Stockton Air Quality Monitoring Station Report No1

1. Introduction

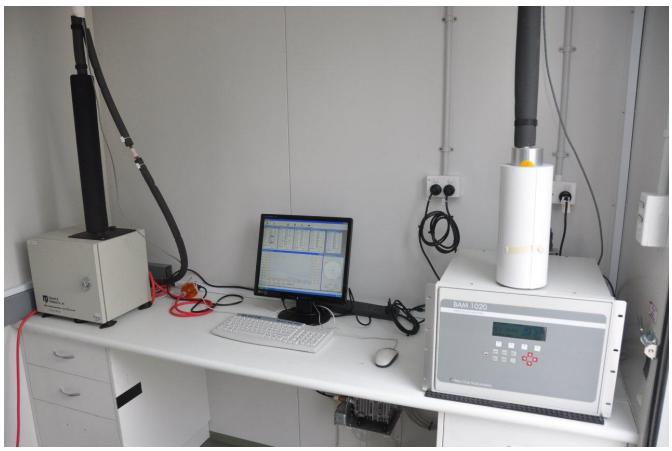
Following representations and a proposal from the Stockton Community Action Group, Orica agreed to install an air quality monitoring station in Stockton.

The station design and equipment selected was undertaken in consultation with OEH and the EPA to ensure the station met the OEH standards. The station was installed and commenced operation on the 13 October 2013.

Orica Air Quality Monitoring Station Stockton

The station included monitoring for:

1. PM10 particles
2. PM2.5 particles
3. Ammonia
4. NOx
5. NO_2



PM10 and PM2.5 Monitors

Ammonia, NOx and NO2 Monitor

An ANSTO PM10 and PM2.5 analyser was also leased to allow collection of these particles for analysis/speciation by ANSTO and the CSIRO. Orica employed the company Ecotech to design, install, commission and service the monitoring station. Ecotech also developed a website which provides the following information:

1. Live data for wind direction and speed
2. PM10 1hr and 24 hr data
3. PM2.5 1 hr and 24 hr data
4. Ammonia 1 hr data
5. NOx 1 hr data
6. NO_2 1 hr data

There are also for the current month and previous month graphs for:

1. PM 10 average hr
2. PM10 daily average
3. PM 2.5 hourly average
4. PM2.5 daily average
5. Ammonia hourly average
6. NOx hourly average
7. NO2 hourly average
8. Wind direction hourly average
9. Wind speed hourly average

Data from previous months is also archived on the website.

2. Review of Data from 13 October 2012 to 1 February 2013

The monitoring station has now been operating for approximately 3.5 months and has provided useful trends and performance after this period. An overview of the data and performance with particle levels against the NEPM standards are assessed from the data.

2.1. PM10 Particles

PM10 particles (< 10 µm) have varied from 4.4 to >200 µg/m^3 for hourly average readings and from 8.0 to 80 µg/m^3 for daily average readings. In only the 3.5 months of operation there have been 13 exceedances of the NEPM standard of 50 µg/m^3. The NEPM standard allows for 5 exceedances a year to allow for natural events such as bushfires.

The data shows in only 3.5 months the 5 requirement has easily been exceeded (13 exceedances) indicating significant air quality issues in Stockton that requires more detailed investigation by the NSW Government. The high hourly peaks exceeding 200 µg/m3 are also a concern for the community. Many of the daily average exceedances have corresponded with winds from the west to north-west direction bringing winds from Kooragang Island.

The exceedances are outlined in Table 1 below; the January 2013 graph for the daily average PM10 levels is shown in figure 1 and January 2013 graph for PM10 hourly average in Figure 2.

Table 1: PM10 NEPM Standard Exceedances

Date	Reading (µg/m³)	Comment
16/10/12	50.3	
17/10/12	52.2	
25/10/12	61.0	
5/11/12	51.5	
6/11/12	59.4	
7/11/12	62.0	
21/11/12	52.9	
8/12/12	50.8	
11/1/13	74	Read from graph
18/1/13	72	Read from graph
29/1/13	65	Read from graph
31/1/13	80	Read from graph
1/2/13	62	Read from graph

Figure 1: PM10 Daily Average Graph for January 2013

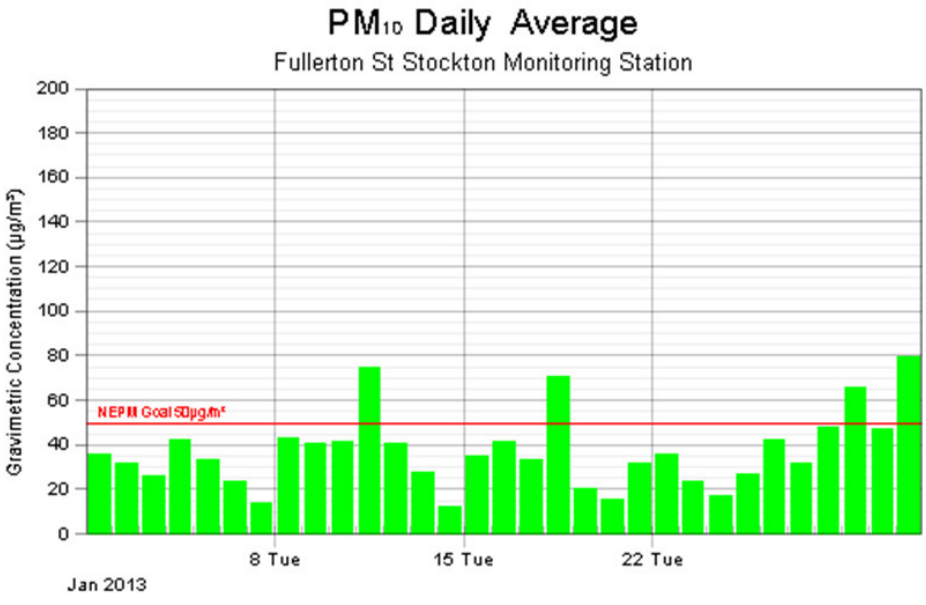
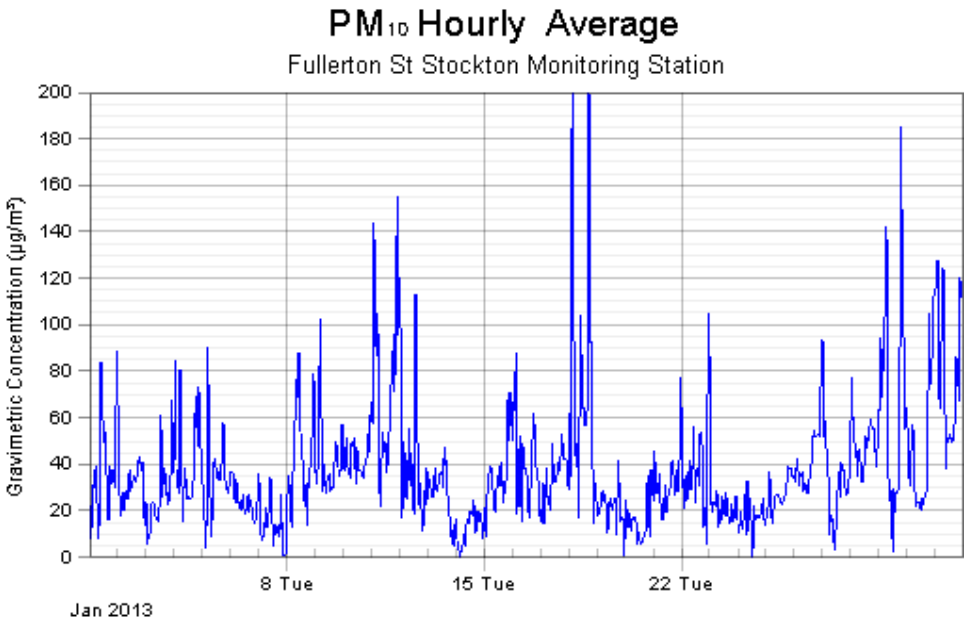


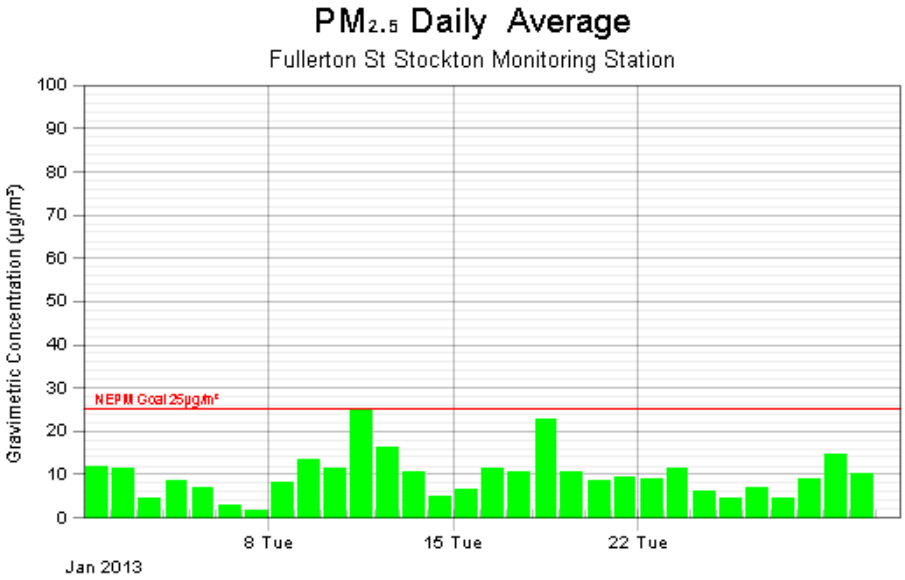
Figure 2: PM10 Hourly Average Graph for January 2013



2.2. PM 2.5 Particles

The PM 2.5 particles (< 2.5 µm) have varied from 0 to >134 µg/m³ for hourly average readings and from 1 to 25 µg/m³ for daily average readings. The NEPM target level of 25 µg/m³ for PM2.5 particles has not been exceeded in the first 3.5 months of operation. The daily average for PM 2.5 particles for January 2013 is shown in Figure 3 below.

Figure 3: PM2.5 Daily Average Graph for January 2013

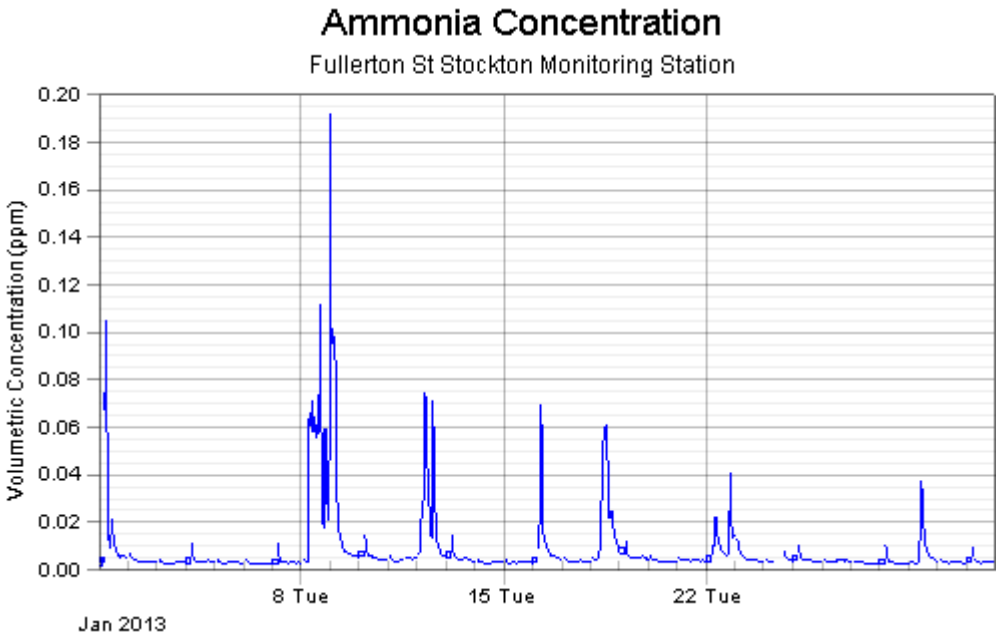


2.3. Ammonia

Ammonia levels have generally been low in the first 3.5 months of monitoring however there have been a number of peaks that have caused concern for the community and are likely to be related to fugitive releases from the Orica Kooragang Island (KI) plant.

Generally ammonia levels range from 0.004 to 0.02 ppm with peaks up to 0.19 ppm. The peaks correlate with winds directions from the Orica KI plant. Figure 4 shows the ammonia 1 hour average graph for January 2013.

Figure 4: Ammonia 1 hour Average Graph for January 2013



2.4. NOx and NO_2

NOx and NO_2 levels have generally been low and the NO_2 levels have been below the NEPM standard. However there appears to be regular peaks and occasional higher peaks in NOx and NO_2 hourly average readings. The NOx hourly average readings have varied from 0.001 to 0.11 ppm and NO_2 hourly average readings varied from 0.001 to 0.044 ppm which is below the NO_2 NEPM standard of 0.12 ppm.

Figures 5 and 6 show the hourly average graphs for NOx and NO2 for January 2013.

Figure 5: NOx Hourly Average Graph for January 2013

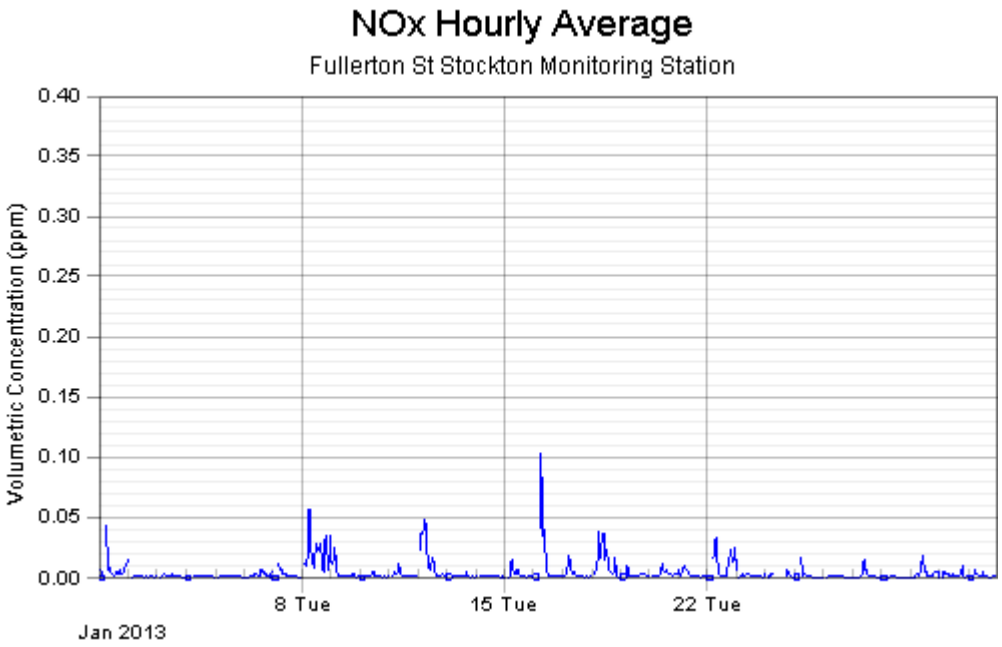
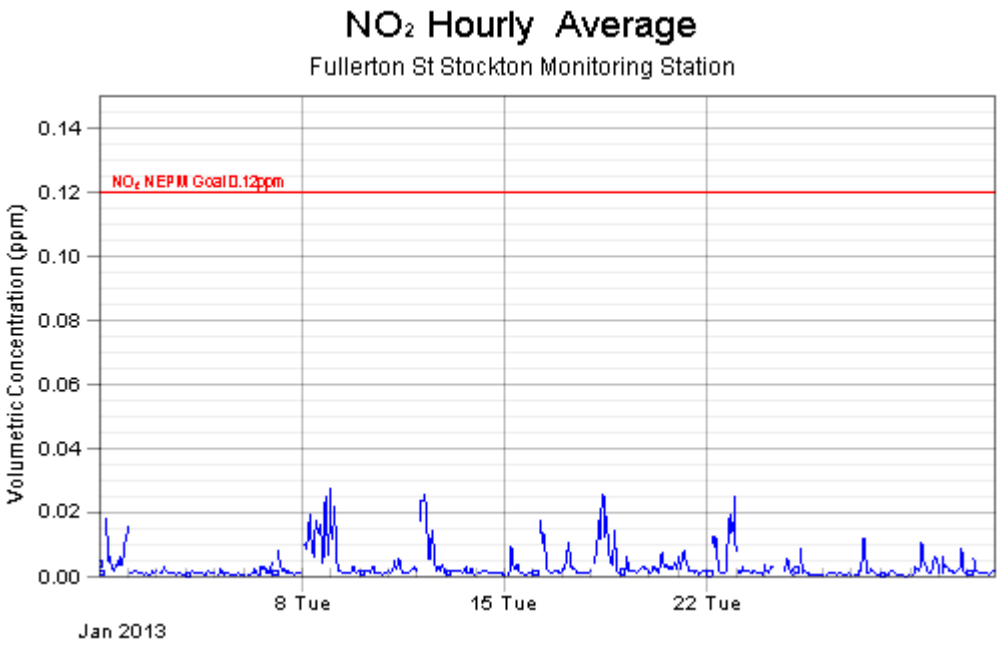


Figure 5: NO_2 Hourly Average Graph for January 2013



2.5. Wind Direction Effect Example

Wind direction can make a significant difference to fine particle levels particularly PM10 levels. The figures below show the effect of wind direction. PM 10 hourly average levels rose to >170 µg/m^3 with winds from the west to north range (Kooragang Island (KI) direction) and dropped sharply to <30 µg/m^3 when the wind direction changed to southerly direction (not from industry). This is also reflected in the PM10 daily average which exceeded the NEPM standard on the 1 February with northwest winds (KI direction) with a value of >60 µg/m^3 and dropped to <20 µg/m^3 with strong southerly winds (not from industry).

Figure 6: PM10 Hourly Graph 1 and 2 February 2013

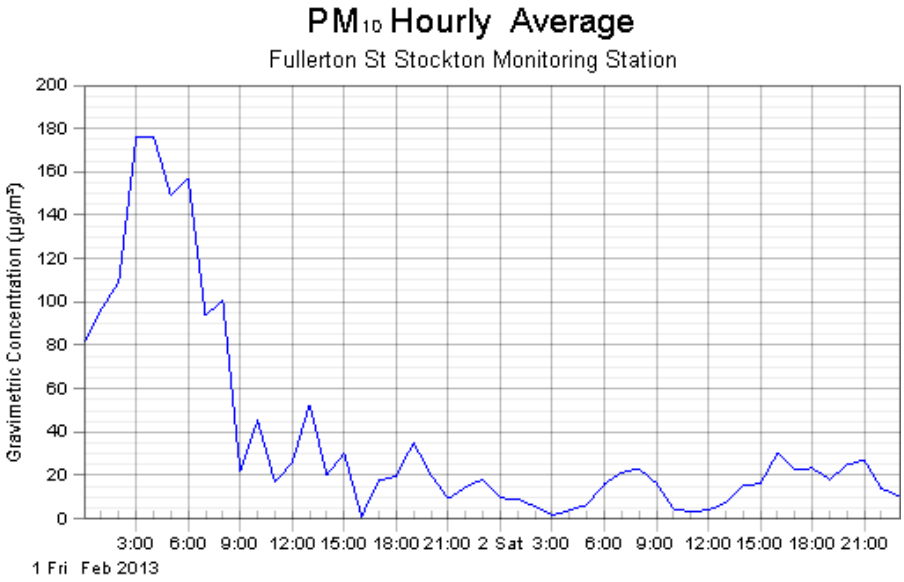


Figure 7: PM10 Daily Average Graph 1 and 2 February 2013

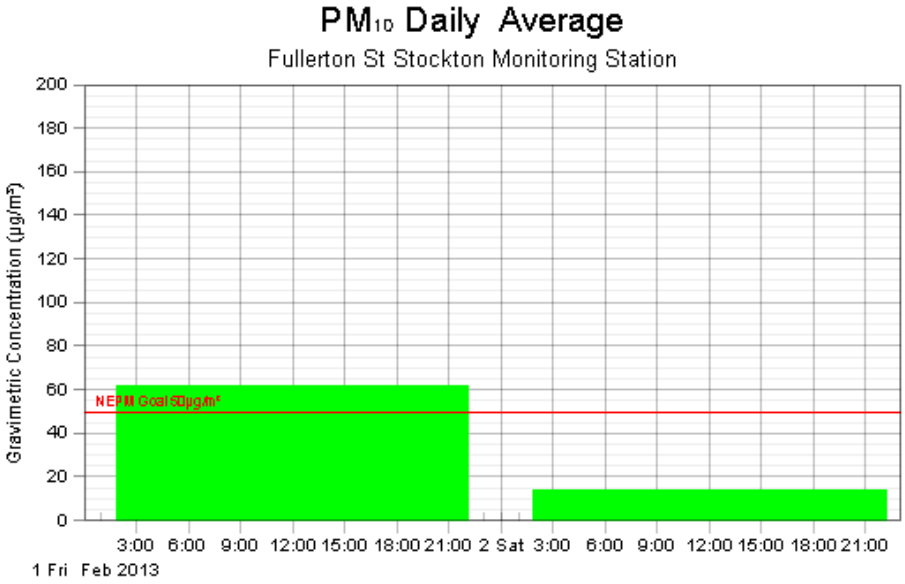
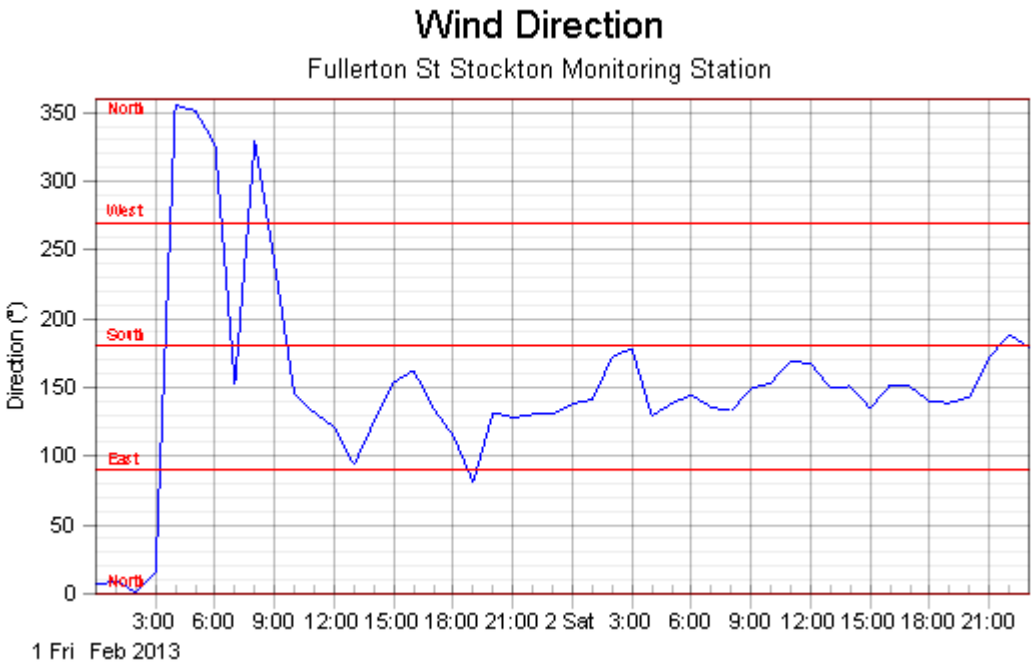


Figure 8: Wind Direction 1 and 2 February 2013



3. Summary

The Stockton Air Quality Monitoring Station has provided valuable data over the first 3.5 months of operations. While ammonia, NOx, NO_2 and PM 2.5 levels have been below standard or targets there is a major concern with the high level of exceedances of PM 10 particles which have exceeded the NEPM standard 13 times in only 3.5 months (5 exceedances allowed per year for natural events). Many of these exceedances correlated with wind directions bringing particles from Kooragang Island.

The worst period for winds coming from Kooragang Island are the autumn and winter months and it is likely that the exceedances will increase significantly giving a very high level of exceedances for a one year period of PM10 particles. PM10 daily average readings up to 80 µg/m^3 are a concern as are hourly averages exceeding 200 µg/m^3 for the community.

These levels cause significant health concerns for the Stockton community and concerns that new industries will create increased fine particle pollution such as the T4 project.

The Stockton air quality monitoring station clearly shows how the current monitoring stations in Newcastle do not provide a complete picture of pollution from industry in the Newcastle LGA and the urgent need for the new air quality monitoring stations being implemented by the EPA at Carrington, Mayfield, Stockton and Fern Bay.

It is noted these PM10 particle levels are worse than many of the current EPA Upper Hunter monitoring station results.

The particle analysis data from particles collected in the ANSTO monitor at the Stockton monitoring site should begin to provide data in the first half of 2013 for the chemical composition of the fine particles.

3.1. Recommendations

The following recommendations are:

1. This report is copied to the Minister for the Environment Robyn Parker, The EPA Chairman and Board members, key personnel in the EPA in Newcastle and Sydney.

2. The EPA/OEH undertake a study to evaluate the sources of the high particle levels including correlating graphs of PM10 and PM 2.5 levels at monitors across the region with the Stockton monitoring station. The graphical data of sites from the Upper Hunter, Newcastle and Stockton be prepared by the Sydney office of the EPA for the March NCCCE meeting.

3. The new monitoring stations proposed for Carrington, Mayfield and Fern Bay are installed as soon as possible.