



CONSULTING ENGINEERS  
& SCIENTISTS

Submitted To: Crofton Airshed Citizens Group and  
Reach for Unbleached!

By Email.

## FINAL PEER REVIEW

### Baseline Air Quality Modelling and Human Health Risk Assessment of Current Day Emissions from NorskeCanada Crofton Division

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**Project Number:** W04-318

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**Reputation** *With an emphasis on responsiveness, RWDI Consulting Engineers & Scientists offers skillful use of advanced engineering tools, unique expertise and experience.*

**Resources** *Our deep knowledge and broad resources produce understandable, useful results.*

**Results** *We've built our reputation on it.*

## **EXECUTIVE SUMMARY**

RWDI AIR Inc. (RWDI) and PIONEER Technologies Corporation (PIONEER) were retained by the Crofton Airshed Citizens Group and Reach for Unbleached to review the report by Jacques Whitford (JW) entitled, “Baseline Air Quality Modelling and Human Health Risk Assessment of Current Day Emissions from NorskeCanada Crofton Division” dated October, 2004. RWDI was responsible for reviewing Volume I: Air Quality Modelling and PIONEER was responsible for reviewing Volume II: Human Health Risk Assessment. The review of Volume I consisted of reviewing the Volume I report and other documents and electronic files provided under the non-disclosure agreement including CALMET and CALPUFF model input and output files and the emission inventory spreadsheet.

The following five main components of the air quality and human health risk assessment were reviewed:

- Emission inventory,
- CALMET and CALPUFF modelling methodology,
- Ambient air quality data analysis,
- Dispersion model results, and
- Human health risk assessment.

Significant deficiencies have been noted in the Baseline Air Quality Modelling and Human Health Risk Assessment prepared by Jacques Whitford to the degree that we believe substantial re-work is required. This report identifies and discusses all deficiencies that were found in the report from typographical errors to major flaws and weaknesses. The deficiencies were ranked from minor (deficiency ranking 1) to major (deficiency ranking 5). The deficiencies of greatest concern relate to the emission inventory, dispersion modelling methodology and human health risk assessment. These are summarized below.

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### **Reputation Resources Results**

## **Emission Inventory**

- Average annual emission rates were used in the Crofton Mill Emission Inventory. Peak 1-hour emission rates should have been used to determine maximum short-term (24-hour or less) ground-level concentrations and resulting acute health impacts.
- Emissions during start up, shut down or during low efficiency operation were not considered. As a result, emissions and associated risk may have been significantly underestimated.
- Emission rates were based on 2003 production information only. Several years of production data should have been analyzed.
- Zero emission rates were assumed for non-detects, rather than ½ of detection limit, as recommended by the National Association for Air and Stream Improvement (NCASI). As a result, a number of contaminants were eliminated from the risk assessment.
- A number of contaminants were not included even though NCASI emission factors are available for at least some of the processes. No explanation is provided for not including these contaminants. This may have resulted in an underestimation of emissions and associated risk.
- The Crofton emission inventory does not include criteria air contaminant emissions for the operation of the power boilers using bunker C oil and natural gas.
- Idling and off-site emissions from trucks, rail and marine traffic were not included.

## **CALMET and CALPUFF Modelling Methodology**

RWDI agrees with the overall approach used in the modelling that Jacques Whitford adopted for the Crofton assessment. However, RWDI believes there are significant deficiencies in the input files used and in the model options chosen and that these deficiencies could in turn have a significant effect on the resulting predictions of pollutant concentration. These deficiencies include:

- Omission of surface observation from the Crofton Mill site;
- Option to extrapolate surface observation to higher levels was not chosen;

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## **Reputation Resources Results**

- Land use in the study domain, particularly in the region immediately surrounding the Crofton Mill was improperly characterized;
- Receptor spacing immediately beyond the fenceline is too sparse; and
- Background sources should have been included in modelling or predicted model concentrations should have included some estimate of background contributions.

#### Ambient Monitoring Recommendations

- The suitability of current ambient monitoring station locations should be reviewed. Ideally a new study using site-specific meteorological data and all other recommended changes to the CALMET/CALPUFF model should be conducted to determine optimal ambient air monitoring locations in the Crofton area.

#### Human Health Risk Assessment

PIONEER disagrees with the overall approach that Jacques Whitford adopted for the Crofton risk assessment. There are significant deficiencies in the approach, which results in an underestimation of the human health risks associated with exposure to emissions from the Crofton Mill. These deficiencies include:

- The JW Report does not constitute a Baseline Human Health Risk Assessment because it does not evaluate all complete exposure pathways and sensitive subpopulations. The JW Report only evaluates the inhalation pathway for adults. Indirect exposure pathways (e.g., ingestion, dermal) and sensitive sub-populations should have been evaluated in the JW Report.
- The JW Report only considers/calculates the risks/hazards associated with individual substances. Cumulative risks/hazards should have been calculated and presented. Risk is therefore greatly underestimated.

Please note that PIONEER performed a Screening Level Risk Evaluation (SLRE) of the airborne concentrations presented in Tables 5-4 through 5-13 in the Report using the most current toxicity information available from the USEPA. Each of the airborne concentrations presented in Tables 5-4 through 5-13 in the Report were used “as-is” to calculate Hazard Quotients (HQs) and Cancer Risks (CRs) for an adult

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#### Reputation Resources Results

resident exposed via inhalation of air only. The individual HQs and CRs were summed to calculate the cumulative Hazard Index (HI) and cumulative CRs for each receptor (i.e., fence-line, gridded, and special receptor). The SLRE is presented in Appendix A.

- The JW Report is not transparent and does not follow generally accepted risk assessment principals and guidelines. For example, the Health Risk Assessment did not follow United States Environmental Protection Agency (USEPA) guidance in regards to pathways, cumulative noncancer and cancer risks.
- All substances in emission inventory should be identified as substances of potential concern (SoPCs) and carried through the risk assessment.
- Conceptual Site Model does not include all complete exposure and ingestion pathways.
- The Exposure Assessment is inadequate. Only one page and a figure were devoted to this topic. Typically, the Exposure Assessment is one of the most involved and well-documented chapters in a risk assessment. This section should be revised to identify and discuss potentially exposed populations and exposure pathways that are (and are not) being evaluated in the risk assessment and should provide rationale for the decisions that were made. The section should also include a presentation of the exposure parameters that were used to estimate the exposure for each receptor and exposure pathway. If exposure assumptions are embedded in the ambient air quality criteria or toxicological criteria, then they should be extracted and explained to the reader. Media concentrations should be calculated using equations and associated parameters for each exposure scenario presented in this chapter.
- The Toxicity Assessment should explicitly identify and summarize toxicological criteria for each substance. All toxicity values used should be presented in this section, and not fragmented between Section 4, Appendix A, and Appendix B, which makes it confusing for a reader evaluating which values were used for each exposure scenario. The decision rules used to select toxicity information should be explicitly stated and justified in the text. In addition, it is important to consider whether or not the criterion have been updated to reflect more recent scientific information. For example the British Columbia ambient air quality objectives were developed in the

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## **Reputation Resources Results**

1980s and it is not clear if they have ever been updated and if not, is there new science that should be considered when applying the values.

- The Exposure Assessment and Risk Characterization should be presented separately.
- Toxicity Reference Values should be compared to all modeled concentrations and not just concentrations for SoPCs that did not have Ontario Ministry of the Environment or World Health Organization criteria.

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#### **Reputation Resources Results**