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**ADVOCATES for CLEAN AIR**

5th December, 2003

Council of Australian Governments Bushfire Inquiry  
Department of Prime Minister and Cabinet  
3-5 National Circuit  
BARTON ACT 2600

*m*  
*15/12* *Ad*

"INQUIRY ON BUSHFIRE MITIGATION AND MANAGEMENT"

Attention: Mr. Ellis, Professor Kanowski and Professor Whelan

Dear Sirs,

Re: Adverse\_ HEALTH effects\_ caused by Bushfire SMOKE

We refer to the above, and wish to express our grave concerns regarding the current approach to bushfire mitigation practices. Management appears to involve the use of prescribed burning at the exclusion of non-polluting methods like the physical creation of fire break corridors and manual clearing of excess fuel loads.

We consider the deliberate burning of bushland should be the 'choice of last resort', initiated in emergency situations only, to control wild fires already in progress. Given the history of past events where significant numbers of so called "controlled burns" have gotten disasterously out of control and been responsible for complete annihilation of forrests, loss of human life, and destruction of private property, we believe the lighting of a fire to prevent a fire (that may not have occurred otherwise) is an unintelligent approach to mitigation.

The resulting smoke also causes far reaching atmospheric contamination by air toxics like carbon monoxide, oxides of nitrogen and fine particulate matter (PM2.5), which seriously affects the health of susceptible people, many suffering inordinate pain and distress on a daily basis.

Often, temperature inversions act as a "lid" and hold down the noxious gases and toxic substances near ground level where people live, work, and sleep. The ultra fine particles in lingering 'smoke haze' can be responsible for many more ailments than either patients or health workers recognise as having been initiated by smoke pollution. These particles are small enough to evade the body's defences, penetrating deep into the tiny air sacs where oxygen enters the bloodstream (see web site - U.S. *Washington State Department of Ecology* below).

**SMOKE IS NO JOKE!** An approximated 40-60% of any given community are at risk of being adversely affected to a greater or lesser degree. Research studies have shown more premature deaths are attributed to wood smoke toxicity than is currently acknowledged by Authorities (references are contained in a number of web sites below).

**MOST AT RISK** are:- Newborns, young Children, the Elderly, and the Immuno-compromised with pre-existing conditions such as: Asthma, Emphysema, Bronchitis, Cystic Fibrosis, Heart disease, Cancer, Auto-immune dysfunctions like Lupus and M.S., Chronic Sinusitis, Allergic Rhinitis, and MCS (Multiple Chemical Sensitivity) as well as other respiratory conditions, *The ABS National Health Surveys* of both 1995 and 2001 revealing more than one third of Australians had some kind of respiratory complaint.

Since wood smoke contains many of the exact same Irritants, Toxicants, and Carcinogens as Cigarette Smoke, the broader healthy community are also at risk of long term health threats similar to **PASSIVE SMOKING**. A Chart comparing the substances in both Wood and tobacco smoke is enclosed, plus an *EPA Report (Larson and Koenig)* lists additional health harming substances in wood smoke alone. One U.S. *EPA Study (Lewtas et al, 1991)* found "the lifetime Cancer risk from wood smoke may be as much as 12 times greater than the cancer risk from equal concentrations of cigarette smoke" (ref. *Washington State Dept. of Ecology, and Armidale's Air Quality Research Group's* web sites).

It seems incongruous that Governments have passed legislation banning cigarette smoke in work places, public dining areas, and on occasions within 10 metres of building frontages, while at the same time allow high quantities of environmental smoke from unnecessary burning activities to contaminate densely populated residential areas in greater proportions than cigarette smoke ever would.

Work areas and public places can be avoided by **CHOICE**, however **NO**

**CHOICE** of avoidance can be exercised by vulnerable people whilst within their own homes. Environmental smoke can be all pervading and is not stopped by closed doors and windows. There is no chance of escaping the respiratory distress, or any number of irritating and debilitating symptoms such as: severe headaches, burning eyes, nose and throat, sinus pain, joint pain, post nasal drip, chest pain, insomnia, nausea, loss of appetite, cognitive dysfunction, lethargy, and many other adverse effects listed here separately.

We consider smoke from naturally occurring wild fires is more than sufficient for vulnerable people to be forced to cope with, without also having to endure frequent air-fouling from deliberately lit fires, created in the name of "Hazard Reductions".

They are a ***hazard reduction*** for whom? Certainly NOT for those approximate six million or more Australians who will be adversely affected by the ***increased hazard to their Health***.

Cost Effectiveness is always used as an argument to validate BURNING habits. However, NO thought is given, to the passed-on costs having to be borne by an already overburdened Hospital, Medical, and Pharmaceutical system, forced to treat the consequences of unnecessary air-fouling.

We regard it UNCONSCIONABLE of Government agencies to blatantly and knowingly release highly toxic, and potentially carcinogenic substances into the atmosphere. All airborne pollutants must eventually fall to earth, affecting rain water and soil, which ultimately contaminates our food chain as well.

It seems to those of us who experience the inescapable regular invasion of our personal spaces, that Authorities entrusted with the responsibility of community well-being, are NOT prioritising human health requirements. We need not worry about chemical and biological warfare coming from offshore, we're slowly but surely doing a good job of poisoning ourselves.

People should expect to be entitled to breathe clean air whilst within their own homes. We believe Governments should be protecting the Environment and Human Health above all else, ensuring wherever possible that NON-POLLUTING practices are the primary methods of mitigation employed. 'Work for the Dole', and other Community Service schemes may be utilized to provide the extra manual labour required to ensure a clean environment.

Protection of life and property against bushfire threats could be achieved WITHOUT BURNING if reasonable ongoing physical maintenance of buffer zones around housing and roadways was treated as a PRIORITY. We're told mechanical and manual clearing was 'Best Practice' some 30 or so years ago, and provided year round work for many. The use of this practice would also provide employment in other areas like Saw Milling, Wood Chip and Mulch industries, land fill businesses, as well as being constructively used in 'Green Power Stations' where waste vegetation is burned under controlled conditions with scrubbers and filters to protect the Environment.

People who CHOOSE to live within vegetated areas should become accountable for shouldering a great deal of the responsibility of 'risk management', and preparedness for wild fire events. Enforcement of risk management requirements involving mechanical and manual fuel load reductions, plus the installation of trickle irrigation with bore water (where possible), could be administered by-the Rural Fire Service.

It is envisaged that invention and development of special equipment to slash and vacuum &/or irrigate ordinarily inaccessible terrain, would also create employment in Engineering and manufacturing fields.

The increased costs involved in the use of ENVIRONMENTALLY-FRIENDLY methods of mitigation may be greater in the short term but would be far outweighed by the long-term broad economic, and health gains - providing cleaner air, better health, increased productivity, and fuller employment.

Substantiating Scientific references regarding adverse health effects and mortality risks can be found at web sites hereunder:

U.S. Washington State Department of Ecology:

<http://www.ecy.wa.gov/progratmlairlwdsnwk.pdf>

NSW EPA: <http://www.epa.nsw.gov.au/woodsnewkelp/problem.htm>

NEPC (National Environment Protection Council)(PM2.5 Variation):

[http://www.eph.gov.au/nepmlairlair\\_variation\\_dL.html](http://www.eph.gov.au/nepmlairlair_variation_dL.html)

NEPC (National Environment Protection Council)(Air Toxics):

[http://www.ephc.gov.au/nepimlairlair\\_Txics.html](http://www.ephc.gov.au/nepimlairlair_Txics.html)

Amidale's Air Quality Group: <http://www.ozemail.com.au/airqual>

Burnine Issues: <http://www.burningissues.org>

American Lume Association:

[http://www.lungusa.org/lair/out00\\_woodburning.html#solutions](http://www.lungusa.org/lair/out00_woodburning.html#solutions)

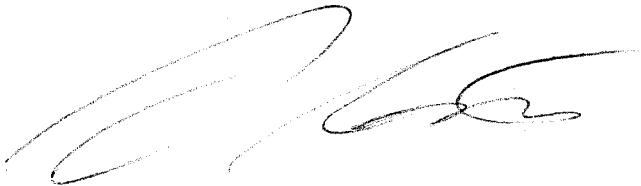
and, <http://www.city.palo-alto.ca.us/cleanbaylpdf/woodsmokebilL.pdf>

*ReNew Magazine.*     <http://www.ata.org.au>  
*European Commission DG Environment - (cost of PM2.5 emission)*  
<http://europa.eu.int/commlenvironment/lenvecolair/beta/ec02/forprint/ingpdf>  
*UK Department of Environment:*  
<http://www.defra.gov.uk/environment/airquality/airpol/index.htm>

Although our focus has been on health, it has come to our attention that rainfall is also affected by pollution from bushfires. Enclosed is a copy of a News Release' by NASA', which is headed:- "NASA Spacecraft Provides Direct Evidence - Smoke Inhibits Rainfall" (part of a submission by "Australian Management Consolidated Pty. Ltd.", on Agriculture, Fisheries, and Forestry, concerning future water supplies for Australia's rural industries and communities).

We thank you for the invitation to comment on 'Bushfire Mitigation and Management', and hope our perspectives will make a difference.

Yours faithfully,



Gayle Crossett (AFCA)  
On behalf of those too sick  
to raise a voice.

A quote from the American Lung Association:

*"When You Can't Breathe, Nothing Else Matters"*



When You Can't Breathe, Nothing *Else Matters*®



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## American Lung Association@ Fact Sheet Particulate Matter Air Pollution

November 28, 2001

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September 2000

Particulate matter is the generic term used for a type of air pollution that consists of complex and varying mixtures of particles suspended in the air we breathe. Particles are present everywhere, but high concentrations and/or specific types of particles have been found to present a serious danger to human health.

- Particulate matter is a combination of fine solids such as dirt, soil dust, pollens, molds, ashes, and soot; and aerosols that are formed in the atmosphere from gaseous combustion by-products such as volatile organic compounds, sulfur dioxide and nitrogen oxides.
- Particulate pollution comes from such diverse sources as factory and utility smokestacks, vehicle exhaust, wood burning, mining, construction activity, and agriculture.
- Particles of special concern to the protection of lung health are those known as fine particles, less than 2.5 microns in diameter. (For comparison, a human hair is about 75 microns in diameter.) Fine particles are easily inhaled deeply into the lungs where they can be absorbed into the bloodstream or remain embedded for long periods of time. A recent study showed a 17% increase in mortality risk in areas with higher concentrations of small particles.
- Particulate matter air pollution is especially harmful to people with lung disease such as asthma and chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema, as well as people with heart disease. Exposure to particulate air pollution can trigger asthma attacks and cause wheezing, coughing, and respiratory irritation in individuals with sensitive airways.

Recent research has also linked exposure to relatively low concentrations of particulate matter with premature death. Those at greatest risk are the elderly and those with pre-existing respiratory or heart disease.

This information was published in 1993. EPA Report, A Summary of the Emissions Characterization and Noncancer Respiratory Effects of Wood Smoke, EPA-453/R-93-036. It can be ordered from the US EPA at (919)-541-5344.

The same information was also published as Table 1 in A Summary of the Emissions Characterization and Noncancer Respiratory Effects of Wood Smoke, by Timothy V Larson and Jane Q Koenig, *Annual Review of Public Health* (1994) 15:133-56

Chemical Composition of Wood Smoke

Species	g/kg wood
Carbon Monoxide	80-370
Methane	14-25
VOCs (C2-C7)	7-27
Aldehydes	0.6-5.4
Formaldehyde	0.1-0.7
Acrolein	0.02-0.1
Propionaldehyde	0.1-0.3
Butryaldehyde	0.01-1.7
Acetaldehyde	0.03-0.6
Furfural	0.2-1.6 1.6
Substituted Furans	0.15-1.7
Benzene	0.6-4.0
Alkyl Benzenes	1-6
Toluene	0.15-1.0
Acetic Acid	1.8-2.4
Formic Acid	0.06-0.08
Nitrogen Oxides (NO,NO2)	0.2-0.9
Sulfur Dioxide	0.16-0.24
Methyl chloride	0.01-0.04
Napthalene	0.24-1.6
Substituted Napthalenes	0.3-2.1
Oxygenated Monoaromatics	1 - 7
Guaiacol (and denvatives)	0.4-1.6
Phenol (and denvatives)	0.2-0.8
Syringol (and derivatives)	0.7-2.7
Catechol (and denvatives)	0.2-0.8
Total Particle Mass	7-30
Particulate Organic Carbon	2-20
Oxygenated PAHs	0.15-1
Polycyclic Aromatic Hydrocarbons (PAH)	
Fluorene	4x10 <sup>-5</sup> - 1.7x10 <sup>-2</sup>
Phenanthrene	2x10 <sup>-5</sup> - 3.4x10 <sup>-2</sup>
Anthracene	5x10 <sup>-5</sup> - 2.1x10 <sup>-5</sup>
Methylanthracenes	7x10 <sup>-5</sup> - 8x10 <sup>-5</sup>
Fluoranthene	7x10 <sup>-4</sup> - 4.2x10 <sup>-2</sup>
Pyrene	8x10 <sup>-4</sup> - 3.1x10 <sup>-2</sup>
Benzc(a)anthracene	4x10 <sup>-4</sup> - 2x10 <sup>-3</sup>
Chrysene	5x10 <sup>-4</sup> - 1x10 <sup>-2</sup>
Benzofluoranthenes	6x10 <sup>-4</sup> - 5x10 <sup>-3</sup>
Benzo(e)pyrene	2x10 <sup>-4</sup> - 4x10 <sup>-3</sup>

ATTACHMENT

Listed hereunder, are some of the most recognised "Irritants", "Toxicants", and "Carcinogens", which are relative to BOTH, CIGARETTE SMOKE & WOOD SMOKE, according to references such as "The Queensland Cancer Fund"; "The Schaffer Drug (tobacco) Library"; "Armidale's Air Quality Group at New England University"; "The U.S. EPA & Timothy V. Larson"; "Washington State, Department of Ecology"; "NICNAS (National Industrial Chemical Notification and Assessment Scheme)"; "[Purest-Air.com](http://Purest-Air.com)"; and "Dr. R.H. Waring at Birmingham University, U.K.(Goldberb)".

- Benzo(a)pyrene : A Polycyclic Aromatic Hydrocarbon (PAH), and one of the most Carcinogenic compounds known to exist, with a scientifically identified direct link to human Lung Cancer.  
(ref: Schaffer tobacco library, U.S. EPA & T. Larson, New England University, NICNAS)
- Benzo(a)anthracene: & Identified as PAH's, and Carcinogenic  
Diben z(a,h)anthracene: (ref: Schaffer tobacco, Larson)
- Benzene: A Volatile Organic Compound (VOC), and Aromatic Amine, is a known Carcinogen linked to Lung Cancer, Leukaemia, and damage of the Central Nervous System, with NO safe limit.  
(ref: Schaffer tobacco, NICNAS, Purest-air, Larson)
- Carbon Monoxide: A poisonous gas that can stay in the bloodstream for up to 24 hours, decreases the amount of oxygen available to the body, leads to the formation of blood clots, and increases the risk of heart attacks, strokes and blockages in the arteries. Known to cause Angina (chest pain), is lethal at very high concentrations.  
(ref: Qld. Cancer Fund, Schaffer Tobacco, Larson, N.E.Uni.)
- Nitrogen Oxides: Disturbs the normal balance of 79% nitrogen in the atmosphere, leads to bronchial infections, congestion, colds, headaches, eye irritation, lung edema (fluid,swelling), and is linked to fibrosis (tissue thickening & stiffening).  
(ref: Schaffer, Larson, Purest-air, N.E. Uni, Oxford Dict.)
- Acrolein: An acute effects, toxic aldehyde gas causing serious eye and respiratory irritation, affects mucociliary function.  
(ref: Schaffer, Larson, Washington Ecology, N.E. Uni.)
- Phenol: A highly toxic respiratory irritant, known to cause food/chemical sensitivities, is a derivative of Benzene.  
(ref: Schaffer, Larson, Waring (Goldberg paper), Oxford Dict.)
- Ⓢ Toluene: A Hydrocarbon, and derivative of Benzene.  
(ref: Schaffer tobacco, Larson, Oxford Dictionary)
- Sulphur Dioxide: Causes nose blockages, and a hacking cough, may exacerbate the condition of people with breathing difficulties such as those suffering Asthma, Emphysema, Bronchitis etc.  
(ref: Schaffer tobacco, Larson, Purest-air)
- Formaldehyde: Causes headaches, respiratory complaints, allergic reactions, and is known to contribute to behavioral and learning problems in children with ADHD (Attention Deficit and Hyperactivity Disorder), a condition for which prescription medication increased from 2.8million in 1990 to 56.4million in 2000 (a 20 fold increase).  
(ref: Schaffer, Larson, New England University, ACA Video)

In addition, the inhalation nitrogen oxides and amines in tobacco smoke (also found in wood smoke), may contribute to the endogenous formation of carcinogenic N-nitrosamines (Hoffmann & Brunnehan, 1983; Ladd et al., 1984. Ref: Sct-a **erj**)

S Y M P T O M S        S U F F E R E D  
FROM ENVIRONMENTAL WOOD SMOKE-EXPOSURE  
WHILST WITHIN THE CONFINES OF A FULLY CLOSED PRIVATE HOME  
SITUATED IN A "RESIDENTIAL" ZONED AREA

- Extremely sore and burning THROAT (hurts to speak)
- Extremely sore and stinging EYES (painful to read)
- Dry irritable COUGH (all night long)
- Dry, Blocked and Stinging NOSE (chronic)
- Runny NOSE
- Hayfever
- Sinusitis Pain
- Laboured Breathing (triggers ASTHMA attacks)
- Headache (general)
- Piercing Head Pain (severely disabling)
- Burning Joint Pain (disabling)
- o Cognitive Dysfunction (disabling)
- Lethargy (disabling)
- Muscle Weakness (disabling)
- a Insomnia (disabling)
- Nausea and loss of appetite
- Dizziness
- o Tightness in the CHEST
- Chest Pain
- Chest Infections
- Kidney Pain
- Spinal NECK Pain
- Abdominal Cramps
- Bronchitis
- Cold Sweats
- Numbness and tingling in hands and feet
- Dry Eye Syndrome
- Exacerbates all Chronic Respiratory Complaints such as Emphysema and Lung Cancer

These symptoms vary with each individual who is vulnerable, anywhere from mild irritation and discomfort to extreme and severe disablement. They may even cause death in infants (SIDS) and in frail elderly people.

**SMOKING**

Smoking has been identified as a health risk factor for many conditions, including respiratory conditions. In 1995, 24% of Australian adults (aged 18 years or more) were current smokers, a further 27% were ex-smokers and 49% had never smoked (table 4).

When age and sex standardised rates for adults are compared, the prevalence of respiratory conditions overall was higher in smokers (37%) and in ex-smokers (41 %) than in those who had never smoked (36%). These differences were particularly apparent in the case of bronchitis and/or emphysema, where the standardised rate for smokers (9%) was nearly twice that of ex-smokers (5%) and three times that of those who had never smoked (3%). Rates for asthma were also higher among smokers (11%) and ex-smokers (11%) than among those who had never smoked (9%).

In contrast, for hayfever the standardised rate was lower for smokers (12%) than for ex-smokers (18%) and for those who had never smoked (17%).

ADULTS, Smoker Status and Respiratory Conditions-Standardised rates(a)

Type of condition	SMOKER STATUS .....			Total persons
	Smoker	Ex-smoker	Never smoked	
	%	%	%	%
Hayfever	12.3	17.9	17.0	16.0
Asthma	11.0	10.7	8.5	9.6
Sinusitis	11.9	13.4	12.0	12.3
Common cold	3.9	4.6	4.6	4.4
Bronchitis and/or emphysema	9.2	5.0	3.0	4.8
Influenza	3.6	3.7	2.8	3.3
Cough and/or sore throat	2.0	2.7	2.5	2.4
Other respiratory conditions(b)	1.9	2.9	1.9	2.2
<b>All respiratory conditions(c)</b>	<b>37.3</b>	<b>40.6</b>	<b>36.4</b>	<b>37.4</b>
Total persons	100.0	100.0	100.0	100.0

(a) Data have been age and sex standardised (see Explanatory Notes, paragraphs 19 and 20).

(b) See Explanatory Notes, paragraph 14.

(c) Each person may have reported more than one type of condition and therefore components may not add to totals.

The prevalence of asthma in young children living in households with one or more smokers was higher than in non-smoking households. Of those aged 0-4 years, 13% in households with one or more smokers had asthma compared with 9% in households where there were no smokers. Of those aged 5-9 years, the rate of asthma was 22% in smoking households and 18% in non-smoking households. In contrast, for children aged 10-14, asthma was less prevalent in those living in smoking households (17%) than those in non-smoking households (20%) (table 5). Differences in asthma between smoking and non-smoking households were proportionally greater for boys than for girls in each age group under 15 years. The differences between non-smoking households and those with one or more adults who were ex-smokers were not investigated as no information was collected on how recently people had given up smoking.

# SUMMARY OF FINDINGS

a \* a a s s s s a s s . a a o a a s i m a s s . . \* . a a s v n a a a a a n s s s s s a a s a a s a a > a a t s s + r a > . a a i v a a a a o s > s

## HEALTH STATUS

### SUMMARY HEALTH INDICATORS

The majority of Australians consider themselves to be in good health. Results of the 2001 National Health Survey (NHS) showed that 82% of people aged 15 years and over considered their overall health to be good, very good or excellent. Similar proportions were reported by males and females and in the previous NHS conducted in 1995. The proportion of people reporting fair or poor health increased with age, from 9% of those aged 15-24 years to 39% of those aged 75 years and over (table 3)

Most people aged 15 years and over considered that their health was better (21%) or about the same (66%) as one year ago, with less than 2% reporting their health was much worse. A higher proportion of females reported that their health was much, or somewhat, better than one year ago (23%) than males (19%) (table 4).

### LONG TERM MEDICAL CONDITIONS

Although most people reported they were in good health, 87% of those aged 15 years and over and 78% of the total population reported that they had one or more long term medical conditions up from 83% and 76% respectively in 1995. It should be noted that the survey results exclude persons in hospitals, nursing homes and other non-private dwellings.

The most commonly reported long term conditions were problems with eyesight, including long sightedness, short sightedness and presbyopia (22%, 21%, 9% respectively) and back and disc problems (21%). Other commonly reported conditions were hayfever and allergic rhinitis (16%), arthritis (14%), asthma (12%), complete or partial hearing loss (11%) and hypertensive disease (10%) (table 5).

The prevalence of most conditions increased with age, to the extent that at least one long term condition was reported for almost all (99%) persons aged 75 years and over compared with less than a third (27%) of children aged less than 5 years. The types of conditions most commonly reported also differed markedly across age groups.

Among children and young adults, respiratory conditions were the most commonly reported conditions, with asthma being the most prevalent among children under 15 years, while hayfever was the most prevalent condition for young people aged 15-24 years.

.....

0-4 YEARS		5-14 YEARS		15-24 YEARS	
Asthma	8	Asthma	16	Hayfever/allergic rhinitis	19
Allergy n.e.c.	4	Hayfever/allergic rhinitis	9	Shortsightedness	17
Dennatitis/eczema	3	Allergy n.e.c.	6	Asthma	16
Otitis media	3	Chronic sinusitis	6	Back pain/problems (incl disc)	16
Hayfever and allergic rhinitis	3	Long-sightedness	5	Chronic sinusitis	9

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# News Release

National Aeronautics and  
Space Administration



-- SOON FNAMC --

Greenbelt, N%surd 20771  
(301) awww

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## NASA SPACECRAFT PROVIDES DIRECT EVIDENCE - SMOKE INHIBITS RAINFALL

Smoke from forest fires has, for the first time, been proven to inhibit rainfall, according to an extensive analysis of data taken from NASA's Tropical Rainfall Measuring Mission (TRMM) spacecraft.

The TRMM data, published in the Oct. 15th issue of Geophysical Research Letters, shows that the warm rain processes in tropical clouds, polluted with heavy smoke from forest fires, are practically shut off. In clouds that have been "contaminated" with smoke, scientists found that the clouds tops must grow considerably above the freezing level (16,000 feet or 4.8 kilometers) in order for the clouds to start producing rain by the alternative mechanism of ice. In the typical rainfall process in cleaner air, rain can form in significantly smaller clouds without ice.

Raindrops in the atmosphere can grow by two means. The first is by coalescence or "collision." In this process, the Warm rain process, a few cloud drops get large enough to start falling. As they fall, they pick up the other clouds drops until they become big enough to fall to Earth as rain drops. The second way needs ice particles and supercooled water (water colder than 32 deg. F). Ice particles surrounded by supercooled water may grow extremely rapidly as water freezes onto the ice core. These large ice particles fall and eventually melt and become raindrops as they fall towards the warmer surface.

Scientists have known for some time that smoke from burning vegetation suppresses rainfall, but it was not known to what extent until now. Because of TRMM, scientists are able to observe both precipitation and cloud droplets over large areas, including clouds in and out of smoke plumes.

"We've seen evidence of decreased precipitation in clouds contaminated by smoke, but it wasn't until now that we had direct evidence showing that smoke actually suppresses precipitation completely from certain clouds," said Dr. Daniel Rosenfeld, TRMM science team member and the author of the paper, TRMM Observed First Direct Evidence of Smoke from Forest Fires Inhibiting Rainfall" the research paper in which this information was published.

Scientists have a keen interest in the changes in global precipitation not only because of its impact on human activities, such as crop production, but also because of its role in deriving the global rainfall weather pattern.

Tropical rainfall is responsible for about two-thirds of the energy required to power the global atmospheric circulation. The recent El Nino serves as a perfect example of the atmospheric circulation changes that can result from a displacement of the normal precipitation patterns in the central Pacific. Similarly, the modification of precipitation by aerosols (particles of liquid or solid dispersed as a suspension in gas, such as air) might also affect the global climate. More precise information about this rainfall and its variability is crucial to understanding and predicting global climate and climate change.

In the paper, Rosenfeld highlights one specific area - Kalimantan, Indonesia. During a TRMM overpass on March 1, 1998, the southeastern portion of the Island was engulfed heavily by smoke while the northwestern portion was relatively smoke free. The TRMM radar detected precipitation in smoke-free clouds while almost none in the smoke-plagued clouds, thus showing the impact of smoke from fires on the rain forest rainfall processes.

"It's important to note that this is not a unique case," said Rosenfeld of the Hebrew University of Jerusalem, the Institute of Earth Sciences, Israel. "We observed and documented several other cases that showed similar behavior. In some instances even less severe smoke concentration was found to have comparable impacts on clouds."

This research further validates earlier studies by Rosenfeld on urban air pollution showing that pollution in Manila in the Philippines has an effect similar to forest fires, according to Rosenfeld.

"Findings such as these are making the first inroads into the difficult problem of understanding humankind's impacts on the global precipitation process," said Dr. Christian Kummerow, TRMM project scientist at NASA's Goddard Space Flight Center, Greenbelt, MD.

The Tropical Rainfall Measuring Mission (TRMM) carries microwave and visible/infrared sensors, and a spaceborne rain radar - the first rain radar ever launched into space. The three primary instruments used for this research were

the TRMM Precipitation Radar, the TRMM Microwave Imager, and the Visible and Infrared Sensor.

TRMM is NASA's first mission dedicated to observing and understanding tropical rainfall and how it affects the global climate. The TRMM spacecraft fills an enormous void in the ability to calculate world-wide precipitation because so little of the planet is covered by ground-based radars. Presently, only two percent of the area covered by TRMM is covered by ground-based radars, Kummerow said.

TRMM is a joint U.S.-Japanese mission that was launched on Nov. 27, 1997, from the National Space Development Agency at Japan's Tanegashima Space Center. The TRMM satellite has produced continuous data since Dec. 8, 1997. Tropical rainfall -- that which falls within 35 degrees north and 35 degrees south of the equator -- comprises more than two-thirds of the rainfall on Earth.

TRMM is part of NASA's Earth Science Enterprise, a long-term research program designed to study the Earth's land, oceans, air, ice and life as a total system. Images from the TRMM mission are available on the Internet at URL: <http://trmm.gsfc.nasa.gov/>



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## SUBMISSION TO THE STANDING COMMITTEE ON AGRICULTURE FISHERIES AND FORESTRY CONCERNING FUTURE WATER SUPPLIES FOR AUSTRALIA'S RURAL INDUSTRIES AND COMMUNITIES

### ABSTRACT

This submission concerns the environmental, administrative, management and scientific issues concerning the planning of future water supplies to Australia's rural industries and communities and refers to the failure of various State and Commonwealth Government agencies to incorporate into decision support the latest scientific findings concerning causes for declining rainfall over Australia. In particular the most recent technologies and research in respect to rainfall enhancement seem to have been ignored. The lack of action in relation to rainfall and snowfall' reductions and its impact on Australia's past, present and future water resources is outlined here together with an account of an absence of scientific objectivity, which is detrimental to Australian National Interests. The obstructive and ill-informed conduct of certain officers of the CSIRO and the Bureau of Meteorology in respect to evaluation of this research and application will be referred to.

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