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U909

28 February 2002

Nick Agapides
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Sydney South NSW 1232

Dear Nick

ASHTON COAL PROJECT
ADDITIONAL AIR QUALITY INFORMATION REQUESTED BY NSW EPA

We attach hereto a copy of our submission in response to the undated letter from the acting Head of Hunter Regional Operations for the EPA (your ref: File 273142A1, NEF 7387). Our response addresses each issue raised in that letter, but the overall strategy tends to get lost in the detail, so we provide hereunder a strategic overview of the basis for our response.

The process that we were requested to follow is outlined on pages 6 & 7 of the EPA's letter. The basic philosophy requires us to:

(a) Assess the ambient background air quality
(b) Recognize the impact of other mines in the district
(c) Demonstrate that the Ashton Mine will operate at "best practice" standards of emission control
(d) Ensure that the proposed operational controls keep mine emissions to within the criteria outlined in the *Approved Methods and Guidance for the Modeling and Assessment of Air Pollutants in NSW (NSW EPA 2001)*
(e) Establish the total (i.e. increment plus background) air quality impact, and
(f) Provide advice on whether affected landowners may agree / have agreed to accept exceedances of the criteria.

The following notes address each issue in sequence:

(a) Assess the ambient background air quality

Existing air quality is addressed in section 4 of our response. You will note that information available since September 2001 has been incorporated into Table 1 (TSP, PM10 and PM10:TSP Ratios for Camberwell Area) and that the monitored ambient air quality includes the effects from all existing mines and biogenic sources in the surrounding district.

Our detailed evaluation of this information identified a number of episodic events and, following their exclusion resulted in the following conclusions:

- Episodic events at the Camberwell Church monitor appear to be influenced by a motor bike track that has been established adjacent to the grounds of the church. Following the exclusion of TSP recordings believed to have been affected by the bushfires and one anomalous value, where the TSP concentration was recorded as being lower than the PM_{10} concentration, the average TSP for the period June 2001 to Jan 2002 is 56.1 ug/m3.
- Similarly excluding data collected during the period affected by the serious bushfire situation that prevailed during December and January the average PM10 recording for the period June 2001 to Jan 2002 is17.8 ug/m3. The highest 24-hour average PM10 concentration observed under northwesterly winds (required to transport dust from Ashton to Camberwell) is 32 ug/m3.
- Following the above exclusions, the ratio of PM10:TSP demonstrates a long term average of 0.35, but considerable doubt exists about the relevance of the Church monitor, so a PM10:TSP ratio of 0.4 has been adopted and applied to the above PM10 recording, resulting in a calculated annual average TSP of 45 for Camberwell Village..

This analysis of the monitoring data resulted in the following conclusions:

- Maximum 24 hr PM10 concentrations under northwesterly winds is 32ug/m3
- Annual average PM10 is 17.8ug/m3
- Annual average TSP is 45 ug/m3

(b) Recognize the impact of other mines in the district

Air emissions from nearby mines is addressed in section 7 of our response. It is relevant to note that emissions from all existing mines are included in the monitored background data. The impact of the proposed Glendell Mine is included in the analysis using information from their 1982 EIS. The contributions that more distant mines and biogenic sources make to particulate matter levels in the Camberwell Village area were dealt with in the EIS by adding 0.5 g/m2/month to annual average particulate matter deposition rates and 10ug/m3 and 5ug/m3 to TSP and PM10 concentrations respectively. Additional modeling confirms that these allowances are reasonable and possibly conservative.

(c) Demonstrate that the Ashton Mine will operate at best practice standards of emission control

Dust emissions from coal mines in the Hunter Valley has been the focus of much attention in recent years, but the relative proximity of the Ashton Mine to the Camberwell Village necessitates the development of innovative controls which can engender confidence that the mine will meet or exceed its commitments. This requires a comprehensive system that incorporates best practice planning controls, best practice engineering controls and best practice controls over the management of the operation.

Best practice ***planning controls*** will be based on the following:

- The adoption of reduced hours of operation to ensure that emissions do not occur during the period whilst the nocturnal drainage effect results in north westerly winds
- The construction of large earth berms and tree plantations to screen the operations from the village within 6 months of commencement

- The completion of all external overburden emplacement areas within two years of commencement and their complete rehabilitation within four years
- The containment of the active mine area to less than 30 Ha. This is less than 5% of the active mining area proposed in the recently approved Mount Arthur North project.
- Locating all coal handling infrastructure as far as practicable from the village
- Placing the raw coal storage area in an excavated slot to provide maximum wind protection, and
- Ensuring that the mine layout minimizes the potential for wind erosion.

Best practice ***engineering controls*** could include the following:

- The use of water carts to keep trafficked areas in a damp condition
- The use of fixed water sprays on all stockpiles
- The partial enclosure of conveyors, the coal dump hopper and the use of water sprays at the dump hopper
- Regular grading of roads to ensure that loose dust generating surface material is kept to the lowest practicable level
- The implementation of speed limits on mine roads
- The use of chemical dust suppression on haul roads
- The clear marking of roads to minimize trafficked areas and to ensure that traffic is kept to watered areas
- Drills being fitted with dust control equipment
- The use of coarse material to stem blasts
- The use of haul trucks and other earthmoving equipment with upwardly directed exhausts to minimize the generation of dust by exhaust emissions
- Maintenance programs to ensure that diesel equipment is maintained properly so that it does not generate excessive black smoke
- The operation of the mine to ensure that exposed areas susceptible to wind erosion are minimized, and
- The use of dust inhibiting agents on long term storage areas.

Best practice ***operational controls*** based on a network of real time monitoring stations within the village and around the mine have been proposed in the EIS. Mine operations will be governed by these protocols to ensure that the impact of the mine on the air quality within the village is minimized.

In addition, the following protocols could also be considered:

When the wind is emanating from the northwest sector:

- Meteorological conditions will be assessed and blasting will only take place when the conditions indicate that blasting emissions will not travel over residences.
- Out of pit dumping will cease when the 10 minute average wind speeds are greater than 10 m/sec
- Should the running average of the preceding 24 hour PM10 exceed 50ug/m3, suspension of all out-of-pit overburden operations. In-pit alternate dumps will be utilized if available
- If the running average of the preceding 24 hour PM10 exceeds 150 ug/m3, all dust generating operations will be suspended.

To our knowledge, this will be the first time that any coal mine has proposed to cease operations on the occurrence of cumulative dust measurements. It therefore provides clear demonstration of Whites commitment to best practice management techniques.

(d) Ensure that the proposed operational controls keep mine emissions to within the criteria outlined in the *Approved Methods and Guidance for the Modeling and Assessment of Air Pollutants in NSW (NSW EPA 2001)*

Modeling has been undertaken to demonstrate the level of emissions that would occur from the mine operations in isolation when "typical" dust control measures normally used in open cut coal mines are implemented and when the additional "special controls" proposed by Ashton are also implemented. With the special controls in place, emissions from the Ashton Mine meet the following criteria:

- Dust deposition less than 2 g/m2/month annual average
- Annual average PM10 less than 30 ug/m3
- 24 hour PM10 less than 50 ug/m3

(e) Establish the total (i.e. increment plus background) air quality impact

The total air quality impact following the implementation of best practice emission control measures is therefore calculated as follows:

Criteria	Unit	Background (incl existing mines)	Other Approved Mines	Ashton Increment at Residence 41	Outcome
Annual Av. Dust Deposition	g/m2/mth	1.5	0.5	<2	<4
Annual Av. TSP	ug/m3	45	2	<33	< 80
Annual Av PM10	ug/m3	18	2	<25	<45
Max. 24 hour PM10	ug/m3	32	5 uncertain	< 113 or better if required - achieved by progressive shutdown under adverse weather	< 150

With respect to the final entry in the table above the projects commitments is to suspend all dust generating activities should the preceding (running average) 24-hour PM_{10} concentration reach or exceed 150 $\mu g/m^3$.

These outcomes represent a significant improvement over the standards applied to recently approved coal mining projects.

(f) Provide advice on whether affected landowners may agree / have agreed to accept exceedances of the criteria

The Ashton Project has identified three distinct levels of affectation and has adopted management strategies appropriate to the level of affectation. These are detailed hereunder:

- Category 1 residences are located along the ridgeline adjacent to Glennies Creek Road. All of these residences are in close proximity to the mine and the occupants will need to be relocated. All residences are either owned by Glendell Mine or are the subject of compulsory purchase by them.
- Category 2 residences are those which are located close to Ashton. Ashton has (or will) either purchased these residents or will establish a legal agreement with the owner of the land for "no objection" to the mining operations.
- Category 3 residences are all other houses within the village. They are located outside of the any zone of influence of the Ashton operations and need to be dealt with within a regional context.

White Mining Limited, under its community consultation process has offered landowners within Camberwell Village the option to enter into market value contracts for the purchase of properties. These binding contracts are triggered by the granting of the mine lease. To date 8 contracts have been entered into, 5 of which are in the northern section of the village. A further two residences in the same area are under negotiation.

In addition to property purchase, offers of employment have been made with the residents of Camberwell given priority. To date 23 people have registered with Whites. Of these, 12 live within the northern portion of the village.

As well as community meetings, the consultation process has involved several one on one meetings with each landowner. There is a high degree of acceptance of the project among those wishing to gain employment. Those that feel that they have been locked in have taken the offer to sign contracts for the purchase of their properties. The success of this consultation process is best evidenced by the fact that Singleton Council voted to support the project on 11 February 2002. The council noted that there were no verbal or written submissions received during the exhibition period from residents in the Camberwell Village.

Details of the property purchase contracts are commercial-in-confidence, so Whites is not in a position to make public statements. However, through a meeting with the EPA, it would be possible to discuss the position of residents with regard to the Ashton project.

The plans and strategies as outlined above represent the most comprehensive approach to dust management ever undertaken by a coal mining company, incorporating best-practice operational controls.

If you require any additional information please contact Mr Nigel Holmes from Holmes Air Sciences on 98748644.

Yours faithfully
HLA-Envirosciences Pty Limited

A. Wells

Alan Wells
Regional Manager

AIR QUALITY:

ADDITIONAL INFORMATION REQUESTED BY NSW EPA FOR ASHTON PROJECT ASSESSMENT

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FIGURES

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1. INTRODUCTION

This report provides additional information requested by the NSW EPA following their review of the air quality section of the Ashton Project EIS. It has been prepared following receipt of the EPA's correspondence dated 14 December 2001 and following a meeting held with Mr Nick Agapides of the NSW EPA Air Branch on 5 December 2001. The response has been organised as far as possible using the same headings that appear in the EPA's letter. This means that the report contains some repetition as it discusses issues raised by the EPA in the same sequence as in their letter.

2. AIR QUALITY CRITERIA – AIR QUALITY MANAGEMENT AND GOALS IN NSW

2.1 Revisions to assessment criteria

The EPA letter refers to their document titled "Approved Methods and Guidance for Modelling in Assessment of Air Pollutants in NSW" (NSW EPA, 2001). This document provides guidelines as to how air quality assessments should be undertaken and refers to air quality goals, some of which are different from the goals used in the EIS. In particular the document refers to a 30 $\mu g/m^3$ annual goal for PM_{10} and a 50 $\mu g/m^3$ goal for 24-hour PM_{10}.

The selection of appropriate air quality goals was addressed in Section 3 of the Air Quality Assessment Report, which was presented as Appendix F of the Ashton EIS. Table 1 of this report is reprinted hereunder:

Table 1 – Health-based air quality standards/goals for particulate matter concentrations (from EIS Air Quality Report)

POLLUTANT	STANDARD/GOAL	AGENCY
Total suspended particulate matter (TSP)	**90 $\mu g/m^3$ (annual mean)**	**NHMRC**
Particulate matter < 10 μm (PM_{10})	**150 $\mu g/m^3$ (average of 99th percentile of 24-hour averages over three years)**	**US EPA Standard**
	50 $\mu g/m^3$ (annual mean)	**US EPA Standard**
	50 $\mu g/m^3$ (24-hour maximum)	NSW EPA reporting standard
	30 $\mu g/m^3$ (annual mean)	NSW EPA long-term reporting goal
	50 $\mu g/m^3$ (24-hour average, 5 exceedances permitted per year)	NEPM reporting standard
Particulate matter < 2.5 μm ($PM_{2.5}$)	65 $\mu g/m^3$ (98th percentile of 24-hour averages over three years)	US EPA Standard
	15 $\mu g/m^3$ (1-year average)	US EPA Standard

The EPA's revised criteria are:

Emissions from the mine should not cause an increase in the 24-hour PM_{10}, annual average PM_{10}, annual average TSP concentrations, or annual average dust deposition rate above the assessment criteria (see Point 4(c) on Page 6 of the EPA letter). In practice this means that emissions from the mine should not increase 24-hour PM_{10} concentrations by more than 50 $\mu g/m^3$, or the annual average PM_{10} concentration by more than 30 $\mu g/m^3$, or the annual average TSP concentrations by more than 90 $\mu g/m^3$, or the annual average dust deposition rate by more than 2 g/m^2/month. Since these criteria relate to the effect of emissions from the project rather than the resulting ambient concentrations they are not easily compared with the criteria listed in the EIS Table 1. There is a distinction between the criteria listed in the EIS and those required by the EPA in this step even when the numerical values are identical as is the case for the criteria for TSP and deposition.

The EPA requires a further step in the assessment in which the increases in concentrations or deposition rates are to be added to measured background levels to determine total levels. The dispersion model should be run iteratively with progressively effective controls until the assessment criteria are met or it can be demonstrated that best practice controls are in place. While the concept of best practice is a subjective concept which changes with time we believe that the mine will meet a strict definition of the concept (see later).

The requirement that mining emissions meet a 50 $\mu g/m^3$ (24-hour) goal makes the implicit assumption that the particulate matter emissions from mining operations have the same potential for harm as particulate matter from combustion processes, where particles are much finer and contain chemical compounds with known harmful health effects. There is significant evidence to indicate that dust of crustal origin such as dust from quarries, mines and farms is less harmful than dust from combustion sources. The US EPA "Facts Sheet" that accompanied the release of the new US EPA PM_{10} standard in July 1997 makes this point. Further the NSW EPA's submission to the Donaldson Inquiry in November 1998 provides some assistance as to how the 50 $\mu g/m^3$ should be applied. They state the following:

"The NSW Action for Air Plan, launched by the State Government in March 1998, reflects national standards and undertakes to adopt the NEPM standards in NSW following the tabling and gazettal by the Commonwealth Government.

The NSW Action for Air sets as an interim goal for fine particles, a 24-hour average PM_{10} level of 50 $\mu g/m^3$ and a long-term reporting PM_{10} level of 30 $\mu g/m^3$. The National Environment Protection Council (NEPC) ratified national health based, ambient air quality standards in a National Environment Protection Measure (NEPM) for ambient air at their meeting in June 1988. The Air NEPM will set, on gazettal, a 24-hour average regional ambient air quality standard for PM_{10} of 50 $\mu g/m^3$.

These goals are designed as regional air quality goals and are not intended or appropriate for use as limit conditions for any individual development proposal. They are useful as a context for predictive modelling and the development of regional strategies to help respond to the potential cumulative impact of a number of sources of particulates."

There are therefore sound reasons to suggest that the US EPA standards are more applicable to coal mining projects than the criteria requested by the NSW EPA.

The EPA appears to recognise that the strict application of their criteria may not be warranted and suggests on page 6 of their response that if these goals cannot be achieved, then the project needs to demonstrate that best management practices have been implemented.

The proponent accepts that the Ashton Project should aim to deliver PM_{10} dust emission outcomes superior to the US EPA standard, so the following response details the outcomes that could be expected through the application of "normal" standards of dust control typically utilised at open cut coal mines in the Hunter Valley and then the improvement that could be expected through the application of "best practice" control measures. Discussion in respect to the level of improvement that could be delivered will then follow.

2.2 Consequences of the revised criteria – preliminary comments

Previously a standard of 150 $\mu g/m^3$ was used as the 24-hour goal however the interpretation of the new goal of 50 $\mu g/m^3$ is such that the project by itself should not exceed 50 $\mu g/m^3$. The previous goal was interpreted as the total concentration from all sources. Thus although the change in the short-term PM_{10} goal is significant it is difficult to compare the two goals.

Figure 6 of Appendix F of the EIS clearly demonstrates that the project needs to put special controls into place in order to deliver outcomes that conform to the US EPA Standard. Figure 12 of Appendix F of the EIS shows that with controls in place the most affected residence in Camberwell Village would be expected to experience annual average PM_{10} concentrations of about 20 $\mu g/m^3$. The mine should therefore be able to conform to the EPA's annual PM_{10} goal of 30 $\mu g/m^3$ at the nearest affected residence in Camberwell Village.

The annual goal for TSP (90 $\mu g/m^3$) is the same in the EIS as in the EPA's guidelines and consequently the conclusions in the EIS are unchanged. The conclusions were that, without special controls, there would be a small number of residences in the Camberwell Village area where the annual average TSP goal of 90 $\mu g/m^3$ would be equalled (see Figure 10 of Appendix F of the EIS). With controls (real time management of dust sources in which mining is modified based on a real time review of ambient air quality monitoring and meteorological conditions) the goal would be met at all residences (see Figure 13 of Appendix F of the EIS).

In addition, the annual goal for dust deposition (total deposition of 4 g/m^2/month) is the same in the EIS as in the EPA's guidelines and consequently the conclusions in the EIS are unchanged. The conclusions were that, without special controls, there would be some residences in the north of Camberwell Village where the annual deposition 4 g/m^2/month would be exceeded (see Figure 11 of Appendix F of the EIS). With controls the goal would be met at all residences (see Figure 14 of Appendix F of the EIS).

The above discussion indicates that, with appropriate controls in place, the project will be able to comply *with the US EPA Standards in total and* with the EPA's annual average goals for PM_{10}, TSP and deposition. *The 24-hour PM_{10} goal which could be delivered through the application of best management practices still needs to be demonstrated.* This is addressed later in this report.

3. Impact Assessment Criteria

At the top of Page 6 of the EPA's letter, it is stated that "Although the EIS describes the manner in which impact assessment criteria are applied, it does not identify the need for the proposal to comply with the assessment criteria and where it fails to do so, the need to demonstrate that best management practices will be implemented". In fact the EIS did identify the air quality criteria (although these are now revised) and did use modelling to first show that the criteria could not be met without the application of special controls and then went on to show the effects of the special controls and to show what levels of air quality could be achieved using the special controls.

However the revised criteria proposed by the EPA require that the question of managing air quality be revisited in an attempt to meet the goals or demonstrate that best practice is being implemented. Thus this report will present some revised modelling results and describe the proposed controls in more detail and relate them to "best practice" and recast the controls into a form that is consistent with the Protection of the Environment Operations Act 1997 (POEO).

Page 6 of the EPA's letter further goes on to outline how the impact assessment process should follow an iterative process involving:

- determining existing background concentration and deposition rates
- estimating project emissions
- modelling to determine the contribution made by the project
- adding the contribution from the project to the background levels
- comparing total levels to criteria
- developing controls to achieve compliance with the criteria or developing best management practices to achieve lowest achievable impacts.

Again it may be noted that this is in fact how the EIS air quality study was presented. However this response will make reference to air quality monitoring data collected since the EIS was published and will better define the proposed controls and relate these to best practice controls.

4. Existing Air Quality - TSP and PM_{10} concentrations

On the question of existing air quality (see from the middle of Page 6 of the EPA submission) the EPA comments on the review of existing air quality data presented in the EIS, making suggestions as to alternative ways of analysing the data. At the time of preparing the EIS the information on actual PM_{10} concentrations in the Camberwell Village area consisted of a relatively short record (29 June to 21 September 2001). Generally the EPA comments are accepted, although there are some reservations about deriving a ratio of PM_{10}:TSP concentrations from the two separated monitoring sites namely PM10-1 and TSP-1 particularly since there is some concern that TSP-1 may be subject to a local source that does not affect PM10-1 (a local motor bike track in the immediate vicinity is likely to be producing episodic events). **Table 1** shows the PM_{10}:TSP ratios for contemporaneous measurements. The average is 0.35 which can be compared with the value of 0.4 assumed in the EIS, but the scatter from one day to the next is large.

Table 2. TSP, PM_{10} and PM_{10}:TSP ratios for Camberwell area

Date	TSP Camberwell Church - µg/m³	PM10 Camberwell - µg/m³	Ratio PM10:TSP	Most common wind direction (degrees from North)
5/06/2001	84	17	0.20	180-190
11/06/2001	53	15	0.28	330-340
17/06/01	44	13	0.30	340-350
23/06/01	44	13	0.30	340-350
29/06/2001	60	13	0.22	350-360
5/07/2001	82	27	0.33	350-360
11/07/2001	38	20	0.53	180-190
17/07/2001	80	23	0.29	350-360
23/07/2001	50	13	0.26	150-160
29/07/2001	42	8	0.19	230-240
4/08/2001	32	13	0.41	350-360
10/08/2001	37	28	0.76	340-350
16/08/2001	70	33	0.47	10-20
22/08/2001	56	20	0.36	320-330
28/08/2001	29	12	0.41	340-350
3/09/2001	46	17	0.37	330-340
9/09/2001	**10**[1]	**21**[1]	2.10[1]	330-340
15/09/2001	42	16	0.38	340-350
21/09/2001	Missing	17		150-160
27/09/2001	Missing	17		150-160
3/10/2001	90	10	0.11	320-330
9/10/2001	66	15	0.23	140-150
15/10/2001	39	11	0.28	340-350
21/10/2001	84	10	0.12	130-140
27/10/2001	45	12	0.27	320-330
2/11/2001	48	45	0.94	150-160
8/11/2001	50	19	0.38	140-150
14/11/2001	75	26	0.35	160-170
20/11/2001	38	8	0.21	230-240
26/11/2001	45	14	0.31	350-360
2/12/2001	31	21	0.68	170-180
8/12/2001	20	10	0.50	160-170
14/12/2001	163	33	0.20	200-210
20/12/2001	**70**[2]	**30**[2]	**0.43**[2]	10-20
26/12/2001	**322**[2]	**32**[2]	**0.10**[2]	320-330
1/01/2002	**Missing**	**21**[2]		320-330
7/01/2002	**Missing**	**36**[2]		350-360
13/01/2002	**113**[2]	**40**[2]	**0.35**[2]	160-170
19/01/2002	57	18	0.32	180-200
Average[3]	**56.14**	**17.8**	**0.35**	

[1] This measurement is anomalous because TSP concentration is less than PM_{10} concentration. This reading has been excluded from the estimate of the average PM_{10}:TSP ratio. This type of reading indicates either an invalid reading(s) or a local source of emissions that affect the Camberwell Village monitor but not the Church monitor

[2] All measurements potentially affected by bushfire smoke have been excluded from the analysis.

[3] Averages exclude the bolded data.

It can be seen that on some days a very high TSP concentration is observed at the Church (TSP-1) while the PM_{10} data at Camberwell Village (PM10-1) is not correspondingly high; see for example the 14 and 26 December 2001. These data add further support to the conclusion that the TSP measurements made at the Church are not representative of air quality in Camberwell Village. The data available suggest that the annual average PM_{10} concentration will be approximately 18 $\mu g/m^3$ allowing an increase of 32 $\mu g/m^3$ before the US EPA standard is reached, or an increase of 12 $\mu g/m^3$ before the NSW EPA goal is reached. Further the data suggest that the maximum 24-hour PM_{10} concentration will be below 50 $\mu g/m^3$ – the maximum to date has been 45 $\mu g/m^3$, however of greater importance for the project is the maximum 24-hour PM_{10} concentration of 32 $\mu g/m^3$ observed under northwesterly winds which are the winds that would carry dust from Ashton to Camberwell Village.

Using the PM_{10} data for Camberwell Village to infer a long-term average TSP concentration gives a value of 45 $\mu g/m^3$ [18 $\mu g/m^3$ x 1/0.4]. This is below the EPA's goal of 90 $\mu g/m^3$ and would allow an increase of 45 $\mu g/m^3$ before the goal was exceeded.

In summary the definitive statement on existing air quality required by Point 5 on Page 6 of the EPA's submission is as follows:

- Maximum 24 h PM_{10} concentration is 45 $\mu g/m^3$ or 32 $\mu g/m^3$ under northwest winds
- Annual average PM_{10} is 18 $\mu g/m^3$
- Annual average TSP is 45 $\mu g/m^3$.

5. Emissions from nearby mines

On Page 6 and Page 7 of the EPA's letter they express concern that although the modelling takes account of emissions from neighbouring mines including Camberwell, Narama, Rix's Creek and Glendell, there are other mines including Nardell, Ravensworth South, Glennies Creek, Ravensworth No 2, Ravensworth East, Liddell, and Lemington. It is not clear why these additional mines are considered by the EPA to be significant contributors to particulate matter in the Camberwell Village area.

Nardell is an underground operation with small emissions. Ravensworth South is no longer producing coal and since Narama provides the source of material used in the rehabilitation work, the small emissions that result from rehabilitation work, would be included in the Narama inventory and so are already included in the cumulative modelling. Ravensworth No. 2 is longer in production and dust emissions from this area would be expected to be relatively small. Ravensworth East and Lemington may be significant sources, but the prevailing winds would not be expected to transport significant quantities of dust to the Camberwell Village area from either of these mines. On checking the inventories used in the EIS it was found that Ravensworth East had in fact been included in the cumulative assessment although this was not noted in the text of the EIS. Liddell may also be significant but is approximately 8 km to the northwest.

The contributions that more distant mines and biogenic sources make to particulate matter levels in the Camberwell Village area were dealt with in the EIS by adding 0.5 g/m^2/month to annual average particulate matter deposition rates and 10 $\mu g/m^3$ and 5 $\mu g/m^3$ to TSP and PM_{10} concentrations respectively.

The EPA submission suggests that these allowances are too small and are not consistent with the existing air quality as reported in **Sections 4.1** and **4.2** of the air quality report (Appendix F). It is possible that the reason for these allowances has been misunderstood. The purpose of the additional concentration and deposition levels that were added to the model predictions is to account for remote mines, i.e. mines further away than the immediate neighbours. Emissions from these remote mines and biogenic sources were not included directly in the model runs.

The monitoring data of existing air quality includes contributions from the all mines in the Hunter Valley (including mines that would be neighbours to the Ashton project and those that could be described as remote) and all biogenic sources and every other source of particulate matter that reaches the area. Thus the measured existing values would not be expected to match well with the allowances made only for the more distant mines and the biogenic sources.

To test the reasonableness of the allowances that were made in the EIS, the contribution that additional operating mines nominated by the EPA (and not included in the EIS) make to air quality in the Camberwell Village area, has been modelled. These mines are Nardell, Glennies Creek, Liddell and Lemington. Ravensworth East was also included. The results are shown in **Figures 1**, **2** and **3**.

Figures 1, **2** and **3** include the following emissions from the additional mines:

- Nardell – underground mine producing an estimated 22,000 kg of TSP/y (from EIS)
- Ravensworth South – open cut no longer producing (but will experience some emissions due to transfer of material from Narama as part of mine closure work)
- Narama – open cut mine currently producing an estimated 2,200,000 kg of TSP/y (this mine is approved to produce up to 4.5 Mtpa and is thus potentially capable of generating an estimated 4,500,000 kg of TSP/y)
- Glennies Creek – underground mine producing an estimated 440,000 kg of TSP/y
- Ravensworth No 2 – open cut no longer in production.
- Ravensworth East – open cut mine producing an estimated 2,250,000 kg of TSP/y and already included in the EIS work although not noted as such in the EIS
- Liddell – open cut producing an estimated 4,103,033 kg of TSP/y
- Lemington – open cut mine producing an estimated 3,340,000 kg of TSP/y

The model results show that the remote mines are predicted to contribute between 2 and 4 $\mu g/m^3$ (see **Figure 1**) to annual average PM_{10} concentrations in the Camberwell Village area. This compares with the allowance of 5 $\mu g/m^3$ made in the EIS to account for all other sources not included in the model. The 5 $\mu g/m^3$ allowance would seem to be reasonable.

The predicted annual TSP concentrations contributed by the remote mines is very similar, 2 to 4 $\mu g/m^3$ (see **Figure 2**). This suggests that the coarser fraction of the TSP has settled out of the dust plume by the time it has reached Camberwell Village area from the remote mines. Thus the allowance of 10 $\mu g/m^3$ for TSP used in the EIS is probably overly conservative although local unmodelled TSP emissions, such as pollens and other nearby sources would mean that it may not be as conservative as appears at first sight.

Annual dust deposition levels due to emissions from the remote mines are predicted to between 0.05 and 0.1 g/m^2/month (see **Figure 3**). This is much lower than the 0.5 g/m^2/month assumed as background. However, because deposition measures the fallout of coarse particles, local sources, i.e. sources within a few tens of metres to a few hundred metres from the area, would be expected to contribute the majority of dust deposition in any particular area. Based on an analysis of dust deposition results in a wide selection of gauges in the Hunter Valley (see Mt. Arthur North EIS) it can be concluded that annual deposition rates of 0.5 g/m^2/month represent the lower end of the observed deposition rates and would represent the deposition rate found in areas remote from specific sources of dust. Therefore 0.5 g/m^2/month is a reasonable, but probably conservative, background level to assume for the contribution from all sources excluding the project and those mines included in the model. To assume the lower value of 0.05 to 0.1 g/m^2/month (as estimated from the model run above) would risk underestimating the true background deposition because it would not allow for local sources.

6. INFORMATION FOR REVISED ANALYSIS

On Page 7 of the EPA's submission they specify their requirements for a revised analysis of impacts. The analysis requires the following:

1. Identification of properties owned by the proponent or other mines, or for which agreements have been entered into
2. Nominated representative background values of annual average PM_{10}, TSP and deposition
3. A description of the following for the scenario representing the mine with controls:
    a. the precise nature of the controls, with mitigation measures being related to best practice management
    b. contour plots and tabulated values of annual average TSP and PM_{10} concentrations and deposition rates, and 24-hour average PM_{10} concentrations at each of the nearby sensitive receptors for three scenarios (1) the mine considered in isolation (2) total impacts defined as the proposal plus the background (3) cumulative impacts i.e. proposal plus other mines plus background.
    c. The assessments (1), (2) and (3) above, should be undertaken with the proposal using no controls.
4. The assessment of 24-hour average PM_{10} should be carried out where possible using contemporaneous ambient monitoring and meteorological data.

Not all of these can be undertaken, but we believe that we have addressed these issues in the best way that can be done with the available information.

In interpreting the results of the analyses that follows we have been guided by the following points which elaborate on how the criteria should be interpreted. The relevant points may be summarised as follows:

- That the project by itself should not cause the 24-hour PM_{10} goal to be exceeded
- That total ambient air quality with the mine operating and other sources accounted for should (1) either comply with the criteria or (2) the mine should demonstrate that the mine is being operated using best practice controls
- That operations at the mine should comply with the POEO requirements.

7. IDENTIFICATION OF PROPERTIES

The proponent is willing to enter a safety net agreement that, provided consent for mining is obtained, would in effect oblige the proponent to purchase, at market value, any *affected* property in Camberwell Village that the owner wishes to sell. The proponent has also undertaken a survey of property owners to establish the current wishes of the owners. There are 51 properties of which four are described as land only and one is the community hall. White Mining Ltd has contracts in place to purchase eight properties and is negotiating for the purchase of another six properties. Three other properties are currently on the market. Fifteen residents wish to stay within the village and have no concerns whilst 22 residents have registered with White Mining Ltd for employment opportunities with Ashton. At this time the properties closest to the mining operation have not been acquired but contracts have been exchanged and sales will be finalised on granting of consent. These properties have been excluded from the assessment. The closest property for which there is some uncertainty about the sale is labelled 41 on the figures to be presented later. This property lies in the northern end of the Village and consequently is relatively close to the proposed mining operations. A plan detailing the location of each of the properties identified in this section of the report will be made available of the EPA on a confidential basis, if required.

8. NOMINATED BACKGROUND LEVELS

Based on a review of monitoring data collected in Camberwell Village over the period 5 June 2001 to 20 December 2002 it is concluded that the:

- Maximum 24 h PM_{10} concentration is 32 $\mu g/m^3$ (under northwest winds)
- Annual average PM_{10} is 18 $\mu g/m^3$.

Based on the assumption that annual average TSP concentrations will be 2.5 times the annual average PM_{10} concentrations (see earlier analysis) it can be concluded that the annual average TSP concentration will be 45 $\mu g/m^3$.

9. OPTIONS FOR CONTROL MEASURES

Coalmines in the Hunter Valley apply a range of control measures which can be considered in the following categories:

- Planning controls
- Engineering controls, and
- Operational controls.

Planning controls instituted by the project include:

- Locating all infrastructure as far from the village as practicable,
- Placing the raw coal storage area in an excavated slot to provide maximum wind protection,
- Constructing large earth berms and tree plantations between the operations and the village,
- Minimising the exposed operational area to less than 5% of mines recently approved in the Hunter,
- Rehabilitating all external dumps within four years of commencement.

Engineering controls include:

- The use of water carts to keep trafficked areas in a damp condition
- The use of fixed water sprays on all stockpiles

- The partial enclosure of conveyors, the coal dump hopper and the use of water sprays at the dump hopper
- Regular grading of roads to ensure that loose dust-generating surface material is kept to the lowest level practicable
- The implementation of speed limits on mine roads
- The use of chemical dust suppressant on haul roads
- The clear marking of roads to minimise trafficked areas and to ensure that traffic is kept to watered areas
- The fitting of drills with dust control equipment
- The use of coarse material to stem blasts
- The use of haul trucks and other earthmoving equipment with upwardly directed exhausts to minimise the generation of dust by exhaust emissions
- Commitments to ensure that diesel equipment is maintained properly so that it does not generate excessive black smoke
- The operation of the mine to ensure that exposed areas susceptible to wind erosion are minimised

These measures when applied diligently represent "best practice" with respect to the implementation of engineering controls.

Active controls involve the hour by hour management of dust generating activities to ensure that dust emissions do not affect nearby sensitive receptors. Operations will be managed in response to real time air quality data measured within the village in accordance with the following protocols. When the wind direction indicates that Ashton is contributing to dust emissions within the village:

1. If the running average of the preceding 24-hour PM_{10} exceeds 50 $\mu g/m^3$, cancel all out-of-pit overburden operations. Utilise in-pit overburden dumps (if available in lower levels of open cut).
2. If the running average of the preceding 24-hour PM_{10} exceeds 150 $\mu g/m^3$, suspend all dust generating activities. Stop all overburden removal. Stop ROM coal extraction if generating dust.

Other controls include day-to-day planning of mining activities taking account of forecast weather and actual weather conditions. These include the following:

1. They will be no out of pit dumping when ten minute average wind speeds exceed 10 m/s
2. Dumping, dozing, loading and haulage operations will be managed to ensure that no visible dust leaves the "lease" area
3. Blasting will be undertaken using procedures that will involve an assessment of meteorological conditions and will be designed to prevent dust and other emissions causing exceedances, or air quality goals or nuisance effects

To account for the effects of these controls requires several types of model runs. The first involves modelling using a revised inventory taking account of the best practice engineering controls. Since these were similar to the controls used in the EIS the EIS inventories need very little change. The only practical improvement has been to adopt more stringent controls of dust emissions from haul roads and to recognise that the mine operates only in the hours 7 am to 10 pm. The control efficiency on haul roads has been assumed to increase from 50% (in the EIS) to

80%. Literature values (**Buonicore, 1992**)[4] suggest that 90% control is the highest level of control likely to be achievable.

The effects of this can be seen by referring to Table 8 of the EIS Air Quality Study, which shows that haulage operations account for 1,191,558 kg of dust emission out of a total of 1,782,388 kg (67%) in Year 4. These emissions are evenly distributed over the entire mine area. If the control of dust was improved from 50% to 80% it would be possible to reduce total emissions from haulage to 476,623 kg or reduce total annual emissions to 1,067,453 kg, i.e. 60% of that from the "typical control" case.

The model has then been re-run to estimate the effects of this including the effects of limiting operating hours to 7 am to 10 pm. The original work allowed operations 24 hours per day. The advantage of restricting operating hours is to ensure that emissions during poor dispersion conditions that apply at night are reduced to the minimum level practicable.

Finally, the effects of the real-time control measures cannot be assessed directly by modelling. However a semi-quantitative discussion is presented in **Section 11**.

10. LONG TERM GOALS

The results of the model runs with the revised emissions (reflecting best-practice controls) are shown in **Figures 4** to **6**. These show the predicted annual average PM_{10}, TSP and deposition levels for the worst-case year.

It can be seen that Ashton by itself would comply with all the relevant assessment criteria at all residences.

It remains to determine the effects of the mine taking account of existing background. This has been done for three sites in the Village Residence 41, 22 and 1. The predicted annual average PM_{10} and TSP concentrations due to emissions from the project at the three selected residences and the background levels are shown below.

Table 3. Effects of controls

	Typical Controls			**Assuming 80% control on haul roads and restricted operating hours but not taking account of real-time controls**		
	Annual PM_{10} at Residence 41	**Annual PM_{10} at Residence 22**	**Annual PM_{10} at Residence 1**	**Annual PM_{10} at Residence 41**	**Annual PM_{10} at Residence 22**	**Annual PM_{10} at Residence 1**
Due to Ashton	65	30	21	25	10	7
Background	18	18	18	18	18	18
Total	83	**48**	**39**	**43**	**28**	**25**
	Annual TSP at Residence 41	**Annual TSP at Residence 22**	**Annual TSP at Residence 1**	**Annual TSP at Residence 41**	**Annual TSP at Residence 22**	**Annual TSP at Residence 1**
Due to Ashton	72	32	22	33	15	10
Background	45	45	45	45	45	45
Total	117	77	**67**	**78**	**60**	**55**

[4] Buonicore A T and Davis W T (1992) "Air Pollution Engineering Manual" Air and Waste Management Association, Published by Van Nostrand Reinhold, 115 Fifth Avenue, New York 1003.

The above results indicated the annual PM_{10} TSP goal of 90 µg/m^3 could be met everywhere with additional haul road treatment and with operations confined to 7 am to 10 pm. With the same controls the annual PM_{10} goal would be met at Residence 22 and in fact could be met at residences to the southeast of a line through Residences 18, 24 and 35 (see **Figure 4**).

The effects of the Glendell proposal were dealt with in the Ashton EIS by assuming that it emitted 3,600 tpa of TSP corresponding to a mine with a ROM production of 3.6 Mtpa. The EIS modelling indicated that the effects of Glendell emissions could be significant on Camberwell Village, however detailed information as to how this mine will operate are not sufficient to allow it to be modelled in detail and the Glendell EIS published in 1982 indicates that the effects of Glendell at Camberwell will be small. In its EIS, Glendell was predicted to increase annual dust deposition in the northern end of Camberwell Village by approximately 0.2 g/m^2/month. Based on the Ashton model results, an annual average dust deposition of 0.2 g/m^2/month would correspond to annual average PM_{10} and TSP concentrations of approximately 2 µg/m^3. Given that the modeller for the Glendell EIS had access to details about the Glendell mine plan that were not available to the Ashton study, the estimates of deposition from the Glendell EIS has been used along with the inferred annual PM_{10} and TSP concentrations. The results of the Ashton modelling including the effects of existing background and future emissions from Glendell are summarised in **Table 4**.

Table 4. Effects of controls and including Glendell

	Typical Controls – no real-time controls			Assuming 80% control on haul roads and restricted operating hours but not taking account of real-time controls		
	Annual PM_{10} at Residence 41	**Annual PM_{10} at Residence 22**	**Annual PM_{10} at Residence 1**	**Annual PM_{10} at Residence 41**	**Annual PM_{10} at Residence 22**	**Annual PM_{10} at Residence 1**
Due to Ashton	61	30	21	21	10	7
Background plus Glendell	20	20	20	20	20	20
Total	**81**	**50**	**41**	**41**	**30**	**27**
	Annual TSP at Residence 41	**Annual TSP at Residence 22**	**Annual TSP at Residence 1**	**Annual TSP at Residence 41**	**Annual TSP at Residence 22**	**Annual TSP at Residence 1**
Due to Ashton	66	32	22	25	15	10
Background plus Glendell	47	47	47	47	47	47
Total	**113**	**79**	**69**	**72**	**61**	**57**

11. ASSESSMENT OF THE EFFECTS OF THE PROPOSAL (BY ITSELF) ON 24-HOUR PM_{10} CONCENTRATIONS

This has been done by focussing on Residence 41 with best practice controls in place. The results of the analyses are shown in two ways; (1) as a time-series of the predicted 24-hour PM_{10} concentrations for each of the 365 days in the year (see **Figures 7**) and (2) as a cumulative frequency plot showing how often any particular 24-hour PM_{10} concentration level would be expected to be exceeded due to emissions from the project by itself (see **Figure 8**).

Figures 9 and **10** show the same information as **Figures 7** and **8** but are based on the assumption that the mine is operated with no special controls above those normally applied as engineering controls on Hunter Valley mines. These could be referred to as "typical controls". The best practice controls represent a significant improvement over typical controls.

Figure 7 shows that even with best practice engineering controls the 24-hour 50 $\mu g/m^3$ is predicted to be exceeded at Residence 41. However the maximum 24-hour concentration is 133 $\mu g/m^3$, which is less than the US EPA 150 $\mu g/m^3$ 24-hour standard which formed the basis for the Mt Arthur North consent with respect to short-term air quality.

In summary relying only on the best practice engineering controls it is predicted that:

- The mine by itself will comply with the 150 $\mu g/m^3$ 24-hour PM_{10} standard for 100% of the time
- The mine by itself will comply with the NSW EPA 50 $\mu g/m^3$ 24-hour PM_{10} criterion for 85% of the time.

In terms of the ambient air (taking account of background plus Ashton) it will be noted that Ashton will begin applying real-time management controls when the running 24-hour average PM_{10} concentrations in Camberwell Village reach 50 $\mu g/m^3$ and Ashton is contributing to the PM in the village. All dust generating mining activities would be suspended when PM_{10} concentrations in Camberwell reach 150 $\mu g/m^3$ and Ashton is contributing. There are significant difficulties in estimating the effects of these measures on ambient air quality, but the following will help in evaluating the effects.

The maximum observed 24-hour average PM_{10} concentration in Camberwell under a northwest wind so far has been 32 $\mu g/m^3$ (see **Table 2**). This means that, under conditions when ambient 24-hour PM_{10} reached 32 $\mu g/m^3$, real-time management measures would begin when emissions from the mine caused concentrations in northwest Camberwell to increase by a further 18 $\mu g/m^3$ [50 $\mu g/m^3$ – 32 $\mu g/m^3$]. **Figure 8** shows that the mine would cause concentrations to exceed this value on 117 days per year. That is if the worst observed ambient background concentration of 32 $\mu g/m^3$ were to occur continuously then the mine would need to initiate management controls on 117 days per year. The effects of Glendell would be to increase the background and therefore could increase the number days when the management controls would be implemented although it is unlikely that Glendell would cause ambient concentrations to be permanently at the highest level currently observed.

Cessation of mining occurs when the ambient 24-hour PM_{10} concentration reaches 150 $\mu g/m^3$ and Ashton is contributing to the measurements. On the assumption that background levels are 32 $\mu g/m^3$ this would occur when Ashton's contribution is 118 $\mu g/m^3$ [150 $\mu g/m^3$ – 32 $\mu g/m^3$]. **Figure 8** shows that this would be expected on five days per year. Again the same comments concerning Glendell apply.

These real time management measures would be expected to cause a slight reduction the long-term average to below those predicted.

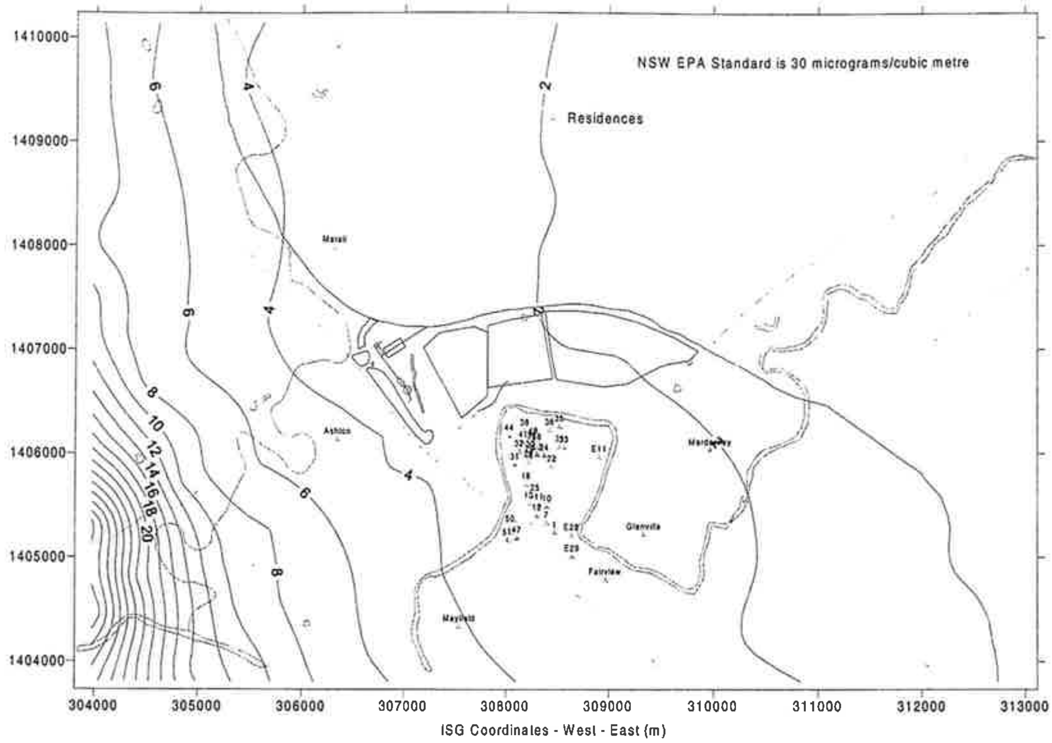
12. CONCLUSIONS

The above analysis indicates the following:

1. The Ashton mine, considered by itself and operated with best practice engineering controls is predicted to meet the NSW EPA criteria for:
    a. Annual PM_{10}
    b. Annual TSP.
2. Best practice engineering controls would allow 85% compliance with the 50 $\mu g/m^3$ criteria; however the Ashton mine, considered by itself and operated with best practice engineering controls is predicted to meet the US EPA standard of 150 $\mu g/m^3$.
3. Real-time controls, involving the staged reduction in dust generating activities, as ambient 24-hour PM_{10} concentrations increase above 50 $\mu g/m^3$, would keep 24-hour average PM_{10} concentrations to below 150 $\mu g/m^3$. This would ensure that if ambient 24-hour concentration of PM_{10} did exceed 150 $\mu g/m^3$ then all dust generating activities on the mine would be suspended. In other words the mine would not be a significant contributor in these circumstances.

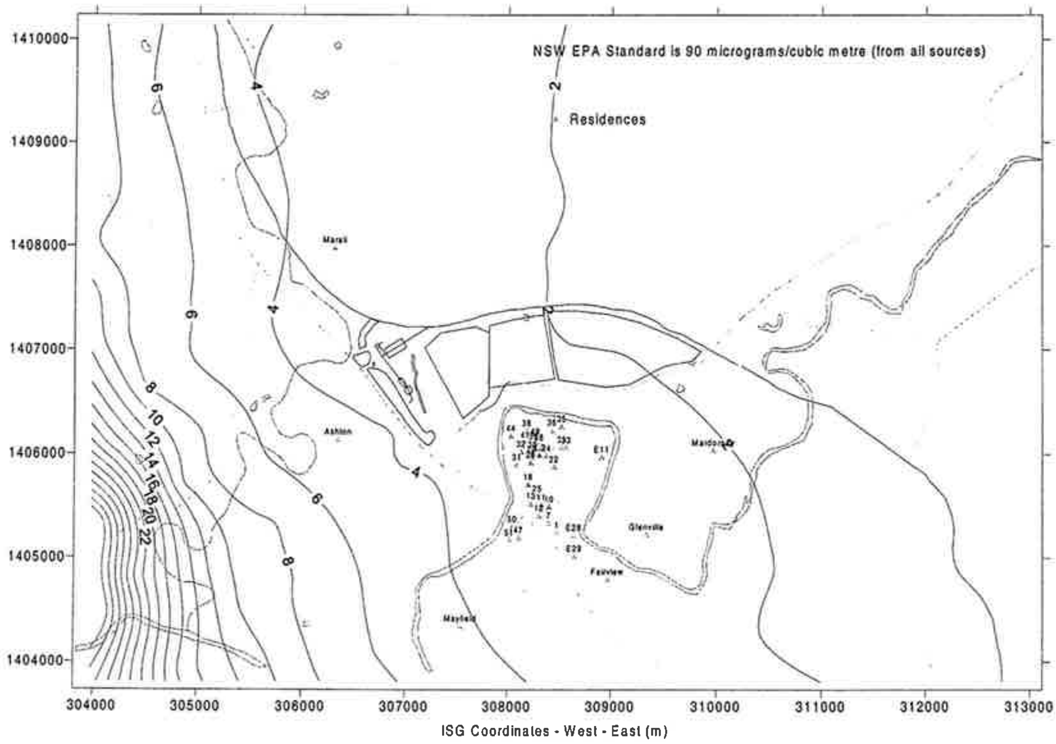
Thus it can be concluded that the Ashton mine considered alone will comply with the NSW EPAs air quality criteria for annual average TSP, PM_{10} and deposition and where it may exceed the 24-hour average PM_{10} criterion of 50 $\mu g/m^3$ it will employ best practice controls to minimise impacts.

FIGURES



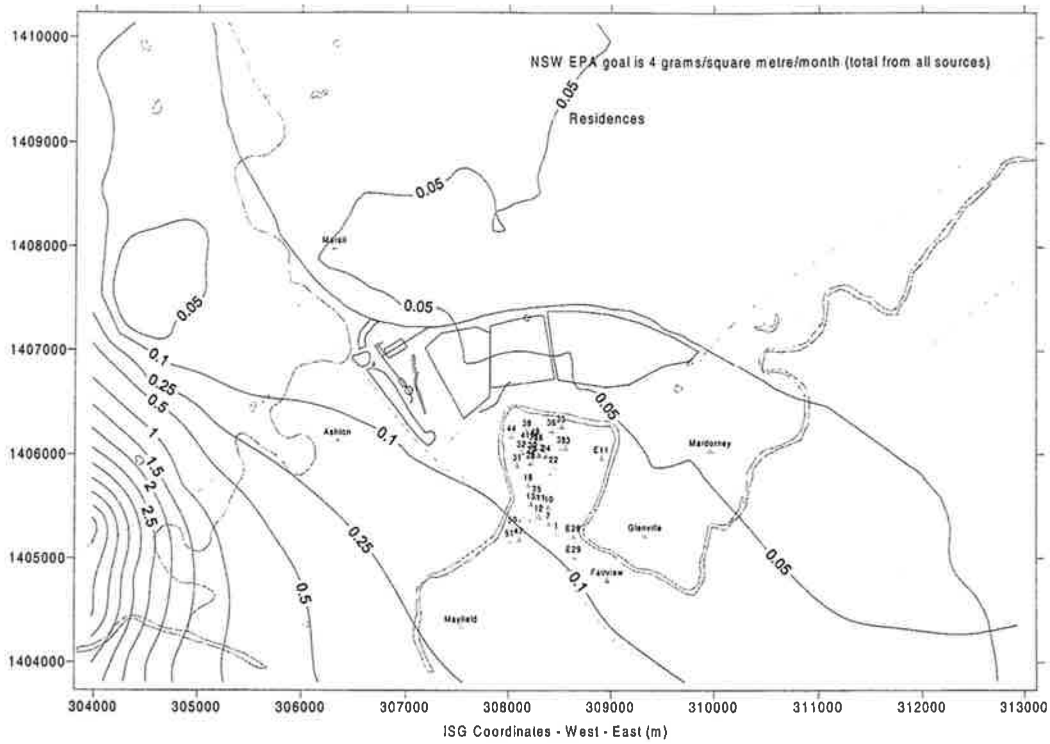
Predicted annual average PM_{10} concentrations due to emissions in Year 4
from remote (see text) mines - micrograms/cubic metre

Figure 1



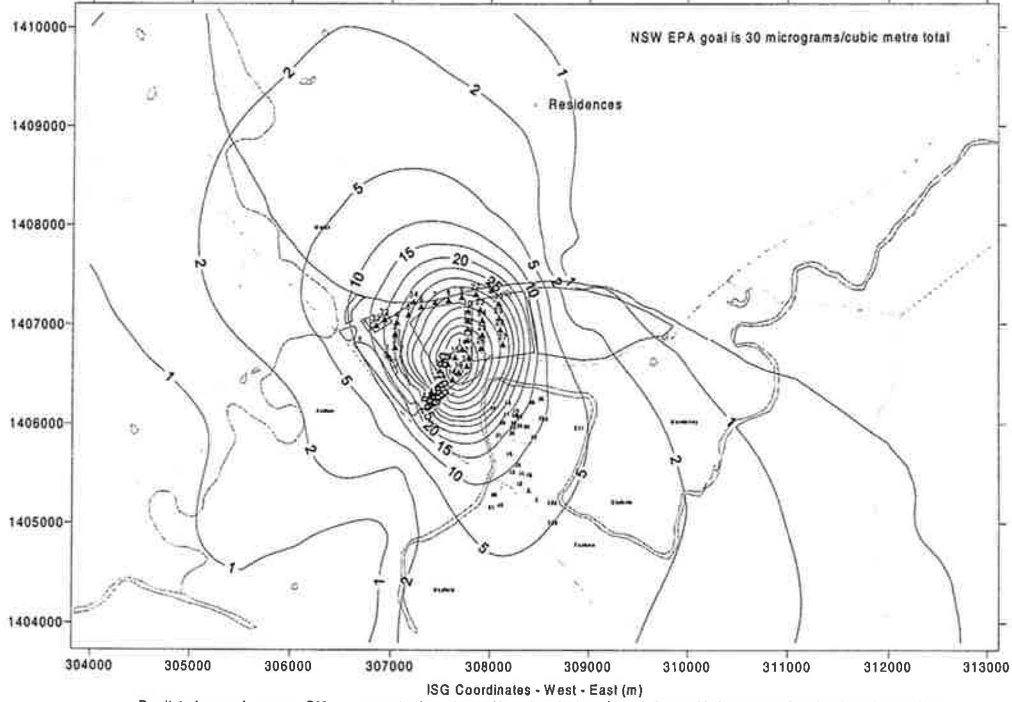
Predicted annual average TSP concentrations due to emissions in Year 4
from remote (see text) mines - micrograms/cubic metre

Figure 2



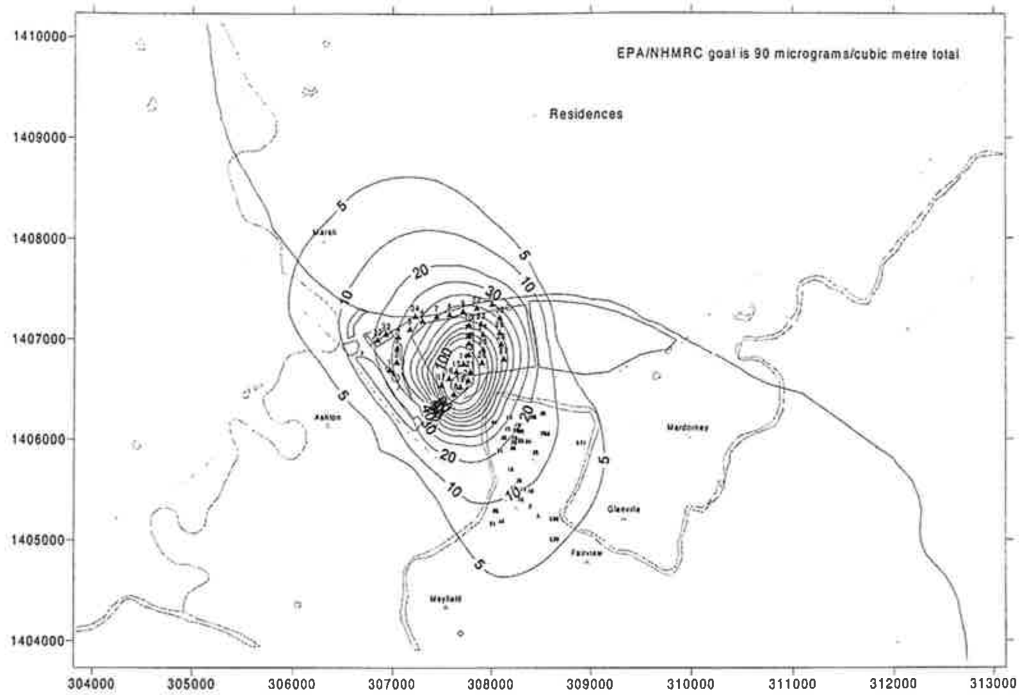
Predicted annual average dust deposition due to emissions in Year 4
from remote (see text) mines - grams/square metre/month

Figure 3



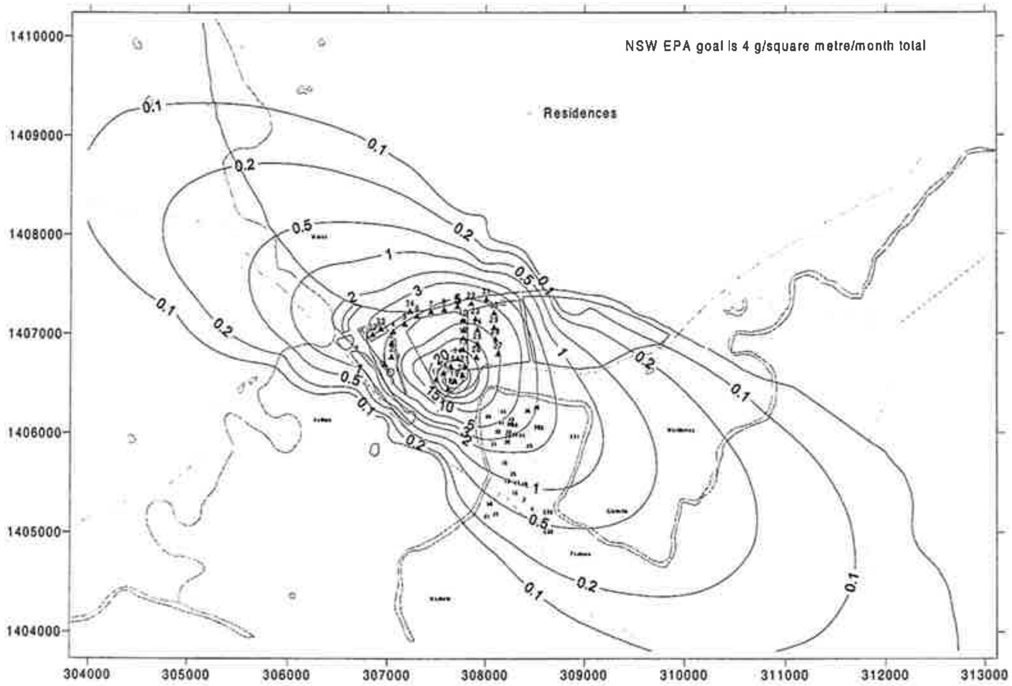
Predicted annual average PM $_{10}$ concentrations due to Year 4 emissions from Ashton with 80% control on haul road emissions
with 80% control on haul roads but no real-time management
- micrograms/cubic metre

Figure 4



ISG Coordinates - West - East (m)
Predicted annual average TSP concentrations due to Year 4 emissions
from Ashton with 80% control on haul roads emissions but no real-time management controls
- micrograms/cubic metre

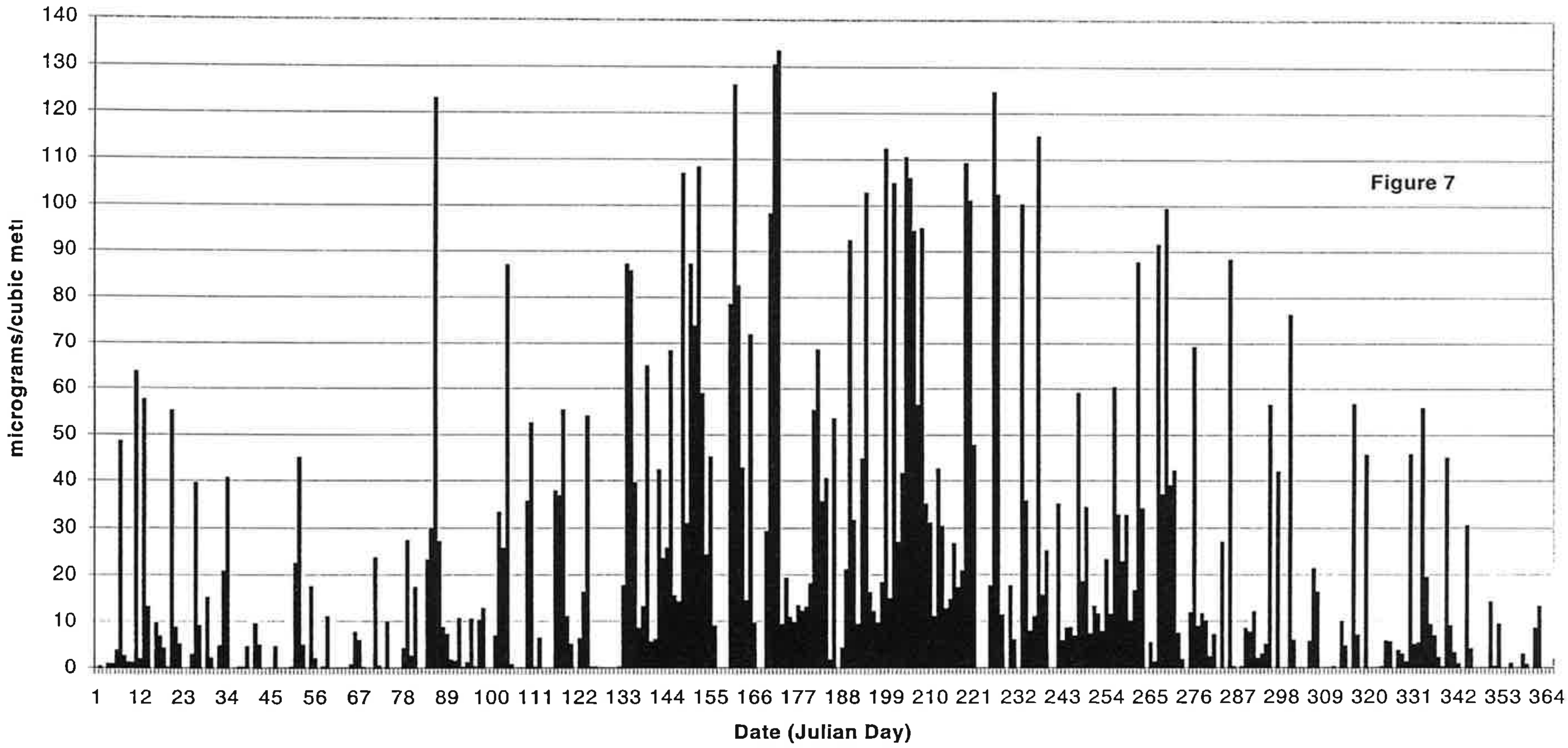
Figure 5

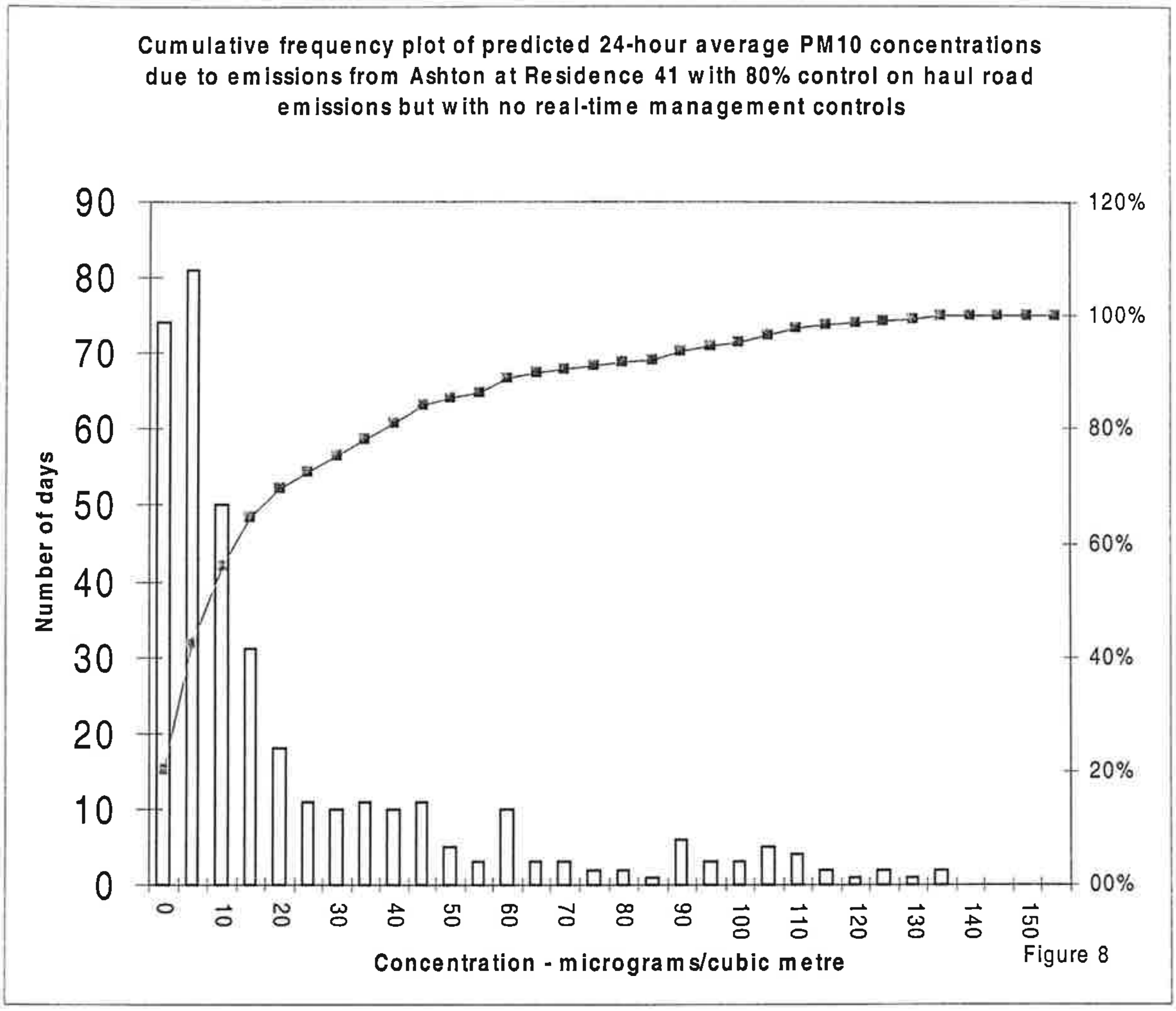


ISG Coordinates - West - East (m)
Predicted annual average dust deposition due to Year 4 emissions from Ashton with 80% control on haul road emissions
with 80% control on haul roads but no real-time management
- grams/square metre/month

Figure 6

Predicted 24-hour average PM10 concentrations due to Year 4 emissions from Ashton at Residence 41 with 80% control on haul road emissions but no real-time management controls

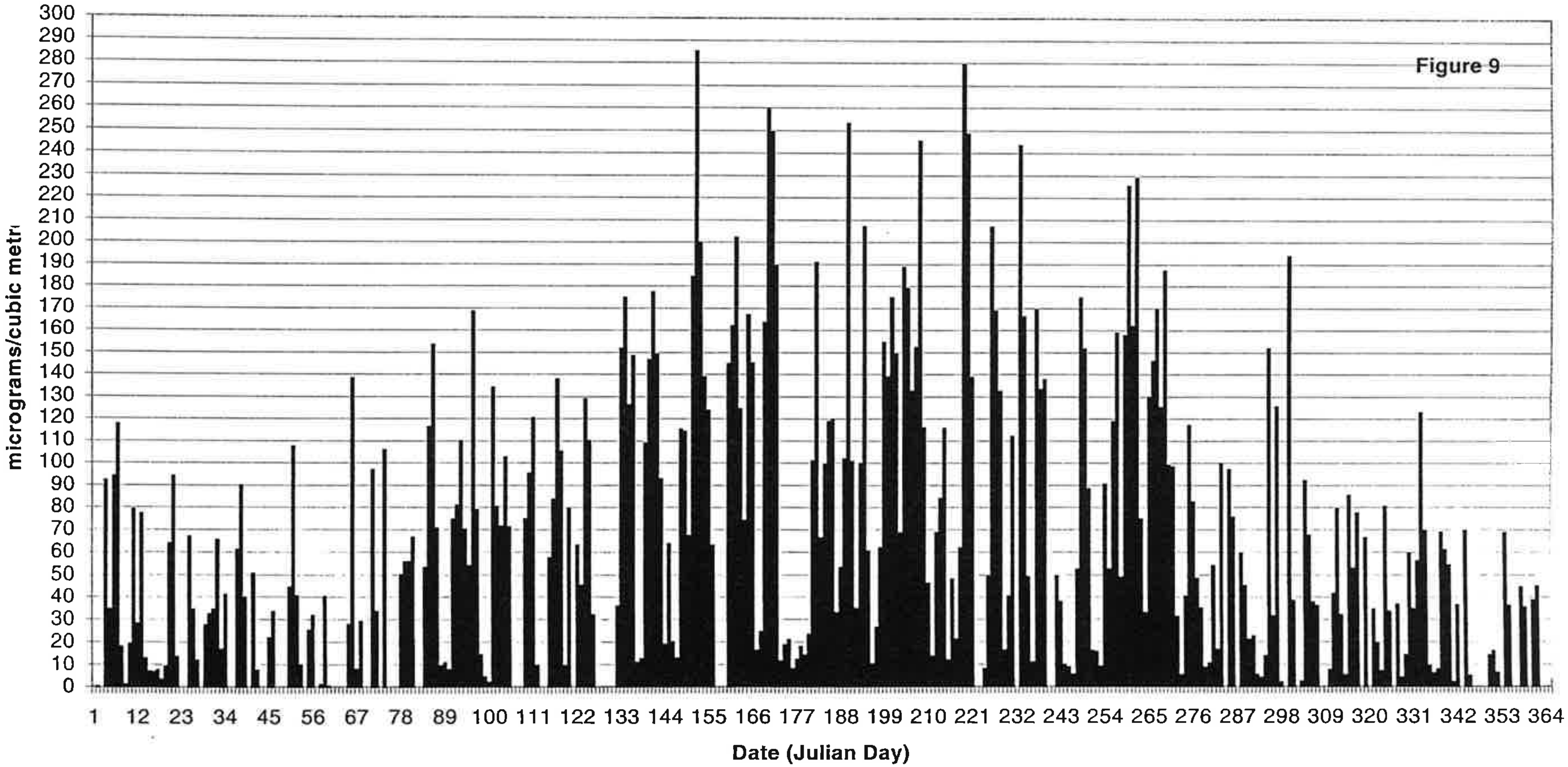


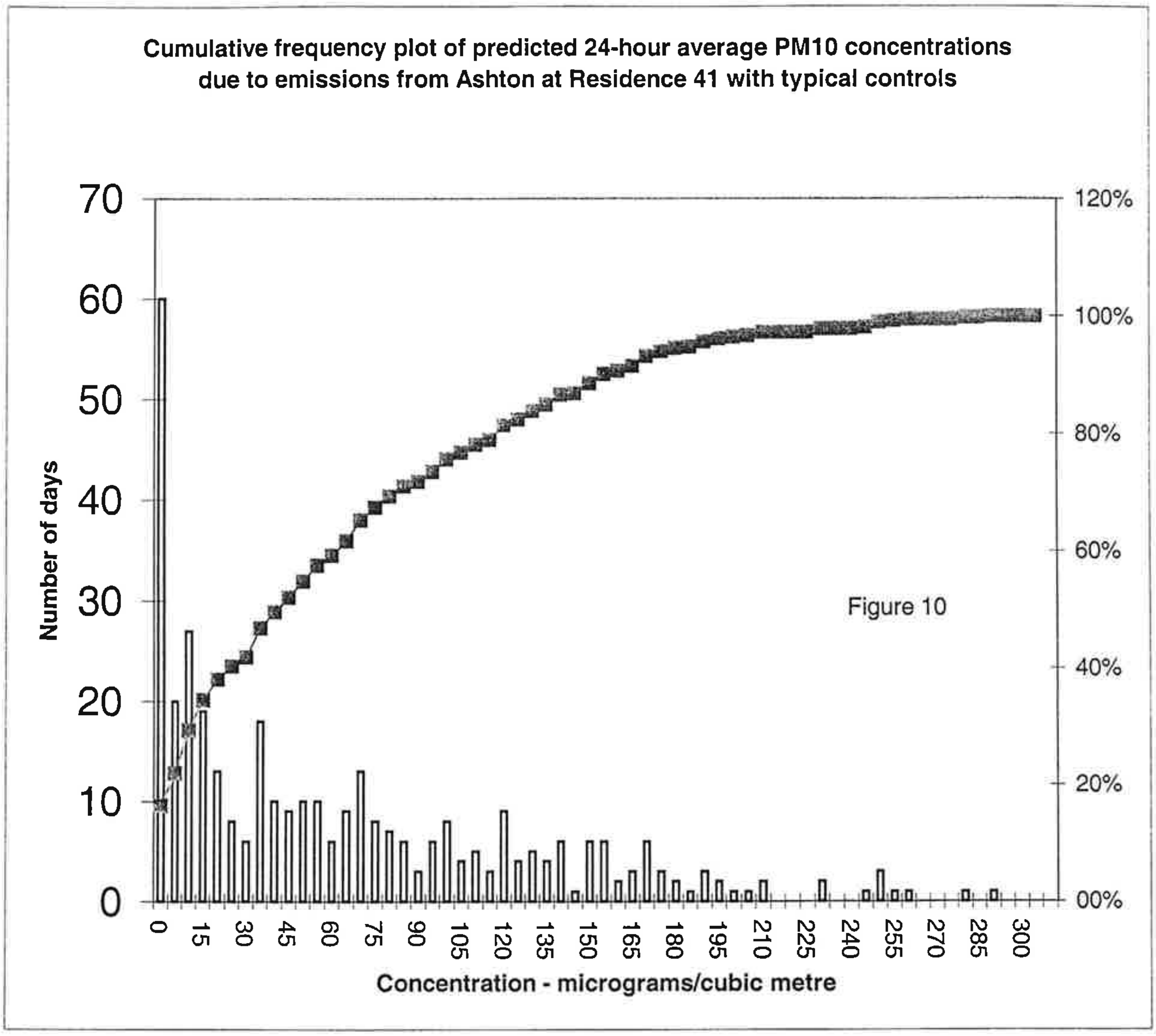


Cumulative frequency plot of predicted 24-hour average PM10 concentrations due to emissions from Ashton at Residence 41 with 80% control on haul road emissions but with no real-time management controls
Number of days
0
10
20
30
40
50
60
70
80
90
00%
20%
40%
60%
80%
100%
120%
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Concentration - micrograms/cubic metre

Figure 8

Predicted 24-hour average PM10 concentrations due to Year 4 emissions from Ashton at Residence 41 with typical controls





Cumulative frequency plot of predicted 24-hour average PM10 concentrations due to emissions from Ashton at Residence 41 with typical controls
Number of days
70
60
50
40
30
20
10
0
120%
100%
80%
60%
40%
20%
00%
Figure 10
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
Concentration - micrograms/cubic metre