

7. Maintain the CALPUFF Modelling Tool

In accordance with Method 1, it is recommended that NRC develops and maintains CALMET and CALPUFF modelling inputs (the modelling tool) in consultation with industry and other stakeholders. The modelling tool will be used for assessing the effects of discharges to air within the Marsden Point area. The current basis for this tool is the CALMET and CALPUFF input files developed by NIWA for the Marsden B application on behalf of Mighty River Power. This is the most recent large-scale modelling exercise involving the tools. Ongoing input from existing industry and consent applicants will be critical and the NRC is committed to updating and improving these files over time, including undertaking validation studies as both ambient monitoring and real-time emissions data becomes available.

7.1 CALMET Data Set

The CALMET data set developed by NIWA for the Marsden B application is a 26-by-35 km domain at a 500 m grid resolution. The model incorporates hourly weather observations from 10 surface stations and has 10 vertical levels up to 3000 m. It uses upper air data from Whenuapai (over 60 km to the south of Whangarei Harbour) and relies on surface observations collected by NZRC at Marsden Point. The NIWA CALMET files were produced for the year 2001.

The NIWA set is considered the best meteorological data currently available. NIWA considers that the CALMET data can be improved by incorporating observations from a quality surface meteorological station located in the Marsden Point area and incorporating prognostic meteorological data from an appropriate meteorological model (such as MM5). Measured upper air data is not considered necessary at this stage. NRC will develop a meteorological monitoring site located in Marsden Bay, as discussed in Section 4.

It is recommended that NRC update the CALMET data, incorporating these measurements once at least 18 months to two years of data has been collected.

7.2 Modelling Tool Development

Developing the Marsden Point CALPUFF Modelling Tool will provide a consistent basis for determining the potential cumulative effects on air quality for new air discharge consent applications.

NIWA's CALPUFF modelling for Marsden B incorporated the maximum theoretical emissions from the proposed Marsden B power station on coal and maximum daily emissions from NZRC. NIWA ran CALPUFF on an 18-by-15 km grid with a resolution across the grid of 250 m and 125 m near Marsden B. Twenty-one discrete receptors were included to determine maximum ground level concentrations at key terrain features and residential areas. This is considered an appropriate modelling domain for future applications within the airshed.

NIWA also made a simplistic comparison with available monitoring data in the region but at this stage a full evaluation of the model performance has not been undertaken because there is not sufficient data. NRC recognises that model validation is a very important part of the air quality strategy.

To do this, it will be necessary to develop a real time emissions file for the refinery and other existing sources, and model emissions for the same year as ambient monitoring observations. Such a validation study will require co-operation from the existing industry, and will best be completed following an upgrade of the monitoring programme. It is anticipated that this could not be undertaken for 18 months to two years, when a suitable

amount of monitoring data is available. As such, the NRC commits to completing a model validation exercise within three years of the air quality management strategy being implemented. In the meantime, however, it is considered that the modelling inputs already used for the Marsden B application will be suitable for the purpose, with some modifications (which are likely to be dealt with as part of the further information request to Mighty River Power).

The NRC, in consultation with the industry and other stakeholders, can develop and maintain the NIWA modelling to provide a modelling tool for general use in the Marsden Point area. As discussed previously, the meteorological data will need to be upgraded over the next few years, and model validation exercises completed.

The emission input files will incorporate the major sources of NO_x, PM₁₀ and SO₂ and any sources identified as being important in the airshed following a review of the emission inventory e.g. shipping. The file will need to be updated when:

- A resource consent is issued;
- Consents are implemented (i.e. facility built);
- The airshed inventory is updated; and
- Consent applications for significant point sources are publicly notified.

At the time of writing, the emission files are likely to include the major point sources only, i.e. the NZRC, the Carter Holt Harvey LVL plant and possibly the Marsden B power station (depending on the outcome of the current application). The NRC will need to make these files available to applicants for air discharge consent applications.