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Ark

Research Report

Cigarette Butt Litter

Commissioned by Sydney Water Limited

April 1995

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Background

Preamble

In 1994 cigarette butt litter grew dramatically as smokers were increasingly compelled to pursue their habit out of doors.

The strong push towards establishing public buildings, public transport, work places, restaurants and the like as "no smoking" areas may have improved our health, but it has seriously exacerbated the litter problem; it is now a common sight in our central business districts for smokers to be seen puffing away outside the doorways of office buildings, railway stations, theatres etc.

The result is littered cigarette butts in unprecedented numbers in the surrounding areas.

While other environmental problems have attracted global attention and become the subject of international conferences or news headlines, the humble but ubiquitous butt has proliferated to become numerically and very visibly the nation's number one environmental litter item.

Suddenly cigarette butts are "out of the closet" and into the streets. The problem is self evident - right before our eyes and under our feet, but little is being done about it!

Who could or should take responsibility? Many smokers seemingly couldn't care less.

Cigarette manufacturers appear to have some difficulty seeing beyond their "bunkers", and in light of their continued resistance to admit the deleterious and indeed deadly effects of smoking to human health, it is unlikely that they would lead the charge to clean up the environmental after-effects of the habit they promote.

"Clean Up Australia" is a one-day-in-the year phenomenon - hopelessly overwhelmed by the daily deluge of detritus from the dreaded addiction. Other environmental groups are concerned with weightier matters.

City Councils armed only with hard-to-implement litter legislation and fines varying from \$20 - \$200 have been reluctant to become "policemen" and "policewomen" to the army of smokers invading the streets. Councils do become, however, temporary and reluctant custodians of the butts on their journey from building entrances to footpaths and beyond, into the gutters and drains before being washed away to their final resting place in the beautiful waterways, rivers, harbours, estuaries and beaches of which we are so proud, there to sit, preserved by seawater, for three years or more - or perhaps until ingested by an unsuspecting sea bird or passing peckish "dolphin fish".

And what is the purpose in life of these long-lived little miracles of modern manufacturing? To filter and trap dangerous toxins before they enter the delicate respiratory organs of cigarette smokers.

Thus the cigarette butt containing the solid toxic residue of smoking, essentially a poisonous pellet, is delivered in its billions into the environment. Very little is known of the effects of this environmental onslaught. No studies have been done on the impact on the natural (and specifically the marine) environment of this most widespread of man-made litter items.

Against this background, Ark has launched the "Butt Busters" campaign.

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Sydney Water and Ark

Early in 1995 Ark approached Sydney Water to discuss the issue. Ark requested sponsorship for the first stage of a proposed 5 year campaign to research the problem, explore with the tobacco industry and other stakeholders potential solutions, and devise a marketing and promotional plan to make cigarette smokers aware of the environmental pollution by-product they are causing.

The objective is to shift the focus back up the waste stream from clean up after the event to pre-emptive entertaining education aimed at minimising the litter at its source.

Sponsorship Endorsement Support

It was intended that Sydney Water would be one of a number of potential sponsors to provide funding, support in kind and technical assistance to further the campaign, an alliance of stakeholders around a common cause to clean up this blight .

Already the following support has been forthcoming:

Stewart Marketing (Australia) P/L, marketers of a new butt bin containing Fire-X (an environmentally friendly fire retardant) have contributed in the form of product samples for the trialling of outdoor butt collection.

Canon Colour Copiers have agreed to contribute all photocopying needs for the campaign.

Negotiations are continuing with The Tobacco Institute and two of the three major cigarette manufacturers for further financial support and assistance in the design and marketing of personal butt disposal containers.

Discussions with the Sydney City Council are underway to explore ways to join forces with their attempts to combat the butt problem.

Gold Coast City Council which trialled the butt buster concept via their cleansing department have agreed to the development of "Butt Busters" as our campaign theme and are keen to participate further as the momentum builds.

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Rationale

Cigarette butts consist of some residual tobacco and paper which quickly breaks down in the environment, and the plug which consists of cellulose acetate (or modified wood pulp, similar to the more familiar "rayon" used in clothing) and which does not break down readily under certain conditions, especially in sea water.

These butts are increasingly now disposed of either in the streets where they find their way into stormwater channels, in the sand on beaches where they become an inland water pollution problem, in snowfields where they have become an environmental issue in the thaw.

Sydney Water agreed to commit funds for initial research into the extent of the problem in Australia and in particular in the Sydney and Illawarra areas for evidence of the pollutant content of the butts and for evidence of any danger to wildlife or human health from the residual butts.

Environmental Focus

It was agreed that the campaign would focus specifically on the environmental issue of cigarette butts. The practice of smoking, and smokers per se, would not be attacked.

Sydney Water has its own non-smoking policy and Ark in no way condones smoking. However, the issue of smoking and its health hazards are rightly the provenance of other organisations such as QUIT, ASH and the Cancer Council.

The purpose of this campaign is unequivocally to address the pollution issue, and intends to engage the support of the Tobacco industry in finding and funding solutions to the environmental problems which their customers create.

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Smokers and Littering

There is an important hypothesis behind the strategy of targeting cigarette butt litter as a major focal point for a populist environmental campaign.

A spokesperson for the EPA of NSW reported that the EPA's predecessor, the State Pollution Control Commission conducted a six monthly attitudinal tracking study from 1979 through the early 1980's as part of their Litter Reduction Campaign. The research was conducted by Roy Morgan Research.

The results indicated that smokers are significantly more likely to litter than non-smokers. The report is no longer available since the transition from SPCC to EPA, and no further studies have been done. However, in light of the rapidly proliferating problem of cigarette butts in the environment, it seems likely that the finding of that earlier study is still relevant.

Our hypothesis therefore is that smokers who are seemingly less concerned about their own "internal environment" are likely to be similarly unconcerned about their outer environment, and may be responsible for a disproportionate share of litter.

In terms of increasing the mass awareness of environmental issues and the need for effective action, smokers, who comprise about one third of the adult population are an important psychographic target audience who must be addressed.

The Butt Busters campaign is intended to dramatise the issue and capture their attention in an up-front, humorous, tongue-in-cheek, yet effective manner, which is in no way "finger-wagging", or accusatory towards the individual smoker.

In this way, we hope to attract their attention, alert them to environmental issues arising from their own habit, and engage their support in action to minimise the problems in terms of both their cigarette butt disposal and the bigger issues of pollution.

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Cigarettes In The City

Interviews with Officers of the Sydney City Council Cleansing Department indicate that cigarette butts are posing a major problem. It is estimated that over 70% of buildings are now smoke free resulting in a huge upsurge in butts on footpaths, nature strips and in gutters. The problem is growing as more venues, toilets, transport facilities etc, prohibit smoking in enclosed spaces.

The Sydney City Council has come under attack for not cleaning adequately and dealing with the situation. However the problem recurs daily and often originates in the entrance foyers of buildings which are beyond the Council's control. The butts are blown or washed onto pavements and into gutters and then become their problem.

The Sydney City Council gullies all have traps which catch silt, including cigarette butts. No specific quantitative measurement has been made, but there is ample anecdotal evidence of a serious problem.

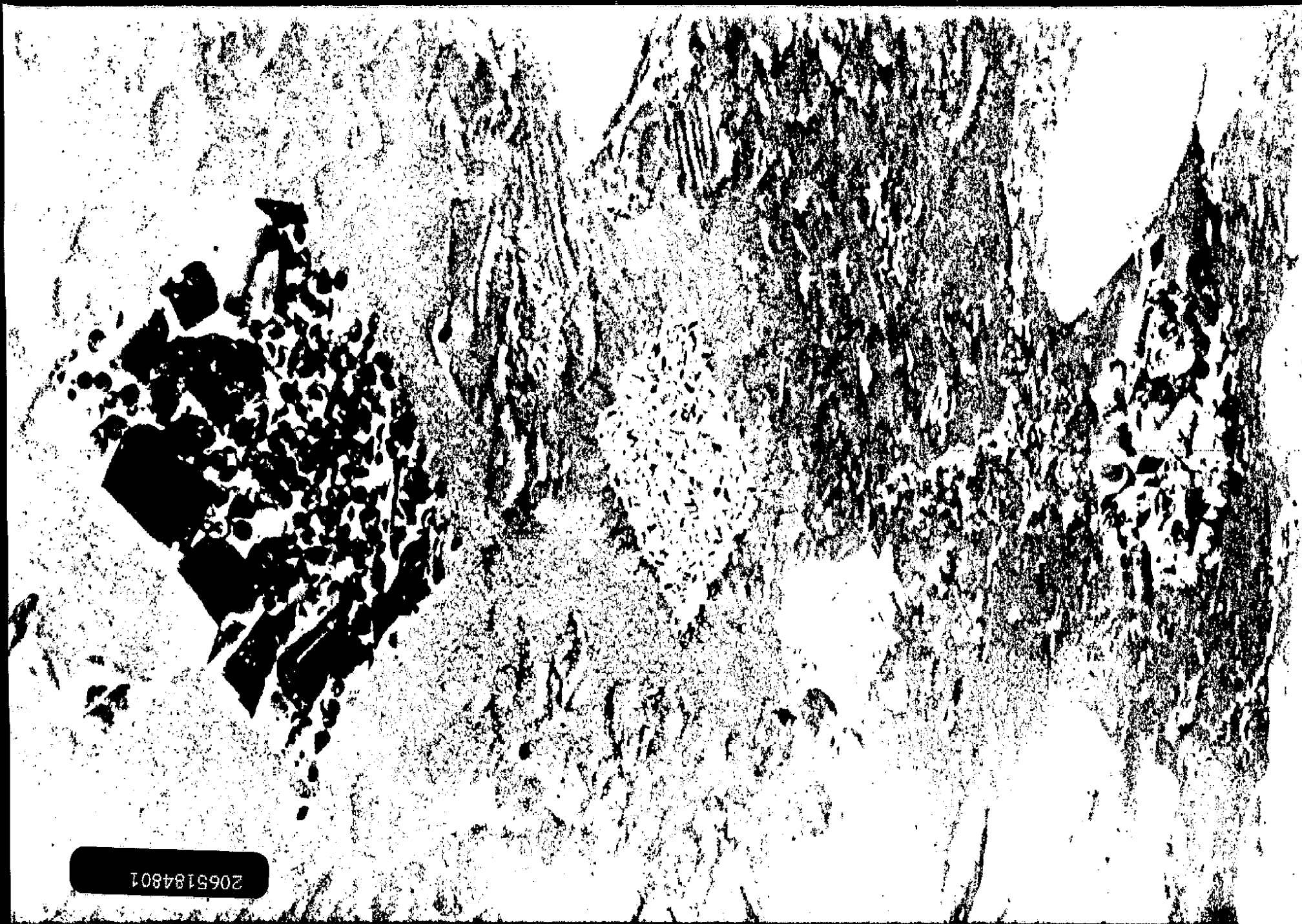
Kerbside ashtrays have been introduced to some streets heavily trafficked by smokers, such as the George Street cinema district. These ashtrays are cast aluminium, made by Street Furniture Australia, designed to wrap around and clamp onto SCC street signposts. They are being modified for bolting to walls. The disadvantage of these is a high capital cost and therefore limited installation sites.

The SCC plans to address the issue of butt pollution, among others, at a seminar planned for May 18th, 1995, titled "Building Buildings for Better Recycling" conducted for the Building Owners and Managers Association and architects.

The current option of a \$200 fine for littering is perceived to be of limited value in addressing the butts issue.

An opportunity exists and will be further explored, to work with the SCC and extend our "Butt Busters" publicity campaign to tie in with their efforts and maximise the impact.

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Introduction To The Report Findings

This report is a summary of information gathered from local, national and international sources. Its purpose is to provide a current information profile of the impact of cigarette butt litter on the environment.

The research concentrates on the Sydney and Illawarra catchment areas as much as possible and details current evidence of the pollutant contents in cigarette butts and evidence of subsequent dangers to the health of the environment, marine, animal and human life. However, being that pollution does not recognise borders and boundaries, and in the absence of data specific to the Sydney Water catchment area, much of the information has been extrapolated from more general sources.

All aspects of the cigarette smoking issue are extremely emotive. Increasingly claims for and against the activity appear to be couched in such a way as to elicit an emotive response from society, and it appears from our research that the issue of cigarette butts is as emotive as the act of smoking itself. It is interesting to note that we have received almost unanimous support from non-smokers and smokers for our campaign. The information in this document only emphasises the urgent need for an education campaign to curb this insidious type of pollution.

This report seeks to separate myth from fact and provide a current and accurate assessment of the problem as it relates to the environment. A quantitative assessment is included and is dealt with in such a way that the substantial numbers involved are portrayed in a manner that allows for anyone to comprehend the extent of this pollution. Although the report is not intended to be a scientific document, it is based on the most reliable information which is referenced accordingly.

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Quantitative Assessment of Cigarette Smoking

Nationally

In a report issued in 1992 by the Australian Bureau of Statistics entitled "1989-90 Health Survey - Smoking Australia" it was estimated that smokers in Australia totalled 3,531,000. However the ABS measured only smokers 18 years of age or over, and other studies have indicated significant consumption among 16-17 year olds, and even among 12 - 15 year olds.

The Medical Journal of Australia (Vol 154, pp 797 - 801, Hill D.J. White V. Gray N. 1991) published the results of a study in 1991 entitled "Australian Patterns of Tobacco Smoking in 1989" which measured smokers of 16 years and over. That study reported a total of 3,757,884 smokers. This is generally regarded as the more appropriate figure.

While smoking may have since declined in some segments of the population, the figure of 3.7 million smokers is still regarded as the most accurate guesstimate.

Based on the ABS estimated population over 15 years old in 1989 of 13,118,477, the proportion of smokers is approximately 29% - a little under one in three.

A study of cigarette smoking conducted by the Centre for Behavioural Research in Cancer, in Melbourne in 1990 confirmed that among secondary school students approximately 29.5% of boys and 28% of girls in the 16-17 year age group are smoking, and a further 17-18% of 12 - 15 year olds are smokers.

In terms of consumption of cigarette sticks per head per day, the most recent figure is 27.6. This however is distorted, because it is calculated upon the lower ABS figure of smokers 18 years old and over. Consequently a lower consumption-per-head figure on a higher total smoker base incorporating under age smokers is favoured. The generally accepted figure is 23.5 sticks per smoker per day.

Total cigarettes smoked per day in Australia on the above best guesstimates is approximately 87 million, and annually, approximately 32 billion.

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Sydney Water Catchment Area

The population supplied with water in Sydney Water's catchment area is reported to be 3,742,350 (Sydney Water, Principal Statistics as at June 30 1994).

Extrapolating from national figures, the population of the area over the age of 15 years, is 2.73 million.

Smokers in the area would thus total approximately 780,000, and this smoking population would dispose of about 18.3 million cigarette butts per day into the environment.

The annual cigarette butt total for Sydney Water's catchment area would be approximately 6.7 billion, or 21% of the national total.

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Extent of Cigarette Butt Litter

Every year, in excess of 32 billion cigarettes are consumed in Australia and almost 7 billion in the Sydney Water catchment area. A significant but unquantifiable proportion of the residual butts find their way into the environment.

To put this into perspective, if all the butts discarded annually were lined up end to end, they would extend some 640,000 kilometres, and circle the planet 23 times!!

The volume of toxic waste generated by these 32 billion odd butts is estimated at more than 40,000 cubic metres, depending on compression of the filters.

Obviously this represents a huge volume of toxic residue which would require some 3000 garbage trucks to transport (a queue 30 kilometres long lined up at your local council land fill depot!).

The concept of agglomerating such waste raises a number of interesting issues. Given that the hypothetical garbage trucks would each carry a proportion of the 200+ tonnes of cigarette tar and nicotine in addition to 3,900 other chemicals, many of them dangerous, plus a quantity of radioactive polonium-210, would they have to bear toxic chemical warning signage? Indeed, would they be allowed to dump their cargo in land fill sites at all? And what would be the issues attendant upon incineration of such waste?

At present, the toxic chemical residues of smoking are widely dispersed through billions of individual filter "containers" disguising the extent of the problem and diffusing the impact across our long-suffering environment.

There is no available published information or estimate on the final destination in the environment for this material. It is readily apparent that a significant proportion ends up either in land fills, streets and nature strips, waterways or oceans.

Cigarette butts vary significantly in length, but our analysis of samples collected in Sydney city streets suggest that the average length is 3 centimetres and average weight is approximately 300 milligrams. This includes about 1 centimetre (100 milligrams) of residual tobacco and paper which appears to disintegrate quite quickly, leaving the filter plug and tipping paper which averages about 2cm in length and 200mg in weight.

The total weight of tobacco consumed annually is approximately 28,000 tonnes*. The solid waste left behind in butts and residual tobacco would be in the order of 8 - 10,000 tonnes nationally, about 21% of this being in the Sydney Water catchment area.

While the tobacco and paper wrap break down relatively quickly, degradation of the actual filter plug is problematic. Rates of degradation vary widely, depending on circumstances, from 1 to 2 months up to 3 years or more in sea water, significantly raising the cumulative total of waste matter in the environment at any given time.

In Sydney the Maritime Services Board are in charge of emptying Sydney Water storm water booms. They suggest that cigarette butts are not arrested by the boom and actually flow into the harbour. Beach Watch claim that many of those butts eventually are dumped onto beaches or carried out to sea. One of the beaches that is most commonly found covered in rafts of cigarette butts following a storm is Bondi, owing to a function of prevailing tides.

The discarded butt material dumped onto beaches, harbour foreshores and catchment areas for the Sydney Water system, although substantial, is only a portion of the total material. The smoking habit is also responsible for litter created by cigarette packaging which represents 13% of paper litter, and is the second most common form of paper litter.

*(Australian Tobacco Board Annual Report 1992).

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Coastal Shoreline Litter

A study of sources of coastal shoreline litter near three Australian cities (Melbourne, Sydney and Brisbane) was conducted by the Victorian Institute of Marine Sciences and published in 1993.

The report makes the following points:

- little Australian data exists which describes the impact of litter on marine wildlife populations; the current practice of applying overseas data to Australian wildlife may overstate the Australian problem.
- efforts need to be directed to an accurate assessment of impacts of litter on Australian marine wildlife.
- All participants in the use of potential litter items - manufacturers, designers, industry representatives, consumers, clean up organisations, responsible authorities need to educate and be educated about the potential impacts of litter in the marine environment.

The study investigated a variety of shoreline locations, and data from a number of other sources. The waste profile measurement methodologies were not necessarily consistent in all locations. Cigarette butts for examples were broken down as a separate item in only one area, where they were the second most prolific item of street litter. Often it seems as though butts may be simply overlooked in many surveys.

The study of Coastal Shoreline Litter concluded among other things:

"There is a lack of Australian information on the impacts of marine litter on wildlife populations".

"Amenity is lost as a result of littering"

The report's recommendations included:

"Increase public awareness of the consequences of discarding litter in the streets and the connection between drains and the sea".

"Increase council awareness of the link between sweeping streets and cleaning beaches"

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Another study , "Flotsam & Jetsam", written by marine biologist Janet Slater and published in 1991 by the Tasmanian Department of Parks, Wildlife & Heritage specifically makes the point:

"We have not included cigarette butts in our surveys to date but it was interesting to note that they form the major debris item both in the USA and internationally"

"There is considerable misunderstanding of the sources of shoreline litter, most of it being land based and delivered to the shoreline and sea via waste water or windblown means".

More recent studies in the USA have confirmed the earlier results referred to above. In 1993, cigarette butts accounted for 16% of rubbish collected on beaches by volunteers for the Centre for Marine Conservation (American Medical News (1994): Noted in American Family Physician). USA Today of 22/3/94 reported cigarette butts to be the most common item collected in coastal clean ups.

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Cleaning Up Australia - The Rubbish Report

The most recent "Clean Up Australia" Rubbish Report published after each annual clean up day indicates that cigarette butts have leapt to the Number One spot as the most common item of litter collected at 12% (45,912 butts), well ahead of paper pieces (8%), beverage bottles (6%), glass pieces (6%), cans (5%), chips and confectionary bags (4%)!

Cigarette butt litter as a proportion of all rubbish collected has more than doubled from previous years, reflecting the increase in outdoor smoking and butt disposal of recent times as "no smoking" zones colonise more indoor spaces.

As the Rubbish Report states:

"One of the major differences between the 1993 and 1994 Rubbish Reports is the dramatic increase in the number of cigarette butts collected. The figure has increased from 5% to 12%. Cigarette butts do not biodegrade and last in the ground forever"

"Overall though, the proportions of the different types of rubbish dumped in 1994 is roughly the same as in previous years"

The statement that "butts do not biodegrade and last in the ground forever" is demonstrably not true, but to the author of the Rubbish Report, it may have seemed that was the case!

In previous years, cigarette butts were categorised under plastics. In 1994 they were placed in "miscellaneous" where they comprised 82 % of the category. An analysis of the sites where butts were collected is instructive. Of the nearly 46,000 butts collected nationally, 13% were in waterways, 30% on beaches or coastal areas, 28% on roadways, 13% in parklands, and 16% miscellaneous.

In summary, cigarette butts are now the most prevalent item of litter in Australia. They are the only item to have significantly increased their presence in the environment in the last clean up period. They are predominantly found in the waterways, beaches and coastal areas, and roadways (whence presumably many will find their way back into stormwater drains and eventually waterways).

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Cigarette Filters and Biodegradability

In most areas of the world cigarettes are produced from complex tobacco blends plus additives to produce desired flavours, aromas, burning properties and smoking characteristics. In recent years the trend towards filtered cigarettes has increased, probably in light of growing health concerns, and in many countries, the production is approaching 100% filtered.

The purpose of the filter is the "removal of particulate smoke components and absorption of vapors" in the objective language of an industry publication or put more subjectively, the removal of unpleasant and dangerous by-products of smoking.

The filter also provides a clean mouthpiece that does not collapse during smoking.

The most widely used material for cigarette filters is cellulose acetate tow (and paper to a lesser degree), often treated with flavourants or combined with other filtration agents such as charcoal.

The filter plug is physically held together by a paper wrapper and joined to the column of tobacco by tipping paper which completely covers the plug and slightly overlaps the tobacco column.

Burning tobacco blends and their additives is a complex chemical process which forms literally hundreds of compounds while other compounds such as nicotine are distilled unchanged from the tobacco column. The filter plug is designed to trap many of these which have been demonstrated to have adverse effects on human health.

The main component of cigarette filter plugs is highly purified cellulose fibre derived from wood pulp. The fibre is acetylated (reacted with acetic anhydride) to produce primary cellulose acetate, which in turn is converted by hydrolysis to the secondary acetate. This is converted into a fibre, cellulose diacetate which is the main component of the filter plug.

The material is commonly called simply "cellulose acetate" and is similar to the fibre known as "rayon" used in the manufacture of certain clothing items.

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Degradability

In recent years there has been growing interest from the public and the cigarette industry in the degradation of cigarette filters under those disposal conditions where degradability is needed ie. compost, waste water treatment, and the environment.

Two European filter manufacturers - Rhone-Poulec Rhodia and Courtaulds undertook a study into biodegradability of cellulose acetate filter tips in 1991.

The results demonstrated that the filters do break down, used or unused in both soil or water, and that the mechanism is principally biological under action by bacteria, algae and fungi.

The rate of degradation is strongly determined by environmental conditions. As an indication, the study produced the following degradation rates:

1 - 2 months under anaerobic conditions

6 - 9 months in soil

12 months in fresh water

36 months or more under unfavourable conditions such as sea water, desert or underground stations.

The study included work on the mechanism of biological degradation with the objective of finding means to improve the rate of degradation. Various papers and patents on the issue have been published. There is general agreement that the rate of degradation is dependent upon the degree of acetylation of the cellulose acetate, and possibilities exist to improve the degradation rate.

At the time of publication of this information in the Tobacco Journal International, June 1994, cigarette filters with significantly increased degradation speed had been produced on a pilot scale. However, it was noted "there is still a long way to a commercially available product, especially under the aspects of food legislation"

The results of the pilot test led to the conclusion that degradability of fibres made from modified cellulose acetate in compost or waste water treatment is greatly improved. The implications for degradability of butts in a natural environment (ie. litter) can not be quantified however.

Effect of Cigarette Butt Pollution & Toxic Wastes On Wildlife

It is clear from the quantities of cigarette butts finding their way into the environment daily, the known toxins in cigarettes and the fact that water, in particular sea water, acts as a preservative to inhibit the breakdown of cigarette filters, that there must be a significant impact on the environment over time.

However, the widely dispersed but diffuse nature of cigarette butt pollution is such that no definitive studies have been made of the problem.

Marine biologist, Martin Robards, a leading international expert on sea life and the ingestion of plastics (now generally extended to include all anthropogenic debris) confirms that butts are a growing problem and are even appearing in remote locations.

He reports that no formal research has been done on the impact of cigarette butts and that all information is anecdotal. Of the last 2000 seabirds studied for ingestion of debris, about 30 had consumed cigarette butts. However these were from a remote sampling area in Alaska where cigarette butt pollution is not yet an issue. In more built up areas the problem is a lot more common. All the butts found were in the process of disintegration and are relatively less important than the much longer-lived plastics which pose a deadly and recurring threat to a wide variety of marine life forms.

The problems with ingestion of any such debris includes false satiation, particularly with young birds that do not have the ability to regurgitate. Intestinal blockage is another risk to both young and smaller species of bird, and intestinal damage (probably less of a problem with cigarette butts because they are soft). Another problem of unknown dimension is the uptake of toxins, and it is anticipated that nicotine may be a threat, particularly for birds feeding close to the point of disposal when the butts are fresh.

What is known is that seabirds do ingest butts, but at this stage it is only possible to theorise about the impact.

A similar situation pertains in the case of fish and other sea creatures. Anecdotal evidence from Fisheries Officers suggests that some species of fish ingest butts, in particular "dolphin fish", but again, no definitive study of the impact has been made.

Ingestion of butts by sea turtles has been reported in Queensland, but the threat to turtles is primarily strangulation of the intestines by plastics and fishing line, and consequently the impact of cigarette butts is of less immediate concern.

Everyone interviewed in the course of preparing this report expressed the view that cigarette butt litter and its impact on the marine environment should be studied in light of its rapid proliferation.

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Toxicity

The question of whether the toxic waste in cigarette butts, which can take many years to break down, represents a health danger as chemicals leach out of the material cannot be answered in the available research. Given the potentially high level of toxicity for the material this is a question which should be answered.

Cigarettes contain more than 3,900 chemicals and compounds many of which are extremely dangerous. The following lists detail some of the most dangerous of these. Although we cannot detail the deleterious effects of these chemicals on the environment, we lack only a method to illustrate the degree of damage. It is not a question of "if" they are dangerous to the environment because many have already been proven to be deadly to living organisms.

Chemical

Carbon Monoxide
Nicotine
Ammonia
Arsenic
Butane
Hydrogen Cyanide
Toluene
DDT
Acetone
Cadmium
Methanol
Naphthalene

Common Usage

Poisonous gas in car exhaust
Pesticide, highly poisonous carcinogen
Floor Cleaner
White ant poison
Lighter Fluid
Gas chamber poison
Industrial solvent
Insecticide (Banned)
Paint stripper
Used in car batteries
Rocket fuel
Moth Balls

(Adapted from "Smoke Busters" Classroom Health Dept. WA)

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Other Major Poisons in tobacco are:

2-nitropropane	Acrolein
Acetaldehyde	Isopreptides
Acrylonitrile	Nickel
Nicotine	Nitrogen oxides
Alkanes and Alkenes	Ammonia
Aromatic amines	Arsenic
Benzenes	Phenol
Aza-arenes	Carboxylic acids
Dimethylnitrosamine	Hydrocarbons
Polonium-210	Polynuclear aromatic
Formaldehyde	Hydrazine
Hydrogen Cyanide	Urethane

Tobacco smoke contains many carcinogens- that is chemicals that cause cancer.

Those identified so far are:

- 11 polynuclear aromatic hydrocarbons
- 4 N-heterocyclic hydrocarbons
- 9 n-nitrosamines
- 3 aromatic amines
- 3 aldehydes
- 12 organic and inorganic compounds(including arsenic, benzene, cadmium, chromium and vinyl chloride) and the radioactive element polonium-210.

Tobacco smoke has been declared a Group A Carcinogen by the US Environment Protection Agency.

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Radioactive Polonium in Tobacco Plants

How does radioactive polonium-210 and its precursor, radioactive lead, get into tobacco plants and why is it increasing? Studies have shown that most of these radioactive chemicals enter the plant through the soil during growth, with lesser amounts of radioactive polonium and lead entering from the atmosphere.

These chemicals enter the soil through the increasingly heavier use of artificial phosphates. Tobacco plants are a unique farm product in that the quality of the flavour of tobacco depends on a reduction of tobacco nitrogen. Therefore large amounts of artificial chemical phosphates are repeatedly used on a tobacco crop in restricted amounts of land to use up the nitrogen in the soil improving the quality and growth of the crop.

The chemical phosphates are made by grinding Apatite rock and dissolving this in sulphuric acid. Apatite rock contains radium, polonium and radioactive lead. The link between this radiation and lung cancer is now beyond question.

Radioactive Polonium emits Alpha radiation which has at least 10 to 20 times the cancer-causing disruption for living cells as any other form of radiation. Some scientists estimate that it may be as high as 110 times as high as other radiation in its effect on DNA. Alpha radiation is also known to cause cancer more readily with low doses administered frequently than with a few large doses. While Polonium has a half life of only about a third of a year, radioactive lead which accompanies it has a half life of 22 years.

The effect of this material on the environment is not known. Consider however that polonium is water soluble and therefore would leech from butts into the surrounding soil in land fill disposal. Vegetation can then take the material into the chain - again, the effect of this is not quantified anywhere. Of course the fact that cigarette butts are so spread throughout the environment it may then be valid that they are probably not in sufficient concentration in any one area to cause a problem. However, one of the most efficient forms of aggregation for cigarette butts is storms. Storm water delivers millions of cigarette butts dropped into streets and parks into our waterways. The Sydney catchment area is surrounded by urban communities and is therefore the final destination for a substantial quantity of cigarette butts. What effect this has on the quality of our water is not known.

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Future Scenario

No Smoking On The Beach

It was reported in "The Australian", on Thursday 15th December 1994, under the headline "Hawaiian Smokers Told To Butt Out" that Honolulu's Hanuama Bay is "the first beach in the world to outlaw smoking". The council is now considering whether to extend the ban to Hawaii's famous Waikiki beach.

Hanuama Bay is a tourist beach which has about 1.5 million visitors every year and smokers using this beach face a US\$25 fine for lighting up.

Hawaii's beaches are constantly wafted by warm air currents, so the problem is one of littering, not the health dangers of so called "passive smoking". The anti smoking forces claim that cigarette butts are polluting the beach sands and the water. It is known that cigarette butts take a significantly longer time to degrade in sea water than in other environments due to the preservative effects of various salts.

Honolulu city councillor and sponsor of the bill to ban beach smoking, Mr John Henry Felix, claims fish have begun to develop tumours as a result of toxins in cigarette butts washed into the ocean. No scientific evidence to back up this claim is reported.

"The Australian's" US correspondent reports that this is the latest form of social ostracism of smokers which is "already endemic in every American state".

The anti smoking campaign in Australia has many parallels with that in the USA. It is therefore conceivable that this recent development in the US will be picked up in Australia, given our high coastal population density, ubiquitous beach culture and dramatically escalating cigarette butt litter in the wake of the largely successful campaign of recent years to drive smokers outside.

If this were to happen, it would be the first attack on cigarette smoking from a purely environmental perspective, focussing specifically on the litter detritus of smoking rather than the health hazards of the habit.

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Note: At the time of writing, no further information on the Hawaiian initiative is available. However full details of the legislation and the testimony supporting it are being forwarded by Honolulu City Hall and will be available as a separate addendum as soon as they come to hand.

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The Social Cost of Smoking

When looking into the social cost of smoking most people would immediately think of the associated health costs. There are many other areas of cost however, which do not have the same community awareness as the \$650 million health bill for smokers. This is only one aspect of a social cost which is so high it could be severely holding back the economic growth of the nation.

The 'Ash' organisation puts the social cost of smoking at \$9 billion per annum. Ash's estimate represents 28 cents for each cigarette consumed. When one includes in this such things as the cost of property and life of the 2,422 bush fires started by cigarette smoking last year then the figure starts to make sense.

Damage to the catchment area through bushfires is something that the management of Sydney Water would be well aware of. The last serious bushfire in the catchment was so severe a major ecological disaster was averted only because heavy rains did not arrive as expected. Heavy rain would have caused serious erosion and loss of new seed if it had arrived as forecast. Fortunately the non-arrival of the rain saved a situation which the city would have been helpless to prevent. Bushfires are a normal part of the Australian ecology but we have far too many in the catchment, and far too many are caused by irresponsibly discarded cigarettes and matches.

Government excise on cigarettes collects \$3.6 billion each year and this leaves a shortfall of at least \$5.4 billion dollars out of Ash's estimated \$9 billion cost. None of the excise collected is invested in solving the massive and shameful litter problem that is a direct result of smoking.

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Ark Action

The cigarette butt litter problem is complex. Ark proposes a number of possible steps to begin to address some of the issues:

Umbrella Theme Campaign - "Butt Busters" - an attention grabbing publicity campaign unashamedly based on the "Ghost Busters" concept to signal Ark's offbeat innovative approach to the situation:

- action orientated
- focussing on butts, not smokers.
- humourous

The concept is to create a "Butt Buster" team equipped with portable back-pack industrial vacuum cleaners to suck up butts off the streets, gutters, nature strips, parks and beaches. Three of the vacuum units have been purchased.

Special "Butt Buster" T Shirts featuring a distinctive green "no butts" design with Ark and Sydney Water logos have been produced.

The campaign was soft launched at the Clean Waves Surf Festival on Manly Beach in February 1995. Celebrity "Butt Busters" were on hand for the launch and promotional photographs including "Today" presenter Richard Wilkins, singer Jenny Morris, "Neighbours" star Dan Falzon, "Home & Away" heartthrob Daniel Goddard, and "Miss Australia", Margaret Tierney.

It is intended with further sponsorship funding, to create a Community Service Television spot (Ark Hollywood is exploring the possibility of securing Dan Ackroyd, star of the original "Ghost Busters" movie) to provide umbrella TV support for a rolling campaign in selected locations with an on-the-ground team of "Butt Buster" volunteers.

This is intended to entertain and grab attention. Ideally it would be integrated with other actions undertaken by local authorities to maximise the impact of the campaign.

Discussions have commenced with the Sydney City Council Cleansing Department to tie "Butt Busters" in with a concerted blitz on cigarette butt black spots, possibly involving Council's law enforcement officers to issue warning notices. At present Council Officers have no jurisdiction within the building envelope and are somewhat hamstrung.

"Butt Busters" would be an effective promotional device to increase the profile and effectiveness of Council's efforts. We feel it is also important to have an element of authority to the campaign - the "iron fist in a velvet glove" approach - without going to an authoritarian extreme which may alienate and antagonise smokers. Butt Busters is the "edutainment" cutting edge of a cigarette butt litter reduction campaign with teeth.

Butt Receptacles

One aspect of the campaign is to induce smokers to dispose of their cigarette butts responsibly. There is no one solution that fits every situation.

Butt Bins

In building foyers, public buildings, offices, hospitals, restaurants and shopping centres, Ark intends to trial the "Butt Bin" marketed by Stewart Marketing of Bayswater, Victoria. The "Butt Bin" is made from high density polyethelene modified with flame retardant. It has an aluminium lid with a funnel shape leading to a central hole. Cigarette butts do not have to be extinguished. They are simply dropped into the bin and disappear from sight. This is not suitable for on-street use.

Pole Mounted Ash Trays

Sydney City Council are installing cast aluminium ashtrays mounted on Council street signs. These cost around \$200 each. They must be emptied regularly. Occasionally they are used as rubbish receptacles. This requires that they be sited close to a normal rubbish receptable., to avoid the problem of inadvertant fires. The cost and limitation of suitable sites precludes the widespread use of these footpath ashtrays.

Ark is exploring the possibility of an alternative pole mounted ashtray with a self funding sponsorship/promotional component to offset the capital cost and the ongoing servicing costs.

Personal Ashtrays

Ark is investigating a range of personal butt bins or ashtrays for use in cars or outdoor locations where it is irresponsible or dangerous to discard cigarette stubs eg. on the beach or in the bush.

An initial design has been drawn up for evaluation. One of the major tobacco companies has expressed interest in helping Ark to source alternative designs and eventually to market them through their 30,000+ retail outlets.

Next Steps

Ark intends to extend the "Butt Busters" alliance and seek further sponsorship support to:

- a) develop and produce the television/cinema commercial.
- b) conduct pilot attitudinal research with smokers to test reactions to the communication campaign and to alternative personal and public butt disposal concepts.
- c) recruit and train a team of Ark "Butt Busters" to mount on-the-street actions for a 3 month trial period.
- d) develop personal and public butt bin designs to prototype stage.

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