IPZ-3 Delineation

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The uncertainty ratings for the IPZ-3 delineation for all 3 intakes are summarized in Table A13-2 below as listed in Rule 14 (MOE, 2009a). The following table and text is an excerpt from Baird (May, 2011).

Table A13-2 Uncertainty Analysis for IPZ-3 delineation for the LAWSS, Petrolia and Wallaceburg Intakes

Criteria	**Rating (High/Low)**
Data and data gaps	High
Modelling	High
QA/QC	Low
Model calibration/validation	High
Overall Uncertainty Rating	High

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According to Baird, the *IPZ-3* delineation received an overall high uncertainty rating. The high rating reflects data limitations, as well as limitations of the modelling undertaken not a reflection of the quality of work. The modelling approach is consistent with the Technical Rules and the level of effort permitted based on schedule and budget. The intent of this work is to provide a better understanding of the vulnerability of the intake and this has been accomplished.

Modelling has been used to evaluate whether the release of a chemical parameter or pathogen would be transported to the intake and result in deterioration of the water as a drinking water source, as required for *IPZ-3* delineation and for designation of significant threats using Rule 130 (MOE, 2009a). The cross-section of the water courses were assumed to be constant throughout and discharge was averaged throughout the channel length. Evaporation, physical changes including decay and chemical changes to the contaminant as it moves downstream were not considered. Besides these limitations common to all three intakes, other factors that contribute to the uncertainty level for each *IPZ-3* delineation is described below.

A limited number of events (defined as up to the 100 year return period) were simulated. The selected events may not cover the full range of spills and plume dispersion that may occur in Perch and Cow creeks, St. Clair River, Sydenham River and in the Lake Huron. If different events were selected, the concentrations at the intake would be different, however the modelling demonstrates that under these conditions it is possible for the spill to result in a deterioration of the source water for the purposes of drinking.

a) IPZ-3 Delineation for LAWSS and Petrolia intakes

For the LAWSS and Petrolia *IPZ-3* delineation, the cross sections for Perch Creek and the cow creeks were estimated from raster imagery. Cow Creek is not gauged and the flow conditions were assumed to be similar to nearby Perch Creek, which is gauged and has similar watershed and tributary characteristics. These result in an increase to the level of uncertainty.

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For the purposes of delineating the *IPZ-3*, a longitudinal dispersion analysis (LDA) is carried out on Perch and Cow creeks. This provides a first-order estimate of the likely dispersion of 2% benzene from a spill on Highway 402 into Perch and Cow creeks. The predictors used in the longitudinal dispersion analysis are empirical equations. They have not been validated for the Perch and Cow creeks used in this study, nor have they been validated for the contaminants considered.

b) IPZ-3 Delineation for Wallaceburg intake

For the Wallaceburg *IPZ-3* delineation, Limited current data were available to calibrate the MISED model in the Chenal Ecarte (see Baird, 2010). Baird recommended that additional data for model validation in the Chenal Ecarte would be beneficial to future analyses. The hydrodynamics in the MISED model were calibrated with ADCP data as described in Baird (2009, 2010). Validation for one scenario was completed using a spill in the St. Clair River and a monitoring station in the St. Clair River. Additional calibration and validation for the advection/dispersion feature is recommended. These result in an increase to the level of uncertainty.

The hydrodynamics in the Wallaceburg area are extremely complex. There are a large number of tributaries flowing into the Chenal Ecarte, including the Sydenham River. The bathymetry data used to develop the model grid is coarse in this area. These result in an increase to the level of uncertainty. MOE has predicted shorter travel times in the Chenal Ecarte than were

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