

Concentration and Health Effects Associated with “Blue Haze” from Non-Condensable Gas Incinerators

FOREST INDUSTRY HEALTH RESEARCH PROGRAM

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The FOREST INDUSTRY HEALTH RESEARCH PROGRAM (FIHRP) has published a report titled “Concentration and Health Effects Associated with “Blue Haze” from Non-Condensable Gas Incinerators”. The report is available to FIHRP members on the B.C. Pulp and Paper Industry website at www.paperforum.com or contact Mr. Fred Oud by phone (250) 748-9445, by fax 1-888-273-7148, or by e-mail at westcot@telus.net. Non-members of FIHRP may be charged for the report.

The Forest Industry Health Research Program (FIHRP) funded an investigation to determine the composition and associated health effects of the “blue haze” periodically emitted from non-condensable gas (NCG) incinerators at Kraft Pulp Mills. To meet the objectives of this study, a literature search was conducted, a questionnaire was distributed to participating FIHRP Pulp Mills, and stack testing for NCG components was conducted.

The results of the survey and literature review found that NCG emissions are composed of: water vapour, carbon, nitrogen and sulphur oxides, reduced sulphur gases, ammonia, particulate matter, alcohols, and volatile and semi-volatile organic compounds.

Of eight participant mills (53% response rate), 37.5% reported experiencing “blue haze” incidents and 50% had evaluated the composition of their NCG streams. Mills reported using lime kiln, power boiler, or dedicated incinerator, coupled with secondary emission controls, to reduce or destroy NCG. Half of respondents have tested their NCG stack emissions for select chemical compounds. Survey and literature results suggested sulphur oxides, ammonia, sulphuric acid, condensation of volatile hydrocarbons, abietic and primaric acids, terpenes, and particulate matter may be the cause of the “blue haze” incidents.

Based on survey and literature review results, stack sampling was undertaken under normal stack conditions, and while bypassing the demister at a pulp mill with “blue haze” issues. The stack testing revealed higher concentrations of total particulate, lead, carbon and sulphur oxides, and total volatile organic compounds when the demister on the NCG Stack was bypassed suggesting that these compounds could be contributing to the visible haze observed. Further evaluation revealed that the increase in total particulate concentration was likely due to high concentrations of sulphuric acid.

Analysis of the data suggests sulphuric acid and sulphur trioxide may be responsible for, or most likely contribute to, the “blue haze” experienced by the pulp mill periodically. The results of this study are consistent with other researchers’ findings. As stack sampling was not conducted during an actual “blue haze” incident, it cannot be determined if these compounds are responsible for the incidents, or if other compounds are also involved.

With respect to the symptoms reported by workers, the following chemical contaminants were found to be present in the emissions at concentrations that could result in worker health complaints depending on the level of dilution: nitrogen oxides, sulphur dioxide, sulphuric acid and sulphur trioxide. Ambient monitoring of these contaminants to evaluate worker exposure potential was recommended; however, for logistical reasons related to the dissolution of FIHRP, the Board of Directors decided not to proceed with this additional monitoring.