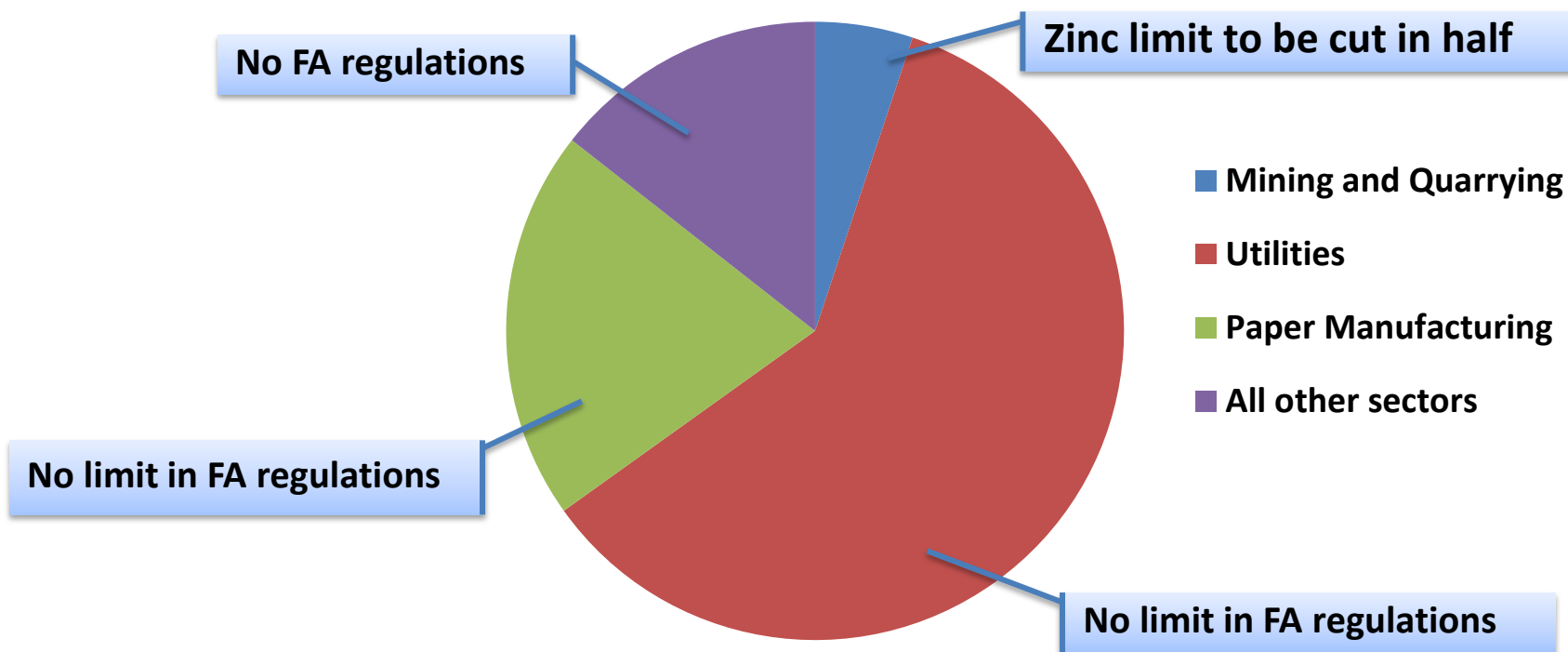


Utilities: releases mainly from municipal wastewater.

Example: Zinc

- **Mines are 5% of the releases** of zinc to water from point sources in Canada reporting to the National Pollutant Release Inventory (NPRI), **but 100% of the Fisheries Act (FA) regulatory requirements.**

Zinc releases to water (2010 NPRI)



Utilities: releases mainly from municipal wastewater.

The Bottom Line

- Mining is **not** the biggest source of releases to water for most MMER parameters
 - But is the **most strictly regulated**
- MMER Review proposes to add at least 9 more parameters and reduce existing stringent limits by 50% to 80%
 - The attention on mining effluent is far out of proportion to relative contribution
- **These actions could have significant economic consequences and leave certain operations unviable**

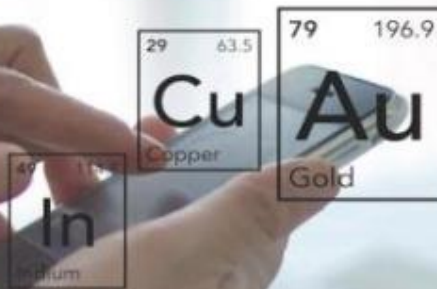
Proposed in Environment Canada's December 2012 Discussion Paper		
Existing limits	More stringent limits	New limits
Acute Rainbow Trout pH Radium 226 TSS	Arsenic Copper Cyanide Lead Nickel Zinc	Acute Daphnia Magna Aluminum Ammonia Iron Selenium Chloride Manganese Phosphorus

What we are looking for...

Compliance Certainty

- **A workable regulation for selenium**
- **Ability to develop non-metal mines in all parts of Canada (including access to Schedule 2 for TIAs)**
- **Reasonable effluent limits that effectively protect the environment without imposing unwarranted costs**
 - **Application of the BATEA study results to help inform achievable regulatory limits**
 - **Site-specific regulatory approaches for circumstances where a national effluent limit does not work**
- **Access to the MMER/EEM data to allow 3rd Party assessment of “effects”**
- **A reasonable approach to determine the “deleteriousness” of substances, applied fairly and consistently to all sectors**

Thank You
Merci



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What will we find next?

Future Mining Symposium 2014

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