

Submission Opposing Stratford Extension Project on Urgent Health grounds

Ref Application Number SSD-4496

Introduction

I oppose the above application to extend Stratford Mine.

I am a specialist medical practitioner (psychiatrist) who saw patients at Gloucester Medical Centre from 1998-2007 one to two days per week and lived and am still living in Gloucester Shire. I retired from medical practice five years ago. Both patients and friends have described to me the health impacts from this coal mining. In retirement I have maintained an interest in the health impacts from mining and whilst not holding formal public health qualifications I consider I have become as knowledgeable as the few experts in this specialty.

The Stratford Mine Extension Environmental Impact Statement was put on public exhibition following a process involving Director General's Requirements and advice from various government departments. Any advice from the NSW Health Dept has not been made public. The impact of an open cut mine is extensive and includes impacts on the land, water, air, ecology, agriculture, the economy and the social systems and health of the citizens of the area.

The residents of Stratford and the Gloucester Valley affected by this mine place health impacts very high in their list of priorities, many would place it the highest, yet this is not reflected in the directions given to the company in producing this EIS. There was no direction to include a health impact assessment despite a number of facts indicating this would have been appropriate.

The lack of acceptance of mining in this community was first demonstrated in the BGSPA 2007 survey of those living within 5km of mining. It showed five times as many opposed mining than supported it. A series of Gloucester council surveys have taken place since then. Consistently 85% of local residents oppose any extension of mining and health impacts are frequently the reason for this rejection of more mining. The social turmoil this community resentment causes was probably best seen by the overturning of a mayor who had the courage to voice the harms mining is causing this community.

The government granted a license to mine over 17 years ago at a site that was only 1.5km from the village of Stratford with 50 residencies and a primary school. The village relies on tank water for it's domestic water supply. The initial license was for 8 years and there would have been some consideration of the inevitable acute and chronic health damage that would be expected to eventuate over that time with a mine so close to a population base. Evidently it was judged to be a risk worth taking and the license was granted. To my knowledge no warning was given to the community, particularly to 'at risk' groups (the very

young, the elderly and the chronically ill) of the health dangers or of measures they might take to reduce the impact of the mine on their health.

In 2001 a warning occurred that should have resulted in greater action. The Education Dept arranged for the water of the Stratford Primary School to be tested and it showed amongst several abnormalities there was a raised lead level. Advice was sought from health authorities and the water was monitored, the problem persisted, bottled water was supplied briefly and eventually the tank was cleaned out and a series of filters and a calcium carbonate float was added. The most likely explanation was that the natural rainwater plus the acidity of blast gases and diesel vehicle emissions had caused an acid pH causing heavy metals (lead and copper) to leach from the roofing, plumbing and paint. The school was instructed to run the water for 3 minutes before any pupil drank the water each morning to flush the system to eliminate water standing overnight in the pipes. To my knowledge no blood tests were done for lead levels in the children, no cognitive or behavioural screening tests were done and no warning was given to the rest of the community of this danger. No hydrocarbon testing (BTEX etc) was done. Yearly water testing has been done since the filters were added in 2004. I don't know whether the float has been replaced.

More recently a resident took a sample of water from her gutter which supplied water to her drinking tank and it was several hundred times the maximum recommended concentration for lead and 25 times the maximum for cadmium.

This is just one example of the many health dangers associated with that original risky decision to grant a license to mine so close to people. In all probability wide-ranging health damage has been accumulating in the approximately 500 people living within 5km of the mine but the most severely affected will be long term residents of Stratford Village.

It is notable that mining employees request to be employed, are medically examined before employment with baseline health data recorded, only the fit are employed, they are educated about minimising risks, they are mostly only working 40 hours/week in the 'at risk' environment and are typically in air conditioned vehicles and wear ear muffs. They are remunerated with high wages in part as recognition of the health risks, they undergo regular health monitoring and they have a system of compensation should they suffer health impairment. In contrast the community of Stratford Village and surrounds did not ask for a mine, were not medically screened initially and so do not have baseline health data, they received no health education, are not supplied with air filters or sound muffling except in exceptional circumstances, they may be in the risk zone for up to 168 hrs/week. There is no health damage compensation system. It has increasingly become a village of underprivileged people and so there is expected to be an above average number of people with compromised health.

Causes of mining related health damage in a coal community

Traditionally air quality and noise are the subject of sections within an EIS although focussing on technical rather than medical aspects. Social/amenity issues get mentioned but are not comprehensively discussed and usually not defined and never monitored although informally at meetings it is acknowledged psychological stress is a common phenomenon with significant impacts. This reflects the world scientific literature with extensive literature about air quality, some literature about toxicology and very little about the non-auditory effects of noise and psychosocial impacts. Australian literature is particularly sparse in the medical impacts of coal mining but some local research has been done about social impacts, including a study of Craven residents, by Connor, Higginbotham et al. In many coal communities there is both coal mining and coal fired power generation with differing but overlapping impacts. Stratford is unusual in not having a coal fired power station locally.

The evidence for health damage has increased over the years but in 1991 studies from the Hunter region (Henry et al) described asthma in the vicinity of power stations and in 1992 a British Medical Journal article (Temple et al) described asthma and open cast coal mining. We therefore knew for at least 3 years before Stratford was licensed the potential for harm.

Two Australian reviews deserve special mention:-

Castleden WM and Shearman D (2011) et al of Doctors for the Environment of Australia writing a review in the Medical Journal of Australia "The mining and burning of coal: effects on the health and environment" describe the evidence from the USA of increased mortality from cardiopulmonary disease, chronic obstructive pulmonary disease, hypertension, other lung disease and kidney disease. They make the point State Environmental Protection Agencies are the ones given the power to use the precautionary principle to protect the health of communities but to date have not used that power.

Colagiuri R et al (2012) wrote 'Health and Social harms of Coal Mining in Local Communities: Spotlight on the Hunter region' This review of international peer reviewed literature concluded "There are clear indications from the international health research literature that there are serious health and social harms associated with coal mining and coal fired power stations for people living in surrounding communities". They elaborated the health impacts firstly for adults and then separately for children of coal mining on it's own (and then of coal fired power generation). It is therefore very pertinent for the community of Stratford/Craven. As well as repeating the physical health impacts of increased mortality and morbidity outlined above, it adds an important psychosocial factor 'poorer self rated health and reduced quality of life'. In children the increased blood levels of heavy metals is quoted, increased neural tube defects and any birth defect, and absence from school as a result of respiratory symptoms. All very pertinent again to the Stratford community.

Heavy Mining vehicles cause damage to our roads and railway. Stratford mining caused a dangerous subsidence across the full width of Wenham Cox Road and the movement of very wide loads is a safety hazard known to cause road deaths elsewhere in the Hunter.

Air quality, it's monitoring and health impacts

Air pollution is a consequence of both the quantity and size of particles and the chemical/physical make-up of those particles. The modern gold standard of air quality particle size (PM 2.5) was set out with the publication in 1993 by Dockery et al of the Harvard six cities study. It is only these fine particles which can enter lung tissue. It became the mandatory size for monitoring in the US in 1997. Health savings followed the adoption of this new standard. The old standard PM 10 coarse particle size is not satisfactory because it results from different processes (mechanical) than PM 2.5 (incendiary) and the relationship between the two particle sizes is not consistent. In 2008 the American Heart Association found (JAMA May 14 2008) whereas there was a strong correlation between increased PM2.5 levels and admissions for cardiovascular and respiratory disease, there was no correlation with increased PM 10 levels.

The American Heart Association in Circulation produced an update of it's scientific statement in 2010 on 'particulate matter, air pollution and cardiovascular disease' and included in this review is the statement myocardial infarction can occur within hours of increased PM 2.5 exposure and also that the chemical make-up of the particle was an important variable. Amazingly 20 years after the discovery of the critical importance of fine particles Australia still has not adopted PM 2.5 as the mandatory size for monitoring.

In 2000 a major report from the Clean Air Task force of US "Death, disease and dirty power" pointed out that **deaths occur below the PM2.5 standard and there is no threshold below which particles of this size are safe.** In the same year Kunzli et al writing in the Lancet "Public health impact of outdoor and traffic related pollution" showed life expectancy is reduced by about six months for every 10micrograms increment in PM10 levels. (We now know this is primarily due to the PM2.5 component of PM 10). More recently in 2012 Kloog et al from Harvard Public Health showed chronic exposure to PM 2.5 particles is associated with 4.2% more hospital admissions for respiratory diseases for every 10micrograms increase and 0.7% increase for acute exposure. Thus by continuing to mine coal close to a population base we are unnecessarily killing people prematurely and chronically disabling others. All of this is being done without any warning to this effect being given in this EIS. In fact with the expansion of the Roseville West mine to within 1km of the village boundary and the movement of mining 3km southwards to a new area with Stratford East Mine this will escalate the unnecessary premature death and disability numbers.

The high sulphur content particularly in some of the thinner seams, has led to spontaneous ignition in the walls of the mine. This is a slow incomplete burn which results in carcinogenic compounds and has a nasty odour.

Alarminglly, because PM 2.5 monitoring is not mandatory, no measurement has ever been made of PM 2.5 levels in Stratford! The valley is partially enclosed and expert meteorologist Martin Babakhan says the up to 560 meter high walls of the valley (Gloucester Buketts) will

circulate PM 2.5 particles back into the valley which is 11km wide at Stratford. The EIS has modelled the PM 2.5 levels for this project using just 450meters valley height which is the maximum height on the lower side of the valley and this resulted in a PM2.5 level for this project of 4micrograms in Stratford Village but air quality modelling of PM 2.5 levels in the Upper Hunter has been notoriously inaccurate. To what extent would the PM 2.5 contours change if the higher side of the valley is included? We are not given cumulative impact data of PM 2.5 particles from other sources (which of course would have a different chemical composition profile.)

In response to the lack of a health audit local volunteers have just commenced measuring lung function, oxygen saturation and blood pressure in the Stratford environs community and comparing it with a Gloucester community 10km distant from mining. To date 9 of 43 persons (21%) tested at Stratford had impaired lung function. If this is reflective of the whole community it is clearly irresponsible to increase air pollution as planned.

The history of air monitoring of this mine shows it has been largely complying with PM 10 consent conditions whilst the community has been experiencing lung cancers, strokes, asthma etc in anecdotally higher rates than non mining rural communities. PM 10 Dust levels are only a guide and a poor one at that.

There is no social license for premature killing and causing disability in a community.

Air Quality Recommendations

- 1) After 17 years exposure we need to be auditing the health status of the affected community before any expansion is contemplated.**
- 2) Any future consent conditions should have mandatory PM2.5 monitoring with an annual average maximum of 5micrograms.**
- 3) 24hour continuous air monitoring with real time hourly results on the web to enable high risk individuals to be able to move to an air filtered room before risking acute heart or asthma attack.**
- 4) PM 2.5 mapping of the Gloucester valley with air monitors at critical community sites (Gloucester Hospital or Gloucester High School and Wards River) as well as sites important to miners.**
- 5) PM 2.5 chemical particle characterisation for the Gloucester valley**
- 6) Blast fume monitoring**
- 7) Methane levels in Stratford Village to be monitored**
- 8) Pollution Reduction Program to add a focus on reducing PM 2.5 levels via stringent emission control on vehicles**

- 9) Vehicle running sheets to be checked by Community Consultative Committee to ensure night-time water spraying is occurring etc
- 10) Covering of coal rail wagons and veneering at stockpiles.
- 11) Listing of toxic substances reported to National Pollution Inventory with discussion of dangers and a program for their reduction
- 12) Compensation fund for the rusting of roofs, gutters, tanks and water filters and extension of Dust Diseases Tribunal responsibility to community members
- 13) Recommendation to MidCoast Water to extend mains water to Stratford Village
- 14) Recommendations regarding health dangers to pets, stock and native animals and safety of pastures and milk.
- 15) A locally stationed enforcement officer
- 16) A Complaints system that avoids resident contact with the Mine.
- 17) A costing of health damage should be presented

Greenhouse Gases, Global Warming and Health Impacts

The burning of coal and the release of fugitive methane are a significant contributor to global warming. To date there has been 1degreeC rise in global temperature and heat records have been broken world-wide. Locally the record 45.8degC (114degF) in Sydney was a wake-up call that Australia as a premier culprit needs to take a lead and start reducing it's coal production. This unhealthy unpopular mine would be a good place to start.

The increased temperatures has already world-wide caused increases in malaria, dengue fever, Japanese encephalitis, infant diarrhoea, heat stress with dehydration in the elderly and infants. Ambulance and mortuary services are stressed on very hot days.

Noise, Blasting and their health impacts

Overview

Noise is the basis of the largest number of complaints about this mine and blasting comes second. (For most mines it is dust which generates the most complaints which suggests this mine is particularly poor in regards to noise and blasting).

Environmental Noise is a public health concern and reference is made in the relevant legislation to the sleep disturbance and separately to the 'Annoyance factor'. Community surveys, such as the one carried out in this valley in 2007, often rate psychological disturbances as the most prevalent health problems associated with mining and noise is a

big causal part of those psychological problems. D-G Requirements state health factors should be an integral part of the assessment.

Issue 1 Health damage is much more than the intensity of sound but that is all that is being measured

The complaints vary but much of the annoyance experienced stems from people whose sleep is being repeatedly interrupted but not measured, people whose rural quiet is disturbed by intrusive low frequency engine noise of upsetting tones which again is discounted by the inappropriate use of just using 'A' weighted sound readings, people whose houses are rocked by blasts which cause cracks in their houses but are told it is all within consent limits etc.

Review of Industrial Noise Policy

In the past the focus has been on 'Auditory Effects' which are that aspect of noise which interferes with hearing. The prevention of industrial deafness and the ability for speech to be heard therefore heavily influenced the monitoring system and associated legislation which is encapsulated in the Industrial Noise Policy (INP). Deafness results from excessive middle and high frequency noise and so the 'A' weighted monitoring system has been the cornerstone. The Environmental Noise which is the subject of this EIS however is mostly the lower intensity noise which affects the community surrounding the mine and to a large extent this concerns lower frequencies which get increasingly minimised by the 'A' weighted system.

The INP acknowledges the annoyance of noise with this statement

'Accounting for annoying noise characteristics

A noise source may exhibit a range of particular characteristics that increase annoyance, such as tones, impulses, low frequency noise and intermittent noise.'

but fails to follow through with these sentiments by measuring and monitoring these factors.

The realisation of extensive 'Non-auditory' adverse health effects of noise e.g. **impairment of sleep, impairment of concentration, learning and communication with their consequent cognitive, emotional and behavioural effects**, has formed one important basis for the review of the NSW Industrial Noise Policy (1999) which is currently being undertaken. These sentiments need to be reflected in this EIS.

Noise by definition is unwanted sound and that unwanted aspect is one element in the adverse impact of noise on mental health. The associated 'antagonism' activates stress hormones which in turn have adverse health effects (Meerlo P et al, 2008).

Issue 2 Low frequency noise and infrasound issues are being neglected

Whilst low frequency noise is usually taken to be that below 300Hz this probably wouldn't be thought of as low frequency to the average person, since middle C (256Hz) on the piano is well within this low frequency range. (The lowest note on a full sized piano is 28Hz and is easily audible). This is relevant because noise lower than two octaves below middle C (64Hz) is often not recorded due to a myth that it is not troublesome. However this has been proven not to be the case in recent years and low frequency noise and infrasound is the range of much of the sound energy of very large diesel engines, a focus of many complaints. This EIS does not supply the details of the wavelengths covered. The A weighted system understates the sound energy as much as one thousand fold at these low frequencies so it is ridiculous to use it as the principal measurement. **'C' weighted measurements must be mandatory for all low frequency noise.**

Low frequency noise has a number of special characteristics such as it not being blocked by insulation since it's energy is conveyed easily through solids by vibration in contrast to the attenuation in air which happens with middle and high frequencies. Therefore offering double glazing and insulation is only a partial help for noise problems.

Low frequency covers the wavelengths which are the natural resonating wavelengths of rooms in a house, so that resonance can be set up within a bedroom by low frequency engine noise making it **essential A and C weighted sound levels are checked both inside and outside affected houses.**

Low frequency sound is not attenuated nearly so quickly and travels much further than middle and high frequency noise. It can pass through hills. Some of the noise complaints come from houses way out of the affectation zone indicated using only the A weighted sound modelling and results. This extensive distribution of noise complaints of noise of the low frequency component may also be a consequence of the night-time temperature inversion layers very common in this enclosed valley. The walls of the valley rising to 560 metres cause an additional echoing effect at some locations (not acknowledged in the EIS).

The annoyance caused by low frequency noise is reduced by concurrent higher frequency noise which explains why more machine operatives don't complain of this aspect. They are hearing all frequencies at the same time. As distance from the mine increases the middle and high frequencies attenuate and only the low frequencies get through to people living several km's away in a quiet rural situation.

The psychologically alarming and noxious nature of low frequency noise may be hard wired into us because dangerous animals typically emit low frequency growling as part of aggression. Again a reason to focus on low frequency noise, not overlook it.

Noise below 20Hz is traditionally called infrasound because it is much less audible though **it is still perceived** but increasingly as a body vibration more than an audible noise. This

frequency range has been ignored because it was thought 'what couldn't be heard would have no effect' but the vibrations are not enjoyed by our bodies and if they persist for months and years they can cause tissue to be laid down in the walls of blood vessels impairing their function (Vibro-acoustic disease described by Pereira et al). Recently Prof Alec Salt has demonstrated outer hair cells in the cochlear which are selectively stimulated by infrasound wavelengths.

Noise Hypersensitivity

Some people are born with sensitivity to noise (Approximately 15% in a community). For others it develops secondary to another condition. There are some ear conditions e.g. endolymphatic hydrops, which predispose people to infrasound hypersensitivity. Some brain conditions e.g. autism are associated with noise sensitivity. (Susceptibility to the annoyance effect of noise is measured in an instrument developed by Bob Thorne). Those people liable to carsickness and seasickness are at increased risk of being made sick by low frequency noise. **The community needs to be screened for and warned about noise hypersensitivity.** It probably affects about 100 persons in the Stratford Mine environs. They may well be suffering chronic sleep lack and/or neuro-endocrine disturbance. They may well be the group who become so frustrated they commit aggressive acts. **In the past year police were called to two individuals who lost control when complaining following excessive blasting episodes.** The apparent policy of the mine to never apologise at the time of a complaint, presumably so as not to imply liability, is very provocative to those complaining.

The reality of the harmful nature of low frequency noise

The submissions to the 2012 Senate Environment and Communications Legislation Committee, In Respect of Renewable energy (excessive noise from wind farms) heard evidence from a number of expert acousticians including Salt and Thorne referred to above. Additionally Dr Michael Nissenbaum demonstrated wind farms emit much low frequency noise and the closer you are to a wind farm then the greater is the adverse effect on your sleep and mental health and the greater is your likelihood of suffering daytime sleepiness. Wind farm low frequency noise comes as pulses which is different to mining low frequency noise which is not pulsed but mining noise can have an upsetting grating character. The above evidence reinforces the existing known harmful effects documented about sleep disruption and cognitive impairments from rail and mining noise.

Issue 3 Learning Impairment

Stratford has a primary school. S A Stansfeld et al studied the effects of noise (from aircraft and road traffic) on primary school aged children's learning and found it adversely affected reading comprehension and several other cognitive measures. Heavy mining vehicle noise is likely to be more noxious than lighter road traffic. Stratford school is just such a school that we should expect to experience adverse concentration and learning effects.

A recent study investigating the nocturnal effects of railway noise by Patricia Tassi et al in the Journal of Experimental Psychology showed long term exposure to nocturnal railway noise produces chronic signs of cognitive deficits and diurnal sleepiness. Stratford residents suffer a mixture of railway and mining noise. The school needs to understand double glazing etc is only partially protective (i.e. not effective against low frequency noise). **This should be referred to the Education Dept. This serious issue calls into question the future of Stratford Village as a community**, particularly if the Roseville West pit continues to get even closer to the village i.e. the proposal is for it to be only 1.2km from Stratford School. To think that some children may be brought from further a-field to have their schooling in this adverse environment is bizarre. **A public forum on the future for the Stratford community needs to be urgently called.**

Issue 4 Cumulative Brain Disruption Effects

There is a cumulative adverse effect on brain function, in children particularly, caused by (1) Noise effects/disturbed sleep, (2) Toxic chemical effects from a mixture of heavy metal poisoning from the domestic rainwater tanks (discovered in 2001 by Education Dept), blast fumes and PAH emissions, (3) psychological factors such as anxiety caused by blasting shaking their house, family disagreements about planning for the future etc 4) Reduced brain oxygen from Asthma and also asthma induced sleep impairment.

Blasting is known to have caused panic attacks in both children and adults at Stratford with both excessive vibration and overpressure e.g. at least 122dB at 29 Avon St (Measured at 27 Avon St sheltered by the affected house of 29 Avon St). It is known to have caused structural damage verified by a structural engineer. Pets, native animals and stock can be terrified by blasting. A pond full of fish all died at the above house following an excessive blast with orange fumes.

Issue 5 Sleeping Disruption

Noise can cause difficulty in getting to sleep, awakening from sleep and stressful sleep. Sleep is usually broken if a noise occurs more than 15dB above the background noise level. In rural situations it is not unusual to have a background of 25dB and although the INP calls this 30dB the brain doesn't know this rule and so a sudden mining or rail noise of 40dB is likely to cause awakening. Three or more such awakenings per night will affect overall sleep quality. This in turn can cause daytime sleepiness, emotional disturbance, learning and memory impairments and behaviour problems. Sleep stressed by chronic low frequency and impure machinery noise can cause stress hormones to increase blood pressure and heart rate and heart stability and predispose to depression. Daytime sleepiness causes traffic and other accidents. These problems are acknowledged in the legislation but no sleep quality monitoring is built into consent conditions. The extent that this is happening within the Stratford Mine environs has never been examined. **After 17 years of operating the mine a**

sleep disorder community audit is overdue and mining expansion should not occur until we know the extent of harm already occurring.

Conclusions and Recommendations

- 1) The advance of medical knowledge about the adverse effects of low frequency sound non-auditory noise problems emphasise the necessity for making C weighted noise recordings in all situations.
- 2) The population of people in the vicinity of Stratford Mine have had up to 17 years of noise and blasting impacts. We know they are experienced as noxious by the fact of so many complaints. The large majority of people in Gloucester Shire are against an expansion of mining. Further impacts should only be agreed to if we know that the extent of damage to health and buildings to date is within limits 'acceptable to the community' and/or compensation arranged for those health damaged and/or homes damaged and the community alerted to the risks.
- 3) An audit of the impact of Mining Noise using the Pittsburgh Sleep Quality Index, the Epworth Sleepiness Scale and the general health measure SF 36 questionnaire should be carried out on those up to 10km from the mine. This is the distance inversion layer effects cause reports of mining noise to extend to.
- 4) Similarly a survey is needed to know the extent and severity of blasting induced psychological damage and an audit of blast damage to houses needs to occur.
- 5) An urgent assessment of the learning deficits being caused at Stratford School by the noise combined with chemical poisons and psychological stressors. The Roseville West extension will be 1.2km from the school and the mine will operate in school hours. Mining and Education of young children are mutually incompatible and a public forum should explore the future of the Stratford community.
- 6) Obtain the advice from a Neuro-acoustician about strategies for minimising the harmful impacts of mining noise and add these as consent conditions.
- 7) Abandon plans for the recommencement of 24 hour mining and the expansion of Roseville West Mine even closer to the village.

Selected References

‘Responses of the Ear to Low Frequency Sound and Infrasound and Wind turbines’ by Alec N Salt and Timothy Hallar in Hearing Research. 21/11/2012

‘Effects of industrial wind turbine noise on sleep and health’ by Nissenbaum MA et al in Noise and Health 2012 Vol 4, Issue 60, p 237-243

Restricted and disrupted sleep: effects on autonomic function, neuroendocrine stress systems and stress responsivity, by Meerlo P et al, Sleep Med review 2008; 12:197-210

‘Long term exposure to nocturnal railway noise produces chronic signs of cognitive deficits and diurnal sleepiness’ Nov 2012, by Patricia Tassi et al in Journal of Environmental Psychology

Psychological Impacts from Open Cut Coal Mining

This is the most neglected area of health impacts in both the scientific literature and the mining legislation. Community surveys bear out the great prevalence of psychological problems mining brings about in a community, such as the one carried out by Barrington Gloucester Stroud Preservation Alliance in 2007 which showed 45% of those in the 5km impact zone believed their health had been adversely affected with psychological problems being twice as common as physical health problems. Noise was a problem for 85% and dust for 54%, life plans had to be changed for 42% (copy of results available on request).

One typical example of the ignorance and/or dismissal of psychological factors is the fact an expert scientific committee has been set up to examine health impacts from mining in the Upper Hunter but none of the experts has psychological expertise.

Mechanisms of Psychological Damage

Psychodynamic stresses e.g. personal losses and anger at what is happening in the community, grief at the loss of a loved landscape, Organic effects:- chemical poisons in the air and water such as heavy metals and PAH (polycyclic aromatic hydrocarbons), changes in brain blood flow causing strokes, changes in hormone levels, interference with brain transmission and stress through noise (particularly low frequency noise), genetic changes from ultrafine particles and BTEX in coal dust, sleep disruption from noise and impaired respiration, all combine to adversely impact on our emotions, our behaviour, our cognitive processes and our ability to communicate. This needs to be acknowledged and compensated for.

As a psychiatrist seeing patients from a mining area for the first time in my working life I heard people talking of the mining as one of the significant stressors for them. Typically the stress reactivated a past psychological disorder that had become quiescent. E.g. (1) a man with paranoid schizophrenia who had bought a house in a remote area to seek quiet and perhaps refuge from imaginary assailants, became psychotic again when an exploration miner kept watch over the house to catch him and persuade him to sell up. (2) a woman with past treatment for phobic anxiety started to get panic attacks every time her house shook with blasting. (3) A woman who had minor depression in the past became more severely depressed when she realised the mines wanted to dig up all the surrounding country which she loved. (4) A child waking in panic because they couldn't breathe (?asthma, ?low frequency noise related). (5) A man depressed and 'trapped' because his house can't be sold.

The exploration phase of mining is when many examples of psychological problems appear. Gradually it dawns on people that all their life plans may now be ruined. They complain but their complaints are dismissed and a sense of powerlessness, helplessness and hopelessness comes over them. Hallmarks of a depressive state.

In the production phase of mining the brain starts to be poisoned by heavy metals, lead, mercury, cadmium etc and PAH from the diesel emissions. These latter poisons when exposed to a foetus cause a reduction in IQ of up to 5 points (Periera et al). Surely the state has an obligation to warn an affected community of dangers such as these. Anxiety occurs in reaction to serious physical illnesses. I am aware of two men who have developed lung cancer, one who has had a stroke due to high blood pressure a neurologist wrote was in reaction to mining, a woman developing cancer of the thymus (very rare cancer due to immunological disruption), an adult and a child terrified by blasting, several individuals threatening to assault/shoot the mine employees etc, etc all in a tiny community.

This is a community under very great stress. When I asked one woman why she hadn't complained she replied "When all your energy goes into just surviving you have nothing left for complaining".

Higginbotham et al (2010) described the phenomenon of social injustice in mining communities with 'the disproportionate exposure of socially vulnerable groups to pollution and its associated effects on health and the environment, as well as the unequal environmental protection provided through laws, regulations and enforcement'.

Health related quality of life in mining communities was investigated by Zullig and Hendryx (2010 and 2011) and they found residents of coal mining areas had more days of poor physical health, mental health and activity limitation and poorer self rated health compared with residents of non mining areas.

Economics

The health dollars consumed in treatment and the time off work on sickies, and the educational disadvantage caused for the children within the approximately 500 people living within the health impact zone of this mine undoubtedly costs NSW more than the royalties gained from coal. This is the experience of Hendryx and Ahern (2009) in the Appalachian region of US who used the VSL (Value of Statistical Life) and found whereas coal was worth \$8billion to the economy the loss due to health damage was \$18-\$84billion.

Conclusion

The above submission addresses the failure of the EIS to discuss the health impacts of this mine which has been operating for 17 years. It's placement was so very close to a community that health damage would have been thought almost inevitable yet no health damage audit or preventive community education has been attempted. A health audit is essential. The expected deaths and disability levels must be publicly stated for there to be a social license. The crisis of a mine being located in a community can be compared in enormity with a protracted cyclone or bushfire devastating an area. However when natural disasters are visited on communities they are usually given help. When the disaster (an inappropriate granting of a license to mine) is of a past government's making it appears the embarrassment means no help is forthcoming. An urgent health and social review is called for before any license extension is granted.

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