

# **Literature Review**

**1998**

**Melanie Lehmann**

Aboriginal Drug and Alcohol Council (SA) Inc.

**Development of a Manual for the Detoxification and  
Treatment of Aboriginal Solvent Abusers**

ISBN 09585204 7X

## Table of Contents

	<b>Page</b>
<b>Solvent Abuse</b>	<b>1</b>
<b>Petrol Sniffing in Australia</b>	<b>2</b>
Prevalence	<b>3</b>
Patterns of Use	<b>4</b>
Reasons for Beginning Petrol Sniffing	<b>4</b>
Petrol Sniffing and Australian Law	<b>5</b>
<b>Effects of Petrol Sniffing</b>	<b>6</b>
Acute Effects	<b>6</b>
Mortality	<b>7</b>
Morbidity	<b>7</b>
Social Effects	<b>10</b>
<b>Treatment Approaches</b>	<b>11</b>
Community Health Worker Treatment Approach	<b>11</b>
Hospital Based Treatment Approach	<b>12</b>
Community Based Treatment Approaches	<b>14</b>
Educational Approach	<b>14</b>
Harm-reduction Approach	<b>16</b>
Aversion Approach	<b>16</b>
Outstation Approach	<b>18</b>
Residential Approach	<b>19</b>
Positive Alternatives Approach	<b>20</b>
Family Influence Approach	<b>22</b>
Other Approaches	<b>23</b>
<b>Review of Two Community Approaches to Petrol Sniffing</b>	<b>24</b>
The Healthy Aboriginal Life Team (HALT)	<b>24</b>
The Petrol Link-up	<b>27</b>
<b>Overseas Approaches to Solvent Abuse</b>	<b>28</b>

A British Approach	28
A Canadian Approach	29
A South-East Asian Approach	30
<b>References</b>	<b>32</b>
<b>Appendix A: Hospital Treatment Protocols</b>	<b>36</b>

## **Solvent Abuse**

Solvent abuse is the deliberate inhalation of gas or fumes given off from solvents at room temperature for the intoxicating effect. Solvent abuse is observed throughout the world in a variety of populations. Solvent abuse is different from some other forms of substance abuse, in that, solvents are not illegal to use and the age profile of the solvent abuser is much younger (Ives, 1994).

Most young people do not abuse solvents. In the UK, a recent review of prevalence suggests that 4-8% of secondary school children have sniffed solvents (Ives, 1994). In Australia, a 1992 survey of NSW Secondary School Students found that 2.6% of girls and 3.1% of boys used inhalants every week (Mundy, 1995). Studies in the United States indicate that approximately 5.7% of high school students have used inhalants (National Institute on Drugs, 1988).

Specific ethnic minority groups appear to have much higher rates of solvent use than the general population. A study of inhalant use among Eskimo school children in Alaska reported a lifetime prevalence of 48 per cent (Zebrowski et al., 1996). Similar prevalence rates have been reported in Native Americans, Canadian Indians, and Mexican Youth (Zebrowski et al., 1996). In Australia, rates appear higher in Aboriginal Australians. A recent study investigating the prevalence of drug use in urban Aboriginal communities found that 8 per cent of males and 4 per cent of females had sniffed petrol, which is significantly higher than that reported in the general population (Perkins, 1994).

Within ethnic groups, prevalence rates vary depending on geographical location. A recent Western Australian study investigated the use of tobacco, alcohol and other drugs in young Aboriginal people in the rural town of Albany (Gray et al., 1997). The study found that 16 per cent of the sample reported sniffing a variety of substances. This is significantly higher than the rates reported in urban Aboriginal communities (Perkins, 1994).

Similar ethnic variations are observed in relation to solvent choice. Young (1987) noted that in North America, Hispanics preferred spray paints and Blacks preferred corrective fluids. Similarly, petrol sniffing is particularly prevalent in Canadian, American and Mexican Indians, Canadian Inuit, black South Africans, Maoris and Australian Aboriginals (Brady, 1992).

Evidence of variation in solvent choice within an ethnic group is found in Australia, with urban Aboriginal youth preferring toluene in the form of adhesives and thinners, and Aboriginal youth living in remote rural regions preferring petrol (Brady, 1992; Sandover, 1997). It is thought that youth in towns and metropolitan areas have greater access to a wider variety of substances and this determines the variation in substance choice (Gracey, 1998; Brady & Torzillo, 1994).

The variations in solvent abuse observed between and within populations necessitates specialised approaches to treatment. The following section will review the literature on petrol sniffing as occurs in Australian remote rural Aboriginal communities with particular consideration to prevalence, aetiology, laws, effects, treatment and intervention approaches.

### **Petrol Sniffing in Australia**

Petrol sniffing is the deliberate inhalation of petrol fumes for the intoxicating effect.

## **Prevalence**

Petrol sniffing has been recognised in Australia for more than 50 years, with the larger remote rural Aboriginal communities being the most affected. Variations in prevalence across the remote rural regions are evident with Central Australia, the Eastern Goldfields in Western Australia and West, Central, and East Arnhem land in the Northern Territory being the areas of greatest use (Brady, 1992).

Young men are the greatest abusers of petrol with the ratio of males to females being approximately 3 to one (Brady & Torzillo, 1994; Mosey, 1997). The age of users range from 8 to 30 years (Brady & Torzillo, 1994). Interestingly, the age of petrol sniffers seems to be increasing with the greatest proportion of users being in the 20 to 25 year old age group (Roper & Shaw, 1996). This is likely due, in part, to the particularly high proportion of chronic sniffers observed in the older age groups (d'Abbs, 1991).

It is extremely difficult to determine the number of young Aboriginals engaged in petrol sniffing with much accuracy. Rates of use reported are based on observation and self-reports, which are known to be inaccurate. Moreover, petrol sniffing appears cyclical with the practice flourishing and dying down over periods of time (Brady, 1989; Garrow, 1997; Gray et al., 1997). Factors noted to correlate with changes in prevalence include seasonal weather variations, the presence of ringleaders, school holidays and changes in community population (Brady, 1992).

Indeed, the majority of young Aboriginals do not sniff petrol. Brady (1992) believes that only a very small proportion of young Aboriginals engage in the activity. Also, there appears to have been a reduction in the number of young Aboriginals sniffing petrol. In 1984, it was estimated that 10 per cent of the total population in the Anangu Pitjantjatjara Lands were petrol sniffers, whereas, in

1995 estimates had reduced to 3.8 per cent (Roper & Shaw, 1996). Analyses of these results indicate very little recruitment over the decade.

### **Patterns of Use**

As with solvent abusers, petrol sniffers can be distinguished by their patterns of use with experimental, social (occasional) and chronic sniffers contributing to the total population. Unlike most solvent users who are experimenters, many Aboriginal petrol sniffers appear to be chronic users (Chalmers, 1991). Brady & Torzillo (1994) reported that in the AP lands approximately 50 per cent of 10-14 year old users in 1980 continued to sniff petrol at 25-29 years of age. Similarly, current sniffers in a recent study in the Maningrida community reported sniffing for a mean duration of 8 years (Burns et al., 1995).

### **Reasons for Beginning Petrol Sniffing**

Numerous reasons for beginning petrol sniffing have been suggested in the literature. Poverty, cultural and family breakdown, peer pressure, boredom, pleasure and the lack of apparent health sequelae for ex-sniffers being the most frequently cited (Burns et al., 1995; Brady, 1992; Brady & Torzillo, 1994; Gracey, 1998; Hayward & Kickett, 1988).

Aetiological explanations of petrol sniffing emphasising cultural and family breakdown have been criticised. Indeed, Brady (1989) observes that many petrol sniffers come from well respected, caring families. Furthermore, factors common to other forms of adolescent substance abuse such as physical and mental pleasure, risk taking behaviour, and feelings of autonomy appear to be of greater significance. Notably, all sniffers consulted in the Senate Select Committee on

Volatile Substance Fumes (1985) reported 'fun' as the reason for engaging in the activity.

Burns (1996) considered the aetiology of petrol sniffing and presented a well integrated view concluding:

*“Like native American youth, the degree of social disadvantage experienced by Aboriginal youth through poverty, prejudice and the lack of economic, educational and social opportunities may increase their susceptibility to drug use but may also be accompanied by factors common to other adolescents which make them vulnerable to harmful drug use.”*

### **Petrol Sniffing and Australian Law**

Only two regions of Australia, the Pitjantjatjara Lands in the northwest of South Australia and the Ngaanyatjarra Lands in Western Australia, currently have laws specifically concerning petrol sniffing.

In South Australia, by-laws under the Pitjantjatjara Land Rights Act 1981 make it an offence to possess or supply petrol for the purposes of inhalation. An amendment to the Act in 1987 also gives police the power to confiscate and dispose of any petrol or containers suspected as being used for the purpose of inhalation.

In Western Australia, there are by-laws in the Ngaanyatjarra Lands that restrict the supply, possession and use of deleterious substances, including petrol.

In the Northern Territory, under section 18 of the Misuse of Drugs Act 1993, it is illegal to sell or supply petrol to anyone when it is known or should be known that



the person will use it as a drug or supply it to someone else to use as a drug. Also, under the Northern Territory Community Welfare Act, a petrol sniffer under 18 years of age can be declared 'in need of care' and dealt with through statutory child protection.

### **Effects of Petrol Sniffing**

The effects of petrol sniffing are widespread and not limited to the individual. There are also significant social consequences for families and communities.

In 1985, the Parliamentary Senate Select Committee on Volatile Substance Fumes identified petrol sniffing as the 'most intrinsically hazardous form of drug abuse, being more dangerous than amphetamines, alcohol, tobacco, barbiturates and heroin' (Commonwealth of Australia, 1995).

### **Acute Effects**

Petrol consists of a complex range of toxins including hydrocarbons such as benzene, toluene and xylene. The acute effects of petrol intoxication are largely due to the action of such hydrocarbons on the central nervous system. Sniffers experience feelings of mild euphoria and excitement similar to that of alcohol. Many individuals also report hallucinations and delusion with high levels of intake. Accompanying the initial high are the unpleasant effects of nausea, vomiting, dizziness, staggering gait, irritation of the eyes, excessive sensitivity to light and confusion (Morice et al., 1981). Following these initial effects, individuals experience drowsiness with the highly intoxicated progressing into unconsciousness and sometimes coma. A more extensive account of the acute effects of petrol inhalation is given in Morice et al. (1981).

## **Mortality**

The major cause of death associated with petrol sniffing is aspiration pneumonia although a number of deaths are cardiac or burns related (Brady, 1995; Goodheart & Dunne, 1994). Unfortunately, the mortality associated with petrol sniffing is extremely difficult to ascertain. Death is often attributed to the presenting cause, such as pneumonia, and not recorded as associated with petrol sniffing.

The most recent data on deaths associated with petrol sniffing is from the National Drug Abuse Information Centre (NDAIC) for the period between 1981-1988. Twenty deaths were attributed to petrol sniffing in the reporting period however the number of Aboriginal deaths amongst these was not determined. Brady (1995) suggests that NDAIC severely underestimated the true number of petrol sniffing deaths and that the majority were Aboriginal people. Indeed, this idea is supported by a study which reported that 18 of the 20 chronic sniffers admitted to a Perth hospital with severe illness were Aboriginal (Goodheart & Dunne, 1994).

## **Morbidity**

Fortunately, short-term experimental petrol sniffing does not appear to result in irreversible long-term detrimental health effects. The outcome of chronic long-term petrol sniffing, however, is not as favourable. Arguably, the most significant long-term effect of chronic petrol sniffing is cognitive dysfunction (Brady & Torzillo, 1994; Goodheart & Dunne, 1994; Maruff et al., 1998; Valpey et al., 1978). Other common long-term physiological effects include chronic tissue irritation of the respiratory system, nutritional disturbances, anaemia, foetal abnormalities and cardiac, liver and renal dysfunction (MacGregor, 1997).

The major contributor to long term adverse effects of petrol sniffing is thought to be tetraethyl lead in leaded petrol. However, neurological damage can also occur from the toxic aromatic hydrocarbons, such as toluene, that are present in petrol (Morrow, 1992). The exact contribution of lead as opposed to these other components of petrol is yet to be determined and a point of vigorous debate among researchers.

A recent study investigated the neurotoxic effects of both unleaded and leaded petrol (Burns et al., 1996). The study found that both unleaded and leaded petrol were neurotoxic with neurocognitive deficits being related to the duration of exposure. However, neurological deficits were observed to be more widespread in users of leaded petrol as were hospital admissions. This study also investigated the possibility of physical improvements with abstinence. It was found that abstaining from petrol sniffing was associated with improvements in neurological functioning with the degree of improvement being related to the length of abstinence.

The most recent study investigating the neurological and cognitive abnormalities associated with chronic petrol sniffing is that by Maruff et al. (1998). This study compared 33 current sniffers, 30 ex-sniffers and 34 matched non-sniffers and found that current sniffers showed higher rates of cognitive and neurological abnormalities than non-sniffers. Ex-petrol sniffers showed similar deficits as sniffers, however, these were not as widespread. This finding suggests that there may be some improvement in functioning with abstinence, which is in accordance with the results of Burns et al. (1996). When analysed, blood lead levels and length of time sniffing were significantly correlated with the magnitude of neurological and cognitive deficits.

Differences have been observed in the presentation and outcome of acutely intoxicated versus chronic petrol sniffers. Goodheart and Dunne (1994)

investigated petrol sniffers encephalopathy in 25 patients admitted to Perth teaching hospitals. Twenty patients were chronic sniffers and five presented with acute petrol intoxication. The acute patients generally presented with altered states of consciousness and were ataxic, whereas, the clinical features of the chronic patients were far more extensive. The outcome for the acute patients was far more favourable than that of the chronic patients. All acute patients recovered within 24 hours whereas 8 out of the 20 chronic petrol sniffers died. Furthermore, only one of the surviving chronic petrol sniffer was functionally independent on discharge. Similar to the findings of Maruff (1998), blood lead levels on admission were correlated with poor prognosis.

The disabling effects of petrol sniffing are widespread and severe disability is not uncommon (Mosey, 1997). Disability from petrol sniffing results mostly from damage to neural networks and their connections. More specifically, the incoordination often observed in petrol sniffers appears to result from damage to cerebellum, pyramidal tracts and areas of frontal cortex. Similarly, memory deficits probably result from damage to discrete areas of temporal lobe and cerebellum (Burns et al., 1996). Accidents and self-inflicted harm associated with intoxication also make a significant contribution to disability.

Psychological sequelae have also been observed in chronic sniffers. The most common including personality disorders, apathy, mood swings, depression and paranoid thinking. Psychological dependence is also common among chronic sniffers. Although physical dependence is rare, withdrawal can occur and symptoms include dizziness, tremors, nausea and seizures (MacGregor, 1997).

## **Social Effects**

Petrol sniffing adversely effects the communities in which it occurs. The Royal Commission into Aboriginal Deaths in Custody found that the impact on communities affected by petrol sniffing can be 'massive and destructive' (Commonwealth of Australia, 1991). It is most often the social disruption and vandalism caused by sniffers which instigates intervention attempts (d'Abbs, 1991).

The families of petrol sniffers suffer tremendously. Feelings of loss and shame are widespread and alienation from their community is common (Brady, 1992).

Crime among Aboriginal youth related to petrol sniffing is considerable. In the Northern Territory, there were 131 juvenile offences associated with petrol sniffing between January 1986 and June 1989, which represents 9.4% of the total offences for that age group (Brady, 1992). A recent study by Burns et al. (1995) found that 80 per cent of ex-sniffers and current sniffers reported having 'been in trouble with the police' as a direct result of petrol sniffing.

The financial burden on the Aboriginal communities affected by petrol sniffing is substantial. Sniffers continually damage buildings, including homes and businesses. Moreover, the cost of caring for a disabled sniffer can be as much as \$100, 000 annually (Mosey, 1997). A recent estimate of disabled ex-sniffers in the cross-border areas of NT, SA, and WA was forty three, however, the true numbers are likely to be significantly higher (Mosey, 1997).

High levels of sexually transmitted diseases have been observed in affected communities. Petrol sniffers report increased libido and risk taking behaviour when intoxicated (Burns et al, 1995).

## **Treatment Approaches**

The recent report on petrol sniffing in Central Australia by Central Australian Alcohol and Other Drug Services (Mosey, 1997) stated that:

*“...all communities and service providers wanted to be trained in how to deal effectively and safely with sniffers both when they were affected by the substance and at a later date.”*

Treatment approaches to petrol sniffing will be considered according to three perspectives; (1) the community health worker; (2) the hospital; and (3) the community.

### **Community Health Worker Treatment Approach**

Community care facilities are the first point of reference for most petrol sniffers (Brady, 1992). On presentation individual needs are assessed. Severely ill individuals need to be stabilised and quickly evacuated to a critical care facility. The major concern for community health staff and evacuation teams in such situations is protection of the airways (Currie et al., 1994). Fortunately, most petrol sniffers present with the less serious effects of fits, hallucinations, uncontrollable behaviour, minor burns or infections. These individuals can be adequately treated in community care facilities.

The Central Australian Rural Practitioners Association (CARPA) manual (1997) provides the best treatment protocol available for health workers in community care facilities. According to the CARPA manual there are 3 main presenting problems associated with solvent abuse: (1) Fits; (2) Strange and violent behaviour; and (3) Weakness and Infection. The CARPA protocols for the treatment of these problems are outlined in the CARPA Manual.

The literature suggests that burns are also a common presenting problem for petrol sniffers. Although burns are not included in reference to solvent abuse in the CARPA manual, a protocol for the treatment of burns is found elsewhere in the manual.

### **Hospital Based Treatment Approach**

Hospital based treatments are appropriate for individuals suffering serious symptoms of petrol sniffing. Regional hospitals deal with most of the serious cases however those who are more severely ill are transferred to tertiary referral hospitals (Goodheart & Dunne, 1994).

The serious acute effects of petrol sniffing such as convulsions, coma and cardiac arrhythmia all require hospitalisation and treatment is symptom appropriate (Morice et al., 1981). Severe burns and other serious injuries resulting from petrol sniffing may also require hospitalisation. The treatment protocols for all such cases are agreed upon in the medical profession. For those individuals presenting with the chronic effects of lead intoxication agreement on treatment is less widespread. The general protocol appears to be airway stabilisation followed by chelation therapy. The Royal Darwin Hospital and the Alice Springs Hospital both have protocols for the treatment of petrol sniffers (See Appendix A).

Chelation therapy aims to reduce serum levels of lead using chelating agents. Chelating agents are chemical compounds that bind to heavy metals including lead. The most common chelating agents are Calcium disodium edetate (EDTA), British Anti-Lewisite (BAL) and D-Penicillamine. Although use of the chelation therapy is widespread both overseas and in Australia, there is uncertainty over its effectiveness (Brady, 1992). A number of Australian studies have investigated this issue.

Currie et al. (1994) studied 70 petrol sniffers evacuated to the Royal Darwin Hospital with encephalopathy (degenerative disease of the brain). The primary emphasis of treatment for these individuals was airway management followed by chelation therapy using calcium EDTA and dimercaprol. These researchers support the use of chelation therapy for lead intoxication as it appears to hasten recovery in hospital and reduces the amount of lead in the body (Currie et al., 1994). They do acknowledge that this lead mobilisation is sometimes accompanied by neurological deterioration, however, this appears to be temporary in nature.

An evaluation of hospital based treatments for severely ill petrol sniffers by Burns & Currie (1995) included an evaluation of chelation therapy as a means of mobilising inorganic lead. The study found that lead was mobilised and excreted through the use of chelation therapy with a decrease in blood lead levels. They emphasised that airway management and vigilance against sepsis was critical in survival. This is in accordance with the results of others.

A less favourable appraisal of chelation therapy was given by Goodheart and Dunne (1994). In their investigation of petrol sniffing encephalopathy in 25 patients the outcome of treatment was reported as 'extremely disappointing'. Forty per cent of the chronic patients treated with chelation therapy died. The direct causes of death were cardiac arrest or respiratory failure due to pneumonia.

Berry et al. (1993) calculated that by the year 2000 the use of leaded petrol in Australia would fall well below 15%. With the increasing introduction of unleaded fuel to remote areas of Australia it is likely that the number of hospitalisations for acute petrol encephalopathy will fall, as evidenced in the Maningrida study, and hence the need for hospital based treatments focusing on lead intoxication (eg. chelation therapy) will wain.



Since the major cause of death for petrol sniffers is sepsis, particularly aspiration pneumonia, this will continue to be a problem with unleaded petrol and should therefore be the focus of hospital based treatments. According to d'Abbs (1991) treatment for chronic sniffers should also include intensive physiotherapy, to help restore wasted muscle and overcome the symptoms of neuropathy.

### **Community Based Treatment Approaches**

Community based approaches to substance abuse have recently experienced a growth in popularity throughout the world. The work of Martien Kooyman, a Dutch psychiatrist, has been fundamental in this change. Kooyman (1993) evaluated the therapeutic community approach and found that the involvement of families and the larger community acted as a curative mechanism in substance abuse.

Various community approaches have been employed to address the problem of petrol sniffing in Australia. The major approaches will be outlined here.

### **Educational Approach**

One would assume, after all the work undertaken in the area of petrol sniffing including education, that communities would now be aware of its detrimental effects. Nevertheless, a recent report on petrol sniffing in Central Australia (Mosey, 1997) stated that:

*“ All community organisations, families and service providers expressed concern at their lack of knowledge of the physical effects of inhalant abuse on the body. They wanted information on the physical, neurological and social effects of petrol sniffing...”*

The same report also stated that:

*“There was concern at the lack of teaching aids ...and all communities asked for videos about petrol sniffing...”*

Indeed, it appears community education is still an area that needs to be addressed.

Educational material has primarily focused on the detrimental health effects associated with petrol sniffing. The Senate Select Committee into Volatile Substance Abuse concluded that such ‘scare tactics’ were unlikely to be effective in reducing petrol sniffing. Fortunately, a number of other approaches have been taken.

Videos produced by communities in response to the petrol sniffing problem have been valuable. The focus of the material has been varied. The Yalata community made a video called “Petrola Wanti”, which shows how they reduced petrol sniffing in their community. Two videos produced in Western Australia have taken a more educative approach. One video “Care about Yourself” includes information on caring for friends, fitting, harm reduction, identifying healthy alternatives to petrol sniffing and identifying adults to notify if problem occurs. The other video “Your’e the Boss” focuses primarily on the legal implications associated with petrol sniffing.

The Petrol Link-Up project developed “The Brain Story”. The brain damage resulting from petrol sniffing is shown through a series of laminated posters. This educational approach has been very popular throughout the remote Aboriginal communities (Shaw, 1994).

A School Drug Education Approach has been implemented in WA. Through the program children are educated about drugs, including petrol sniffing, as part of

their school curriculum. This approach is limited to those communities where petrol sniffing occurs, as exposure to the unaware is not desirable.

Future educational approaches would do well to focus on the effects petrol sniffing has on physical co-ordination, particularly in relation to sporting activities. This was an area of concern for petrol sniffers in the Burns et al. (1995) study of strategies to reduce petrol sniffing in an Aboriginal community.

### **Harm-reduction Approach**

Some Aboriginal communities have taken a harm reduction approach and have introduced unleaded petrol as an alternative to leaded petrol. Maningrida is one such community located 300km east of Darwin. The introduction of unleaded petrol for a 3 year period in Maningrida resulted in a reduction of hospital admissions from 40 in the period 1984-1988 to zero in the study period of 1990-1993 (Burns et al., 1996). Indeed, communities would benefit from replacing leaded petrol with unleaded petrol but volatile hydrocarbon toxicity still remains a problem.

### **Aversion/Preventive Approach**

The introduction of aviation fuel (AVGAS) as a substitute for petrol is an approach implemented by as many as 25 remote Aboriginal communities. AVGAS is not an attractive alternative for petrol sniffers as it causes severe headaches and abdominal cramping when inhaled (Burns et al, 1994; Burns et al., 1995). A number of studies have evaluated the effectiveness of AVGAS.

Burns et al. (1995) evaluated the AVGAS strategy in the Maningrida community. Eleven non-sniffers, 11 ex-sniffers and 18 petrol sniffers participated in a 20-month follow-up. The researchers reported that following the introduction of

AVGAS, petrol sniffing ceased, community crime was reduced and employment increased significantly.

The Petrol Link-Up project (Shaw et. al., 1994) evaluated the introduction of AVGAS as an alternative fuel to petrol in a number of remote regions throughout Central Australia. The project found that the introduction of AVGAS was successful in reducing and eliminating petrol sniffing in some communities yet not others. Success appeared to be related to the proximity of alternative sources of petrol. This idea is supported by others (Roper & Shaw, 1996; Commonwealth Department of Health and Community Services, 1998).

A project in the Anangu and Pitjantjatjara Lands found that the introduction of AVGAS was significant in the reducing petrol sniffing between 1994 and 1995 (Roper & Shaw, 1996). Moreover, there was a significant decrease in petrol sniffing related offences. Interestingly, there was no change in the number of petrol sniffing related evacuations by the Royal Flying Doctors Service. This finding suggests that AVGAS does not prevent chronic sniffers from obtaining petrol.

An obstacle to the success of AVGAS is the importation of petrol into communities. Aboriginal and non-Aboriginal residents are reported to be involved in the activity (Roper & Shaw, 1996). Moreover, there is evidence that the parents are providing their children with petrol. This practice is thought to be a result of despair, desperation and fear on the part of the parent and threats of violence and self-harm from the child (Commonwealth Department of Health and Community Services, 1998).

Although most remote Aboriginal communities are now using AVGAS the petrol sniffing problem persists. Unfortunately, AVGAS alone cannot solve the petrol sniffing problem. Indeed, this strategy has been effective in a number of communities yet success appears dependent on the proximity of alternative

sources of petrol. A multi-modal approach, which includes AVGAS seems most likely to be successful in reducing petrol sniffing.

The Australian government has recently increased the excise on AVGAS from 13 cents per litre to 45.242 cents per litre for non-aviation purposes. This move has caused uproar in Aboriginal communities who fear a worsening of the petrol sniffing problem. At present, it appears that communities already using AVGAS will be subsidised, however, others wanting to implement the strategy will have to pay the full excise.

### **Outstation Approach**

Outstations are small settlements on traditional homelands where Aboriginal people are encouraged to engage in traditional activities. From the literature the major functions of outstations in relation to petrol sniffing are: (1) to remove current sniffers from sources of petrol in an attempt to detoxify them; (2) rehabilitate individuals who have developed disabilities as a result of petrol sniffing; (3) provide respite to communities.

The report on Petrol sniffing in Central Australia (Mosey, 1997) stated that:

*“communities generally expressed this (outstation respite services) as one of their preferred strategies.”*

Indeed, outstations have been shown to be an area where petrol sniffing does not occur (Eastwell, 1977; Commonwealth of Australia, 1987).

Many programs for petrol sniffers have been implemented on outstations, however few have continued for a substantial period of time. The Mt. Theo outstation near Yuendumu is an exception and is a good example of the general

concept of outstations. Fortunately, Mt Theo has recently acquired further funding from the Federal Government. The Injartnama outstation near Ntaria has also received funding to expand youth activities and to work with families, as has the Ilpurle outstation near Kings Canyon.

A number of short-comings of outstations have been outlined in the literature. These were publicised in the coronial inquest into the death of a young petrol sniffer in Alice Springs (Donald, 1988). The major limitations identified were the lack of telecommunication facilities and reliable vehicles on outstations and limited or non-existent First Aid skills among Outstation workers. These limitations could prove fatal in medical emergencies. The Petrol Link-up project produced a document entitled "The Missing Link" which can be used as a manual for outstation programs and aims to address these inadequacies (Shaw et al., 1994).

Indeed, most Aboriginal communities believe that the outstation movement is one of the most powerful strategies against petrol sniffing. This is significant as community support for an approach is consistently cited in the literature as one of the most influential factors in ensuing success.

### **Residential Approach**

Throughout all remote Aboriginal communities there is strong sentiment that children should be helped in their communities (Mosey, 1997). Taking children away from their homelands to residential care facilities is not generally supported. The success of this approach has been limited with most petrol sniffers returning to the practice when they return to their community (Divakaran-Brown & Minutjukur, 1993).

A residential rehabilitation facility that has evidenced some success is the Gordon Symons Centre in Darwin (d'Abbs, 1991). Between 1985 and 1990 the centre offered an Education recovery program for men with alcohol or petrol sniffing problems. Treatment was based on: (1) the disease model of substance abuse and (2) the theory that family/kin networks are both the source of substance abuse problems and the solution.

The program lasted for four or eight weeks and included family group therapy, access to Alcoholics Anonymous, cultural activities, and spiritual activities. Follow-up visits were provided with counselling continuing in the home community.

According to d'Abbs (1991) the limited outcome data available on the Gordon Symons Centre suggests that, although there is evidence of some success, the residential program appears less effective than a program based on recreation, community development, and individual and family counselling.

### **Positive Alternatives Approach**

#### ***Secondary Education***

Most remote rural Aboriginal communities lack secondary education facilities (Mosey, 1997). Families who want to further educate their children are forced to send them away from their communities. This is not an attractive option for most Aboriginal people and hence the level of education is limited.

The report on petrol sniffing in Central Australia (Mosey, 1997) stated that:

*“many communities expressed concern at the lack of secondary age education facilities on their community. They believed that this contributed to the numbers of young people attracted to the sniffing habit...”*

Indeed, this is an area that needs to be addressed.

### ***Employment***

Remote communities suffer from extremely high rates of unemployment (Brady, 1992; Mosey, 1997). Furthermore, unemployment has been found to be significantly higher among those individuals with a present or past history of petrol sniffing (Burns et al., 1995). Brady (1992) believes that providing 'meaningful and productive activity, not necessarily paid work' for young people would help reduce petrol sniffing.

An evaluation of strategies to eliminate petrol sniffing in the Maningrida community investigated the value of employment (Burns et al., 1995). In this community, a labour pool was formed from community service admissions referred by the Magistrates court. The more interested individuals were employed with the help of training funds from ATSIC into the building, mechanical and landscaping trades. Burns et al. (1995) concluded that employment strategies were very important in the success of AVGAS this community.

### ***Recreation***

The majority of remote Aboriginal communities lack recreational facilities for their youth. There is widespread belief that the boredom that ensues is significantly related to the abuse of petrol. Hence, to address petrol sniffing communities have implemented recreational programs. Importantly, d'Abbs (1991) notes that recreational programs primarily aim to prevent 'would-be sniffers and experimental sniffers' and are not 'a substitute for treatment and rehabilitation programs for chronic sniffers'.

Sport, music and art have been the focus of most initiatives as these activities are valued by Aboriginal youth (Burns et al., 1995). Prerequisites for successful



recreation-based interventions were identified in The Senate Select Committee on Volatile Substance Fumes (Commonwealth of Australia, 1985). These were:

- Staff that understood the problems of petrol sniffing, the needs of the community and were able to provide interesting, exciting, educational and purposeful activities.
- Providing after-school activities.
- Including sniffers in activities but not giving preferential treatment.
- Including activities for females and some separate sex programs.

The value of youth development workers has been emphasised by a number of prominent researchers in the area of petrol sniffing (Brady, 1992). A Youth development officer has recently been appointed in Jamieson, Western Australia. This move promises success with 4 youth programs now in progress in Warakurna, Warburton and Blackstone. As yet, there are no youth development officers working in South Australia or in the Northern Territory.

### **Family Influence**

The breakdown of family structure is often acknowledged as a major factor in the abuse of petrol (Brady, 1992). Indeed, the importance of family influence is evident in the results of the study by Burns et al. (1995) in the Maningrida community. They found family pressure to be the most significant factor influencing quitting petrol sniffing.

To address the petrol sniffing problem in Yuendumu, the HALT project focused on re-including sniffers into their family networks. Parenting roles had been abandoned under the stress of the problem and attempts were made to reinstate them (Franks, 1989). Increasing support from the community for the families of the sniffers was emphasised as they too were experiencing isolation and blame. The community supported the HALT approach and success followed.

In accordance with the HALT approach a number of communities support the use of community counsellors. Community counsellors work to reinforce family strengths and networks so that they are able to regain control of raising their children. Individual and family counselling has also been requested by communities, especially for long-term sniffers (Mosey, 1997).

### **Other Approaches**

Night patrols have been conducted by police and community members in many remote communities. The patrollers survey the community, seeking out young sniffers and returning them to their homes. The night patrol in Yuendumu has received particular attention with a documentary entitled “munga wardingki partu” (night patrol) being broadcast on the ABC. Although the approach helps ensure the safety of sniffers and peace in the community it has little long-term effectiveness.

Another popular strategy is taking sniffers out bush, far away from the community and thus petrol. The aim is to detoxify the sniffer and give the community a rest. This approach is ad hoc with the health status and needs of the sniffers being neglected. Although the use of this approach is widespread, it is fraught with dangers.

Punishments are often employed by communities in an attempt to deal with the petrol sniffing problem. Traditional approaches such as public beatings, shaming and banishment have all been used with limited success (Morice et al., 1981; Commonwealth Department of Health and Community Services, 1998). Some communities have also introduced Council by-laws that make it an offence to inhale petrol or supply petrol for inhalation.

Volunteer groups have also been used in communities to act against petrol sniffing. In Western Australia, local communities and the Government of Western Australia have formed 'Local Drug Action Groups'. Members of the community act as volunteers and aim to reduce drug abuse, including petrol sniffing, using a variety of strategies. These include issuing drug education material, providing support for families and positive alternatives for youth, monitoring local issues and trends and working with schools. An evaluation of the effectiveness of these groups is yet to be undertaken.

A Combination of all approaches according to the needs of the community is most likely to be effective. All successful projects emphasise the importance of communities undertaking their preferred treatment approach. Success appears to be dependent on energy and support from the community (Brady, 1992; Burns et al., 1995).

### **Review of Two Specific Community Approaches**

Many petrol sniffing programs have been employed in various communities throughout remote rural Australia. Unfortunately, high staff turnover and the short-term nature of funding means that the details of most programs are not readily available. Fortunately two projects, The Health Aboriginal Lifestyle Team (HALT) and Petrol Link-up, are well documented and will be reviewed here. These programs received the greatest publicity and funding.

#### **The Healthy Aboriginal Lifestyle Team (HALT)**

The HALT project was funded by the Commonwealth Government from 1984-1990. The HALT work originated in Yuendumu and was later implemented in Kintore and the Pitjantjatjara Lands.

The HALT approach was based on the theory that petrol sniffing was symptomatic of a breakdown in the nurturing authority provided by significant adults in the sniffers immediate and extended family (Bryce et al., 1994). The HALT intervention focused on helping Aboriginal adults regain this nurturing authority and thereby reintegrating the sniffers into the community and reduce counterproductive peer influence.

According to Franks (1989), the HALT approach to petrol sniffing in each of the communities can be summarised into four broad steps:

1. Talks with the President and Council.

HALT met with the President and Council of the community for a number of reasons. Firstly, the whole community needed to be aware of the project and this was the most appropriate means of achieving this. Secondly, HALT wanted to emphasise the importance of the relationship between themselves and the community. And finally, they wanted to discuss how strategies undertaken by community members would integrate with those of the Team.

2. Community Support Agreements.

Community Support Agreements were formulated at the Council meeting and set out the specific measures that were to be implemented by the community to combat petrol sniffing. These varied between communities but included such things as introducing night patrols, assisting with needs of taking a child to an outstation, and selecting local adults to act as Community Workers with the Team.

3. Counselling.

Individual and Family counselling were included in the HALT approach. Two types of Individual Counselling were utilised. Simple Support Counselling was used in situations where the family was still providing support and understanding.

In-depth Counselling was employed for those families whose functioning had become distorted and powerless.

#### 4. Appropriate Communication

Where possible, HALT used culturally appropriate forms of communication to promote petrol sniffing issues. These included using indigenous symbolism in paintings, diagrams and video production.

A number of evaluations of the HALT approach have been undertaken. There is general agreement that HALT successfully helped the Yuendumu community to eliminate petrol sniffing, however, HALT evidenced less success in Kintore and had no significant impact on the Pitjantjatjara Lands (Bryce et al., 1991; Bryce et al., 1992).

Major criticisms of HALT outline in the literature include a lack of specific goals and outcome criteria, and an apparent inability for others, except the Team, to replicate the approach (Bryce, 1992; Hempel & Patterson, 1986; Smith & McCulloch, 1986). Importantly, the contributions of HALT to petrol sniffing interventions have also been recognised (d'Abbs, 1991). Indeed, the importance of reintegrating sniffers into their families and communities, the significance of kinship networks, and the value of family and individual counselling and community involvement are now generally recognised.

The variation in success at Yuendumu, Kintore and the Pitjantjatjara Lands indicates that there is no single solution to suit every community. Communities need to be supplied with information on a range of approaches so they can choose a strategy most appropriate to their needs. Indeed, it is support for a chosen approach that is one of the most influential factors in success.

## **The Petrol Link-Up**

The Petrol Link-up project was funded by the Commonwealth from 1993-1994. The project supported community initiatives in the tri-state region of the Northern Territory, South Australia and Western Australia. The project aimed to act as a service provider to communities by collecting and supplying information about existing programs and research. The major contributions of the project are outlined here.

Information gathered was disseminated by way of newsletter. The newsletter approach proved to be a powerful communication tool between the Petrol Link-up team and the communities. The requests from communities for further information resulted in a field trip routine, whereby Petrol Link-up team visited communities and continued the information process. A resource list was developed which included all current relevant information sources.

One of the major successes of the project was the development of the “Brain Story”. This series of laminated posters depicting the brain damage caused by petrol sniffing was used on visits to the communities.

The Petrol Link-up team recognised the value of outstations from their field trips to communities. Through meetings and workshops they endeavoured to help communities apply for funding for outstations programs. After visits to numerous outstations they developed a document entitled “The Missing Link”. The document had been intended to be a resource which set out the all the options and arguments for the funding of outstation programs. Unfortunately, the document was left at first draft, nevertheless, is suggested as a good basis for a manual for outstation programs.

The Petrol Link-up team also focussed a lot of energy on the AVGAS strategy. They gathered and distributed information about the approach to anyone who

was interested or concerned. In addition, they monitored the progress of the strategy in communities where it had been introduced. Following Petrol Link-up involvement a number of communities successfully introduced AVGAS as a strategy to reduce petrol sniffing.

The project hoped to stimulate a “three way” approach to petrol sniffing. The “three way” approach involved:

- reducing the availability of petrol through the substitution of AVGAS
- rehabilitating damaged sniffers through outstations
- providing positive alternatives through youth programs

On conclusion of the project a number of communities were implementing this approach.

The Petrol Link-up project was successful in its meeting its aims and objectives. The major successes of the project included assisting the introduction of AVGAS to communities, the gathering and dissemination of information about petrol sniffing related issues, and the development of petrol sniffing resources.

## **Overseas Approaches to Solvent Abuse Treatment**

### **A British Approach**

Richard Ives is the leading expert in solvent abuse in the UK. He has developed a manual for treatment that includes the most successful approaches implemented in that country. The treatment approaches outlined in the manual may be useful for urban Aboriginal solvent abusers but are unlikely to be effective for Aboriginal youth from remote communities.

## **A Canadian Approach**

Canadian indigenous people suffer similar substance abuse problems as Aboriginal Australians. The use of solvents has grown to epidemic proportions in many First Nation and Inuit communities. Fortunately, the Canadian government has recognised the extent of the problem and has allocated 17.5 million dollars to solvent abuse prevention and treatment. With this funding 8 solvents abuse treatment facilities, designed specifically meet the needs of the indigenous youth, have been established across Canada. These treatment facilities appear highly successful and are a good reference for future directions in treatment for Aboriginal Australians.

The Whiskyjack Treatment Centre Inc. is one of the Canadian facilities. Like the other 7 solvent abuse treatment centres, it is based on a multi-discipline residential treatment approach with particular attention to First Nation cultural beliefs, traditions, values and customs. The centre serves both male and female solvent abusers aged from 8 to 17 years. Treatment generally lasts 6 months however this varies between individuals.

Treatment includes programs which focus on developing mental and emotional wellbeing as well as physical, social and recreational skills, and spiritual growth.. Education plays an important role in treatment with each client being given individualised education program. Moreover, clients are provided with information on solvent abuse and addictions and are encouraged to enhance their command of their native language. Western healing is utilised in the form of Psychiatric Nurses, Psychologists and Counsellors, however, native healing is also encouraged. The family of the client is encouraged to participate in as many aspects of treatment as possible as this increases awareness and functioning among family members. A community outreach program is also provided by the



centre. It aims to increase community awareness of solvent abuse and promote maintenance and prevent relapse in ex-solvent abusers.

The residential focus of this approach to solvent abuse treatment is unlikely to be popular in Australian remote rural Aboriginal communities. However, the programs used in treatment may provide a good source of ideas for petrol sniffing communities, in that, the importance of culture and tradition is emphasised.

### **A South-East Asian Approach**

In South East Asia a camp approach to drug detoxification has arisen. Although these camps are not specific to solvent abuse the approach is relevant and transferable.

The camps vary in structure and target group yet most involve the following steps, as outlined by Sell (1994):

- Identification of all the drug dependent users living in the community.

- Initiate a process of rehabilitation before detoxification through empowerment. That is, spread optimism, de-dramatise withdrawal, de-mystify drugs, and de-professionalise detoxification.

- Form a parents' group for self-help and support by bringing together the parents, and/or relatives and friends of the drug user.

- Enlist the help of ex-users and other volunteers to plan the detoxification camps and later provide support for the users.

- Locate an appropriate facility to accommodate the users, significant others and workers for the group detoxification which usually lasts 10-14 days.

- Although a school or community centre is most appropriate some camps have been successfully run in tents.

Usually by the time the detoxification camp is to take place most of the users have been motivated to participate. Those who refuse are expelled from the community as are known drug suppliers.

Following the detoxification camp, there is continued involvement of staff with clients in varying degrees for a number of months. This involvement is aimed at promoting maintenance and preventing relapse.

Variations of this 'camp' approach to drug and alcohol detoxification are found throughout the Indian subcontinent. These include opium detoxification camps in Rajasthan in Northwest India, alcohol treatment camps in Madras in South India and the ad-hoc heroin detoxification camps in the regions of Colombo, Kandy and Galle, Sri Lanka. All have shown surprisingly high rates of success when compared to popular Western approaches (Kaplan et al., 1993). Indeed, in the search for a successful strategy against petrol sniffing the 'camp' approach has much to offer.

## References

- Berry, M., Garrard, J. & Greene, D. (1993). Reducing lead exposure in Australia: A consultation resource. RMIT, 9-47.
- Brady, M. (1989). Drug set and setting: the Aboriginal context. Australian Institute of Aboriginal Studies: Canberra.
- Brady, M. (1992). Heavy Metal: The social meaning of petrol sniffing in Australia. Aboriginal Studies Press: Canberra.
- Brady, M.(1995). Culture in treatment, culture as treatment. A critical appraisal of developments in addiction programs for indigenous North Americans and Australians. Journal of Social Science and Medicine, 41, 1487-98.
- Brady, M. & Torzillo, P. (1994). Petrol Sniffing down the track. The Medical Journal of Australia, 160, 176-177.
- Bryce, S., Rowse, T. & Scrimgeour, D. (1991). HALT: and evaluation. Menzies School of Health Research and the Aboriginal Torres Strait Islander Commission: Darwin.
- Bryce, S., Rowse, T. & Scrimgeour, D. (1992). Evaluating the petrol-sniffing prevention programs of the Health Aboriginal Life Team (HALT). Australian Journal of Public Health, 16(4), 387-396.
- Burns, C.B., Currie, B.J., Clough, A.B & Wuridjal, R. (1995). Evaluation of strategies used by a remote Aboriginal community to eliminate petrol sniffing. The Medical Journal of Australia, 163, 82-86.
- Burns, C. & Currie, B. (1995). The efficacy of chelation therapy and factors influencing mortality in lead intoxicated petrol sniffers. Australian and New Zealand Journal of Medicine, 25, 197-203.
- Burns, C.B., D'Abbs, P. & Currie, B.J. (1995). Patterns of petrol sniffing and other drug use in young men from as Aboriginal community in Arnhem Land, Northern Territory. Drug and Alcohol Review, 14, 159-169.
- Burns, C. (1996). An End of Petrol Sniffing. Ph D thesis, Sydney University.
- Burns, C.B., Currie, B.J. & Powers, J.R. (1996). An evaluation of unleaded petrol as a harm-reduction strategy for petrol sniffers in an Aboriginal community. Journal of Toxicology and Clinical Toxicology, 34, 27-36

Central Australian Rural Practitioners Association. (1997). CARPA Standard Treatment Manual. 3<sup>rd</sup> Edition. Central Australian Rural Practitioners Association: Alice Springs.

Chalmers, E.M. (1991). Volatile substance abuse. The Medical Journal of Australia, 154, 269-274.

Commonwealth of Australia. (1985). Volatile Substance Abuse in Australia. Senate Select Committee on Volatile Substance Fumes. AGPS: Canberra.

Commonwealth of Australia.(1987). Return to Country: The Aboriginal Homelands movement in Australia. House of Representatives Standing Committee on Aboriginal Affairs AGPS: Canberra.

Commonwealth of Australia. (1991). Royal Commission into Aboriginal Deaths in Custody National Report. AGPS: Canberra.

Currie, B., Burrow, J., Howard, D., McEiver, M. & Burns. (1994). Petrol Sniffer's Encephalopathy. In Brady & Torzillo (eds) Workshop on lead and hydrocarbon toxicity from chronic petrol inhalation. The Drug Offensive. AGPS: Canberra.

D'Abbs. (1991). The Prevention of Petrol Sniffing in Aboriginal Communities – A Review of Interventions. Drug and Alcohol Bureau: Department of Health and Community Services: NT

Divakaran-Brown, C. & Minutjukur, A. (1993). Children of Dispossession: An evaluation of petrol sniffing on Anangu Pitjantjatjara Lands. Department of State Aboriginal Affairs: Adelaide.

Donald, W. (Coroner). (1988). Coroners Act: Summary of Findings 9420219 Rel. case A82/94: NT

Eastwell, H.D. (1979). Petrol inhalation in Aboriginal towns. Its remedy: the homelands movement. Medical Journal of Australia, 2, 221-224.

Franks, C. (1989). Preventing Petrol sniffing in Aboriginal communities. Community Health Studies, 13, 14-22.

Garrow, A. (1997). Time to stop reinventing the wheel: petrol sniffing in the Top End. Project Final Report. Alcohol and Other Drugs Services, Territory Health Services. Unpublished.

Gray, D., Brooke, M., Ryan, K. & Williams, S. (1997). The use of tobacco, alcohol and other drugs by young Aboriginal people in Albany, Western Australia. Australian and New Zealand Journal of Public Health, 21(1), 71-76.

Goodheart, R.S. & Dunne, J.W. (1994). Petrol Sniffers encephalopathy: a study of 25 patients. The Medical Journal of Australia, 160, 178-181.

Gracey, M. (1998). Substance misuse in Aboriginal Australians. Addiction Biology, 3, 29-46.

Hayward, L & Kickett, M. (1988). Petrol sniffing in Western Australia: An analysis of morbidity and mortality in 1981-86 and the prevalence of petrol sniffing in Aboriginal children in the Western Desert region in 1987. Health Department of Western Australia: Perth.

Hempel, R & Patterson, B. (1986). Alice Springs Petrol Sniffing Prevention Team: evaluation report. Department of Aboriginal Affairs and Department of Community Development: NT.

Ives, R. (1994). Stopping sniffing in the States: approaches to solvent misuse prevention in the USA. Drugs: Education, Prevention and Policy, 1(1), 37-48.

Ives, R. (1996). Drug use among Western Australians (part II). Journal of Substance Misuse, 1, 226-229.

Kaplan, C., Morival, M. & Bieleman. (1993). The Camp Approach to Drug Detoxification.

Kooyman, M. (1992). The therapeutic community for addicts: Intimacy, Parent Involvement and Treatment Outcome. Erasmus University Press: Rotterdam.

MacGregor, M. (1997). Synopsis of Inhalant Solvent Abuse from a Central Australian Perspective. Central Australian Alcohol and Other Drugs Program, Territory Health Services.

Mann, K.V., & Travers, J.D. (1991). Succimer, an oral lead chelator. Clinical Pharmacy, 10, 914-922.

Maruff, P., Burns, C.B., Tyler, P., Currie, B.J. & Currie, J. (1998). Neurological and cognitive abnormalities associated with chronic sniffing. Brain, 121(10), 1903-1917.

Morice, R.D., Swift, H. & Brady, M. (1981). Petrol sniffing among Aboriginal Australians: A resource manual. Alcohol and Drug Foundation, Canberra.

Morrow, L.A., Robin, N. Hodgson, M.J. & Kamis, H. (1992). Assessment of attention and memory efficiency in persons with solvent neurotoxicity. Neuropsychologica, 30, 911-922.

Mosey, A. (1997). Report on petrol sniffing in Central Australia. Cental Australian Alcohol and Other Drug Services, Territory Health Service. Unpublished.

Mundy, J. (1995). Out of the Spotlight. Connexions, 15(4), 269-274.

National Drug Abuse Information Centre. (1989). Update on deaths caused by volatile substances, 1980 to 1988. Commonwealth Department of Community Services and Health, Canberra.

Perkins, J.J., Sanson-Fisher, R.W., Blunden, S. Lunnay, D., Redman, S. & Hensley, M.J. (1994). The prevalence of drug use in urban Aboriginal communities. Addiction, 89, 1319-31.

Roper, S. & Shaw, G. (1996). Moving On: a report on petrol sniffing and the introduction of AVGAS on the Anangu Pitjantjatjara lands. Nganampa Health Service, Department of Human Services and Health.

Sandover, R., Houghton, S. & O'Donoghue, T. (1997). Harm minimisation strategies used by incarcerated Aboriginal volatile substance users'. Addiction Research, 5(2), 113-136.

Sell, H. (1994). The community approach to drug abuse control. Paper presented at the European Consultation on the Open Community Approach to Treatment/Care & Prevention of Drug Abuse. London 1-5 June.

Shaw, G., Armstrong, W. & San Roque, C. (1994). Petrol Link-up final report. Commonwealth Department of Human Services and Health: Canberra.

Smith, A & McCulloch, L.. (1986). Petrol sniffing: report on a visit to Alice Springs to see the work of the Northern Territory Petrol Sniffing Prevention Team. Department of Community Services (WA).

Valpey, R., Sumi, S.M., Corass, M.K. & Goble, G.J. (1978). Acute and chronic progressive encephalopathy due to gasoline sniffing. Neurology, 28, 507-510.

Young, T.J. (1987). Inhalant use among American Indian Youth. Child Psychiatry and Human Development, 18(1), 36-46.

Zebrowski, P. & Gregory, R. (1996). Inhalant use patterns among Eskimo school children in Western Alaska. Journal of Addictive Diseases, 15(3), 67-75.

**ALICE SPRINGS HOSPITAL PROTOCOL FOR THE MANAGEMENT OF  
PETROL SNIFFING PATIENTS  
(as cited in Brady, 1992)**

- Intravenous fluids to maintain hydration
- Sedation
  - Paraldehyde
- Anti-epileptic medication
  - Phenytoin
- Chelation Therapy
  - Dimercaprol (BAL) 24 milligrams per kilogram of body weight per day  
Intramuscularly in six doses for five days.
  
  - EDTA 50 milligrams per kilogram of body weight per day  
Intramuscularly in six doses for five days.
- Nutrition
  - Nasogastric feeding or parenteral nutrition, ie. feeding through the nose,  
by injection of intravenously.