



## PROPOSED UPPER HUNTER PARTICLE CHARACTERISATION STUDY OUTLINE

This is a summary outline of a proposed fine particle characterisation study for the Upper Hunter (developed and funded jointly by NSW Health and Office of Environment and Heritage (OEH)) to be undertaken by CSIRO and ANSTO.

### BACKGROUND

The Upper Hunter Air Quality Monitoring Network (UHAQMN) has 7 of the planned 14 stations currently providing routine particle ( $PM_{10}$  &  $PM_{2.5}$ ) and meteorological data to the OEH web-site. The installation and commissioning of all 14 stations by the end of December 2011 is on track. The UHAQMN stations are also able to be used as platforms for any further specialised research studies.

The NSW Health Air Pollution Expert Advisory Committee recommended that a number of special studies be undertaken to better understand the health impacts of mining and related activities on communities in the Hunter.

The initial results from the first 8 months of data have seen evidence of slightly elevated fine particle (as  $PM_{2.5}$ ) concentrations in Muswellbrook during winter. There are multiple sources of  $PM_{2.5}$  including woodsmoke from solid fuel heaters and other forms of combustion (e.g. road & rail transport, coal-fired power generation and coal seam spontaneous combustion).. There is a need to better characterise the components of fine particles and their sources.

In response, NSW Health and OEH have developed an initial study to better understand the composition and source of fine particles in the Upper Hunter.

### PROPOSED STUDY

The field sampling component of the proposed study will be carried out at the 2 larger secure UHAQMN sites in Singleton and Muswellbrook. CSIRO and ANSTO are expected to formally start sampling from early January 2012 and cover a 12 month period to ensure any seasonal variation is captured. Sampling will cease at the end of December 2012.

#### Objectives:

The study will seek to:

- determine the contributors to the overall fine particle burden in the 2 major populated centres in the Upper Hunter.

#### Methodology:

CSIRO will install high volume samplers at the OEH sites in Singleton and Muswellbrook and collect samples of  $PM_{2.5}$  particles on quartz filters on a 1 day in 3 cycle for further analysis.

ANSTO will also install their low volume ASP  $PM_{2.5}$  cyclone samplers using Teflon filters at Singleton and Muswellbrook and collect  $PM_{2.5}$  samples on the same 1 day in 3 cycle for further analysis.

ANSTO and CSIRO will then use Ion Beam Analysis and Ion Chromatography to determine the elemental composition (from Hydrogen to Lead (Pb)), organic carbon, black carbon, soluble ions (including chloride, nitrate, sulfate, ammonium, sodium and potassium) and anhydrous sugars (including levoglucosan) to identify as much of the PM<sub>2.5</sub> mass as possible. Levoglucosan, a woodsmoke tracer, will allow a specific assessment of the contribution of woodsmoke.

These 2 techniques combined are estimated to be able to identify more than 95% of the total mass of the PM<sub>2.5</sub> samples.

### **Expected Outcomes:**

Analysis of these data, including the use of ANSTO's Positive Matrix Factorisation (PMF), will provide:

- a description of the contributors to fine particles in the Upper Hunter;
- an estimate of which sources are important and their relative contribution to fine particles in the Upper Hunter;
- an indication of any weekly and seasonal changes in PM<sub>2.5</sub> particles in the Upper Hunter.

The filter papers will be kept and be available for any further analysis (e.g. Carbon14 analysis or toxicological analyses) should that be deemed appropriate at a later stage.

### **Project Management**

The project is being jointly funded by OEH and NSW Health and will be overseen by a project team involving those organisations and the CSIRO and ANSTO researchers.

### **Deliverables:**

To ensure that an assessment of the data is available at key points during the 12 months of the project (but recognising that the data analysis and interpretation is complex and time-consuming), the following reports are proposed:

<b>DELIVERABLE</b>	<b>DESCRIPTION</b>	<b>PROPOSED TIMETABLE</b>
Initial report	Site commissioning & methods	End March 2012
First progress report	Report on Summer measurements & analysis	End June 2012
Second progress report	Report on Winter measurements & analysis	End December 2012
Draft final report	Complete data analysis and interpretation	End May 2013
Final report		End June 2013

## **NEXT STEPS**

The contracts for the proposed study have now been finalised and the necessary equipment is being ordered for installation in Singleton & Muswellbrook during December 2011.

Briefings of the 3 local Councils involved in the UHAQMN have been scheduled for 21 November and 28 November 2011.

Validation of the equipment is expected in December 2011 with the official start to the project expected in early January 2012.

**NSW Health**

**Office of Environment and Heritage**

**18<sup>th</sup> November 2011**