SUSTAINABLE TIMES

Issue 7 – ISSN 1492-3890 (ISSN Online – 1496-4260) October 2002

Acid Deposition: NO_x/SO_2 Management Working Group

In 1998, following the announcement of several new oilsands projects in the Fort McMurray area, industry, regulators, Aboriginals and environmental groups recognised that regional nitrogen oxides (NO_x) and sulphur dioxide (SO_2) emissions needed to be addressed due to concerns about acid deposition (the sum of acidic chemicals in rain, snow and dust) and ground level ozone (also called smog). That same year, the Oil Sands Environmental Coalition (OSEC) and the oilsands industry developed a Memorandum of Understanding committing industry to designing and implementing a regional NOx/SO_2 management system. This resulted in the formation of the NO_x/SO_2 Management Working Group (NSMWG), which was tasked with developing environmental capacity guidelines, environmental management objectives, and a management system for regional NO_x and SO_2 emissions associated with oilsands development. The NSMWG became a CEMA working group in 2000.

Acid deposition concerns in Europe prompted the development of a *critical load approach*. This approach includes measuring and predicting acidifying emissions from stacks and the amount of acidic chemicals falling on the ground (acid deposition), and evaluating of the effects of acid deposition on land and water ecosystems. A *critical load* is the maximum amount of acidifying substances that will not result in any long-term harmful effects when deposited onto the most sensitive vegetation or habitat (receptors). Because of concerns that NO_x and SO_2 emissions from oilsands activities could acidify soils, lakes and wetlands, the NSMWG decided to build on the European approach and develop regional critical loads.

In addition to critical loads, the NSMWG recognized that timing is an important factor when evaluating long-term acidification. The *time-to-effect concept* looks at the predicted time to reach a critical load. For example, if the critical load is not predicted to be reached until many years from now (X), then the management strategy might focus on minimizing emissions from new sources. If the critical load is predicted to be reached in only a short number of years from now (Z), then the management strategy might require that emissions from both new and existing sources be reduced. If the critical load is not predicted to be reached until some intermediate number of years (between X and Z), then the strategy might focus on such steps as no net increase in emissions, offsets, and minimizing emissions. This framework, using both the *critical load approach* and the *time-to-effect concept*, is still in draft form and has not been finalized. The NSMWG is hoping to finalize the Acidifying Emissions Management Framework and bring it to CEMA for approval within the next six months.

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Trace Metals Recommendations Approved by CEMA

In August CEMA approved the Trace Metal Air Contaminants recommendations, which consisted of a proposed adaptive management approach for trace metals, and a management system (*see Sustainable Times Issue 5, December 2001*). The recommendations were passed by consensus of the 38 full members of CEMA. Alberta Environment has received a copy of the Trace Metals recommendations and is examining how it will implement the relevant sections of the proposed management system.

Acid Deposition Q & A

What causes acid deposition?

Acid deposition is rain, snow or fog that is polluted by acid in the atmosphere and damages the environment. Two common acidifying air pollutants are sulphur dioxide and nitrogen oxide. When these substances are released into the atmosphere, they can be carried over long distances by winds before returning to earth as acidic rain, snow, fog or dust. When the environment cannot neutralize the acid being deposited, damage occurs.

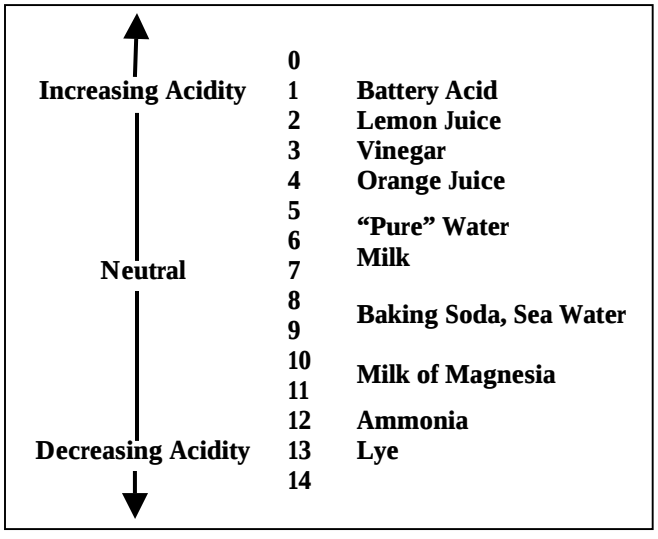
What is pH?

A pH scale (see below) is used to measure the amount of acid in a liquid—like water. This scale is used to measure the acidity of rain samples. The smaller the number on the pH scale, the more acidic the substance is. Although neutral substances have a pH of 7, even rain in pristine areas has a pH of 5.6. Rain measuring between 0 and 5 on the pH scale is acidic and therefore called "acid rain." Small number changes on the pH scale actually mean large changes in acidity. In 1998, the lowest average pH of rain in Alberta was measured in Fort McMurray at 4.9, and the highest pH of rain was measured in Calgary at 5.7.

Is acid rain a problem?

In western Canada, acid rain is not thought to be a problem now but could become one in the future. Historically, lower levels of industrialization, relative to eastern Canada, combined with natural factors such resistant soils (soils better able to neutralize acidity), have preserved much of western Canada from the effects of acid rain. If the environment is monitored carefully and strict pollution controls are applied when necessary, acid rain should be prevented from becoming an environmental concern in western Canada.

However, not all areas in western Canada are naturally protected. Lakes and soils resting on granite bedrock, for instance, cannot buffer against acidity. These conditions are found in areas of the Canadian Shield in northeastern Alberta, northern Saskatchewan and Manitoba, and parts of western British Columbia. Lakes in these areas are as defenceless to acid rain as those in northern Ontario. They must be shielded from exposure to acid rain; if not, environmental damage could occur.



pH scale

Where do sulphur dioxide emissions come from?

Alberta is the second highest emitter of sulphur dioxide in Canada. Sulphur dioxide is generally a by-product of industrial processes and burning of fossil fuels. In Alberta, natural gas processing, oilsands and coal-fired power generators are the main contributors.

Where do Nitrogen oxide emissions come from?

The main source of nitrogen oxide emissions is the combustion of fuels in motor vehicles, residential and commercial furnaces, industrial and electrical-utility boilers and engines, and other equipment.

This information has been adapted from the Environment Canada web site (http://www.ec.gc.ca/acidrain/acidfact.html) and from Alberta's State of the Environment Report, Air Quality, 1998, Chapter 4 (http://www3.gov.ab.ca/env/resedu/soe.cfm).

Did you know?
The study of acid deposition, or acid rain, is thought to date from the middle of the 19th century when Robert Angus Smith, a Scottish chemist, began to study the effect of air pollution in Manchester, England. Smith realized that smoke and fumes from human activities could change the acidity of rain and coined the term "acid rain" to describe his findings.

SEWG Management Tools

The Sustainable Ecosystems Working Group (SEWG) of CEMA addresses issues related to guide development and resource use within the Regional Municipality of Wood Buffalo (RMWB) so that the cumulative impacts from development do not exceed the carrying capacity of the ecosystems. Recently SEWG developed an Ecosystem Management Tools Task Group to address cumulative land disturbance and ecosystem fragmentation resulting from existing and planned development activities in the RMWB.

This task group has identified the implementation of three management tools to minimize land disturbance and ecosystem fragmentation from industrial activities, beginning with the planning and exploration phases, all the way through to the operation phase. These tools are expected to eventually become part of the future SEWG management system. The following three management tools are still in draft form, and are expected to be brought to CEMA for approval within the next six months.

Management Tools:

Minimal Impact Exploration (MIE): refers to the reduction in the area of disturbance from exploration activities.

Integrated Landscape Management (ILM): refers to the joint planning by developers, especially between forestry companies and the oil and gas industry, to co-ordinate access, road building and site clearing. ILM will reduce access, and land disturbance, and promote the better management of forest resources.

Constraint Mapping: refers to a computer-based tool that combines environmental, geological and cultural information for a lease/management area to see if there are any areas that are sensitive or unsuitable to certain project components such as plant sites, well-pads, and roads. These maps will be used to plan future project designs and are expected to reduced impacts to sensitive areas in development zones.

CEMA Briefs

CEMA Communications: The committee contracted a consultant to conduct the CEMA Communications Audit to better understand stakeholder perceptions of CEMA. A presentation on the audit conclusions was presented at the October 3/4 CEMA general meeting.

Traditional Ecological Knowledge Standing Committee: The TEK Committee held a two-day retreat in September to develop a work plan.

NO_x/SO_2 Management Working Group: Members have been working to finalise the Acidifying Emissions Management Framework (*see Page 1, this issue*). Members are discussing the need for monitoring low-level sources of ozone precursors, and planning further research on ozone formation.

Reclamation Working Group: Members have been finalising the 2003 work plan.

Biodiversity Subgroup: A biodiversity pilot study report is due out this fall.

Reclamation Certification Subgroup: Members are considering a literature review and pilot study on reclaiming seismic lines.

Soils & Vegetation Subgroup: A report on the Land Cover Classification System (LCCS) is due in spring 2003.

Wildlife Subgroup: Members are developing a Key Wildlife Indicator Resource list.

Sustainable Ecosystems Working Group: Members have hired consultants to conduct a literature review to assess resource use considerations for SEWG working groups. A draft of the Management Tools is expected to be presented to CEMA in the near future (*see Page 2, this issue*). A Development Scenario mapping exercise for the years 2002, 2010 and 2020 is underway.

Cultural & Historical Resources Subgroup: Work is ongoing for the development of a viewshed analysis.

Landscape & Biodiversity Subgroup: Work is almost complete on the development of Natural Range of Variance digital datasets of human disturbance before 1951, 1979 and current.

Wildlife & Fish Subgroup: The review and assessment of existing information for wildlife and fish key indicators was completed in June. The subgroup held a workshop on September 16 & 17, in Fort McMurray, on regional wildlife habitat classification and mapping.

Surface Water Working Group:

In-Stream Flow Needs Subgroup: Members are planning to develop a science advisory committee to update the subgroup work plan and to aid with future work.

Muskeg River Integrity Subgroup: Members held the Muskeg River Watershed Integrity Workshop on September 18-20 in Calgary. The results of the workshop will aid in planning studies for 2003.

Water Quality Subgroup: Members are developing a contract to review working group issue and relevant guidelines for waste water releases from oilsands activities

Trace Metals and Air Contaminants Working Group: A report on priority ranking of air emissions in the oilsands regions is expected out this November. Members are currently working on air quality modelling of priority substances released to air in the oilsands region.

CEMA'S New Web Site!

CEMA launches its new website to the world, offering information about CEMA initiatives and programs to Members and to the general public. The new site has information on the CEMA structure, its working groups, the first CEMA Annual Report, regular CEMA update, a calendar of meetings and much more! Have a look around at www.cemaonline.ca. The old domain name (cema-wbr.org) will still function for at least the next year, but will forward all traffic to the new address.

CEMA STREET These are the People in your Neighbourhood…

Kim Eastlick's career began after completing a chemical engineering degree at the University of Alberta in 1976. He worked in the oil and gas industry in a variety of roles, including gas plant operations management and oil sands engineering. Kim went back to school and in 1994 completed a master's degree in environmental design from the University of Calgary, specializing in the use of constructing wetlands in western Canada for water treatment. Kim is now currently employed by the Alberta Energy and Utilities Board (EUB), and by his own admission, really likes his job. While acknowledging profitability as essential in business, Kim always found his motivation stemmed more from leading safe and environmentally-responsible energy project operations.

As an active member of the Trace Metals and Air Contaminants (TMAC), Kim Eastlick helped the TMAC team generate CEMA's first management system (*see Sustainable Times, issue 5, December 2001*). While quick to credit the many others who work on TMAC, Kim is proud to have played a role in this initiative. The TMAC management system "may chart a bit of the course to follow for other CEMA groups in future," Kim commented. "I believe we're doing the right things."

Kim is also a co-chair for in the CEMA NO_x/SO_2 Management Working Group (*see article, this issue*). He is able to draw on his experience as a member of the Clean Air Strategic Alliance (CASA) Target Loading Subgroup (this subgroup developed a framework for management of acid deposition in Alberta), his role as co-chair of the CASA Flaring and Venting Project team, and his membership on Alberta Environment's Acid Deposition Assessment Group.

Kim offers this perspective: "What I like about working for the EUB is the focus on making the 'right' decisions for all Albertans. Working with CEMA is kind of like that. CEMA's mandate is to make recommendations on how to best manage cumulative impacts and protect the environment in the region. We're trying to do the 'right thing' both in terms of the present and for the future, and to make the kinds of recommendations that serve all members of the public well. It's exciting to play a part in CEMA, where many diverse parties are collaborating to find real solutions to major issues."

Kim and his wife Deborah - who also works in the energy industry - live in Calgary. Kim enjoys automobiles, spicy food, brainstorming, and discussions with his teen-age son. "Having a son of my own makes issues for future generations all the more real to me," says Kim. "No matter what the future holds, we'll all need a clean and sustainable environment in which to live."

CALENDAR OF REGIONAL MEETINGS

November, 2002

5 – RWG Landscape Design, Fort McMurray
7 – RWG, Fort McMurray
8 – CEMA CC, conference call
14 – SWWG, Muskeg River Integrity, Calgary
15 – RWG Soils and Vegetation, Fort McMurray
18 – CEMA TCC, Conference call
18 – TMAC, Edmonton
19 – CEMA OC, Fort McMurray
19 – RAMP Steering Committee
20 – TEEM Science Subcommittee, Calgary
21 – SEWG Cultural & Historical Resources, Fort McMurray
21 – SWWG – Instream Flow Needs, Fort McMurray
22 – SWWG, Fort McMurray
26 – RWG Landscape Design, Fort McMurray
27 – SEWG Landscape & Biodiversity, Fort McMurray

December, 2002

4 – TEEM, Fort McMurray
4 – SEWG, Fort McMurray
9 – SWWG, Water Quality, Calgary
10/11 – CEMA General Meeting
10 – SWWG – Surface Water Quality
12 – SEWG Cultural & Historical Resources, Fort McMurray

Glossary:

CEMA: Cumulative Environmental Management Association
CC: Communications Committee
OC: Operating Committee
NSMWG: NO_x/SO_2 Management Working Group
RAMP: Regional Aquatics Monitoring Program
RWG: CEMA Reclamation Working Group
SEWG: CEMA Sustainable Ecosystems Working Group
SWWG: CEMA Surface Water Working Group
TEEM: Terrestrial Environmental Effects Monitoring Program
TMAC: CEMA Trace Metals & Air Contaminants Working Group

This newsletter is a joint effort between Alberta Environment, Alberta Sustainable Resource Development and CEMA. For additional copies of this newsletter or to submit an article, please contact Lisa Zaplachinski (AENV) at 403-297-5937 (lisa.zaplachinski@gov.ab.ca), Brenda Erskine (Suncor) at 780-743-6480 (berskine@suncor.com), or visit the CEMA website at www.cemaonline.ca.