Ontario Air and Noise Best Practices

Topic	Thermal Radiation from Open Flares	Date: May 4, 2012 Version 2.0
Purpose	Identify ways of modeling the thermal radiation from open flares in support of Environmental Compliance Approval Applications	Page 1 of 1

Thermal radiation from open flares may lead to elevated temperatures at nearby points of reception. On occasion, Approvals Engineers with the Ministry of the Environment (MOE) may ask for an assessment of this effect. The MOE does not provide official guidance on conduction a thermal radiation assessment however, which creates a need for a suitable Best Practice for practitioners.

In May 2000, Alberta Environment has produced a guidance document titled "Heat Radiation From Flares"[i], which is intended primarily to ensure worker health and safety at a facility. Based on a review of this document, a simplified approach using the U.S EPA SCREEN3 model has been developed. This approach has been used successfully to respond to MOE requests to assess these effects.

The U.S EPA SCREEN3 model is well-suited to assessing impacts from open flares, and in Alberta is commonly used for this purpose. The model contains algorithms to specifically handle the unique source characteristics of open flares, taking into account the heat content of gasses sent to the flare.

Methodology

In order to estimate the temperature increase at a given location, the SCREEN3 model is run for the "flare" source type, using the total heat content of the gasses sent to the flare. Other parameters are input as per normal modelling approaches. The key difference is that the total heat content of the gasses sent to the flare is also input as the gram per second emission rate for the flare.

By using the heat content of the gasses sent to the flare as the emission rate for the flare, the modelled "concentration" will be an estimate of the energy input at a given distance from the flare, in units of energy per unit volume. Using this value and the molar heat capacity of air at constant pressure for typical ambient conditions, the resulting increase in temperature can be estimated.

As a screening-level method for estimating these impacts, this methodology is not meant to replace detailed thermodynamic calculations, but does provide a simple and relatively quick method for estimating thermal impacts from flares.

For more detailed methodologies, please consult the Alberta Environment document noted above.

Best Practice developed by Brian Sulley, RWDI Air Inc.

[i] Guidard, S.E., W.B. Kindzierski and N. Harper, 2000. Heat Radiation from Flares. Report prepared for Science and Technology Branch, Alberta Environment, ISBN 0-7785-1188-X, Edmonton, Alberta.