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To Hazelwood Inquiry
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Subject Submission inquiry into
Hazelwood Coal Mine Fire

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Communist Party of Australia submissions to the Victorian Royal Commission into the Hazelwood open.pdf

To: Bernard Teague
Independent Inquiry
Hazelwood Coal Mine Fire
Attached is the Communist Party's Submission to the Inquiry, Please confirm receipt of our
submission
Thanking you
L G Lean for CPA.

Communist Party of Australia submissions to the Judicial Inquiry into the Hazelwood open-cut coal mine fire which commenced on the 9th February, 2014.

Submission prepared by L. G. Lean, MSc, Master Applied Science OH&S.

The toxic smoke from the Hazelwood coal fire had been blowing over the town of Morwell and close towns and other residential properties for the previous two weeks according to the ABC News transcript Friday 21st Feb 2014, 8.22pm AEDT. The Environment Protection Authority (EPA) "issued a high level alert after it rose above 1,300 this afternoon. A reading above 150 is considered very poor". This was 8.6 times what is considered very poor air quality.

Faced with an immediate catastrophic crisis from the 9th February 2014 the response from the state's EPA, Health Department and Naphthine State Government has been appalling some samples of deficient information given when a complete evacuation was required.

The information about the health hazards to all residents by state government authorities was incredibly inadequate for the catastrophic event occurring. All the EPA's Tanya O'Shea could say at this interview was "visibility is low and people should stay indoors. Visibility is affected, so that's 10 kilometres due to high particle concentration in the air. The particles are of concern health wise. We urge people to take their precautions, avoid prolonged or heavy physical activity, get inside bunkered down".

The state's Chief Health Officer Dr Rosemary Lester at the same interview of the 21st says "people may experience coughing, wheezing and irritation". "Everyone should keep informed about fire activity in their immediate area," Dr Lester said. "Anyone with a heart or lung condition should take their medication as prescribed by their doctor". "People with asthma should follow their asthma management plan". "Anyone with concerns about their health should seek medical advice or call nurse-on-call on 1300 60 60 24," Dr Lester said.

ABC News 24 February 11:49am AEDT, the Health Minister in the State Government, David Davis, said he is "acting on advice from the Chief Health Officer in managing the situation". This was again repeated by Davis at 1:31pm AEDT.

The Age report Published February 27, 2014 – 5:38pm, quoted "One of the things we're dealing with [is] smoke burning in a coal mine directly

adjacent to the community. It is a relatively unique situation Not a straightforward situation," Dr Lester said.

Advice from the EPA, from the page last updated on 2 March 2014 still did not adequately explain the toxic effects of inhalation of the smoke. Their response was "All smoke including bushfire smoke can be harmful to your health". "Further investigation into some of the harmful substances in smoke is being undertaken, but there is currently no reason to expect the smoke from the Hazelwood mine to be significantly different from smoke from other coal sources".

ABC News Saturday 1 March 2014, 10:22am AEDT the Premier Denis Naphine backs Victorian health officer's decision on warning. The Victorian top health officer has defended the decision to wait until almost a month after the Hazelwood coal mine fire began to upgrade the health warning for Morwell South. Dr Lester acknowledges some of the risks surrounding exposure are not known. "The evidence around medium-term exposure is unclear. You're quite right there and we've been taking advice on that," she said.

Who made the decision to keep information from the exposed population?

If there has been a decision not to tell exposed residents of the immediate danger of long term effects of toxic gases, fumes and particulate substances the right to know the true facts, as unpleasant as they may be, is an established right for all Australians.

The competency of staff at the Victorian Health Department and the Environment Protection Authority, in our opinion, is not under scrutiny. Staffs have ready computer access to check on all the potential health hazards, immediate and long term, from combustion of coal both in power stations, indoor cooking and heating as well as coal seam or open-cut mine fires, which are numerous throughout the world.

These questions need to be answered

- Did the Health Department Chief Officer Dr Lester make a decision by herself or consult with others or was she told to limit the comments made public to avoid alarming the residents who had been exposed since the 9th February 2014? If so with whom did she consult?
- Did Dr Lester consider that exposed residents could not handle the truth that they and their children have been exposed to carcinogenic toxins, to heart illnesses etc., and in future their quality

of life and life expectancy may have been diminished because of the exposure period to the numerous toxins from the coal mine fire?

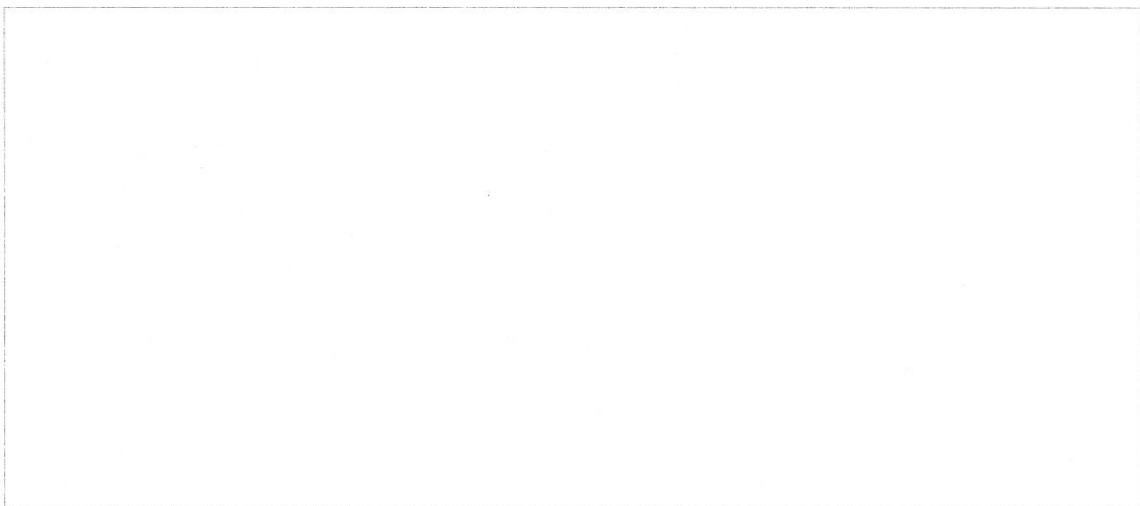
- Has there been any political interference to the limit of health hazard information given to residents? If so, to what extent? And by whom?

Open-cut Coal fires are not unique, the health hazards are well documented and known

There are many trace element emissions from coal combustion. While they may be small, considering trace elements to the total quantities released, it depends upon the total coal burnt (tonnes) and the synergistic effect of multiple exposures.

- Most coal contains uranium and thorium, as well as their decay products and K-40. The amount of radionuclides involved are noteworthy. In Victoria, some 65 million tonnes of brown coal is burned annually for electricity production. This contains about 1.6 parts per million (ppm) uranium and 3.0-3.5 ppm thorium, hence about 100 tonnes of uranium and 200 tonnes of thorium are buried in landfill each year in the Latrobe Valley. (World Nuclear Association, Natural-Occurring Radioactive materials (NORM) updated January 2014).
- A recent research study in 2012 on the health harms of coal fired power stations and coal mining in local communities has found that:

-



Adults (and whole population) in communities near coal-fired power stations and coal combustion facilities have been found to have:

- Increased risk of death from lung, laryngeal and bladder cancer
- Increased risk of skin cancer (other than melanoma)
- Increased asthma rates and respiratory symptoms

Children, infants, and fetal outcomes in communities near coal-fired power stations and coal combustion facilities have been found to have

- *Oxidative deoxyribonucleic acid (DNA) damage*
- *Higher rates of preterm birth, low birth weight, miscarriages and stillbirths*
- *Impaired fetal and child growth and neurological development*
- *Increased asthma rates and respiratory symptoms.*

(Colagiuri R, Cochrane J, Grigis S. Health and Social harms of Coal Mining in Local Communities: Spotlight on the Hunter Region. Beyond Zero Emissions, Melbourne, October 2012).

Medical science has long understood the dangers of being exposed to sulphur dioxide and also nitrogen oxides and how they each can contribute to lung function disabilities and premature deaths and low birth weight in infants, which may well indicate future ill health such as allergen sensitivity.

The EPA would be well aware that particulate matter has a number of different deleterious effects, however, it has only acknowledged that if breathed can cause breathing difficulties asthma but no mention of the more devastating effects of different substances that make up the particulate matter from combustion of coal, which have more serious outcomes than just respiratory. Why then did they not advise exposed persons of all known facts?

- ***Some of the Heavy Metals from Coal Combustion, acute and chronic exposure***

Substance	Human Toxicity		Comments
	Acute	Chronic	
Sulfur dioxide	Lung irritant, triggers asthma, low birth weight in infants.	Reduces lung function, associated with premature death.	Also contributes to acid rain and poor visibility.
Nitrogen oxides	Changes lung function, increases respiratory illness in children.	Increases susceptibility to respiratory illnesses and causes permanent alteration of lung.	Forms ozone smog and acid rain. Ozone is associated with asthma, reduced lung function, adverse birth outcomes and allergen sensitization.
Particulate Matter	Asthma attacks, heart rate variability, heart attacks.	Cardiovascular disease, pneumonia, chronic obstructive pulmonary disease, premature death.	Fine particle pollution from power plants is estimated to cut short the lives of 30,000 Americans each year.
Hydrogen chloride	Inhalation causes coughing, hoarseness, chest pain, and inflammation of respiratory tract.	Chronic occupational exposure is associated with gastritis, chronic bronchitis, dermatitis, photo sensitization in workers.	
Hydrogen Fluoride	Inhalation causes severe respiratory damage, severe irritation and pulmonary edema.		Very high exposures through drinking water or air can cause skeletal fluorosis.
Arsenic	Ingestion and inhalation: affects the gastrointestinal system and central nervous system.	Known human carcinogen with high potency. Inhalation causes lung cancer; ingestion causes lung, skin, bladder and liver cancer. The kidney is affected following chronic inhalation and oral exposure.	
Cadmium	Inhalation exposure causes bronchial and pulmonary irritation. A single acute exposure to high levels of cadmium can result in long-lasting impairment of lung function.	Probable human carcinogen of medium potency. The kidney is the major target organ in humans following chronic inhalation and oral exposure.	Other effects noted from chronic inhalation exposure are bronchiolitis and emphysema.
Chromium	High exposure to chromium VI may result in renal toxicity, gastrointestinal hemorrhage and internal hemorrhage.	Known human carcinogen of high potency.	Chronic effects from industrial exposures are inflammation of the respiratory tract, effects on the kidneys, liver, and gastrointestinal tract.
Mercury	Inhalation exposure to elemental mercury results in central nervous system effects and effects on gastrointestinal tract and respiratory system.	Methyl mercury ingestion causes developmental effects. Infants born to women who ingested methylmercury may perform poorly on neurobehavioral tests.	The major effect from chronic exposure to inorganic mercury is kidney damage.

a Agency for Toxic Substances and Disease Registry Online. ToxFaqs. Division of Toxicology, Atlanta, Georgia.

b U.S. EPA, 2000. Integrated risk information system (IRIS). Online. Office of Health and Environmental Assessment, Cincinnati, Ohio.

Other Toxic Ingredients in coal combustion

1. Sulphur Dioxide (SO²) and Nitrogen Oxides (NO_x) are two primary examples of particle-forming air pollutants (particulate matter) from coal power plants. Particulate matter is known to contribute to serious health problems, including lung cancer and other cardiopulmonary mortality. SO² and NO_x are both highly toxic to human health, and contribute directly to thousands of hospitalisations, heart attacks, and deaths annually.
2. Polycyclic Aromatic Hydrocarbons (PAHs) from combustion of coal are an entire class of toxic chemicals, linked together by their unique chemical structure and reactive properties. Many PAHs are known human carcinogens and genetic mutagens. In addition, they

- are particular prenatal health risks: prenatal exposure to PAHs is linked to childhood asthma, low birth weight, adverse birth outcomes including heart malformations, and DNA damage.
3. Mercury in coal, a dangerous neurotoxin, damages the brain and the nervous system either through inhalation, ingestion or contact with the skin. It is particularly dangerous to pregnant women and children. It is known to disrupt the development of the in-vitro brain. In low doses, mercury may affect a child's development, delaying walking and talking, shorten attention span and cause learning disabilities. High dose prenatal and infant exposure to mercury can cause mental retardation, cerebral palsy, deafness and blindness. In adults, mercury poisoning can adversely affect fertility and blood pressure regulation and can cause memory loss, tremors, vision loss, and numbness of fingers and toes. Coal fire power plants are the largest single source of airborne mercury emissions in the United States. The mercury emitted from such plants can travel thousands of miles. Scientists recently linked the chemical fingerprint of mercury found in fish in deep portions of the Pacific Ocean to coal power plants thousands of miles away in Asia. (Don Lieber, *Planet Save, Top 10 Toxic Ingredients Used in the Fossil Fuel Industries, A User's Guide to oil, coal, and gas*, 12/07/2013)
 4. The American EPA estimates that coal-fired power plants are the largest man-made source of mercury pollution, accounting for 50 per cent of mercury air emissions in the United States. Once mercury settles onto water, certain micro-organisms change the chemical into highly toxic and persistent form - methyl mercury- that builds up in shellfish, fish, and animals, including humans that eat fish. Methyl mercury is not easily broken down And moves up the food chain. (Vicki Stamper, Cindy Copeland, Megan Williams, *Poisoning the great lakes: Mercury Emissions from Coal-Fired Power Plants in the Great lakes Region*, June 2012).

It is unbelievable that the Victorian Health Department Staff, the EPA staff did not know these facts of the very real dangers to all residents exposed to the toxic smoke, fumes, gases and particulate matter from the Hazelwood open-cut coal mine fire.

Serious questions must be answered by the State Government, Health Department, EPA and Coal company if there was any collusion to keep vital health risk information from all those exposed to the toxic materials from the coal fire?

It is inconceivable that the Health Department and EPA would keep this information from the State government and all parties must be

accountable for future and ongoing health illnesses, hospitalisations and premature deaths caused by exposure to toxic material from the fire.

The coal and power generating company have an obligation to tell workers of all known health and safety risks. The company must be asked have they informed all workers employed at the power station of all known risks if so when? If not, why not?

Why did Dr Lester Chief Officer Victorian Health Department claim the Hazelwood open cut coal fire unique? There are numerous references on the web of many coal mining fires large and small. The Centralia, Pennsylvania fire, which has been burning since 1962, of the hundreds of mine fires in the United States burning today, most are found in the State of Pennsylvania. The Hazelwood Power station, a 2 km coal face in the Hazelwood open cut mine, was set alight by bushfire in October 2006, many other quoted from (Wikipedia, the free Encyclopaedia from Germany, Norway, China, India and Indonesia. Coal Seam fire last modified on 7th March 2014). *The Australian* newspaper article by John Ross March 4th 2014 12.00am wrote: "Lake Macquarie, NSW: Triggered in October 2013 by underground coal seam fires sparked by an arson attack weeks earlier, Burnt thousands of hectares of bush on the state's central coast, destroyed three homes and killed a resident. Burning mountain Nature Reserve, NSW: World's oldest known coal fire having smouldered in NSW's Hunter Valley for over 5,500 years, early explorers assumed it was an active volcano until a geologist identified it as a naturally burning coal seam, unique in Australia."

The required health information and action never came why?

How long after the fire commenced on the 9th February 2014 did it take to assess the serious nature of the blaze?

How much coal was burnt or was smouldering during the course of the fire?

The Hazelwood owner energy giant GDF Suez knew of the serious health risks to the entire population at Morwell and surrounding regions but appears that no alert regarding serious health dangers that may lead to death and illnesses that can lead to death was forthcoming from the company. The company must be held accountable to the whole community. Why the silence by the company when it knew the health dangers?

It has been reported that; - A fossil-fuel company in Italy's north part owned by GDF Suez, the ultimate owner of Victoria's Hazelwood brown coal generator - has been ordered to shut down two of its coal-fired generation units after a court ruled they were responsible for hundreds of human deaths and thousands of cases of heart and lung diseases.

Italian news site RAI News reported on Tuesday that a judge directed police to take control of the Vado Ligure plant in the northern district of Savona, after finding in favour of prosecutors in the case.

Francantonio Gianero, Savona's chief prosecutor, had argued that emissions from the plant, owned by Tirreno Power, were responsible for more than 400 premature deaths between 2,000 and 2,007, and 2,000 cases of heart and lung disease. (Energy giant GDF Suez in court over coal health Impact, 12 March 2014).

The clean-up danger remains

Residents had in places thick particulate matter in their homes. The natural inclination for residents is to clean up the horrible mess. The usual clean up method was to use a domestic vacuum cleaner which does not capture the fine breathable sub 10 microns particulate. Why has the Health department and EPA spokesperson/s not advised residents of the dangers of using a domestic vacuum cleaner as the settled particulate can go straight through into the breathing zone of adults and children alike exposing them to greater danger of serious health effects in a few years?

Too little too late for some

There is no way residents can decontaminate their homes and it's very difficult to live in a contaminated house with so much toxic particular matter.

The Age published an article by Nick Toscano: March 10, 2014 - 3:00am reported; - "Latrobe City Council has secured a \$50,000 state government grant to 'kick-start the recovery program' by purchasing 24 special filtered vacuum cleaners capable of picking up fine particles, and air-impurities for Morwell's most vulnerable and elderly residents."

Mayor Sharon Gibson said "the council's community support workers would bring the new equipment to help clean homes and gardens of ash and fine-particle matter left by the coalmine fire disaster that cloaked the town in toxic smog and raised health fears".

The clean-up requires specially trained skilled people to perform this arduous task of vacuuming all areas where toxic particulate has penetrated, which would include roof space, sheds etc. Soft furnishing however would not be able to be cleaned affectively of the very fine toxic dusts and must be replaced. Untrained workers cleaning up gardens could increase the already very high risk of further inhalation and ill health and probably make the soil contamination more hazardous through toxic dust penetrating deeper into the soil.

The Victorian chief health officer, Rosemary Lester, has repeatedly said the smoke is having no serious health effects, *ABC News* updated Wed, 12 March 2014, 3:29pm AEDT. Dr Lester has to answer questions of why she has repeatedly given out misleading information and giving residents a false sense of being safe from harm.

If there has been a conspiracy to cover up the true extent of the health dangers to residents it must be exposed and made public.

The state government on the 18th March told *ABC News* it has offered Morwell residents clean-up assistance. Morwell residents will have access to a \$2 million assistance package announced by the state government to help in the clean up after the long-running Hazelwood coal mine fire. The government has purchased 150 vacuum cleaners for local residents to borrow to clean their homes. They can also borrow high pressure water hoses. A free professional house cleaning service is available for vulnerable residents in the area closest to the mine. The Latrobe City Council will coordinate all services and offer expert cleaning advice, laundry and car-washing vouchers. The ABC reported.

The State Government, Health Department and EPA's actions have been unconscionable when scientific published studies, which are freely available, show how toxic to human health coal combustion is both in the short and long term.

Not only residents close to the mine are vulnerable but all residents in and around Morwell are vulnerable. The questions must be asked, have the professional house cleaning workers been trained in cleaning up such fine invisible toxic particulate matter? Have they been told the facts of the health risks of what they are exposed to while cleaning up?

The fine particulate would have covered ornaments, pictures, books, inside cupboards, inside vents, soft furnishings, bedding, all clothing inside water heating jugs etc. outside the home water tanks must be cleaned, roof gutters and roofs. Air conditioning units must be cleaned

and filters replaced. Roof space must be cleaned and any insulation replaced.

The use of special vacuum cleaners to clean-up is essential but if the vacuum cleaners are not fitted with an outside exhaust then the forced air from the vacuum cleaner will increase the already very high risk of airborne toxic particulate matter that can be breathed by all persons and family pets that come into contact with the dust.

Victims register and air and dust monitoring required and recorded

Has the State Government, Health Department and/or the EPA kept a register of all person living or working in or near the contaminated areas. If not, why not?

Has the EPA conducted air monitoring in homes? Or dust sampling in homes including roof spaces, schools and buildings? Has soil testing in the fall out area of the contaminants been tested? If so what are the results? If not, why not?

Morwell mine floats plan for lake

The Age News published March 15, 2014 - 11:55am reports that "operators of the mine, which has been burning for over a month, plan to turn the Morwell mine pit into a lake. However, there is no clear deadline set out in their work plan for rehabilitation of the 3,554 - hectare mine".

Turning the open-cut pit into a lake may be the only way the fire can be extinguished however, if proceeded with, the water of the lake could never be used for domestic purposes or for any aquatic purposes, and there would always be a risk of poisoning up the food chain if birds or animals drank from the lake waters or the water was used to water vegetable gardens.

What action needs to be done now?

- ❖ First action required is to have a dust analysis be carried out by an independent company in a number of homes that are contaminated. Particulate matter (ash soot) from the fire contains hazardous substances. Major contaminants to be analysed and looking for are particles of: - sulphur dioxide, nitrogen oxide, polycyclic aromatic hydrocarbons (PAHs), Mercury, silica, radon daughters, copper, nickel, lead, zinc, chromium, and cadmium. Have residents been advised of the necessity of doing this?

- ❖ The unseen fine particulate enters the home, shop or other commercial buildings, play grounds, school buildings and yards etc. It finds its way into the roof space, small openings, and soft furnishing such as cloth covered lounge chairs, some bedding materials, curtains etc. Outside environment has been contaminated such as children's play equipment, vegetables in the garden, soil and roof tops. Have residents been advised?
- ❖ Clean up should be carried out professionally requiring appropriate equipment to perform the tasks, using a commercial vacuum cleaner capable of capturing the very fine harmful particulate contaminants as small as 2.5 microns (μm) and not allowing the particulate to pass through the vacuum capture system into the breathing zone of children, adults or pets. Have residents been advised?
- ❖ It is impracticable to decontaminate the furnishing contaminated and other items as the cost would be prohibitive, therefore all must be replaced. Roof and roof spaces can be vacuumed and decontaminated however, ceiling insulation would have to be replaced. Soil contaminated also needs to be replaced. Have residents been advised?
- ❖ A register must be kept by the state government of all persons exposed to the coal fire contaminants including persons not living in close communities who visited the town during the blaze. Have residents and those working in the area been advised that a register of exposed persons must be kept for future claims?

Anything less than a full clean-up by professionally trained cleaners will result in the hazards remain for many decades and children in particular are at greatest risk of future ill health, hospitalisation and probable premature death. Children may well have a lifetime of pollution ahead of them.

The Judicial Inquiry should investigate if any industrial or civil laws have been broken and recommend prosecution if found to be so.

The role and advice given by the State Government, Health Department and Environmental Protection Authority must also be scrutinised and appropriate recommendations made for any misleading statements, inadequate information and advice to residents about the nature of exposure to the toxic fumes, gases and particulate matter. Failure to issue an early evacuation order for the whole city of Morwell and surrounding districts affected.

***The lack of adequate professional advice on clean-up methods
must be considered.***

Bob Briton

28th March 2014

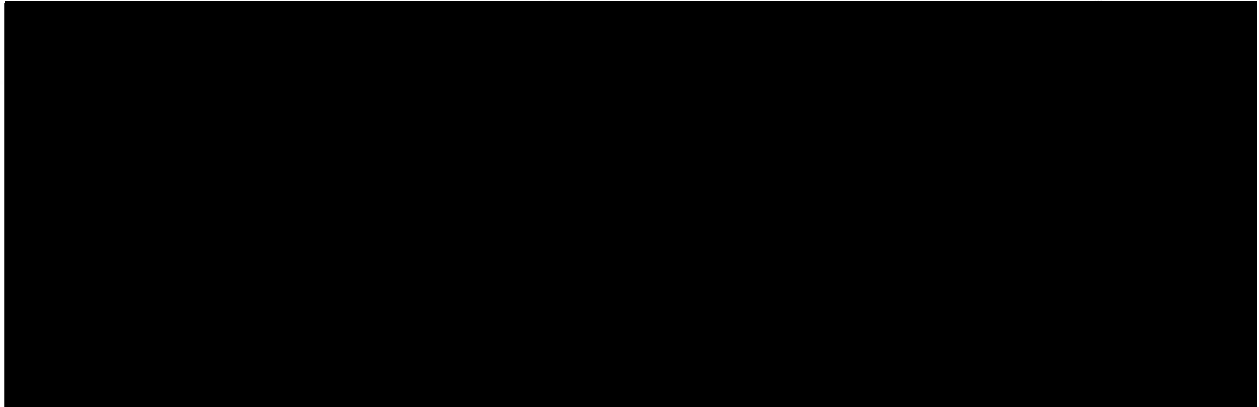
General Secretary Communist Party of Australia E-mail
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Fw: Morwell Mine Fire Submission

info to: [REDACTED]
Sent by: info@hazelwoodinquiry.vic.gov.au
Cc: [REDACTED]

15/05/2014 11:06 AM



----- Forwarded by [REDACTED] HAZELWOODINQUIRY on 15/05/2014 10:59 AM -----



Hazelwood Inquiry info/DPC@DTF
05/05/2014 03:23 PM

To Hazelwood Inquiry
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cc
bcc
Subject Morwell Mine Fire Submission

Title: Submission from the Communist Party of Australia to the
Judicial Inquiry into the Hazelwood open cut coal mine fire

First Name: Len

Surname: Lean

Organisation represented (if applicable): Communist Party of Australia

Email address: cpa@cpa.org.au

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Mobile: NA

Content of submission (you can choose multiple): Response to fire by
Emergency Services, Response to fire by Public Health Officials,
Response to fire by Other Government Agencies

Please select one of the following options: I acknowledge that my
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rv:28.0) Gecko/20100101 Firefox/28.0
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Submission from the Communist Party of Australia to the Judicial Inquiry into the Hazelwood open cut coal mine fire, headed by Justice Bernard Teague

Submission prepared by L. G. Lean, MSc, Master Applied Science OH&S

Toxic Clean-up a Fraudulent Deception

The Naphthine State Governments clean-up of toxic ash from homes at Morwell was never going to be successful; it was not based on the science information available for correct detoxification of properties. Residents have been deceived by practices that appeared to be the solution to a crisis.

Toxic dust accumulation you can see is a known health risk. However, the extreme danger to all residents is the invisible insidious particulate in the home

Occupational and laboratory studies show that exposure to air toxics can lead to an increase in the incidence of cancer, cardiovascular disease, birth defects, genetic damage, central nervous system defects, immunodeficiency, and disorders of the respiratory system. Further information can be obtained on the web (*Health and Social harms of Coal Mining in Local Communities: Spotlight on the Hunter Region. Beyond Zero Emissions, Melbourne, October 2012*).

What needs to be done?

An independent scientific assessment needs to be carried out to show how much contamination is still present after the supposed clean up.

- **Soft furnishing material:** It is impossible to decontaminate carpets, lounge chairs, curtains etc. Vacuum cleaning will not capture the entire small diameter particulate PM 10 (10 microns) or PM 2.5 (2.5 microns) which can penetrate deep into the fibres of soft furnishings. Remaining toxic particulate can be hazardous to health

through handling with moist hands. Children are more at risk. Soft furnishings must be replaced. (Soft furnishings need to be tested for toxic contaminants)

- **Roof Space:** all roof space of Morwell homes will be contaminated with toxic dust. Insulation must be replaced as the fine dust can penetrate deep into the insulation posing a threat to anyone entering the roof space to perform electrical, plumbing or other repairs. (Roof-space and insulation must be tested)
- **Roofs and water tanks:** must be decontaminated as the toxic dust can enter the water tank and if consumed by the residents their future health will be at high risk. (Water tanks must be decontaminated)
- **The back yard shed:** often forgotten area that must be included in the clean-up decontamination.
- **Garden soil:** Human exposure to contaminants in soil is a matter of general health concern in urban environments. Private gardens at Morwell following the coal mine fire are, in all probability, contaminated with heavy metals and other contaminants. The exposure of the population to contaminants via consumption of home-grown vegetables and fruit may constitute a potential health risk and a risk assessment must be carried out. In the older power stations the particulate toxic coal ash goes through a filter system that can capture approximately 90 per cent of contaminants, however, the toxic fallout from the coal mine fire ash toxins did not go through any filters. The whole toxic contaminants from the coal mine fire have settled on surrounding land and water. Using the Commonwealth of Australia 2001, Health-Based Soil Investigation Levels, would be a good start for the soil testing and evaluation. It must be also remembered that the evaluation of mixtures of contaminants and include the synergistic effects of risk. One of the important interacting affects affecting toxicity is the influence of compounds in mixtures on the metabolic activation and detoxification enzymes. Enzymes such as cytochrome P-450 can have their activity induced or reduced by various compounds. Children less than 6 years old are at higher risk from soil toxins, they often play in the dirt with toys or on playground equipment and hand to mouth can result in future ill health, particularly when exposed to some of the soil contaminants from the coal mine fire, substances such as Arsenic, Cadmium, Chromium, Copper, Hydrogen Chloride, Hydrogen Fluoride, Mercury, Nitrogen Oxides, Sulphur Dioxide, Polycyclic Aromatic Hydrocarbons (PAHs), and zinc. Most coal contains uranium and thorium, as well as their decay products and K-40. In Victoria, some 65 million tonnes of brown coal

is burned annually for electricity production. This contains about 1.6 parts per million (ppm) uranium and 3.0-3.5 ppm thorium, hence about 100 tonnes of uranium and 200 tonnes of thorium are buried in landfill each year in the Latrobe Valley. (World Nuclear Association. Natural-Occurring Radioactive Materials (NORM) updated January 2014). Presence of these contaminants must be tested for in the garden soil.

- **Vegetables:** some vegetables may absorb more contaminants than others therefore soil testing must be carried out and replaced if necessary. Studies have shown vegetables take up toxins from contaminated soil. A research article showed that the total PAH contents were higher for most root vegetables like potato and carrot (- 13µg/kg and relatively lower for turnips (10.9 µg/kg), while for fruit vegetables, all the peels were found to be more contaminated than the cores. For leafy vegetables, cabbage showed maximum PAH (11.6 µg/kg. (Mohammad W. Ashraf, Syed Iqleem H, Taqvi, Amber R, Solangi, and Umair A, Qureshi. Distribution and Risk Assessment of Polycyclic Aromatic Hydrocarbons in Vegetables Grown in Pakistan, 18th July 2012.
- **Livestock:** Meat is a very important human food, but it may potentially accumulate toxic minerals and represents one of the sources of heavy metals for humans. (FAO, Standards for contaminants and toxins in consumer products human and animal Codex stan. 193;1995). Meat is a very rich and convenient source of nutrient, including micro-elements. The chemical composition of meat depends on both the kind and degree of feeding animal. Metals in general can be classified as toxic (cadmium, mercury) and essential (cobalt, copper, zinc, iron). With environmental pollutants, especially heavy metals, ingestion of these contaminants by animals causes deposition of residues in meat. Toxic elements can be harmful even at low concentrations when ingested over a long time period due to their ability to accumulate in human and animal body. (Rays S, in Kiceniuk JW. Rays (Eds), Analysis of contaminants in edible aquatic resources, VCH Publishers, Inc 1994;91-113). The level of heavy metals in meat from different animals depends on factors such as environmental conditions, type of pasture and industrial development. (Kadim I, Mahgoub O, Faye B, Farouk M. Camel meat products CAB International pubi, Oxfordshire, UK & Boston, USA. 2013;248). Livestock around Morwell and other near towns have been exposed to toxic particulate such as mercury, silica, radon daughters, copper, nickel, lead, zinc, chromium, cadmium and polycyclic aromatic hydrocarbons (PAHs). Local livestock including poultry should be tested for these contaminants

also including poultry eggs to prevent contaminating the food chain. The elements manganese, cobalt, nickel, copper, zinc, arsenic, selenium, molybdenum, cadmium, antimony, thallium, lead, and mercury were found in Belgium free range eggs obtained from hens of private owners of commercial farms. It concluded that extensive consumption of eggs from private owners is likely to result in toxic equivalent quantity intake levels exceeding the tolerable weekly intake. (I Van Overmeire, L Pussemier, V Hanot, L De Temmerman, M Hoenig, & L coeyens, Chemical contaminants of free range eggs from Belgium, Food Additives & contaminants Volume 23, Issue 11, pages 1109-1122, 2006).

Residents of Morwell and surrounding districts have been exposed to toxic substances while the fire was burning and any further increase in toxicity would be deplorable.