

## **Health and Environmental Assessment Task Group**

### **Recommendations to the Electricity Framework Review Project Team for their consideration**

#### ***Introduction***

Recommendation 29 of the 2003 Emissions Management Framework for Alberta recommends that Alberta Environment lead, in consultation with Alberta Energy and other regulatory authorities, the establishment of a formal process, to be undertaken every five years, to review certain elements of the emissions management framework. As part of the five year review in 2008, a multi-stakeholder Health and Environmental Assessment Task Group (HEAT) was established to:

- Assess new information related to possible new substances not yet regulated, but which should be considered based on potential impacts;
- Compile and review any new or additional information that illustrates potential health effects associated with emissions from the electricity sector and determine how any new information impacts the framework; and
- Make recommendations for future five year reviews.

In addition, consultants were hired to undertake a review of recently published research or reports (2002-2007) and provide reports pertaining to any new information on the magnitude and/or nature of (1) health effects or impacts and (2) environmental effects or impacts of air emissions associated with fossil fuel based electrical generation. It should be noted that the recommendations of this report are based on research and reports published up to December 31, 2007.

Specifically, the consultants prepared annotated bibliographies that surveyed and documented any new information, studies and reports related to the direct or indirect health and environmental effects of air emissions from fossil fuel fired electrical generation facilities, with a focus on:

1. Direct and indirect health and environmental effects that could be associated with air emissions from fossil fuel fired electrical generation facilities.
2. New information related to emissions from fossil fuel fired electrical generation facilities.

#### ***Environmental Effects Literature Review***

The objective of this review was to report on recent research that addresses: 1) atmospheric emissions from thermal electricity generation; and, 2) the direct and indirect environmental effects of these emissions. Although all of the abstracts presented in the report were screened for relevance, no attempt was made to critically evaluate the quality of the science. Some of the papers included in the report are quite broad in scope (e.g., include pollutant sources other than thermal electricity).

The vast majority of papers published on thermal electricity generation since 2002 have been focused on pollutant reduction, pollutant monitoring, and regulatory evaluations. There has been considerable emphasis on research related to mercury emissions and abatement. Recent studies

on direct and indirect environmental effects of air emissions from thermal electricity generation were primarily limited to local and regional studies (especially in Eastern Europe and Greece) and to toxicity research on some List 2 substances. For certain pollutants, especially for particulate matter and PAHs, recent research was primarily directed toward human health effects; these abstracts were screened out of this report. Further investigation revealed that the bulk of research projects relating to environmental effects of thermal electricity generation were published between 1985 and 1999, and that these findings appear to be so well-documented that focus has now shifted to pollutant reduction. As such, part of this review is focused on technology and standard/guideline changes that have evolved since 2002. Many researchers are now conducting “life cycle” emissions studies, where the total emissions of electricity generation (including upstream processes such as mining and fuel transport) are accounted for and evaluated in economic and environmental terms.

No attempt was made to search for new or “emerging” pollutants from thermal electricity generation. Despite this, a number of studies on radionuclide emissions were encountered during the course of the review; these are included in the section that presents results for List 2 substances. Research continues to advance in the field of polycyclic aromatic hydrocarbons (PAHs) speciation.

### ***Health Effects Literature Review***

The objective of this review was to report on recent white and grey literature articles assessing the health effects of electrical generation emissions. The search was limited to studies published between 2002 and 2007 that examined the relationship between electrical generation from fossil fuel combustion and adverse health effects. For the white literature, articles were identified and collected using the databases *ISI Web of Science*, *Ovid EMBASE*, *Toxnet*, and *Pubmed*. For the grey literature, reports and other scientific articles were obtained through searches of individual websites of government agencies and environmental groups. In total, 37 white literature and 19 grey literature articles were found. The majority of studies evaluated at least one of the five priority substances (Hg, SO<sub>2</sub>, NO<sub>x</sub>, particulate matter, and greenhouse gases (primarily CO<sub>2</sub>)). A few studies assessed one or more of the List 2 substances, and no health effects studies were found assessing any new ‘emerging chemicals’. There continues to be a vast amount of research being done on the potential health impacts of particulate matter, in particular PM<sub>2.5</sub>. This report offers the findings of the literature searches and provides a compilation of suitable abstracts.

### ***Other Considerations***

The HEAT group became acquainted with projects and initiatives related to emissions from the electricity sector through presentations from government and industry. Of specific note, TransAlta and Epcor made a presentation to the task group on their environmental monitoring programs at the Genesee, Wabaman, Sundance, and Keephills generating stations.

### **Recommendation 1: Revisions to the Framework**

Based on the two literature reviews, the HEAT task group concluded:

1. No new substances were identified that should be of concern to regulators; and
2. No new environmental and health effects information was identified that would warrant a detailed review of the framework.

The HEAT group recommends that the CASA Board agree that additional work or revisions to the framework are not required at this time based on new or additional health and environmental effects information.

**Recommendation 2: Analysis of Research**

The HEAT group recommends that for future 5-year reviews, a multi-stakeholder group with appropriate representation be struck to oversee a study to be undertaken to identify any new and relevant studies or research findings regarding potential environmental or health effects from air emissions from electricity generation, and that an independent peer review be completed on the results.