Oil Sands Environmental Management Division
Approvals Program Interim Policy

ENVIRONMENT

Emission Guidelines for Oxides of Nitrogen

(NOx) for New Boilers, Heaters and Turbines Using Gaseous Fuels Based on a Review of Best Available Technology Economically Achievable (BATEA)

DATE: December 14, 2007

ISSUE:

Interim Emission Guidelines for Oxides of Nitrogen (NO_x) for New Boilers, Heaters and Turbines using Gaseous Fuels for the Oil Sands Region in the Regional Municipality of Wood Buffalo North of Fort McMurray based on a Review of Best Available Technology Economically Achievable (BATEA)

DISCUSSION:

As each new oil sands project enters the airshed in the Fort McMurray area, the amount of NO_x being emitted is increasing. While the mobile mine fleets are a significant source of NO_x emissions, the stationary sources (e.g. turbines, boilers, heaters) also contribute to the NO_x emissions. A review of information on the NO_x emission control BATEA (Best Available Technology Economically Achievable) for stationary sources determined that the previous NO_x emission requirements appear to be dated in comparison to what may now be achievable.

The Regional Ozone Management Framework, as developed through the Cumulative Environmental Management Association (CEMA) process, recommended that Alberta Environment lead a process to establish regional BATEA-based standards for ozone precursors (which includes NO_x). The NO_x BATEA Review was also referenced during the Alberta Energy and Utility Board Hearings in 2006 for the Suncor Voyageur Project, the Albian Sands Muskeg Mine Expansion Project, and the Imperial Oil Kearl Oil Sands Project.

NO_x contributes to acid deposition, nitrogen eutrophication, ozone and increases in ambient levels of nitrogen dioxide (NO_2) in the natural environment.

POLICY:

See Appendix 1 for the Interim Guideline.

SUPPLEMENTARY INFORMATION REQUIRED:

In support of the interim guideline review and finalization in 2009, a technology review will be undertaken by AENV in conjunction with regional and industrial stakeholders to validate the performance of existing technologies and the applicability of additional technologies that could be used in the future (both combustion and post-combustion NO_x controls will be reviewed), as well as consideration of the potential extension of the use of the guideline outside of the "North of Fort McMurray" area.

BACKGROUND:

- Fort McKay First Nation expressed concern regarding the increasing levels of NO_x and requested that Alberta Environment determine or confirm a NO_x emission control BATEA for stationary sources in the Fort McMurray area. In addition, the Fort McKay Industry Relations Corporation issued a discussion paper in January 2006 regarding NO_x emission limits from turbines, boilers and furnaces, and technology that they felt could be used as BATEA. The scope of the NO_x BATEA Review was kept to gas-fired new stationary sources north of Fort McMurray to address the specific concerns brought forward by the Fort McKay First Nation in Statements of Concern for applications.
- AENV discussed the scope and project with the CEMA NO_xSO_2 Management Working Group in March 2006.
- AENV issued a request for stakeholder input on NO_x emission control BATEA and feedback on draft documents in September 2006, March 2007, and September 2007.
- AENV contracted the Alberta Research Council (ARC) to conduct an independent review of NO_x emission control technologies. AENV developed a draft emission guidance document based on the input received from stakeholders and the ARC report.
- AENV held a stakeholder meeting on July 5, 2007 to discuss the status of the NO_x BATEA review and viable options for completing the guideline. The Fort McKay IRC representatives and industry representatives from Regional Issues Working Group (RIWG) requested the opportunity to prepare an alternative consensus draft guideline for AENV to consider. They submitted this alternative option to AENV for consideration. The final draft of the Interim Guideline was based on the alternative option.

APPROVED: *Original Signed by Shannon Flint* **DATE:** *December 14, 2007*
DIRECTOR

Appendix 1

Emission Guidelines for Oxides of Nitrogen (NO_x) for New Boilers, Heaters and Turbines Using Gaseous Fuels Based on a Review of Best Available Technology Economically Achievable (BATEA)

Interim Guideline

December 2007

The purpose of this guideline is to update NO_x emissions criteria for stationary sources. Currently, these limits are based on CCME (1992, 1998) and CASA (2003). Concerns have been raised as to the applicability of these guidelines based on technology improvements (ARC, 2007). This guideline is interim and is intended for review and finalization in 2009.

The guideline has two primary components:

Compliance Limit – is the minimum operational performance limit a given piece of equipment must achieve in order to meet approval conditions.

Performance Target[1] – represents the approximate level of NO_x emissions achievable by using the best available NO_x control combustion technology economically achievable and operated under normal conditions and averaged over a year. It generally represents a better level of NO_x control than is required to meet the compliance limit. The design, selection and operation of equipment are to be based on meeting the performance target. It is recognized that in some cases performance target levels may not be realized despite the use of the best available NO_x control combustion systems or that the best available NO_x control combustion systems may not be appropriate for all applications. Information gathered during the operation of units will be used to establish future performance targets and to guide future equipment selection, design and operation to minimize NO_x emissions from subsequent facilities.

During guideline finalization as contemplated by this interim guideline, both combustion and post-combustion NO_x controls will be reviewed.

Monitoring of these targets will be based on the CCME guidelines that are listed in references section.

The compliance limits and performance targets are shown in Table 1.

[1] This target is not to be used in the same context as the Target in the Specified Gas Emitters Regulation (SGER) where it is set for Greenhouse Gas (GHG) reduction compliance of a facility.

Table 1: Emission Guidelines for NO_x

Type of Unit	Sub type	Fuel Type	Compliance Limit (g/GJ)	Performance Target (g/GJ)[a]
Gas Turbines		NG AGF	[b] [d]	20.4* [c]
HRSG		NG AGF	[b] [d]	7.9 15.8
Heater >10.5 GJ/hr		NG AGF	26 40	7.9 15.8
Boiler > 10.5 GJ/hr	Industrial	NG AGF	26 40	7.9 15.8
	OTSG	NG AGF	26 40	7.9 15.8

NG – natural gas
AGF – alternate gaseous fuel including refinery fuel gas, produced gas, etc.
HRSG – heat recovery steam generator
OTSG – once through steam generator
[a] – An annual average value
[b] – Based on CASA (2003) or CCME (1992) whichever is more stringent and will be calculated for the entire cogeneration unit, i.e. turbine plus HRSG, in accordance with the methodology specified in the CASA or CCME guidelines.
[c] – To be determined as part of the guideline finalization
[d] – To be determined as part of the guideline finalization, but for interim to be based on CASA (2003) or CCME (1992) whichever is more stringent
*The Performance Target for gas turbines (NG) is based on heat input
Note: Energy input for heaters, boilers and steam generators is based on higher heating value. Energy input for gas turbines is based on lower heating value. The basis for the performance targets is natural gas.

This interim guideline is intended for:

- New approvals
- Amendments to existing approvals that involve new stationary sources
- Existing approvals with greater than 2 years delay between approval and start of construction
- Replacement of existing equipment at the end of design life
- Potentially, projects constructed in phases/stages, for phases commencing construction after August 2, 2007, based on a case-by-case determination by AENV.

In support of the interim guideline review and finalization in 2009, a technology review will be undertaken by AENV in conjunction with regional and industrial stakeholders to validate the performance of existing technologies and the applicability of additional technologies that could be used in the future.

This interim guideline was developed for immediate use in the AENV approvals process for new gas turbines, boilers and heaters operating in the oil sands region in the Regional Municipality of Wood Buffalo north of Fort McMurray. Potential extension of the use of the guideline will be considered during the process for guideline finalization.

References

Alberta Research Council Inc. (ARC). 2007. Technologies for Reducing NO_X Emissions from Gas-Fired Stationary Combustion Sources. Prepared for Alberta Environment by the Alberta Research Council, Carbon and Energy Management. February 27, 2007.

Canadian Council of Ministers of the Environment (CCME). 1992. National Emission Guidelines for Stationary Combustion Turbines. PN 1072. CCME NO_X/VOC Management Plan, Mutistakeholders Working Group and Steering Committee. Winnipeg, MB.

CCME. 1998. National Emission Guidelines for Commercial/Industrial Boilers and Heaters. CCME NO_X/VOC Management Plan, Mutistakeholders Working Group and Steering Committee. Winnipeg, MB.

Clean Air Strategic Alliance (CASA). 2003. An Emissions Management Framework for the Alberta Electricity Sector, Report to Stakeholders. Prepared by the Electricity Project Team. November 2003.