



# APPROVALS PROGRAM POLICY

## OIL SANDS ENVIRONMENTAL MANAGEMENT DIVISION

**POLICY NO.:** replaces Policy 1, 2007 and 1-A, 2008

**DATE:** \_\_, 2009

**TITLE:** Emission Standards for the Use of Non-gaseous Fossil Fuels for Steam Generation in In-Situ Bitumen or Heavy Oil Recovery Projects

**SUBJECT:** Alberta Environment (AENV) is issuing this revision to Policy #1, dated Oct. 5, 2007, and Policy #1-A, dated Jan. 17, 2008, establishing new emissions standards and performance targets for sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and particulate matter (PM) for industrial steam generating boilers and heaters (“steam generators”) burning non-gaseous fossil fuels (“non-gaseous fuels”) for in-situ bitumen or heavy oil recovery projects (“in-situ projects”). In addition to these standards and targets, these steam generators when using non-gaseous fuels are required to be carbon dioxide (CO<sub>2</sub>) capture-ready. Initially, this policy is applicable to in-situ projects, however it may be expanded in the future to include other industrial activities using non-gaseous fuels.

This policy is intended to achieve an integrated set of goals including:

- Minimizing emissions of concerns and reducing cumulative effects,
- Encouraging natural gas conservation,
- Adopting best available technology,
- Encouraging energy efficiency,
- Allowing flexibility in the choice of fuel and the method in which emission limits are met,
- Encouraging research and development on advanced combustion, oxy-fuel combustion, gasification and pollution control technology, and
- Supporting technologies and processes that align with Alberta’s Climate Change Strategy.

**POLICY:**

In-situ projects that propose to directly burn non-gaseous fuels (such as bitumen, petroleum coke or asphaltenes) for steam generation will be considered for approval if the steam generators burning the non-gaseous fuel are designed to meet the emission standards and performance targets specified in Table 1 for SO<sub>2</sub>, NO<sub>x</sub> and PM and are CO<sub>2</sub> capture ready. These standards and targets will be used to develop emission limits in approvals. In addition to the emission standards and performance targets, an analysis of the fuel as specified in Table 2 and source monitoring requirements as specified in Table 3 are required.

**Table 1: Emission Standards for the Use of Non-gaseous Fossil Fuels for Steam Generation in In-Situ Projects**

Parameter	Compliance Standard <sup>a,c</sup> (g/GJ <sub>input</sub> )	Performance Target <sup>b,c</sup> (g/GJ <sub>input</sub> )
SO <sub>2</sub>	116	70
NO <sub>x</sub>	50 (new steam generator)	40 (new steam generator)
	65 (retrofit steam generator) <sup>d</sup>	50 (retrofit steam generator) <sup>d</sup>
PM	11	9
CO <sub>2</sub>	CO <sub>2</sub> Capture Ready <sup>e</sup>	

<sup>a</sup> - **Compliance Standard** – is the minimum operational performance a given piece of equipment must achieve in order to meet approval conditions.

<sup>b</sup> - **Performance Target** – represents the approximate level of emissions achievable by using the best available pollution control technology economically achievable and operated under normal conditions. It generally represents a better level of emission control than is required to meet the compliance standard. 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 pollution control technology or that the best available pollution control technology 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 emissions from subsequent facilities.

<sup>c</sup> - An annual average value.

<sup>d</sup> - Retrofit steam generator means modifications to an existing and approved steam generator at the project site. Relocation of a used steam generator from outside the Project will be considered as a new steam generator to the Project and must meet the emission standards for a new steam generator.

<sup>e</sup> - Until a CO<sub>2</sub> capture ready policy is established by AENV, the following definition of CO<sub>2</sub> capture ready as defined by the International Energy Agency (2007) shall apply:

A CO<sub>2</sub> capture ready facility is a facility which can include CO<sub>2</sub> capture when the necessary regulatory or economic drivers are in place. The aim of building facilities that are capture ready is to reduce the risk of stranded assets or ‘carbon lock-in’. Developers of capture ready plants should take responsibility for ensuring that all known factors in their control that would prevent installation and operation of CO<sub>2</sub> capture have been identified and eliminated. This might include:

- o A study of options for CO<sub>2</sub> capture retrofit and potential pre-investments,
- o Inclusion of sufficient space and access for the additional facilities that would be required, and
- o Identification of reasonable route(s) to storage of CO<sub>2</sub>.

Authorities involved in permitting facilities should be provided with sufficient information to be able to judge whether the development has met these criteria.

Note: The above standards are subject to the following energy efficiency requirements (efficiencies based on LHV):

1. If design steam generator efficiency is <80% then standards are to be adjusted as follows:  
**(Emission standard \* design efficiency) / 80%**
2. If design steam generator efficiency is >90% then standards are to be adjusted as follows:  
**(Emission standard \* design efficiency) / 90%**

The emission standards in Table 1 are based on a review of existing standards and controls, as well as performance test results from pilot and/or prototype operations. Data was very limited for bitumen, petroleum coke and asphaltene fuels and the emission standards for these units are extrapolated from standards and controls from other non-gaseous fuels. Once sufficient performance data is available from operating units burning these fuels and employing best control technologies, the standards will be reviewed and adjusted, accordingly. The intent is to undertake such a review in 2014, or possibly sooner, if there are any obvious environmental issues with the standards. Standards for heavy metals may be added in the future.

Monitoring Requirements

An analysis of the non-gaseous fossil fuel is required as outlined in Table 2.

**Table 2: Analysis of Non-gaseous Fuels for Steam Generation in In-Situ Projects**

Fuel	Parameters	Frequency
Non-gaseous Fuel	<ul style="list-style-type: none"> <li>• Sulphur content;</li> <li>• Nitrogen content;</li> <li>• Heavy Metals; and</li> <li>• Higher heating value.</li> </ul>	<ul style="list-style-type: none"> <li>• Once, prior to use; and</li> <li>• Monthly, if composition changes significantly, or</li> </ul> <p>Semi-annually, if composition is constant.</p>

The emission performance of steam generators shall be verified by the monitoring requirements specified in Table 3.

**Table 3: Source Monitoring Requirements for the Use of Non-gaseous Fuels for Steam Generation in In-Situ Projects**

Steam Generator Capacity (GJ/hr)	Parameter	Source Monitoring Requirement
< 105	NO <sub>x</sub> , SO <sub>2</sub> , SO <sub>3</sub> , PM, PM <sub>10</sub> , PM <sub>2.5</sub> , VOCs, PAH, Heavy Metals	Initial stack survey to be conducted at the time the boiler or heater is commissioned
105 - 264	NO <sub>x</sub> , SO <sub>2</sub> , SO <sub>3</sub> , PM, PM <sub>10</sub> , PM <sub>2.5</sub> , VOCs, PAH, Heavy Metals	Initial stack survey to be conducted at the time the boiler or heater is commissioned
	NO <sub>x</sub> , SO <sub>2</sub> , PM, PM <sub>10</sub> , PM <sub>2.5</sub> , Heavy Metals	Semi-annual stack surveys
> 264	NO <sub>x</sub> , SO <sub>2</sub> , SO <sub>3</sub> , PM, PM <sub>10</sub> , PM <sub>2.5</sub> , VOCs, PAH, Heavy Metals	Initial stack survey to be conducted at the time the boiler or heater is commissioned
	NO <sub>x</sub> , SO <sub>2</sub> , PM, PM <sub>10</sub> , PM <sub>2.5</sub> , Heavy Metals	Semi-annual stack surveys
	NO <sub>x</sub> , SO <sub>2</sub>	Continuous emissions monitoring system

### Research Projects

The emission standards and performance targets in Table 1 are not applicable to research projects such as trial test burns, small-scale test runs, steam injection tests, modifications to boiler water treatment equipment or processes, or any other tests that promote research and development in advanced combustion technologies or in reducing emissions when burning a non-gaseous fuel, that does not cause an adverse effect to the environment. A written authorization must be obtained from the Director confirming the proposed activity is within the scope of research projects. The Director would grant in writing exemption periods of up to 12 months from these standards for short term research projects. At the Director's discretion, the Director may grant in writing exemption periods from these standards longer than 12 months for research projects that test novel advanced combustion or pollution control technologies on a larger scale.

### Other Considerations and Requirements

Alberta Environment notes that some in-situ projects are constructed in phases or stages over an extended period of time. Project operators should recognize that emission standards may be updated and revised over time. Accordingly, for approved projects constructed in phases or stages, the most recent emission standards in place prior to construction of the phase or stage will apply.

Applicants should note that in addition to these emission standards, which are mainly technology based, there may be other site specific considerations which may limit the amount of allowable emissions. In particular, ambient air quality and cumulative effect limitations within a region or area will also need to be met.

These emission standards and performance targets shall be become effective on March 1, 2009.

### **For more information, please contact:**

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**APPROVED:** Original Signed  
DIRECTOR

**DATE:** Date Here