REPORT

AIR QUALITY MONITORING PROGRAM - NEWNES KAOLIN MINE - FINAL

Newnes Kaolin Pty Ltd

Job No: **3901**

7 June 2010

PROJECT TITLE:	**AIR QUALITY MONITORING PROGRAM - NEWNES KAOLIN MINE - FINAL**
JOB NUMBER:	**3901**
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1 INTRODUCTION

On 14 March 2010, the Minister for Planning granted Project Approval to Newnes Kaolin Pty Limited to operate the Kaolin Sand Mine (the Project).

The Project site is located approximately 10 km to the east of Lithgow, NSW, adjacent to the settlement of Newnes Junction which is comprised of 6 residences. The area also accommodates three existing extractive industries – two sand quarries and the Clarence Colliery.

Schedule 3, Condition 15 of the Project Approval requires the preparation of an Air Quality Monitoring Program (AQMP). The specific requirements for the AQMP are as follows:

> *"Prior to carrying out any development, the Applicant shall prepare, and subsequently implement, an Air Quality Monitoring Program for the development, in consultation with DEC, and to the satisfaction of the Director-General. This program must include an air monitoring protocol for evaluating compliance with the air quality impact assessment criteria in this consent."*

PAEHolmes have prepared the following Air Quality Monitoring Program (AQMP) on behalf of Newnes Kaolin Pty Limited, in accordance with the Project Approval.

1.1 Objectives of the DMP

The primary objectives of the AQMP are to:

- address the requirements of conditions in the approval and other legislative requirements;
- outline procedures for controlling / managing dust during operation of project;
- define roles, responsibilities and reporting requirements;
- outline the dust monitoring equipment and locations for the project;
- define the air quality criteria used for compliance and outline what the criteria mean;
- define a protocol for evaluating compliance; and
- outline potential contingency measures for responding to non-compliance.

2 PROJECT APPROVAL CONDITIONS

Project Approval for the Kaolin Sand Mine states that activities at the site must be carried out in accordance with the Environmental Impact Statement (EIS), statement of commitments and conditions of approval issued by the Minister (Project Approval). The following environmental performance conditions relate to air quality.

2.1 Impact Assessment Criteria

Schedule 3, Condition 14 of the Project Approval specifies Impact Assessment Criteria that are consistent with the relevant New South Wales Department of Environment, Climate Change and Water (NSW DECCW) air quality assessment criteria for assessing impacts from dust generating activities (**NSW DEC, 2005**). The applicable criteria are shown in **Table 2.1**.

The proponent is required to ensure that no additional exceedances of the criteria occur as a result of the dust generated by the Project.

Table 2.1 Project – Impact Assessment Criteria

Pollutant	Averaging Period	Criterion	
Short-Term Impact Assessment Criteria			
Particulate Matter <10 µm (PM_{10})	24 hour	50 µg/m^3	
Long-Term Impact Assessment Criteria			
Particulate Matter <10 µm (PM_{10})	Annual	30 µg/m^3	
Total Suspended Particulate Matter (TSP)	Annual	90 µg/m^3	
		Max Increase	**Max Total**
Deposited Dust (insoluble solids)	Annual	2 g/m^2/month	4 g/m^2/month

2.2 Dust Management

Schedule 3, Condition 14 of the Project Approval requires that dust generated by the development does not cause additional exceedances of the criteria listed in **Table 2.1** at any residence on, or on more than 25 percent of, any privately-owned land, or at the boundary of the Greater Blue Mountains World Heritage Area (WHA).

2.3 Air Quality Monitoring Program

Schedule 3, Condition 15 of the Project Approval requires the implementation of an air quality monitoring program, as outlined in **Section 1**.

2.4 Meteorological Monitoring

Schedule 3, Condition 24 of the Project Approval requires the establishment and maintenance of a meteorological monitoring station in the vicinity of the development.

3 ENVIRONMENTAL MANAGEMENT PROCEDURES

Dust can be generated from two primary source groups, as follows:

- Wind-blown dust from exposed areas; and
- Dust generated by site activities (i.e. topsoil removal, ore extraction, materials handling and processing).

The following protocol for dust management, for these sources, is proposed:

- Daily visual inspection of dust being generated on site;
- Daily activity log with specific emphasis on the major dust generating activities;
- Implementation of the required air quality controls in response to visual inspections, dust generating activities and meteorological conditions; and
- Regular air quality monitoring as described in **Section 4.1**.

The minimum measures proposed to control dust emissions from the operation of the project are outlined in **Table 3.1**.

Table 3.1 Control Procedures for dust

Source	Control Procedures
Areas disturbed by extraction	Disturb only the minimum area necessary for extraction. Reshape, topsoil and rehabilitate completed extraction areas as soon as practicable after the completion of extraction.
Stockpiles	Maintain stockpiles in a moist condition to minimise wind blown dust or ensure they are located within the pit void.
Crushing	Ensure dust emissions from crushing are controlled by water sprays or partial enclosure of the crusher, or other suitable measures.
Haul Road dust	All roads and trafficked areas will be watered as required using water trucks/carts to minimise the generation of dust. All haul roads will have edges clearly defined with marker posts or equivalent to control their locations.

4 MONITORING AND COMPLIANCE ASSESSMENT

4.1 Air Quality Monitoring

The key objective of the air quality monitoring is to provide a means to assess compliance against regulatory air quality criteria, including compliance assessment at the closest potentially affected residential receptors and the Blue Mountains World Heritage Area (WHA).

The following monitoring is proposed:

- Four dust deposition gauges (DDGs) measuring nuisance dust fallout. One DDG should located at the closest affected residential receptor to the southwest of the site with another installed beyond the northern boundary of the site to allow for upwind and downwind comparisons in dust levels. Two DDGs should be installed along the eastern boundary of the site at the border of the Blue Mountains WHA to assess amenity impacts on the WHA.
- One high volume air sampler (HVAS) measuring PM_{10} concentrations at the closest affected residential receptor to the site, the location depending on the stage of operations and the proximity of extraction to residences to the southwest;

Figure 4.1 shows the location of the Project site as well as the proposed (approximate) locations of the HVAS and dust deposition gauges.

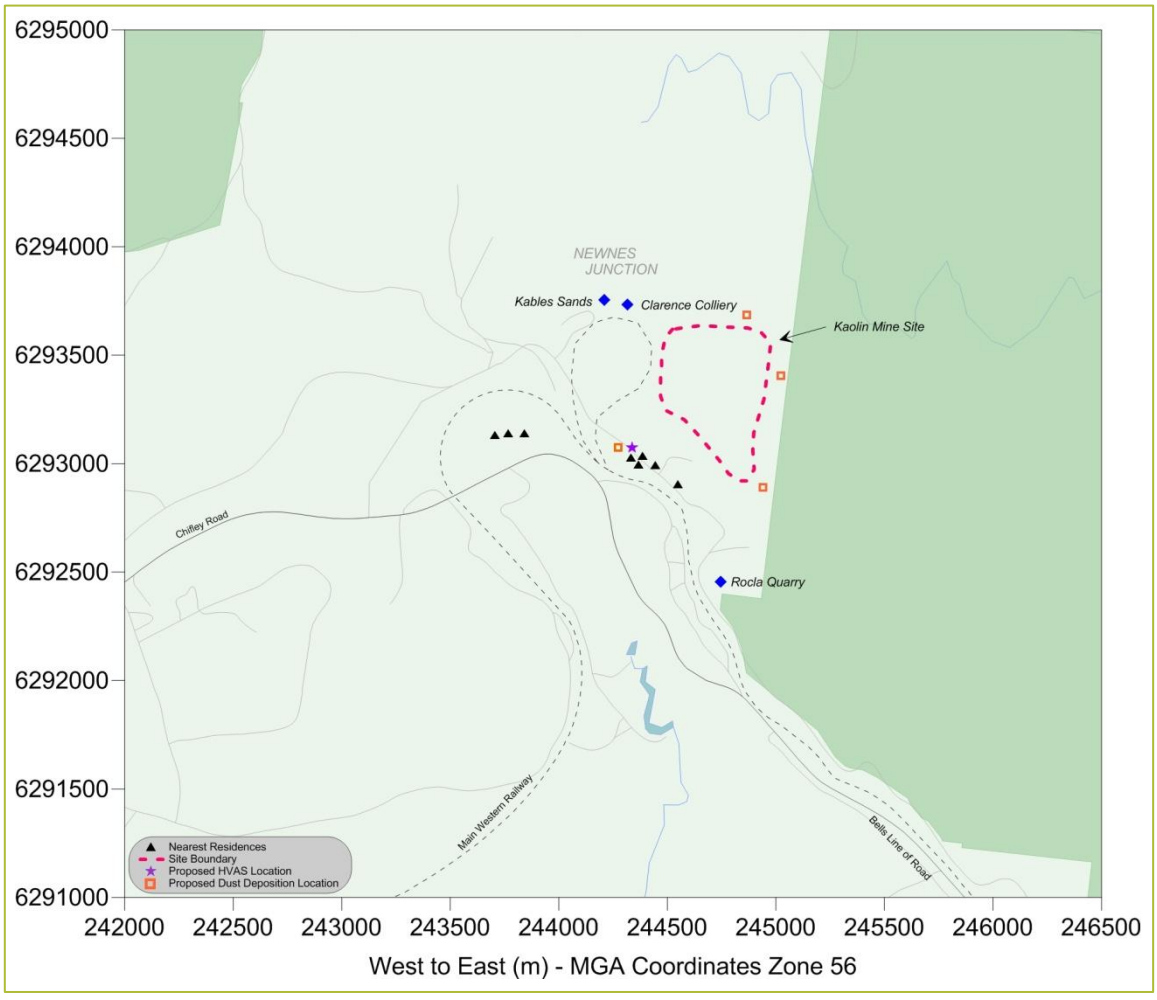

Figure 4.1: Location of the Project and proposed dust monitoring sites

4.1.1 Siting Requirements

The siting and installation of the monitoring instrumentation will be in accordance with Australian Standard "AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air - Guide to siting air monitoring equipment*". It is recommended that the siting of the instrumentation is undertaken in consultation with a suitably qualified air quality professional. Siting should be such that compliance at the closest affected residential receptors can be assessed. Where agreement cannot be reached with the closest affected residential receptors, suitable alternative locations should be chosen that are representative of the impact potential at these most affected receptors, while also taking into account site constraints and power requirements. It is recommended that the location for the HVAS reflects the stage of operation for the project.

4.1.2 Dust Deposition monitoring

Dust deposition gauges will be operated in accordance with the:

- NSW DECCW "*Approved methods for the sampling and analysis of air pollutants in NSW*" **(NSW DEC 2005a)**; and
- Australian Standard "AS/NZS 3580.10.1:2003 *Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method*".

Dust deposition will be measured and reported on a monthly basis. Exposed gauges will be replaced on a monthly basis with analysis conducted at a NATA accredited laboratory for insoluble solids and ash residue. Additional analysis may be required as part of compliance evaluation when elevated levels are recorded (refer **Section 4.3**).

4.1.3 HVAS Monitoring

High Volume Air Sampling units will be operated in accordance with the:

- NSW DECCW "*Approved methods for the sampling and analysis of air pollutants in NSW*" **(NSW DEC 2005a)**; and
- Australian Standard "AS/NZS 3580.9.6:2003 *Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM(sub)10 high volume sampler with size-selective inlet - Gravimetric method*".

Monitoring will be conducted on a one-day-in-six run cycle for a continuous sample period of 24 hours. Filter papers will be returned to a NATA accredited laboratory for analysis, following exposure. Routine operation and regular calibration of the HVAS will be conducted in accordance with AS 3580.9.6. Additional analysis may be required as part of compliance evaluation when elevated levels are recorded (refer **Section 4.3**).

4.2 Meteorological Monitoring

Information is required on the prevailing wind speed and wind direction for the area. If the adjacent Clarence Colliery or Rochla Quarry already operates a meteorological station, a data sharing arrangement will be investigated. If this is not possible, a suitable monitoring site should be chosen in accordance with Australian Standard "*AS 2923 – 1987: Ambient Air Guide for the measurement of horizontal wind for air quality applications*". Generally, the location should be away from buildings or other obstructions that would otherwise impact of the prevailing wind flow. The weather station should be installed and operated in accordance with manufacturer's instructions.

4.3 Protocol for Compliance Evaluation

The following section outlines how compliance against the Impact Assessment criteria will be evaluated and reported for the Project.

Proving compliance with the conditions as written is not always straightforward. It may be difficult, for example, to distinguish between the dust (TSP, PM_{10} or deposited dust) generated from the Project and any other sources in the area, including the two other sand extraction projects in the area as well as potential dust impacts from the Clarence Colliery located less than 500 m from the Project.

The following protocol for compliance testing will be conducted to determine if elevated levels have resulted from, or are likely to have resulted from, dust generated at the Project site.

4.3.1 Compliance with the Dust Deposition criteria

It is noted that the Impact Assessment Criteria for dust deposition are applicable to a deposition level recorded over one month and averaged over a period of one year. In the absence of an established background level (annual average dust deposition for the area without the project), the maximum total dust deposition level of 4 g/m^2/month becomes the compliance criterion for the project. This is because without an indication of the existing deposition dust level before the project commences, the increment from the project alone is difficult to determine.

Where dust deposition monitoring results are below the levels indicated for the Impact Assessment Criteria, no further action is required and results are reported with no additional analysis.

Where dust deposition monitoring results are above the levels indicated for the Impact Assessment Criteria, the following additional analysis will be conducted to determine compliance.

- Obtain meteorological monitoring data for the monitoring period (previous month). Process the data for the period to determine dominant wind direction, average wind speeds, percentage calm conditions (< 0.5 m/s) and significant periods of strong winds (> 5 m/s). Calm conditions can result in poor dispersion of activity dependent emissions from the site; however, wind erosion from exposed surfaces would not be expected to occur under these conditions. Strong winds may also result in wind erosion from other exposed areas in the vicinity of the site.
- Where dominant wind directions are not blowing across the site and towards the monitoring locations, the level above the Impact Assessment Criteria is unlikely to have resulted from site activities and does not represent non-compliance.
- Where the dominant wind direction is blowing across the site, compare the upwind and downwind sites to determine if other upwind sources are contributing to the total deposited dust level.
- Determine if the wind speeds are conducive to wind erosion from exposed surfaces (strong winds / wind gusts > 5 m/s).

On the basis of wind speed, direction and the upwind and downwind results, determine the likelihood of the Project contributing to elevated levels above the Impact Assessment Criterion.

Additional laboratory analysis may be requested for elevated results to show the % contribution of various dust sources (for example coal dust) to the total dust level.

4.3.2 Compliance with the 24-Hour PM_{10} goal

Where 24-hour PM_{10} concentrations are below the levels indicated for the Impact Assessment Criteria, no further action is required and results are reported with no additional analysis.

Where air quality monitoring data are above the levels indicated for the Impact Assessment Criteria, the following additional analysis will be conducted to test non-compliance.

- Obtain contemporaneous meteorological monitoring data. Process the data for the 24-hour period to determine, dominant wind direction, average wind speeds, percentage calm conditions (< 0.5 m/s) and significant periods of strong winds (> 5 m/s).

Where dominant wind directions are not blowing across the site and towards the monitoring locations, the level above the Impact Assessment Criteria is unlikely to have resulted from site activities and does not represent non-compliance.

Where the dominant wind direction is blowing across the site and towards the monitoring locations, the following additional analysis is required to determine if dust from the site has contributed to the elevated levels and / or if wind-blown dust from other upwind sources are also contributing.

- Determine if the wind speeds are conducive to wind erosion from exposed surfaces (strong winds / wind gusts > 5 m/s) or if calm conditions were prevalent (< 0.5 m/s).
- Obtain a site activity log for the elevated level day to determine what activities were occurring and characterise the activities based on being wind speed independent, wind speed dependent or wind erosion sources.

On the basis of the percentage difference in monthly dust deposition monitoring data between upwind and downwind sites, and comparison of the monthly and daily wind patterns, an indication of the potential contribution from other upwind sources can be inferred.

On the basis of the wind conditions, the activities occurring onsite and the potential contribution from upwind sources, determine the likelihood of the Project contributing to elevated levels above the Impact Assessment Criteria. Additional monitoring data for 24-hour PM_{10} can be obtained from other monitoring sites (i.e. NSW DECCW site at Bathurst) to determine if the regional levels of PM_{10} levels were elevated on the day and / or days preceding the localised elevated level. Additional laboratory analysis may be requested for elevated results to show the % contribution of various dust sources (for example coal dust) to the total dust level.

4.3.3 Compliance with the Annual Average PM_{10} goal

It is noted that the long term impact assessment criteria is applicable to an averaging period of one year, and until sufficient representative data are collected, compliance with the long term criteria cannot be tested.

The analysis presented in **Section 4.3.2** can be applied similarly for annual average impacts, by comparing the monitoring data to annual wind patterns and annual average background / regional pollutant levels. Daily varying site activities are not relevant to compliance assessment for annual averages.

4.3.4 Compliance with the Total Suspended Particulate (TSP) criteria

Compliance against the Impact Assessment Criteria for TSP will be assessed by inference from the measured PM_{10} data. In modelling the dust emissions from the site, it was assumed that

PM_{10} was approximately 40% of TSP (**Holmes, 2008**). The distribution of particles has been derived from measurements published by the SPCC (**SPCC, 1986**).

Therefore, TSP data will be inferred from the PM_{10} data by applying the appropriate adjustment factor. The analysis presented in **Section 4.3.2** and **4.3.3** is applied similarly for TSP, however it is noted that the Impact Assessment Criteria is applicable to an averaging period of one year, and until sufficient representative data are collected, compliance with the long term criteria cannot truly be tested.

5 ROLES, RESPONSIBILITY AND REPORTING

5.1 Roles and Responsibility

The management and reporting of air quality aspects of environmental control will be the responsibility of the nominated site environmental representative or mine manager, with specific tasks delegated to on-site personnel.

The environmental representative or mine manager will ensure that proposed dust control measures are effectively implemented and have the intended outcome, that is, no off-site nuisance or health effects due to air pollution are experienced.

The environmental representative or mine manager is responsible for non-compliance and will ensure corrective action is taken to mitigate any impacts.

5.2 Reporting

Where non-compliance with the Impact Assessment Criteria are identified, the Department of Planning (DoP) and DECCW will be notified, in accordance with Schedule 5, Condition 4 of the Project Approval. Within 7 days of detecting the exceedance, a report will be provided to the DoP, which:

- describes the date, time and nature of the exceedance / incident;
- identifies the cause (or likely cause) of the exceedance / incident;
- describes what action has been taken to date; and
- describes the proposed measures to address the exceedance / incident.

Compliance test procedures for identifying non-compliance are outlined in **Section 4.3**.

In accordance with Schedule 5, Condition 5, air quality monitoring results will be reported as part of the Annual Environmental Monitoring Report (AEMR), and will include the following information:

- the test method used, the air pollutants measured and the monitoring instruments used;
- the period of monitoring (start and end dates);
- location of monitoring points;
- analysis of monitoring results against the relevant impact assessment criteria, monitoring results from previous years and predictions in the EA;
- any factors that may have affected the monitoring results;
- identify any non-compliance during the previous year;

- compliance test procedures for dust levels above the Impact Assessment Criteria, as outlined in **Section 4.3**.
- details of any dust complaints received during the monitoring period;
- identify any trends in the monitoring results over the life of the project; and
- describe what actions were, or are being, taken to ensure compliance.

6 CONTINGENCIES

6.1 Non Compliance

Where the compliance evaluation indicates non compliance with the Impact Assessment Criteria, the following actions will be undertaken:

- Identify the activities that were occurring at the time of the non-compliance;
- Determine the activities that were most likely contributing to the non-compliance;
- Review the process and current controls in place for these activities; and
- Implement a best practice alternative to more adequately control dust generation.

The corrective action may involve supplementary monitoring to identify the source of the non-conformance, or may involve modification of activities or programme to avoid any recurrence or minimise its adverse effects.

6.2 Complaints Handling

Complaints will be handled as detailed in the overall Environmental Management Strategy for the site.

7 REVISION PROCEDURE

This AQMP will be reviewed as required by condition 8 of Schedule 5 of the Development Consent being under the heading of Independent Environmental Audit (i.e. within one year of commencement of extraction and every two years thereafter).

A review should also occur when there are significant changes made to the operation. If at the stage of review, it is found that PM_{10} monitoring results are consistently and substantially below the assessment criteria, consideration may be taken to decommission the HVAS.

The review will include an assessment of the effectiveness of the established dust controls and their performance against the AQMP objectives. Any amendments to the Plan will be undertaken in consultation with the appropriate regulatory authorities.

8 REFERENCES

AS/NZS 3580.1.1:2007 "Methods for sampling and analysis of ambient air - Guide to siting air monitoring equipment".

AS/NZS 3580.9.6:2003 "Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM(sub)10 high volume sampler with size-selective inlet - Gravimetric method".

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