A Submission to the Senate Inquiry into Air Pollution and Health, 2013

How to Investigate the Impact of Coal Mining on Community Health

A Hunter Valley Perspective

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Motivation for this Submission

Community members and senate inquiries face great difficulty in identify trustworthy sources of information in any complex scientific issue in which there are polarised and conflicting values. I have lived and worked as a public health physician responding to the public health implications of industrial development in the Hunter Valley of NSW for 16 years. The current debate associated with coal mining, coal transport and combustion (and increasingly CSG) has led to a polarised and distressed community – beyond anything I have witnessed before. There is confusion, a lack of trust in agencies and institutions, and an uncertainty regarding health impacts that in itself causes significant psychological harm.

My motivation for this submission is concern for the very real suffering of community members caught in the crossfire of conflicting land uses. In my 16 years in the Hunter I have seen many communities and families torn apart by the uncertainty and contestation of environmental health threats. There have been assaults against community members for "speaking out". Marriage breakdowns and family separations have occurred when one partner removes their children due to environmental health concerns and the other partner stays on for work. I hear stories of grandchildren not being allowed to visit their grandparents in certain industrial suburbs and people selling houses to escape the worry of environmental threats to their family. This is a huge psychological and emotional cost to society.

This submission and the website www.hunterairandhealth.net seek to assist community members and the senate inquiry to better understand the science of local air pollution in the Hunter and the implications for community health and propose a way forward. While the inquiry is national in scope, the experience and issues in the Hunter are reflected in many communities across the nation and this is the focus of my submission.

In particular, acknowledging best practice in the USA, it calls for the development of an Environmental Health Investigation and Conflict Resolution Centre in the Hunter to encourage participatory research and investigation of environmental health issues – with scientists and local community working in partnership.

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EXECUTIVE SUMMARY OF THE PROBLEM AND POTENTIAL SOLUTIONS

PROBLEMS

1. Rapid development of coal mining and coal seam gas and associated infrastructure in the Hunter Region raising health, social, and environmental concerns
2. Uncertainty over appropriate types of "health study" to address community concerns
3. Academics, agencies, and community conducting separate research projects
4. Lack of strategic and integrated planning and no precedent for coherent collaborative governance of land use conflicts
5. Multiple land use conflicts including agriculture, tourism, small village lifestyle, viticulture, and equine
6. No forum for nonpartisan participatory dialogue in the region
7. Lack of trust in government agencies.
8. Coal mining capacity and infrastructure support may double over the next 20 years.

POTENTIAL SOLUTIONS

1. Integrate toxicological and epidemiological research to identify the major sources of environmental health risk and quantify the risk.
2. Develop an independent Environmental Health Investigation and Conflict Resolution Centre in the Hunter to:
    a. Respond to the environmental health concerns of the community.
    b. Initiate participatory research on the environmental health impacts of mining and related industries collaboratively between community, academia and government.
3. Develop better methods for assessment and approval of major projects that are strategic, based on explicit values, participatory and deliberative with stakeholders.

CONTEXT OF SUBMISSION

The Inquiry Terms of Reference address the impacts on health of air quality in Australia, including:

(a) particulate matter, its sources and effects;

(b) those populations most at risk and the causes that put those populations at risk;

(c) the standards, monitoring and regulation of air quality at all levels of government; and

(d) any other related matters.

It is certain that expert groups will summarise the international scientific and policy literature on terms of reference (a), (b), and (c). This submission addresses (d) the related matters of how to integrate the science of air pollution and health into decision making at a local level – from the perspective of open cut coal mining and associated industries in the Hunter Valley. The focus is on particulate pollution because that is the pollution that appears to cause most concern in the community.

The submission begins with very specific suggestions on how we should best study the relationship between air pollution and health in the Hunter Valley and then moves to address supporting structures and processes, such as an environment health and conflict resolution centre and better planning.

1. INTEGRATE TOXICOLOGICAL AND EPIDEMIOLOGICAL RESEARCH TO IDENTIFY THE MAJOR SOURCES OF ENVIRONMENTAL HEALTH RISK

For many years there have been calls for health studies in the Hunter. There have been many health studies conducted in the Hunter but of varying types and different stakeholders will have different definitions of a "health study".[1,2]

Reaching a collaborative consensus on the appropriate type of health study required in the Hunter is a priority. This will involve a comprehensive review of what has already been done and identification of the need for future work.

EPIDEMIOLOGY AND TOXICOLOGY

I would make a plea that both epidemiological and toxicological science be incorporated into an evidence-based investigation. To some extent the calls for "health studies" have been focused on epidemiological methods and it would be unfortunate if toxicological, exposure science, and risk assessment methods were not brought to bear on this issue.

Health conditions associated with particulate pollution such as asthma, emphysema and cardiovascular disease have a wide range of causes. There are no "coal particulate specific" diseases in communities adjacent to open cut coal mines that are thought to be uniquely associated with coal mine particulate emissions. For example there is no unique relationship such as that found between community exposure to asbestos from an asbestos mine and mesothelioma in the local community as in Wittenoom, Western Australia.[3] Therefore the investigation of the burden of disease in communities from coal mine exposures must be statistically estimated as some addition to the background burden of the disease using both epidemiology and toxicology. Both these sciences are complimentary and any research proposal that did not integrate them would be lacking.[4]

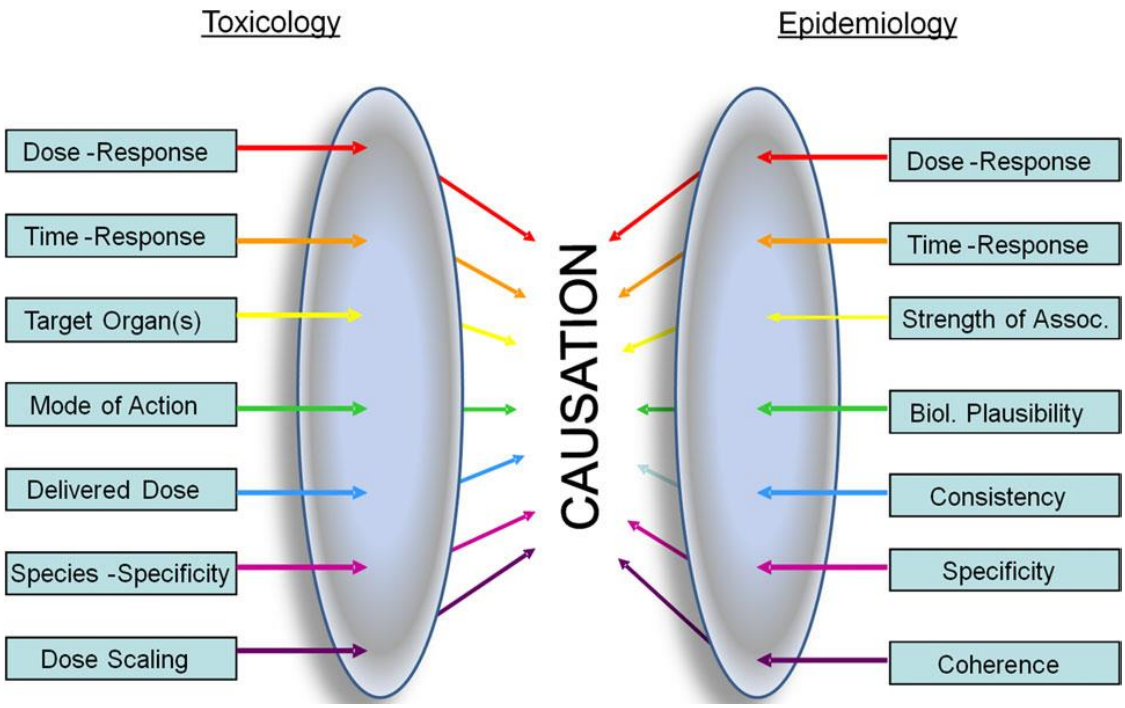
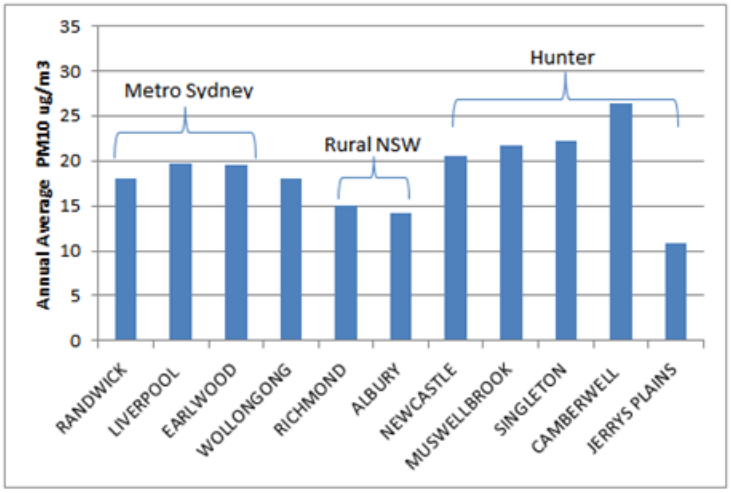


Figure. Contribution of toxicological and epidemiological data to understand cause and effect. From Adami.[4]

In the Hunter there is a wide range of health data available and there is also an extensive and growing resource of environmental exposure data from the Upper Hunter Air Quality Monitoring Network that monitors PM10 and PM2.5 particulates. There is also a joint study conducted by ANSTO and CSIRO into the speciation of particles collected by these monitors in Muswellbrook and Singleton that is scheduled to report results in June 2013.[5] This will give greater insight into the source and potential health impacts of these particles. All of this data must be integrated with toxicological research that investigates the impact of specific components of particulate chemistry and physics on human health. There is also extensive toxicological research on particulate impacts from controlled animal research and research done at the cellular level. All of this information needs to be integrated with local research.

THE UPPER HUNTER AIR QUALITY MONITORING NETWORK

The NSW Government, in partnership with the Upper Hunter coal and power industries established an ambient-air monitoring network in 14 strategic locations around Upper Hunter open cut mining areas and population centres between December 2010 and February 2012. The objectives of the network are to: 1) provide credible, reliable and real-time information (within one hour) on dust concentrations and trends available online ; 2) present real-time information using an interactive mapping system; 3) provide SMS and email updates and alerts; and 4) provide long-term information about dust concentrations to inform mine planning and management. This network stands as a model for designing a strategic approach to monitoring a community and predicting health impact in the face of a rapidly developing coal sector. All 14 sites monitor PM10 and 3 sites monitor PM2.5



Average annual PM10 levels in selected towns across NSW, ending December 2012, NSW Environment and Heritage.

This submission is not the place for a literature review but it is worthwhile noting the limitations of much of the epidemiological research and the equivocal nature of the research outcomes that rely purely on epidemiological research both in the Hunter and in the context of

open cut coal mines overseas. Some studies find elevated rates of respiratory disease in open cut coal mining communities and some do not – hence the importance of toxicology and exposure science to fully understand potential health impacts. [1,2,6,7,8]

Left to epidemiology alone we may not detect an important health impact leading to unnecessary illness, or alternatively we may find false associations between health effects and open cut coal mines – leading to unnecessary worry. An example of the contributions that multiple methods can contribute in investigation cancer causation, extracted from an article entitled "Role and limitations of epidemiology in establishing a causal association" can be found in the appendix.[19]

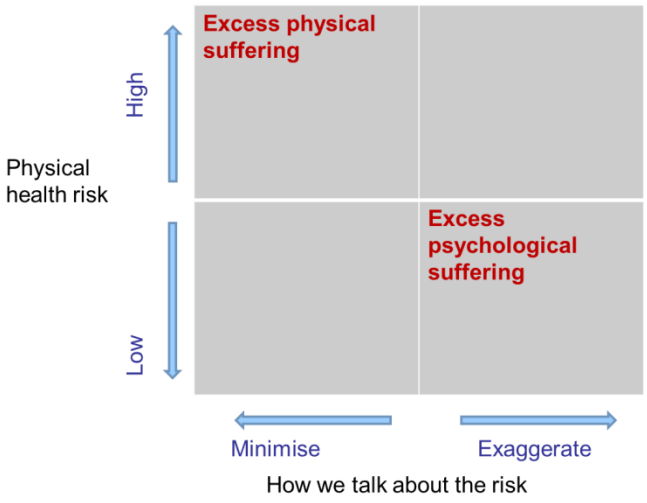
BEST PRACTICE IN LITERATURE REVIEWS

We need a stakeholder consensus on the appropriate methodology for a literature review otherwise the outcome of even a literature review may be dismissed as biased or incomplete. Literature reviews of contentious issues such as these require the highest standards and the new draft *Approach for Systematic Review and Evidence Integration for Literature-based Health Assessments* released in February 2013 by the National Toxicology Program of the US National Institutes of Health provides a state of the art seven-step framework for conducting evaluations using principles of systematic review.[9] It would be an excellent guide for a comprehensive review of the health impacts of open cut coal mines and goes further than the guidance provided in the current Australian Enhealth guidelines. The draft document cleverly addresses the uncertainty involved in these reviews – for example in Step 5 "Rate confidence in the body of evidence" and Step 6 – "Translate confidence ratings into evidence of health effects".

QUANTIFY THE IMPACT OF AIR POLLUTION

To under-call the health impact of air pollution may lead to unnecessary physical illness that could have been prevented and likewise over-calling the health impact may lead to unnecessary psychological and social suffering among those fearing they will suffer illness in the future.

In the figure below we can see there is a risk of either causing excess physical suffering or psychological suffering depending on how we control risk and communicate a risk to a community.



A research finding that reveals an elevated risk of asthma or heart disease or cancer only goes half way. Communities need to know the degree of health impact associated with an exceedance of environmental health goals. This allows community members and agencies to make a more informed decision regarding the potential health impact and the urgency and priority for action.

There are now methods to quantify the impact of particulates on human health to provide an understanding of the disease burden of air pollution. There are methods to calculate the

number of days of healthy life lost, excess respiratory illness and premature deaths that a given community might suffer.[10] There have been estimates of pollution related mortality in the Hunter in the past but these should be updated with the newer research on the impacts of PM10 and PM2.5 particulates.

The seminal multi-city time series analysis APHEA, carried out in 29 (mostly European) study centres, found an increase of deaths from illness of 0.6% for every 10 μg/m^3 increase in PM10 concentration (mean on the day of death versus the day before). Deaths from cardiovascular diseases increased by 0.7%. These results are similar to those of a previous meta-analysis conducted on behalf of WHO, which found the same effect size for total mortality and a slightly higher effect size for cardiovascular deaths (0.6% and 0.9%, respectively, per 10μg/m^3 increase in PM10 concentration). Such methods can be used to quantify the number of deaths that might be expected across a region due to an increase in PM10 levels or the number of death prevented by improving air quality.

PM2.5 exert a stronger health impact than PM10 particles with each 10μg/m^3 elevation in PM2.5 particulate air pollution associated with approximately a 4%, 6%, and 8% increased risk of all-cause, cardiopulmonary, and lung cancer mortality, respectively.[11]

Estimates of how many people in, for example, Newcastle or the towns of Muswellbrook or Singleton in the Hunter Valley develop pollution related illness each year would be useful in developing appropriate responses. How many illnesses would be caused by a 5 μg/m^3 increase in PM10 or PM2.5 and how much illness could be prevented by a 5 μg/m^3 decrease?

2. DEVELOP AN INDEPENDENT ENVIRONMENTAL HEALTH INVESTIGATION AND CONFLICT RESOLUTION CENTRE IN THE HUNTER

Community trust in the process of environmental health assessment and research is essential to a healthy societal functioning. A low level of trust in government agencies, industry, and industry funded consultants is evidenced in much of the interplay between community groups, environmental advocates and other stakeholders. Mistrust leads to disputes which are costly in terms of community, industry and government resources and engenders fear among groups who are unsure of who to trust and what to believe.

It is in this environment that all manner of health risks can be postulated or dismissed by opposing parties leaving concerned community members bewildered and confused – the collateral damage of a system bereft of trust.

The Hunter needs a centre for Environmental Health Investigation and Conflict Resolution. There are many precedents and examples of such centres in the US with leadership provided to a great extent by the Udall Institute and the US Environmental Conflict Resolution Centre.[12,13] Such a centre would play the role of an honest broker and assist in repairing the relationships between stakeholders. A model for such a centre is outlined below.

A Proposal:

Hunter Centre for Environmental Health Investigation and Conflict Resolution

MISSION

The Hunter Centre for Environmental Health Investigation and Conflict Resolution supports community and environmental advocacy groups in the Hunter, and beyond, to investigate and understand environmental health implications of industrial development and participate in planning and policy decisions that impact upon their community. The Centre conducts independent and trusted environmental health education and research. It brings multi-disciplinary expertise in ecology, public health, law, environmental science and engineering to support better societal decision making.

PRINCIPLES

1. COMMUNITY PARTICIPATION AND STEWARDSHIP
    - Community members will drive the program of the Centre. Participatory research will be mandatory and community members will participate in the research and education agenda from scratch.

2. SCIENTIFIC CREDIBILITY
    - The Centre commits to scientific investigation and joint-fact finding with the community ensuring that advocacy is based upon science.

3. INDEPENDENCE
    - The Centre will not receive funding for research or education from coal mining, power generation, coal seam gas or any other industry group likely to represent a conflict of interest.

RESPOND TO THE ENVIRONMENTAL HEALTH CONCERNS OF THE COMMUNITY

On many occasions, in several countries, I have observed government agencies conduct health studies in relative isolation to the community – and always with the best of intentions. The study is designed, conducted, analysed, political level briefings occur, a media release is prepared and rehearsed. The study is released and the community responds with – "that's not the research question of interest to us" or "that's not the methodology we wanted" or "we just don't believe it" or similar. Perhaps hundreds of thousands of dollars of resources poured into a process of limited value to the assumed stakeholder group.

To avoid this outcome the first step in an environmental health research project must be to research the community's research questions. The second step is to involve the community in scoping the project from scratch.

INITIATE PARTICIPATORY RESEARCH ON THE ENVIRONMENTAL HEALTH IMPACTS OF MINING AND RELATED INDUSTRIES COLLABORATIVELY BETWEEN COMMUNITY, ACADEMIA AND GOVERNMENT.

The most successful participatory research project I have been involved in was an investigation of the impact of heavy metals in fish in Lake Macquarie.[14] All of the stakeholders - environmental groups, councils, recreational and commercial fisherman - agreed on the research questions and methodology at the outset of the research. When the results came in not all stakeholders were happy but they did not dispute the findings of the research.

A successful participatory research project requires community involvement at every step. Communities can provide unique and grounded insights into the issues at hand. Research demonstrates that community participation in the processes increases community understanding of the complexity of the issues and increases trust among all parties. While the process may appear slower and politically risky, it is ultimately more effective, quicker to resolve the underlying issues of trust and transparency, and politically astute.

For example, it is unfortunate that significant resources are being put into rail corridor coal dust studies by agencies and community groups without consensus on the appropriate methodology to be used and with little hope for agreement on the implications of the studies.

3. DEVELOP BETTER METHODS FOR ASSESSMENT AND APPROVAL OF MAJOR PROJECTS THAT ARE STRATEGIC, BASED ON EXPLICIT VALUES, PARTICIPATORY AND DELIBERATIVE WITH STAKEHOLDERS.

I am not a planner and have no expertise in planning, however, it is important to acknowledge that much of the conflict associated with land use and environmental health concern arises from a frustration with the planning process and it is impossible to address the environmental health concerns of the community without addressing this issue. It is not an exaggeration to state that people are marching in the streets to vent their frustration on planning issues.[15,16]

While there is an attempt to better focus on the cumulative impacts of coal mining in the Hunter it is clear that the many social, health, and environmental conflicts are not being addressed to the broad satisfaction of the community.

I am not attributing blame to any agency or officers in this submission. In my experience people work on these very difficult problems with great integrity, however, land use conflict is a difficult problem globally and no jurisdiction has developed the perfect system – probably because it does not exist.

In NSW major assessments are placed on exhibition on the internet for a period of approximately 6 weeks. Community engagement and stakeholder consultation often occurs prior to the exhibition. Environmental assessments for open cut coal mines are large and complex documents that run to hundreds or thousands of pages. Community and other stakeholders may make submissions which are uploaded to the website and the development proponent may make response to the submissions after which a planning decision may be made. This process does not optimise opportunities for face to face deliberative planning. Most contentious developments are referred to the Planning and Assessment Commission and public hearings may be held.

COLLABORATION

It may be that we can learn from the Collaborative methodology encouraged under the US National Environmental Policy Act which brings together a diverse range of stakeholders able to engage in multiple rounds of joint fact finding, research, and negotiation to resolve issues associated with contested developments.[17]

LONG TERM VISION

A better planning process also needs to be based on a strategic long term vision that aligns with community values and is explicitly stated. Values need to explicitly stated so they can be coherently discussed.

The newStrategic Regional Land Use Policy still has a focus on the one off approval (or not) of developments proposed by the private sector. This is not strategic. It does not embrace a societal vision for the future of our regions but rather defaults to an attempt to minimise negative impacts. Huge resources from within planning, environment and health agencies are directed to trying to assess and control negative impacts of mining development rather than steering towards a regional planning goal. This work is driven not by the inspiration of our best planners and social geographers in collaboration with the community but by the vagaries of world coal prices. The energies of many of our most community minded citizens are expended in protest rather than civic progress.

The problems with our current planning approach are exemplified in the Camberwell Village case study below.

CAMBERWELL VILLAGE – A CASE STUDY

Camberwell is a small village between Singleton and Muswellbrook in the Hunter Valley surrounded on three sides by open cut coal mines. The mines have come closer and closer to the village over time with ever increasing impacts. A Cumulative Impacts Fact Sheet of July 2010 noted the following:

- *Camberwell is a community of some 56 residences, only a small number of which remain privately owned. The remainder (49) have been purchased by Ashton Coal Operations Limited and are rented by the company's mine workers.*
- *the criterion for annual average PM10 dust concentrations was consistently met at Camberwell;*
- *the criterion for 24 hour average PM10 dust concentrations was exceeded at Camberwell during 2008 on between 10 and 30 days at different monitoring stations in and near Camberwell;*
- *cumulative noise levels at Camberwell were estimated at 42-44 dBA2 (close to the recommended maximum) and were predicted to rise by a further 2 dBA if current project applications were approved; and*
- *there was no evidence of high lead levels in drinking water from rainwater tanks in Camberwell, or that the low levels of lead which were present came from coal mining dust.*

While the PM10 concentrations may be of concern (the average annual PM10 in 2012 was 26.5 $\mu g/m^3$ and there were 23 exceedances of the 24 hour average PM10 goal of 50 $\mu g/m^3$ in 2012), perhaps the greatest public health and/or social impact is that 49 of 56 residences have been left by their original residents. That 87% of the residents of a village leave speaks to significant social and psychological disruption and likely produces a far greater health impact than the current particulate levels. This scenario will be replayed through many small villages that will suffer cultural dislocation as landowners have to decide whether to enter into agreements with mines or sell out and leave.

EXPLICIT VALUES

We need to be explicit as to whether the community of NSW endorses the loss of small villages such as in the Camberwell case study above to make way for coal mines. We need to be explicit as to what level of particulate impact, or increase in particulate level, is acceptable in a rural environment rather than relying on numeric goals or standards.

COMPLEXITY OF ENVIRONMENTAL ASSESSMENTS

Environmental Assessments can run to thousands of pages across multiple documents posing a significant challenge to community members (or anyone) hoping to understand a proposal. It is difficult even for the proponents to assure the quality of the proposals. A case in point is the T4 coal loader environmental assessment. The Stakeholder Engagement chapter stated that approximately **61**% of people aware of the project were supportive of T4 going ahead. However, hundreds of pages later in the last of 60 separate documents it stated that approximately **45**% of those aware were supportive of the T4 project going ahead. This is a

relatively simple statistic but an important issue that strikes at the acceptability of the development to the community.

The Drayton South Mine extension proposal highlighted nine key stakeholder issues that would be addressed in the Environmental Assessment. The Environmental Assessment had been on display for over one month before it was found that one of the nine key issues – property devaluation- had been accidentally left out. But these are relatively simple issues compared to the air modelling of particulate pollution impacts. The modelling is only performed by a handful of consultants under contract to the mines and these are not independently checked using the same modelling software and assumptions. The conflicting views of NSW government agencies on health issues associated with the proposed Ashton South East Open Cut mine were unable to be resolved - leaving the Planning Assessment Commission, to make their best judgement on conflicting expert submissions.

ROLE AND QUALITY OF COMMUNITY ENGAGEMENT

Two examples above relate to errors in the assessments responding to important community engagement issues. This will not be representative of all Environmental Assessments, however, they are examples of the need to really consider the role and quality of community engagement. it is rarely stated what the role of community engagement is in these processes and to what extent the community feedback is able to modify the proposal. The activities of community engagement such as the number of meetings, number of letter box drops etc are listed, however, the satisfaction with the community engagement process is rarely commented upon or assessed. Community satisfaction with engagement processes could be independently audited and its role more explicitly defined.

OUTSOURCING DECISION SUPPORT TO CONSULTANTS

Sometimes it is useful to question the usual way of doing business. Does it make sense to have proponents of mining development contract out the environmental assessment (comprising multiple subsections including air modelling, cultural, heritage, social, economic, surface and groundwater impacts to name a few) to consultants or are these capabilities better maintained within government? This is not to criticize the quality or integrity of consultants but to highlight the inevitable loyalty of client-consultant relationships and question the structure that has evolved. How much of the decision support for major societal choices are mediated within these client-consultant relationships. To take just one small example – when air modellers estimate a mines ability to control PM10 particulates from truck road haulage (often the largest contributor to PM10 generation in the air quality model) they often use dust emission control estimates of 85% and sometimes 90% despite recent surveys suggesting typical performance is between 50 and 75%.[18]

What component of the work now performed by consultants could be invested in building government capacity? Mine proponents could continue to fund the cost of these assessments as occurs with many other user-pays government services.

A LOCAL PLANNING AUTHORITY

It may be that the Hunter would be better served by a local planning authority that could balance the many competing land uses and conflicts in the region. While we would not want to reproduce the environmental impacts and the “development first” focus of The Snowy Mountain Authority and the US Tennessee Valley Authority, these might be considered useful models where multiple jurisdictions in a region face significant development challenges.

So to some solutions for planning:

- We need clear regional planning principles and a vision that extends for at least 100 years
- A local planning authority needs to be commissioned - A “Hunter Planning Authority” could have planning, environment, health, and community collaborative expertise and support a centre as proposed previously in this document.
- The Authority could conduct independent audits of community satisfaction with mining project engagement efforts – something most Environmental Assessments are silent on.
- The Authority could sponsor community based participatory research into health and environmental impacts similar to the US Federal governments Collaborative process so that the community trust the outcome of research
- Those environmental assessments not able to be performed by the Authority could be performed by consultants on contract to the Hunter Planning Authority and not to individual mine proponents. Development proponents could continue to fund this process.

APPENDIX

THE CENTRE FOR AIR QUALITY AND HEALTH RESEARCH AND EVALUATION" (CAR)

CAR - www.car-cre.org.au

The peak research group of relevance to air pollution and health in Australia is "The Centre for Air quality and health Research and evaluation" (CAR) based at the University of Sydney. Australia is a small country in terms of air pollution and health research. I have no links with CAR, however, I strongly recommend that the Senate Inquiry makes the best use of this group when seeking expert testimony. CAR is a Centre of Research Excellence funded by the National Health and Medical Research Council.

CAR's aim is to enable research on the impact of air pollution on human health and translate that research into contributions to policy that mitigate that impact. It is a consortium of leading researchers across leading Australian and international research centres. Advice and guidance from this diverse group of researchers would be of great value to the inquiry and future research endeavours.

ROLE AND LIMITATIONS OF EPIDEMIOLOGY IN ESTABLISHING A CAUSAL ASSOCIATION

Epidemiologic and other approaches considered by regulatory and public health agencies in assessing the totality of the evidence concerning the carcinogenicity of a suspected chemical, physical, or biological exposure or its circumstances (From Franco[19])

Approach	Type of scientific evidence	Level of inference	Type of study	Features
Mechanistic	Analogy	Molecular structure	Structure–activity relationships	Useful to identify potentially carcinogenic compounds based their molecular similarity to known carcinogens
Toxicology	Experimental	DNA, cellular, organ	In vitro short-term genotoxicity assays	Rapid screening system for candidate compounds or exposures
		Organ, whole organism	In vivo animal studies	Provides proof of principle and insights into dose-response effects

Approach	Type of scientific evidence	Level of inference	Type of study	Features
Epidemiologic	Observational	Non-inferential, descriptive	Case reports	Suggestion of association
		Population	Surveillance of incidence and mortality	Documentation of baseline disease burden, exploratory hypotheses
			Ecologic (correlation or aggregate) studies	Coarse verification of correlation between exposure and disease burden
		Individual	Cross-sectional studies	Correlation between exposure and disease (or marker) without regard to latency
			Case-control studies	Correlation between exposure and disease (or marker) with improved understanding of latency; suitable for rare cancers
			Cohort studies	Correlation between exposure and disease (or marker) with improved understanding of latency; suitable for rare exposures
	Experimental	Individual	Randomized controlled trials of preventive intervention	Most unbiased assessment of correlation between exposure and disease (or marker)

THE AUTHOR

I am a medical doctor and public health physician. I have worked on environmental health issues in the Hunter for 16 years and before that in the USA. This submission represents my personal opinion and not that of any employer past or present. I make this submission as a private citizen. I have never received any sponsorship, income or consultancy fees from mining or related industries. I curate the www.hunterairandhealth.net website and have participated in environmental conflict resolution training at the US Environmental Conflict Resolution Center.

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