Appendix A-3
Transparencies/Papers Presented in Plenary Session

3.7 Metal Mining MISA Toxicity Review—Chris Wren (ESG International Inc.)

3.8 Municipal/Industrial Strategy for Abatement (MISA): Metal Mining Regulations—Yousry Hamdy (Ontario Ministry of the Environment)

Municipal/Industrial Strategy for Abatement (MISA)

Metal Mining Regulation

Yousry Hamdy
Ontario Ministry of the Environment

November 1999

Introduction:

- The Metal Mining Regulation was promulgated on August 26, 1994 under the Ontario Environmental Protection Act
- Effluent concentration limits and non-lethality requirement came into force on August 26, 1997
- Metal mining plant means, any opening or excavation in or above ground and includes waste disposal sites, wastewater treatment facilities, and roasting or smelting furnaces, refineries, concentrators or mills.
- Process effluent : effluent that, by design, has come into contact with process materials *other than process materials stored in a materials storage site, including but not limited to a waste rock storage site or a slag storage site*
- Failure of toxicity limit occurs when more than 50 per cent of the test organisms die in 100 per cent effluent.

Application:

✓ The MISA Metal Mining Regulation applies to every plant discharges a total volume of more than 50 cubic metres per day.

✓ The regulation continues to apply even if,

(a) production at the plant is interrupted; or

(b) the total volume subsequently reduced to less than 50 cubic metres.

✓ The regulation does not apply to a plant that ceased production permanently

✓ The Regulation ceases to apply to a plant which begins "temporary suspension" as defined in subsection 139 (1) of the Mining Act and begins to apply to the plant again 30 days after production resumes.

Obligation:

★ pH value of any sample collected at a process effluent sampling point at the plant is within the range of 6.0 to 9.5.

★ effluent is not acutely toxic to rainbow trout and *Daphnia magna. Monthly monitoring reduced to quarterly following 12 consecutive passes*

★ Flow measurement accuracy within plus or minus 15 per cent.

★ Beginning on August 26, 1997, a discharger shall not permit effluent by-pass

★ Forthwith reporting of incidents of non-compliance.

Obligations (cont'd)

★ Compliance with parameter concentration limits

Parameter	Monitoring Frequency	Daily Concentration Limit	Monthly Average Concentration Limit
		mg/L	mg/L
Total Cyanide	3W	2	1
Total Suspended Solids (TSS)	3W	30	15
Copper	W	0.6	0.3
Lead	W	0.4	0.2
Nickel	W	1	0.5
Zinc	W	1	0.5
Arsenic	W	1	0.5

Obligation (cont'd)

★ Monitoring of overflow effluent (only if it is unavoidable as a result of an extraordinary thaw or storm event):

Parameter	Monitoring Frequency
Total Cyanide	8H
Total Suspended Solids (TSS)	8H
Copper	8H
Lead	8H
Nickel	8H
Zinc	8H
Arsenic	8H

Obligation (cont'd)

★ A storm water control study.

★ Annual report to be available to the public, upon request, including a summary of all monitoring data.

★ Quarterly reports to the Director summarizing all monitoring and compliance data including toxicity results and any overflow events for each month in the quarter.

★ On a semi-annual basis, chronic toxicity testing using fathead minnow and *Ceriodaphnia dubia* to be conducted only after the effluent is not toxic to both rainbow trout and *Daphnia magna*.

★ The chronic toxicity report shall include a calculation of the concentration at which a 25 per cent reduction in growth or reproduction would occur.

Annual Loadings (kg/year)

	1990 Loading	1998 Loading	% Reduction
Total Suspended Solids	2161627	681314	68
Copper	37949	6720	82
Nickel	60747	18572	69
Lead	4240	1082	74
Zinc	32238	387	99
Arsenic	13098	6205	53
Cyanide	51974	7300	86
Total	2361246	721580	69

Toxicity Results Status

Status	4th Q 97	1st Q 98	2nd Q 98	3rd Q 98	4th Q 98	1st Q 99	2nd Q 99
Not Discharging	4	16	18	12	11	12	6
No Direct Discharge	2	2	2	2	2	2	2
Program Approvals	8	1	1	1	1	0	0
Passed Toxicity Tests	23	24	19	25	25	21	27
Failed Toxicity Tests	5	2	6*	6	5	5	5
	42	45	46	46	44	40	40

MINING TOXICITY - CURRENT STATUS - (Cont'd)

1998	1st Quarter 99'	2nd Quarter 99'	Current Status
Cameco - SSM (all 98)			Treatment upgraded
Exall Res/Glimmer (all 98)	Exall Res/Glimmer(2 of 6)		Treatment upgraded
Cameco - Port Hope (all 98)	Cameco - Port Hope	Cameco - Port Hope	Toxicity due to chlorine
Inco - Port Colborne (all 98)	Inco - Port Colborne	Inco - Port Colborne	study underway
Placer Dome - Timmins(2Qs 98)			EDTA added
Battle Mtn/Golden Gt (2Qs 98)			
	Battle Mtn/Holloway (1 of 6)	Battle Mtn/Holloway (1 of 6)	options provided
Falconbridge/Met (1Q 98)			
		Falconbridge/Mine (1 of 6)	
Sudbury Contact Mine (1Q 98)			Mine closed
Kinross/Macassa (1Q 98)			
Inco/Sheban (1Q 98)			Mine closed
Inco/Copper Cliff (1Q 98)			
	Inmet - Schreiber (1 of 6) -2 species.		Mine Closed
		Madsen Gold Corp (1 of 6)	Isolated incident

Steps taken by Exall Resources - Glimmer Mine to eliminate toxicity

improved handling of explosives material underground has had some but limited success in reducing un-ionized ammonia concentration in the underground mine water.

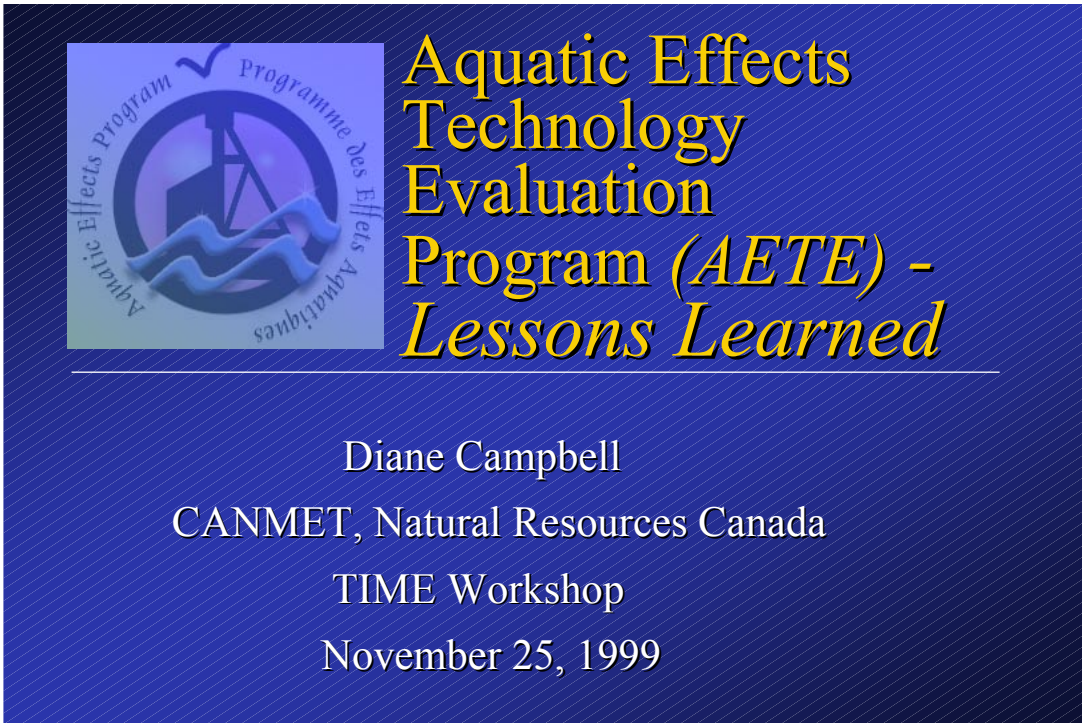
switching to a low ammonia based explosive has had better success in reducing un-ionized ammonia concentration in the underground mine water.

aeration of the underground mine sumps has had better success in reducing un-ionized ammonia concentrations in the underground mine water.

pH control system has stabilized the un-ionized ammonia concentration in the underground mine water discharging to the polishing pond. Aeration of the polishing pond further reduced un-ionized ammonia.

company is working with a consulting firm to establish floating cat tails to reduce heavy metal and ammonia concentrations.

3.9 Aquatic Effects Technology Evaluation (AETE) Program: Lessons Learned—Diane Campbell (CANMET)



3.10 An Environmental Non–Governmental Organization (ENGO) Perspective— Brennain Lloyd (Northwatch)

Speaking Notes

Introduction

- The environmental community is a diverse mix of perspectives and experiences, encompassing a diversity of organizations, ranging from small neighbourhood groups often focussed on a particular local or community concern on a volunteer basis to very large and well-resourced national or international organizations; the Canadian Environmental Network Mining Caucus delegates participating in the TIME workshop are primarily from organizations in the middle range - local, regional and national environmental non-government organizations (ENGO's) working in a collaborative manner to address mining related environmental concerns.

- In the broadest sense, we could generalize to say that the ENGO sector looks at issues of mine effluent - as with other issues - through the lens of health, ie. community health, human health, and the health of the environment; the starting point is the health of the natural community, or the natural world.

- Given the overall lens of health, and given that health then becomes the driver for our work and the focus of our activity and our analysis of different issues and initiatives, it is quite appropriate that, for the discussion of mine related environmental impacts and the activity of mining itself, we borrow from the physicians' Hippocratic oath, that is to say "Do no harm".

- The ENGO perspective is not inconsistent with a number of principles which the federal government has made clear and documented commitments to, and by which we expect government policy and regulation to be driven by.

Principles Directing Environmental Decision-making

Environmental law and rule-making has evolved over the years in response to a public concern about environmental degradation and as a result of increased understanding of the natural environment, how it is affected, and how humans rely upon it.

The following principles outline current thought in the federal regime, and indicate what are now accepted as reasonable expectations in standards and rule-making:

- the precautionary principle[1] directs that precautionary measures be taken, or an activity avoided, if the activity or a substance poses a threat to environmental or human health. The precautionary principle does not demand scientific certainty of the anticipated damage, but rather favours erring on the side of caution, and so on the side of health.

---

1 "It's About Our Health! Towards Pollution Prevention - CEPA Revisited", Report of the House of Commons Standing Committee on Environment and Sustainable Development, June 1995

• the principle of pollution prevention[2] is, simply, a focus on the anticipation and prevention of the creation of pollutants and waste, rather than on the remediation of pollution; the objective is a healthy ecosystem, the means is the efficient and effective use of energy, raw materials and other commodities.

• the objective of sustainable development is, as set out in the landmark 1987 report by the World Commission on Environment and Development[3] "to ensure that (we) meet the needs of future generations without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities".

• the principle of zero discharge has been Canadian policy since 1978, when the Canadian and U.S. governments signed the Great Lakes Water Quality Agreement[4] stating that "the philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge".

• the need to take an ecosystem based approach[5] recognizes the need to base environmental protection on the protection of ecosystem integrity, rather than on the protection of specific environmental components.

Conclusion

• Clearly, we have a great distance to go in terms of protecting the environment from the impacts of mine effluent; the markers can be identified along a range or continuum of protectiveness, with the current MMLERs on the less protective end of the range, to the proposed changes which leave the allowed levels relatively unchanged but require that the lethal be not lethal to at least rainbow trout and we would hope also to *Daphnia magna*, to the future regulatory framework, which will address not only the lethality of effluent, but also the sub-lethal, chronic and cumulative environmental and health effects.

• The sheer volume of the problem is sobering: 100 mines across the country, each averaging 2.6 million gallons of waste water per day, and only an estimated 80% in compliance with even the quite course test of acute lethality, ie. the ability of the mine to discharge and only kill half of the test organism, be it fish or flea.

---

2 *ibid.*

3 "Our Common Future", World Commission on the Environment and Development, Oxford University Press, 1987

4 Great Lakes Water Quality Agreement of 1978, signed between the United States and Canada at Ottawa, November 22 1978, Annex 12 2(a)(ii); consolidated by the International Joint Commission of United States and Canada (January 1988 printing)

5 "It's About Our Health! Towards Pollution Prevention - CEPA Revisited", Report of the House of Commons Standing Committee on Environment and Sustainable Development, June 1995

- The enormity of the problem does not mean that we should take more time time to respond, simply because addressing the problem will challenge the industry; rather the reverse, given the enormity of the problem it means that it must be faced with less delay, in light of the enormous public interest.

- The time is now.

3.11 An Environmental Non-Governmental Organization (ENGO) Perspective – Lisa Sumi (Environmental Mining Council of B.C.)

Abstract

Through work on the toxicology sub-group, and reviews of the recently drafted Metal Mining Effluent Regulation (MMER), the Mining Caucus of the Canadian Environmental Network (CEN) has come to several conclusions related to the proposed new regulation. Overall, the caucus is disappointed with the lack of stringency within the new regulation. Specifically, the limits for prescribed deleterious substances are too high, and fail to reflect the ability of current technology to achieve much lower and environmentally protective levels. Furthermore, the failure to include a regulated requirement to use *Daphnia magna* as a test species for non-acutely lethal effluent will not adequately protect aquatic ecosystems. And finally, there remains a need to create a publicly accessible national database of toxicity information collected by mining companies, in an effort to increase transparency and accountability for the discharge of toxic mining effluents into our environment.

Speaking Notes

This presentation is largely derived from the work of Sue Moodie, who participated in the Toxicology Sub-group of the MMLER Amendment Working Group, as well as comments submitted by the CEN Mining Caucus AQUAMIN Reference Group to the federal government, in response to the draft MMER tabled by Environment Canada in May of this year.

The presentation focuses on three aspects of the proposed MMER:
1) deficiencies with the prescribed limits;
2) the addition of a non-acutely lethal limit; and
3) the need for a national database for toxicity information.

1) Prescribed Limits

As Pat Finlay of Environment Canada reminded us in his presentation, the objective of the new MMER is to improve ambient environmental quality.

There is little evidence that the changes made to the prescribed limits for arsenic, copper, cyanide, lead, nickel, zinc and TSS will improve ambient environmental quality. Other than the limit for TSS,
the maximum levels for all other regulated substances remain the same as they were in the original MMLER, which dates back more than 20 years.

The only new substance to be regulated under the MMERs is cyanide, and the limit established for CN is 500% higher than the government's consultant determined was economically and technically achievable (SENES, 1999). Similarly, the limits for both arsenic and TSS are well above the levels that were deemed feasible in the SENES report.

Moreover, the continued exclusion of an upper limit for pH, when it is widely recognized that pH in the range of 6.5 to 9.0 is appropriate for the protection of aquatic life (Canadian Water Quality Guidelines for Freshwater Aquatic Life; Ontario Metal Mining Effluent Limits Regulation) does little to foster confidence that this regulation will greatly improve the aquatic environment.

One of the main goals in improvement of environmental standards is to encourage technological innovation. The development of improved technologies here in Canada serves a dual purpose: our environment is better protected, and Canadian companies responsible for developing new technologies can profit from their innovation, whilst spreading environmental benefits beyond our borders. The failure to set more stringent limits for arsenic, lead, nickel, copper and zinc will not promote technological innovation.

Finally, it must be mentioned that we are concerned that the prescribed limits remain concentration-based. Mining operations can meet concentration-based limits yet still be discharging tonnes of metals into watersheds if the effluent is being discharged at high volumes. Loadings-based standards are a more appropriate measure to control the amount of metals entering the aquatic environment.

Overall, we are disappointed with the lack of stringency of the proposed limits.

2) Decision to regulate acute toxicity as a limit

It is not enough to have limits placed on individual substances, since combinations of substances can produce unexpected results. Thus, the regulation of acute toxicity of the whole effluent is an important and valuable addition to the regulation. Acute toxicity testing is the only effective method currently available to detect biological effects caused by an effluent.

While we feel very strongly that the requirement for non-lethal effluent is a good first step, we are not as satisfied with the methodology for determining acute lethality. It is our belief that, at minimum, effluent should be non-lethal to both rainbow trout and *Daphnia magna.*

The pollution prevention sections of the *Fisheries Act* prohibit the discharge of substances deemed deleterious to fish and fish habitat. The *Fisheries Act* also uses a very broad definition of fish; all aquatic organisms related to the food chain of fish are called fish. Consequently, those organisms and their habitat are accordingly protected.

If the new MMER has as its goal the protection of fish and fish habitat, the regulation should recognize the fact that the health of all organisms within the aquatic ecosystem must be maintained; if one trophic level is impaired, the trophic levels above will also be impaired. Indeed, all environmental legislation should aim to preserve ecosystem integrity and variability within ecosystems.

To that end, we must stress again that there is a need for test species representative of different trophic levels to be used in acute toxicity testing. Consequently, both rainbow trout and *Daphnia magna* must be required as a test species for acute toxicity.

It is not unrealistic to expect that the MMER would incorporate the requirement that the effluent be non-lethal to *Daphnia magna*. This test, along with the use of the rainbow trout test, is used in both Ontario and Quebec. And there is ample evidence to suggest that the technology exists to enable virtually all mines to consistently produce a non-acutely lethal effluent.

There have been references made to the fact that the MMER is supposed to reflect the harmonization process that has been on-going in Canada. If both Ontario and Quebec have legislation requiring that effluent be non-acutely toxic to both rainbow trout and *Daphnia magna*, and most mines are able to achieve compliance with the regulations, the question remains: don't Canadians living in other provinces and territories have the right to expect the same high level of environmental protection as those living in Ontario and Quebec?

3) National Public Registry

One final topic of discussion is that the MMER does not address the need for a comprehensive way to provide information collected under the regulation to the Canadian public.

It is the public's right to know the types, quantity and frequency with which potentially toxic substances are being discharged into their watersheds. It is also important that the public have access to information on compliance monitoring, inspection and prosecution data, among other things.

In his presentation, Paul Rochon mentioned the problems encountered by Steve Andrews, the consultant hired to collect and analyse acute lethality data from mines across the country. The initial response from the mining industry to the consultant's requests was poor, and the information that did come in was not uniform from facility to facility. The difficulties in obtaining and analysing the data serve to highlight the pressing need to develop a standardized system of data collection that is easy for the mining companies to use, while providing comprehensive and comprehensible information to the public.

3.12 An Environmental Non-Governmental Organization (ENGO) Perspective – Judy Parkman (ROAR)

Speaking notes

Introduction

For those of you who know me I am one of the seven-year veterans of the Metal Mining Liquid Effluent Regulation review and revision process as a delegate of the Canadian Environmental Network Mining Caucus. The last few years I have been involved mainly with EEM.

EEM Issues

Briefly. The key EEM Issues from an ENGO perspective, as they evolved over the last few years have been:

- The lack of a clear "link" between the results of EEM and revisions to the MMLER
- The ability to achieve a balance between Site Specificity and National Consistency
- The lack of a clear commitment to have Public Involvement in EEM.

All of the above issues should be encompassed by a regulatory framework.

EEM/MMLER Link National Level

Nationally. The results of EEM should force the ability to produce a National Database with enough consistency of information to allow for evaluating and deciding on how to enhance the MMLER to better protect the aquatic environment.

At the same time the need to resolve the cause of mine related effects through EEM should optimally force the development of necessary technology (ies) and or system design development to correct the cause of effect(s).

Based on the National results of EEM and evolving acceptable technologies one would hope an enhanced MMLER would evolve.

Do we need to spend another seven years before we have an enhanced MMLER? Will there be an avenue to allow for change based on evolving BATEA?

EEM/MMLER Link Site Specific Level

It became quite clear that in order to provide the necessary flexibility to address the varied characteristics of aquatic receiving environments based on the type of mining and/ or operations, and in keeping consistent with flexibility recommendations in AQUAMIN, the EEM program was evolving into a program that hinged on the ability to respond adequately to questions proposed in each phase of monitoring.

Where a mine related effect was identified this would trigger the necessary study design changes to allow for determination of the cause(s). Knowing the cause, would generally translate into corrective action(s) and the knowledge and ability to apply effective corrective actions consistently, would result in an expectation of establishing revised site-specific requirements.

It is not clear how and if, it will evolve in this manner. It was established that Corrective Actions are not a part of EEM. The question then is what is the National role in the latter part of this evolving process?

Site Specificity versus National Consistency

Is there enough non-prescription to allow for the "right" program to be applied site-specifically, yet not compromising the ability to evaluate the program on a National Level. To provide the minimum National Standard, do we have a balance? I'm not sure that we do.

Key Public Involvement in EEM

There would be a much greater degree of comfort with the issues above had assurances been given that members of the public that have an interest in aquatic conservation would have an opportunity to influence the EEM.
There will not be a required avenue to have Public Involvement in EEM.
ENGO's see considerable benefit in allowing for Public Involvement in all key monitoring areas; Pre Design; Study Design; Monitoring, and Program Review.
With a significant number of decisions made at the discretion of the RAO, members of the ENGO community would feel more comfortable if they had the ability to:

- provide input to the acceptability of the Public Communication plan
- know they can participate on a Public Liaison Committee
- at least take the role of a Public Liaison Contact.

This would clearly help facilitate knowledge levels, education, trust, communication and enhance the overall EEM program.
Nationally, ENGOs would hope for assurances that the Public be allowed to be involved in the Multistakeholder reviews and any proposed EEM coordination group relating to ongoing EEM Issues.

Regulatory Approach

Some key reasons for the ENGO desire for a regulatory framework to encompass EEM.

Toxicological Monitoring Issues

Highlights of some key issue areas needing resolution.