



Covering their butts: responses to the cigarette litter problem

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ABSTRACT

Background Cigarette butt litter is a potential target of tobacco control. In addition to its toxicity and non-biodegradability, it can justify environmental regulation and policies that raise the price of tobacco and further denormalise its use. This paper examines how the tobacco industry has managed the cigarette butt litter issue and how the issue has been covered in the media.

Methods We searched the Legacy Tobacco Documents Library (<http://legacy.library.ucsf.edu/>) using a snowball strategy. We analysed data from approximately 700 documents, dated 1959–2006, using an interpretive approach. We also searched two newspaper databases, Lexis/Nexis and Newsbank, and found 406 relevant articles, dated 1982–2009 which we analysed quantitatively and qualitatively.

Results The tobacco industry monitored and developed strategies for dealing with the cigarette litter issue because it affected the social acceptability of smoking, created the potential for alliances between tobacco control and environmental advocates, and created a target for regulation. The industry developed anti-litter programs with Keep America Beautiful (KAB) and similar organisations. Media coverage focused on industry-acceptable solutions, such as volunteer clean-ups and installation of ashtrays; stories that mentioned KAB were also more frequently positive towards the tobacco industry. Among alternative approaches, clean outdoor air (COA) laws received the most media attention.

Conclusions Cigarette litter, like secondhand smoke, is the result of smoker behaviour and affects nonsmokers. The tobacco industry has tried and failed to mitigate the impact of cigarette litter. Tobacco control advocates should explore alliances with environmental groups and propose policy options that hold the industry accountable for cigarette waste.

INTRODUCTION

As the scientific evidence that secondhand smoke is detrimental to health has accumulated, and as nonsmokers have experienced more smoke-free places, denormalization of smoking and support for regulation has spread.¹ Because secondhand smoke affects nonsmokers, it establishes smoking as a policy issue, not just a personal habit. Cigarette litter is a similar potential target for tobacco control. Like secondhand smoke, it is a visible reminder of the collateral damage of tobacco use. Non-biodegradable cigarette butts are consistently found to be the most littered item in beach and community clean-ups,² damaging civic and recreational areas for all users. Butts contain numerous toxins that can leach into soil or water; the environmental consequences are beginning to be explored.^{3,4} Just as annoyance and concern over

secondhand smoke exposure prompted passage of clean indoor air laws, cigarette litter and waste are potential targets of policy.

The tobacco industry has responded to the litter issue through partnership with Keep America Beautiful (KAB), an anti-litter organisation. The industry has made no secret of its ties to KAB and similar organisations; however, no studies have explored these relationships. In this paper, we examine how the tobacco industry has managed the cigarette butt litter issue and how these efforts have been reported in the press, and discuss media coverage of alternative approaches to the problem.

METHODS

Over 10 million internal tobacco industry documents have been released through litigation.⁵ We searched the Legacy Tobacco Documents Library (<http://legacy.library.ucsf.edu>) using a snowball strategy⁶ beginning with keywords (eg, 'filter', 'Keep America Beautiful', 'butts'). We analysed data from approximately 700 documents, dated 1959–2006, using an interpretive approach.^{7–10} We also examined the websites of KAB and other anti-litter organisations, as well as tobacco companies' corporate sites.

We searched two newspaper databases, Lexis/Nexis and Newsbank, for relevant articles using the following search strings: 'tobacco company' AND 'cigarette butt' in all text (both databases); 'tobacco company' AND 'keep America beautiful' in all text (both databases); 'litter' AND 'cigarette butt' in Lead/First Paragraph (Newsbank); and 'litter and cigarette' OR 'cigarette butt' in Headline (Lexis/Nexis). We did not restrict the search by date, so we retrieved all relevant items in the databases (N=406, dated from 1982 to 2009). We used slightly different search strategies for each database to ensure similar scope and to limit the number of irrelevant items retrieved (eg, those that used 'butts' to refer to cigarettes generally).

We created a coding instrument that included story 'demographics' (eg, publication date, state), story subject (eg, litter problem, beach clean-up, other tobacco topic) and story content, including causes of litter (eg, clean indoor air, lack of ashtray), responses to litter (eg, clean outdoor air (COA), litter law enforcement, education), mention of KAB, mention of the disease effects of tobacco, and attitude towards the tobacco industry (if mentioned). We coded a story as 'positive' towards the industry if it described the industry as helpful with litter clean-up, 'negative' if it referred to the industry as the cause of litter or disease, and 'neutral' if industry representatives were simply asked for comment.

Each author coded a random selection of one half of the articles. We established intercoder reliability through a randomly selected overlapping sample of 20% of stories. All reported data achieved an adjusted κ score of between 0.7 and 1.0; 74% of reported variables achieved an adjusted κ score of 0.80 or greater. Some κ values were adjusted to account for the homogeneity of the material.¹¹ The κ statistic becomes unreliable without sufficient variety in coding; for example, if on one item the correct code is 'no' 90% of the time, the resulting κ has a low value even when interrater agreement is high. Average intercoder reliability over all items was 0.84. No additional significance testing was done because the items collected were not a random sample and we are not extrapolating from them. Rather, we report the findings from the entire population of items meeting the search criteria. The newspaper articles were also analysed qualitatively.

This study has limitations. The tobacco industry document set is not comprehensive, but a selection of litigation-related material. As no tobacco litigation to date concerns litter, it is likely that we did not have access to all relevant documents. We also may not have identified all relevant available tobacco industry documents due to the size of the Legacy database. The news databases we searched are also not comprehensive, although they cover a wide range of national and local newspapers.

RESULTS

Tobacco industry concerns about cigarette butt litter

The tobacco industry has been concerned about cigarette butt litter as an issue since the 1970s; a 1979 Tobacco Institute memo stated that smokers' 'careless, offensive and occasionally harmful' cigarette butt disposal practices were contributing to the declining acceptability of smoking.¹² A decade later, the industry was concerned about the 'potential for anti-smoking groups to seize [the litter] issue to attack cigarettes'.^{13 14} In 1997, Philip Morris (PM) research found that 'litter can move "neutral" non-smokers to "negative"',¹⁵ creating more tobacco control supporters.¹⁶

Throughout this time span, the tobacco industry anticipated that cigarette waste might inspire political 'coalition between "anti's" [tobacco control advocates] and "greens" [environmental advocates]'.¹⁷ According to industry research in 1982, 'nonsmokers were more likely than smokers to support strong environmental programs'¹⁸ and environmentalists were sympathetic to tobacco control.¹⁸ The tobacco industry identified the 'non-degradable nature' of filters as a likely target of such a coalition,^{14 19} which could be derived from mutual concern over litter¹⁷ or from a deeper analysis which linked 'corporate pollution' with 'personal physical health'.¹⁸ Smoking might then be 'seen as both an environmental AND a medical issue'.¹⁸

In the 1990s, as litter and waste regulations expanded, the industry was concerned that they might be applied to cigarettes or cigarette packaging.^{14 20–22} PM worried that cigarette litter would lead to 'environmental taxes'¹⁷; 'regulations on cigarette degradability'¹⁷; or legislation passing 'the responsibility for cleanup to the cigarette manufacturer'.²³ Litter was also being used to justify COA laws, such as prohibiting smoking at beaches or in parks.¹⁶

Yet the tobacco industry also considered using the litter issue to undermine clean indoor air laws.^{24–27} PM explored whether litter, as one of the 'dysfunctions of smoking outside',²⁸ could be used to convince business owners to maintain or reinstate indoor smoking policies. Focus groups with employers and property managers found that although they identified cigarette

litter in their smoking areas as a problem,^{16 29} it was 'not a driving issue', and was unlikely to motivate a return to indoor smoking.³⁰

Managing the cigarette butt litter problem

The tobacco industry's cigarette butt litter programs had three goals: (1) to 'prevent cigarette litter from impacting the social acceptability of smoking'¹⁵; (2) to "remove" cigarette litter as an issue leading to bans/restrictions¹⁵ and (3) to ensure that the tobacco industry was not held practically or financially responsible for cigarette litter (the industry argues that 'the responsibility for proper disposal lies with the user of the product'.^{24 26 31 32}) Financial support for and oversight of KAB supported all three goals.

Keep America Beautiful

KAB was established by the packaging industry in 1953, in response to a Vermont law that required glass bottles to be returnable (rather than disposed of after one use).³³ KAB promoted 'a national cleanliness ethic'³⁴ by individuals and communities. This focused attention on responsible disposal, and away from the 'upstream' problem of industry waste production.³³ KAB still promotes anti-litter efforts while distracting attention from industry production of waste.³³

The tobacco industry has had financial and personnel ties with KAB since the late 1950s.³⁴ Brown & Williamson made donations to KAB in the 1950s and 1960s.^{35–37} In addition to financial contributions,³⁸ PM maintained a relationship with KAB through the 1970s, when PM vice president James Bowling

Box 1

- ▶ In 1993, RJR began a direct mail campaign in which its Vantage brand sponsored KAB and offered smokers a pocket ashtray (figure 1). Vantage smokers welcomed the ashtrays as 'tangible evidence of their consideration for other people, and the environment'.¹⁰⁶ Vantage contributions to KAB helped 'reduce some of the guilt associated with smoking'.^{107 108} As one smoker put it, 'It makes me feel good that a [contribution] is going to [KAB], since we're doing a bad thing'.¹⁰⁷ This good feeling was attained by the smokers 'without being inconvenienced personally, or changing their habits, or being forced to confront other smokers or nonsmokers'.^{107 109} In contrast, smokers were not interested in suggestions that they personally get involved in anti-litter campaigns.¹⁰⁷
- ▶ RJR reports claimed that the pocket ashtray 'solve[d] a real problem for smokers',¹⁰⁸ (ie, disposing of ashes and butts in places without ashtrays). They also suggested that the ashtray communicated that 'Vantage smokers care about the environment',¹⁰⁸ and improved non-smokers' perception of them.¹⁰⁹ The ashtray and KAB campaign 'empowered'¹⁰⁸ smokers to 'enjoy their smoking experience'¹¹⁰; and 'boost [ed] smokers' self image',^{108 110 111} allowing RJR to profit from their customers' discomfort and anxiety about using its product (figure 2). The ashtray also implicitly granted permission to smoke in areas where ashtrays were not provided,¹⁰⁸ as suggested by the tagline, 'Enjoy Vantage Almost Anywhere'.¹¹²
- ▶ At least 1 000 000 Vantage branded pocket ashtrays were distributed through KAB in exchange for RJR's \$25 000 donation. The pocket ashtray program was apparently discontinued in 1997.¹¹³

was, successively, an officer, president and chairman of the board of KAB.^{39–43}

In the 1990s, PM and RJ Reynolds (RJR) developed programs with KAB that provided consumers with portable ashtrays and communities with permanent ashtrays, thereby theoretically reducing cigarette butt litter and maintaining a public presence for smoking. RJR distributed portable ashtrays imprinted with KAB's name and one of several RJR cigarette brands (Winston, Salem, Camel, Doral or Vantage),^{44 45} turning regulatory risk and denormalization into an advertising opportunity. (See box 1.) The ashtrays were distributed at KAB events, such as beach clean-ups.^{46 47}

PM's 'Urban Litter Initiative'⁴⁸ with KAB placed ash/trash receptacles in Atlanta, GA; New York, NY; Santa Barbara, CA; Orlando, FL and Columbus, OH.⁴⁹ KAB claimed the program led to 'an average nationwide reduction of cigarette litter of 54%' in those communities; however, no supporting data were provided.⁵⁰ The program was designed to 'modify consumer behaviour to minimise littering' and to generate goodwill for PM.^{51 52} The latter goal was achieved: 60% of recipients of portable ashtrays reported an 'enhanced perception of PM'.⁵³

Currently, PM is funding KAB's 'Cigarette Litter Prevention Program'.^{54 55} This program has four strategies: increasing smoker awareness that 'cigarette butts are litter'; installing public ashtrays; promoting pocket ashtrays; and 'encouraging enforcement of existing litter laws'.⁵⁵ The PM USA website claims that this program produced 'an average 48% reduction in cigarette litter in participating communities'⁵⁶; no supporting data are provided. We found no evidence of other tobacco company involvement in current U.S. anti-litter programs.

SOLUTIONS IN GOOD TASTE FROM VANTAGE

DW

What's A Smoker To Do?



Figure 2 Vantage portable ashtray direct mail.

VANTAGE—PROUD SPONSOR OF KEEP AMERICA BEAUTIFUL, INC.

Vantage is proud to be a sponsor of Keep America Beautiful, Inc., a national organization devoted to improving waste handling.

Keep America Beautiful's state and local affiliates will distribute Vantage Pocket Ashtrays to adult smokers at various events across the country.

Vantage will also distribute Pocket Ashtrays at 23 Senior PGA Golf Tournaments.

Remember, when you use the Vantage Pocket Ashtray, you're helping to keep America beautiful.

The Pocket Ashtray—Only From Vantage

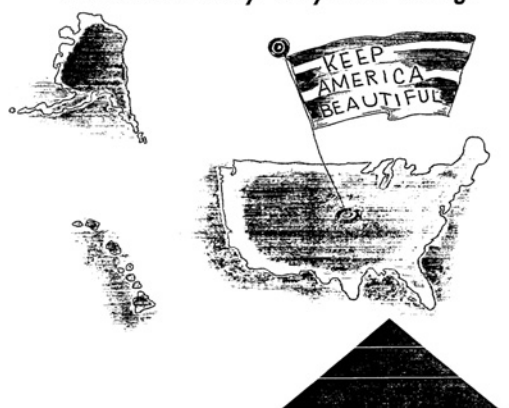


Figure 1 Vantage 'Keep America Beautiful' direct mail.

The tobacco industry and international anti-litter groups

KAB has affiliates in several countries, including the Bahamas, Bermuda, Canada, South Africa⁵⁷ and Australia.⁵⁸ PM organised the KAB Council in 1974,⁵⁸ and in 1998 Rothmans supported a survey on cigarette littering for the organisation.⁵⁹ Currently, the KAB Western Australia chapter website features brochures about cigarette butt litter that focus on smoker education and the provision of ashtrays.^{60 61} British American Tobacco Australia (BATA) has established the Butt Littering Trust⁶² (now 'rebranded' as Butt Free Australia (BFA)^{63 64}) to 'demonstrate its commitment to proactive environmental management of the issue of cigarette butt litter' (emphasis added). Note that the organisation is not attempting to manage cigarette butt litter itself. BFA continues to receive most of its funding from BATA.⁶⁴ BFA acknowledges the 'risks' associated with smoking, but does not encourage cessation,⁶⁵ focusing instead on 'behavioural change' and 'infrastructure',⁶⁶ that is, smoker education and ashtrays. In the 1990s, BAT was a sponsor of the Tidy Britain Group, a position that allowed it to exert editorial control over the organisation's 1993 report,⁶⁷ which initially emphasised the high volume of cigarette litter and characterised smokers as 'habitual litterers'.⁶⁸ The Tidy Britain Group (now Keep Britain Tidy) website does not indicate any ties with BAT or other industries.⁶⁹

Media coverage of cigarette butt litter

In the 1990s, tobacco companies used anti-litter campaigns for public relations.^{51 70} PM used them to 'build positive relationships' with 'conservationists, opinion leaders and consumers'.⁷¹ RJR sought to participate in litter clean ups, such as the North

Table 1 Cigarette litter newspaper items

Variable	Total (N = 406)		Mention KAB (N = 77)		Do not mention KAB (N = 329)	
	N	%	N	%	N	%
Story type						
News/feature	251	61.8	70	90.9	181	55.0
Opinion	75	18.5	4	5.2	71	21.6
Letter to the editor	80	19.7	3	3.9	77	23.4
Story topic						
Litter problem	281	69.2	63	81.8	218	66.3
Litter clean up	43	10.6	13	16.9	30	9.1
Tobacco	51	12.6	1	1.3	50	15.2
Other	31	7.6	0	0	31	9.4
Mention disease effects						
Tobacco industry	83	20.4	7	9.1	76	23.1
Tobacco industry						
Mention industry	125	30.8	26	33.8	99	30.1
Positive to industry	32	7.9	22	28.6	10	3.0
Negative to industry	31	7.6	0	0	31	9.4
Neutral to industry	62	15.3	4	5.2	58	17.6
Cause of litter problem						
No ashtray available	29	7.1	14	18.2	15	4.6
Smoker's fault	101	24.9	17	22.1	84	25.5
Clean indoor air law	59	14.5	24	31.2	35	10.6
Solutions to litter problem						
Industry/KAB solutions						
Litter law enforcement	115	28.3	24	31.2	91	27.7
Education	103	25.4	40	51.9	63	19.1
Permanent ashtray	79	19.5	33	42.9	46	14.0
Pocket ashtray	70	17.2	39	50.6	31	9.4
Volunteer clean-up	120	29.6	37	48.1	83	25.2
Non-industry supported solutions						
Clean outdoor air law	47	11.6	8	9.1	40	12.2
Deposit/return	32	7.9	0	0	32	9.7
Fee/tax	13	3.2	2	2.6	11	3.3

Carolina 'Big Sweep'.^{70 72-74} In public, RJR claimed that environmental activities were undertaken 'because we believe it is the responsible thing to do... not so we can get our name in the news'.⁷⁵ But behind the scenes, RJR worked to get publicity about its participation^{47 76 77}; PM noted that any PM anti-litter initiative would be 'supported by a comprehensive communications effort'.^{78 79}

To determine the success of the tobacco industry's effort to promote its preferred solutions to the cigarette butt litter problem, we examined American news media coverage of the issue. We found 406 relevant newspaper articles, opinion pieces, or letters to the editor published in newspapers between 1982 (when stories first appeared) and 2009. The number of stories per year increased over this period: only seven stories were dated 1982-1991; 154 stories were dated 1992-2001 and 242 stories were dated 2002-2009. Stories came from 40 states and the District of Columbia (see table 1).

Analysis of these stories suggests that KAB disseminated positive views of the tobacco industry and the industry's preferred framing of cigarette litter issues. The tobacco industry was mentioned at about the same frequency regardless of whether KAB was mentioned, but KAB stories were much more likely to be positive about the industry (table 1), describing PM and RJR as helping to clean up cigarette litter by funding KAB programs. For example, a 2009 *New York Times* article noted that a PM-sponsored KAB campaign in 178 cities had 'reduced cigarette littering by an average of 46%' according to KAB officials.⁸⁰ No stories with KAB mentions were negative towards the

tobacco industry (ie, blaming the industry for cigarette litter or tobacco-related disease). The harms of tobacco use were infrequently mentioned, and KAB stories were less than half as likely to mention them as stories that didn't mention KAB. KAB stories were almost five times more likely to mention lack of ashtrays as a cause of litter and three times more likely to blame clean indoor air laws.

Newspaper stories mentioning KAB disproportionately favoured its solutions—education, installation of ashtrays, distributing pocket ashtrays and voluntary litter clean-up programs. KAB stories also mentioned, but did not disproportionately emphasise, litter law enforcement. By contrast, stories that did not mention KAB were more likely to mention non-industry supported solutions, including cigarette butt deposit/return policies, cigarette litter fees or taxes and COA laws. Because they are of strategic interest to tobacco control, we conducted additional qualitative and quantitative analysis of media coverage of these alternative approaches (table 2).

Deposit/return

Beginning in 1996, letters to the editor occasionally called for establishing a deposit on cigarette purchases to be refunded upon return of the butts to a point of purchase. The majority of news items on this issue (14 of 16) focused on two identical (and unsuccessful) \$1/pack deposit bills proposed in 2001 by legislators in Maine and Alaska.⁸¹ (We found no evidence that the tobacco industry played a role in the defeat of either bill.) Five news stories noted that people regarded the Maine bill as a joke, reacting with 'chuckles and guffaws',⁸² when it was first introduced. Store owners objected to handling the butts⁸³ and the Maine Bureau of Health was concerned that children would pick up butts for the nickel redemption, risking dermal exposure to nicotine.⁸³ Tobacco industry representatives noted the difficulties imposed by the required 'for deposit' stamp on cigarettes,⁸⁴ and pointed to industry-sponsored anti-littering efforts as a better solution.

The Maine bill also prompted three negative editorials, describing the measure as an 'over-reaction',⁸⁵ 'excessive',⁸⁶ and 'boneheaded'.⁸⁷ However, one noted that if education and public ashtrays failed to reduce cigarette litter, the proposal 'might not look so absurd'.⁸⁵

Fee/tax

The imposition of a dedicated fee or tax on cigarettes or cigarette companies to cover clean-up costs received the least media attention, perhaps because few jurisdictions have adopted this solution. Most news items concerned proposals in California (2005) for a litter tax on cigarette companies and in San Francisco (2009) for a \$0.20 per-pack cigarette litter fee. (Under California law, a tax may be for any amount and funds used for any purpose as determined by the legislature; a fee may only recover relevant costs, eg, of cleaning up cigarette litter, and must be used for that purpose.) People quoted in these articles did not regard the proposals as humorous. Tobacco industry representatives opposed additional taxes on smokers, stating

Table 2 Industry-opposed tobacco butt litter solutions

	Deposit/ return N=32		Fee/tax N=13		COA N=47	
	N	%	N	%	N	%
Positive comment*	20	63.0	8	62.0	40	85.0
Negative comment*	12	37.0	5	38.0	19	40.0

*Stories could contain both positive and negative comments or neither.

that ‘education, behavioural changes and enforcing litter laws should be enough’.⁸⁸ A *Boston Globe* editorial labelled San Francisco’s plan a possible ‘case of earmark overkill’, but emphasised that ‘there is a very real cost that comes from smoking’.⁸⁹ The California bill did not pass, but the San Francisco proposal was enacted in July 2009.⁹⁰ In January 2010, PM filed a complaint in San Francisco Superior Court over the fee, signalling a possible lawsuit.⁹¹

Clean outdoor air

COA laws received the most coverage of the non-industry supported policy options. News coverage treated COA proposals seriously; articles noted precedents set by other areas (n=26), making the idea appear practical rather than unusual. News coverage was also more likely to contain arguments for COA (n=40) than objections from smokers, smokers’ rights groups, or the tobacco industry (n=19). Objections to COA laws included their excessive reach, the hostility they expressed towards smokers, potential lost revenue and their ineffectiveness at reducing litter.

COA laws have enjoyed political success (table 3) perhaps because of the range of benefits attributed to them, including protecting nonsmokers’ health, cleaning up the environment, safeguarding children and eliminating an unsightly nuisance. PM’s own research showed that most people—even those who generally did not support strong tobacco control regulations—supported COA.⁹² The researchers pointed to the ‘quintessential quote’ from focus groups on the subject: ‘... [smoke outdoors is] not impacting me, so I have very, kind of a hard time defending [COA], and, at the same time, I would like to see it’.⁹³

DISCUSSION

Like secondhand smoke, litter is a consequence of smokers’ behaviour; the industry has no direct control over it. Similarly, industry-backed anti-litter campaigns have failed to change smokers’ butt disposal habits. KAB claims to have mitigated the litter problem, but this is unsubstantiated. Beach clean-up statistics show no decrease in the number of cigarette butts found over the past 10 years.⁹⁴

The tobacco industry has managed the litter issue to its advantage by blaming it on individuals and—as with other issues, including tobacco-related disease⁹⁵—denying its own responsibility. Industry-preferred ‘solutions’ to the litter problem are smoker education, installation of permanent ashtrays and distribution of pocket ashtrays. Although they implicitly blame smokers for litter, these approaches also enable smokers to keep smoking despite increased restrictions and declining social acceptability. They turn regulation into marketing opportunity in the form of branded ashtrays. (The tobacco industry has pursued this strategy in other instances, including its youth smoking prevention programs.⁹⁶) These approaches also offer tobacco companies the opportunity to appear as ‘responsible’ corporate citizens, generating positive publicity for their efforts.

Table 3 US smokefree outdoor air laws*

Area covered	Counties/municipalities	Statewide
Beaches	96	2
Transit stops	144	2
Outdoor dining areas	158	3
Parks	423	1
Zoos	34	1

*Source: Americans for Nonsmokers’ Rights.

Media coverage of the litter issue was dominated by industry-favoured programs, likely due in part to KAB’s active promotion of them. The disease consequences of cigarette use were rarely addressed, and less so in stories mentioning KAB, drawing a boundary between environmental and public health issues. However, the two are linked; environmental degradation ultimately affects human health, and the production and use of cigarettes harms the environment.

Cigarette litter can be a visible representation of this link, supporting political connections between environmental and public health advocates. The tobacco industry’s own research found that unsightly cigarette butts have the power to create tobacco control supporters. Care should be taken, however, in selecting potential partners, as some environmental groups have accepted tobacco funds.⁹⁷

Allies should reach mutual understanding about the nature of the problem. An organisation focused on ‘litter’ might regard ashtray installation as a reasonable solution. The environmental principles ‘reduce, reuse, recycle’ should be foregrounded, ensuring that smoking prevention and cessation (ie, ‘reduce’) are considered fundamental. The one-use nature of non-biodegradable butts might also be stressed to gain the support of environmental groups.

Tobacco control should also reframe the problem as cigarette waste. ‘Litter’ presupposes that the problem is disposal; ‘waste’ refocuses attention on the producer. Holding an industry responsible for the life of its products is becoming more common. Currently, the European Union,⁹⁸ 20 US states and the city of New York require electronics manufacturers to take responsibility for or fund the cost of recycling discarded electronic equipment⁹⁹ to reduce toxic waste in landfills. Given the toxicity and ubiquity of cigarette butts,^{2 4} tobacco control advocates could draw parallels between these products. Waste mitigation programs may also raise the price of cigarettes, a well-established means of reducing smoking prevalence rates,^{100 101} and reduce the number of retailers willing or qualified to sell particular goods.

Reframing the issue as waste may also inspire new solutions. Some of these, as reported here, are being tried. Objections to recycling mandates could be overcome; for example, legislation could require that a sealable return envelope be included with each pack sold, that retailers only accept returns in those containers, and that only those of smoking age be allowed to redeem butts. Litter fees also have yet to catch on; the results of San Francisco’s experience may have some effect. It is as yet unknown whether the fees will reduce smoking or substantially assist the city with clean-up costs. The effects of COA laws on litter are similarly unstudied.

Recycling mandates and waste mitigation regulations are not ordinarily designed to curb use. However, if laws requiring cigarette retailers to accept butts back for recycling cause them to stop selling cigarettes, this would also be a gain for tobacco control. Similarly, fees or taxes imposed to pay for clean up would raise the price of cigarettes, to begin to account for the real costs of smoking, and likely persuade some smokers to quit.¹⁰²

One idea that has not been tried is banning cigarette filters. Filters have not been shown to reduce the harms of smoking.¹⁰³ They may be responsible for a shift in lung cancer type from squamous cell to the more aggressive adenocarcinoma.¹⁰⁴ They were designed as a marketing tool and they still perform this function, by making an implicit health claim. Although discarded cigarette butts without filters would still be unsightly and toxic, they would be biodegradable. The absence of filters might also encourage smoking cessation.

Tobacco control might be best served by taking an expansive view of the environmental costs of tobacco growing and curing (eg, deforestation),¹⁰⁵ and tobacco use and joining with organisations that view environmentalism similarly broadly, to include the impact of tobacco on human health. These alliances could result in novel approaches to the problem that would address the concerns of both groups by reducing smoking, reducing waste and holding the tobacco industry accountable for one more cost of its lethal business.

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Contributors EAS designed the study, performed research and data analysis and drafted the paper. PAM performed research and data analysis and contributed to the writing of the paper.

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REFERENCES

- Hyland A, Higbee C, Borland R, et al. Attitudes and beliefs about secondhand smoke and smoke-free policies in four countries: findings from the International Tobacco Control Four Country Survey. *Nicotine Tob Res* 2009;**11**:642–9.
- Novotny TE, Lum K, Smith EA, et al. Cigarette butts and the case for an environmental policy on hazardous cigarette waste. *Int J Environ Res Public Health* 2009;**6**:1691–705.
- Register KM. Cigarette butts as litter—toxic as well as ugly. 2000. Available at: <http://www.longwood.edu/cleanva/ciglitterarticle.htm> (accessed 27 Sept 2010).
- Slaughter E, Gersberg R, Watanabe K, et al. Toxicity of cigarette butts, and their chemical components, to marine and freshwater fish, *Atherinops affinis* and *Pimephales promelas*. *Tobacco Control*. In press.
- National Association of Attorneys General. Master settlement agreement, 1998. <http://www.naag.org/backpages/naag/tobacco/msa/msa-pdf/> (accessed 3 Mar 2009).
- Malone RE, Balbach ED. Tobacco industry documents: treasure trove or quagmire? *Tob Control* 2000;**9**:334–8.
- Taylor C. Theories of meaning. In: Taylor C, ed. *Human agency and language: philosophical papers 1*. Cambridge [Cambridgeshire]; New York: Cambridge University Press, 1985. pp. 248–92.
- Taylor C. Interpretation and the sciences of man. In: Taylor C, ed. *Human agency and language: philosophical papers 2*. Cambridge [Cambridgeshire]; New York: Cambridge University Press, 1985:33–81.
- Van Manen M. *Researching lived experience: Human science for an action sensitive pedagogy*. Albany, NY: State University of New York Press, 1990.
- Hill MR. *Archival strategies and techniques*. Newbury Park, CA: Sage Publications, 1993.
- Lantz CA, Nebenzahl E. Behavior and interpretation of the kappa statistic: resolution of the two paradoxes. *J Clin Epidemiol* 1996;**49**:431–4.
- A Second Proposal for Industry Litter Policy, Tobacco Institute, 1979 (est). <http://legacy.library.ucsf.edu/tid/nuz30c00> (accessed 4 Dec 2008).
- R.G.'S Master Copy, Philip Morris, 1991. <http://legacy.library.ucsf.edu/tid/mgx71f00>.
- American Tobacco. *ATC Board Presentation—May 1, 1991*, American Tobacco, 1 May 1991. <http://legacy.library.ucsf.edu/tid/bgl35f00> (accessed 26 Jun 2009).
- Responsible Smoking: Litter Recommendations, Philip Morris, 1997. <http://legacy.library.ucsf.edu/tid/oid40b00> (accessed 3 Dec 2008).
- PM USA programs: a workplace strategy, Philip Morris, 18 Jul 1997. <http://legacy.library.ucsf.edu/tid/myz37c00> (accessed 14 Apr 2009).
- [Problem statement on filter litter], Philip Morris, 27 Oct 1994. <http://legacy.library.ucsf.edu/tid/hvx21b00> (accessed 18 Jun 2009).
- Buffalo MD, Miller JS. *Antismoking and the Environmental Movement*. Council for Tobacco Research, 1982. <http://legacy.library.ucsf.edu/tid/xsl20a00> (accessed 12 Dec 2008).
- R&D 5-Year Plan for Tobacco Products, Philip Morris, Jun 1970. <http://legacy.library.ucsf.edu/tid/jwz58e00> (accessed 19 May 2009).
- 1991 state legislation to tax or restrict packaging materials, Tobacco Institute, 25 Apr 1990. <http://legacy.library.ucsf.edu/tid/gvt30c00> (accessed 2 Dec 2008).
- 403.413 Florida Litter Law, Philip Morris, Jul 1998. <http://legacy.library.ucsf.edu/tid/dca48d00> (accessed 14 Nov 2008).
- Cigarettes as Litter (California, Florida, Hawaii, Massachusetts, Minnesota, South Carolina), Philip Morris, 21 Jul 1998. <http://legacy.library.ucsf.edu/tid/cba48d00> (accessed 14 Nov 2008).
- Issue Briefs, Philip Morris, 5 May 1998. <http://legacy.library.ucsf.edu/tid/vec52c00> (accessed 22 Jun 2009).
- PM USA Chairman's Briefing Book '990000, Philip Morris, 19 Feb 1999. <http://legacy.library.ucsf.edu/tid/xfz56c00> (accessed 28 Apr 2009).
- Tomb H, Philip Morris fights litter, Philip Morris, Feb 1999. <http://legacy.library.ucsf.edu/tid/gqo06c00> (accessed 1 Dec 2008).
- TAC Contingency Media Response to Enquiries About the Tidy Britain Group's 1993 UK Litter Survey, British American Tobacco, 1993. <http://legacy.library.ucsf.edu/tid/xhk30a99> (accessed 19 Jun 2009).
- N403 [News release: Coming to a street near you the FOREST pocket ashtray], Philip Morris, 15 Jun 1998. <http://legacy.library.ucsf.edu/tid/gco47d00> (accessed 14 Nov 2008).
- PM USA Programs: a Workplace Strategy, Philip Morris, 18 Jul 1997. <http://legacy.library.ucsf.edu/tid/cbt83c00> (accessed 28 Apr 2009).
- Cobar M, Holm P. *Additional Workplace Analysis*, Philip Morris, 06 Jun 1997. <http://legacy.library.ucsf.edu/tid/qek06c00> (accessed 28 Apr 2009).
- Workplace Business Owners' and Managers' Awareness, Attitudes and Opinions About Ventilation, Philip Morris, Jul 1998. <http://legacy.library.ucsf.edu/tid/iiv70b00> (accessed 11 Jun 2009).
- Johnston JW. *Thank You for Your Recent Inquiry to Louis Gerstner of RJR Nabisco and Me About Environmental Practices by the Tobacco Industry*, RJ Reynolds, 8 Jul 1992. <http://legacy.library.ucsf.edu/tid/rod11d00> (accessed 18 May 2009).
- Culley L, Eiger R, Folie M. *Re: Chairman's BB/TAP, Smoking Restrictions*, Philip Morris, 16 Feb 1998. <http://legacy.library.ucsf.edu/tid/bct94c00> (accessed 14 Nov 2008).
- Rogers H. *Gone Tomorrow: the Hidden Life of Garbage*. New York: The New Press, 2005.
- Keep America Beautiful. *KAB: A Beautiful History*, 2006. http://www.kab.org/site/PageServer?pagename=kab_history (accessed 25 Sep 2009).
- B&W, Minutes 13, Brown & Williamson, 1959. <http://legacy.library.ucsf.edu/tid/ofu30f00> (accessed 3 Dec 2008).
- B&W, Minutes, Brown & Williamson, 1962. <http://legacy.library.ucsf.edu/tid/pfu30f00> (accessed 3 Dec 2008).
- B&W, Minutes, Brown & Williamson, 1966. <http://legacy.library.ucsf.edu/tid/qfu30f00> (accessed 3 Dec 2008).
- Agencies Included in Contributions Program for the Year 670000, Philip Morris, 1967. <http://legacy.library.ucsf.edu/tid/zmz75e00> (accessed 25 Jan 2010).
- Meeting with Bob Tracey—771031, Philip Morris, 1977. <http://legacy.library.ucsf.edu/tid/khp64e00> (accessed 25 Jan 2010).
- Philip Morris News, Philip Morris, 1974. <http://legacy.library.ucsf.edu/tid/aaaf82e00> (accessed 25 Jan 2010).
- Cullman JF III, Weissman G. *Philip Morris Annual Report 690000*, Philip Morris, 1969. <http://legacy.library.ucsf.edu/tid/tsr65e00> (accessed 25 Jan 2010).
- Bowling JC, Cullman H, Cullman JF III, et al. *Philip Morris Incorporated Annual Report 700000. Part 1 of 2*, Philip Morris, 1970. <http://legacy.library.ucsf.edu/tid/usq02a00> (accessed 25 Jan 2010).
- Philip Morris Executive Shares Dais with President and First Lady at Civic Affair, Philip Morris, 1968. <http://legacy.library.ucsf.edu/tid/qdm02a00> (accessed 25 Jan 2010).
- Griscom TC. *Following are the Highlights of Activities in our External Relations Organizations for the Week of Jan 27–31, 1992 (920127-920131)*, RJ Reynolds, 31 Jan 1992. <http://legacy.library.ucsf.edu/tid/wej38c00> (accessed 18 May 2009).
- Griscom TC. *Following are the Highlights of Activities in Our External Relations Organizations for the Week of March 9–13, 1992 (920309-920313)*, RJ Reynolds, 13 Mar 1992. <http://legacy.library.ucsf.edu/tid/xsi38c00> (accessed 03 Dec 2008).
- Lester FG. *R. J. Reynolds Tobacco Company has Called North Carolina its Home for over 100 Years*, RJ Reynolds, 21 Jul 1995. <http://legacy.library.ucsf.edu/tid/ktf10d00> (accessed 18 Dec 2008).
- RJRT Environmental Program, RJ Reynolds, 1994. <http://legacy.library.ucsf.edu/tid/tur75a00> (accessed 18 May 2009).
- Places Update 990100 990200 Highlights, Philip Morris, 14 Mar 1999. <http://legacy.library.ucsf.edu/tid/psa82c00> (accessed 11 Jun 2009).
- Options' Urban Litter Initiative, Philip Morris, Apr 2000. <http://legacy.library.ucsf.edu/tid/khp35c00> (accessed 01 Jun 2009).
- Keep America Beautiful. *Cigarette Litter Prevention Program Reports 54% Decrease in 2007*, 2007. http://www.kab.org/site/PageServer?pagename=pressreleases_11_19_07 (accessed 28 Jul 2009).
- PM Corporate Affairs Robinson & Maites Litter Program Development Scope-of-Work, Philip Morris, 16 Sep 1997. <http://legacy.library.ucsf.edu/tid/bhm16c00> (accessed 14 Nov 2008).
- Robinson & Maites. *[The R&M creative brief]*, Philip Morris, 7 Apr 1998. <http://legacy.library.ucsf.edu/tid/ovg27d00> (accessed 05 Dec 2008).
- Places Strategy Senior Team Presentation, Philip Morris, 22 Jun 1999. <http://legacy.library.ucsf.edu/tid/gew94a00> (accessed 12 Jun 2009).
- Anon. *New Keep America Beautiful litter initiative to focus on cigarette litter. KAB Network News 2002 Fall*; page 2. http://www.kab.org/site/DocServer/nn_fall02.pdf?docID=129.
- Keep America Beautiful. *Cigarette litter prevention program*, 2009. http://www.kab.org/site/PageServer?pagename=CLPP_landing (accessed 28 Jul 2009).
- Philip Morris USA. *Reducing our environmental impact: cigarette butt litter prevention*, 2010. http://www.pmsusa.com/en/cms/Responsibility/Reducing/Reducing_Our_Environmental_Impact/Cigarette_Butt_Litter_Prevention/default.aspx?src=top_nav (accessed Jan 26 2010).
- Keep America Beautiful. *International affiliates*, 2006. http://www.kab.org/site/PageServer?pagename=Affiliate_State_International (accessed 2 Feb 2010).

58. **Maxwell H.** Philip Morris Limited Five Year Management Plan 760000—800000 Part II, Philip Morris, Mar 1975. <http://legacy.library.ucsf.edu/tid/cpi42e00> (accessed 10 Jun 2009).
59. **N403 [Please Bin Your Butts: Research on Cigarette Littering, Stage 3-Smoker Survey]**, Philip Morris, 1998 Jan 5. <http://legacy.library.ucsf.edu/tid/hkq47d00> (accessed 14 Nov 2008).
60. **Keep Australia Beautiful.** Bin your butt: Butts, buildings, and businesses. 2010. <http://www.kabc.wa.gov.au/programs/bin-your-butt/index.html> (accessed 1 Feb 2010).
61. **Keep Australia Beautiful.** Cigarette butt litter, 2006. <http://www.kabc.wa.gov.au/kab/litter-reporting/cigarette-butts.html> (accessed 1 Feb 2010).
62. **Chapman S.** Butt clean up campaigns: wolves in sheep's clothing? *Tob Control* 2006;**15**:273.
63. **Butt Free Australia.** Butt free Australia: background, 2009. <http://www.butfree.org.au/about-us/background.html> (accessed 4 Feb 2010).
64. **Butt Free Australia.** Butt free Australia: funding, 2009. <http://www.butfree.org.au/about-us/our-funding.html> (accessed 4 Feb 2010).
65. **Butt Free Australia.** Responding to health issues, 2009. <http://www.butfree.org.au/about-us/health-issues.html> (accessed 4 Feb 2010).
66. **Butt Free Australia.** Butt free Australia: solutions, 2009. <http://www.butfree.org.au/addressing-butt-littering/butt-free-solutions.html> (accessed 4 Feb 2010).
67. **Luke JA.** Action following the Environmental Steering Group Meeting held on Tuesday, 9th November 1993 at Woking, British American Tobacco, 9 Nov 1993. <http://legacy.library.ucsf.edu/tid/pre00a99> (accessed 2 Dec 2008).
68. **Swan D.** Tidy Britain Group - 1993 UK Litter Group, British American Tobacco, 1993 Aug 20. <http://legacy.library.ucsf.edu/tid/one00a99> (accessed 19 Jun 2009).
69. **Keep Britain Tidy.** About us. 2010. <http://www.keepbritaintidy.org/> (accessed May 20 2010).
70. **Public Policy Environmental Programs,** RJ Reynolds, May 1991. <http://legacy.library.ucsf.edu/tid/smr14d00> (accessed 14 Apr 2009).
71. **Executive Summary of Paper on PM Environmental Giving,** Philip Morris, 1994. <http://legacy.library.ucsf.edu/tid/rrd32c00> (accessed 12 Dec 2008).
72. **Griscom TC.** Following are the Highlights of Activities in our External Relations Organizations for the Week of January 18—22, 1993 (930118-930122), RJ Reynolds, 22 Jan 1993. <http://legacy.library.ucsf.edu/tid/uhg33d00> (accessed 18 May 2009).
73. **Griscom TC,** RJR. Weekly Report. Following Are the Activities in Our External Relations Department for the Week of June 13-June 17, 1994 (940613—940617), RJ Reynolds, 1994 Jun 27. <http://legacy.library.ucsf.edu/tid/aow43d00> (accessed 18 May 2009).
74. **Meyne R.** Ongoing Programs, RJ Reynolds, 1998 Feb 10. <http://legacy.library.ucsf.edu/tid/vpl70d00> (accessed 18 May 2009).
75. **Whitt DD.** Salem APET Packaging General Statement and Q & As, RJ Reynolds, 1991 Nov 12. <http://legacy.library.ucsf.edu/tid/nva27a00> (accessed 18 May 2009).
76. **Annese B.** Weekly Report for Jim Johnston's Weekly Report, RJ Reynolds, 12 Jul 1991. <http://legacy.library.ucsf.edu/tid/hfd03d00> (accessed 18 May 2009).
77. **Griscom TC.** Following are the Highlights of Activities in Our External Relations Organizations for the Week of September 2-6, 1991 (910902) - (910906), RJ Reynolds, 1991 Sep 6. <http://legacy.library.ucsf.edu/tid/ksv28c00> (accessed 18 May 2009).
78. **WRA bi-Annual Meeting Environmental Policy Presentation 20000718-Nantucket,** Massachusetts, Philip Morris, 2000 Jul 18. <http://legacy.library.ucsf.edu/tid/cpk19c00> (accessed 18 Dec 2008).
79. **Lund N.** Revised Strategy and Actions Presentation, Philip Morris, Oct 1999. <http://legacy.library.ucsf.edu/tid/yex75c00> (accessed 27 Apr 2005).
80. **Kaufman L.** Cigarette butts: tiny trash that piles up. *New York Times* 2009 May 29; page 12.
81. **FYI.** FYI, Philip Morris, 2001 Feb 28. <http://legacy.library.ucsf.edu/tid/zjk48c00> (accessed 1 Dec 2008).
82. **Higgins AJ,** Correspondent G. He sees redeeming value in litter: man seeks 5-cent deposits on cigarette butts in Maine. *The Boston Globe* 2001 Jan 28; Sect. F, page 9.
83. **Albert JP.** Maine Butts, RJ Reynolds, 2001 Mar 12. <http://legacy.library.ucsf.edu/tid/igl60d00> (accessed 27 Apr 2009).
84. **Higgins AJ.** Cigarette butt bill goes to committee; Revenue source, anti-litter aspects cited. *Bangor Daily News (Maine)* 2001 Feb 20; Sect. A, page 1.
85. **Butt wars;** reducing the litter from cigarette smokers. *The Record (Bergen County, NJ)* 2001 Aug 27; Sect. I, page 06.
86. **Deposit on cigarette butts isn't really a terribly hot idea;** Its sponsors may think the plan is matchless, but they should pack it in. *Portland Press Herald* 2001 Jan 20; Sect. A, page 8.
87. **Hall L.** Making Maine the butt of a joke. *The Star-Ledger* 2001 Feb 21; Sect. 1, page 15.
88. **Baeder B.** Bill addresses butt of problem. *Whittier (CA) Daily News* 2005 Apr 27; Sect. News.
89. **Smokers:** Butt out of the litter habit. *Boston (MA) Globe* 2009 May 20; page 12.
90. **Sabatini J.** Smoking getting more pricey. 2009. Updated July 7. <http://www.sfexaminer.com/local/SF-cigarette-fee-approved-50175467.html> (accessed 1 Feb 2010).
91. **Knight H.** S.F.'s 20-cent cigarette fee headed to court? *San Francisco Chronicle* 2010 Jan 10; Sect. C, page 1.
92. **Teitelbaum S.** Description of Non-Smoker Segments—Flash Report, Philip Morris, 1994 Jun 1. <http://legacy.library.ucsf.edu/tid/kfv25e00> (accessed 28 Apr 2009).
93. **Qualitative Assessments of Outdoor Smoking Bans,** Philip Morris, Jan 2001. <http://legacy.library.ucsf.edu/tid/arr82c00> (accessed 4 Dec 2008).
94. **Clean Virginia Waterways.** Cigarette butt litter: How many discarded cigarette butts are there? 2008. <http://www.longwood.edu/cleanva/cigbutthowmany.htm> (accessed 21 Jan 2010).
95. **Balbach ED,** Smith EA, Malone RE. How the health belief model helps the tobacco industry: Individuals, choice, and "information". *Tob Control* 2006;**15**(Suppl 4):iv37—43.
96. **Landman A,** Ling PM, Glantz SA. Tobacco industry youth smoking prevention programs: protecting the industry and hurting tobacco control. *American Journal of Public Health* 2002;**92**(6):917—30.
97. **British American Tobacco.** The British American Tobacco Biodiversity Partnership, 2008. <http://www.batbiodiversity.org/> (accessed 3 Feb 2010).
98. **Schneiderman R.** Electronic waste: be part of the solution, 2004. Updated April 12. <http://electronicdesign.com/article/components/electronic-waste-be-part-of-the-solution7820.aspx> (accessed 22 Jan 2010).
99. **Electronics TakeBack Coalition.** State legislation, 2009. <http://www.computertakeback.com/legislation/state-legislation.htm> (accessed 1 Feb 2010).
100. **Chaloupka FJ.** Macro-social influences: The effects of prices and tobacco-control policies on the demand for tobacco products. *Nicotine Tob Res* 1999;**1**(Suppl 2): S77—81.
101. **Ahmad S.** Increasing excise taxes on cigarettes in California: a dynamic simulation of health and economic impacts. *Prev Med* 2005;**41**:276—83.
102. **Hyland A,** Bauer JE, Li Q, et al. Higher cigarette prices influence cigarette purchase patterns. *Tob Control* 2005;**14**:86—92.
103. **National Cancer Institute.** Risks associated with smoking cigarettes with low machine-measured yields of tar and nicotine. Washington, DC: U.S. Department of Health and Human Services, Public Health Institute, National Institutes of Health 2001. Report No.: 13.
104. **Brooks DR,** Austin JH, Heelan RT, et al. Influence of type of cigarette on peripheral versus central lung cancer. *Cancer Epidemiol. Biomarkers Prev* 2005;**14**:576—81.
105. **Geist HJ.** Global assessment of deforestation related to tobacco farming. *Tob Control* 1999;**8**:18—28.
106. **Gene Shore Associates.** R.J. Reynolds Vantage Equity Positioning Focus Groups II, RJ Reynolds, 1992. <http://legacy.library.ucsf.edu/tid/tsj13d00> (accessed 16 Sep 2009).
107. **Gene Shore Associates.** R.J. Reynolds Vantage Positioning Communication Exploratory Focus Groups, RJ Reynolds, 1992. <http://legacy.library.ucsf.edu/tid/ssj13d00> (accessed 3 Dec 2008).
108. **Gene Shore Associates.** R.J. Reynolds Vantage Positioning Communication Exploratory Focus Groups II, RJ Reynolds, 1993. <http://legacy.library.ucsf.edu/tid/dqw13d00> (accessed 1 Dec 2008).
109. **R.J. Reynolds Tobacco Co./Robinson & Maites, Inc.** Wednesday, August 4, 1993 (930804). Positioning background, RJ Reynolds, 1993 Aug 3. <http://legacy.library.ucsf.edu/tid/mmx13d00> (accessed 5 Dec 2008).
110. **Vantage Marketing Plan,** RJ Reynolds, 1993 Apr 30. <http://legacy.library.ucsf.edu/tid/egt85a00> (accessed 16 Sep 2009).
111. **Vantage,** RJ Reynolds, 1993. <http://legacy.library.ucsf.edu/tid/hhj75a00> (accessed 16 Sep 2009).
112. **Enjoy Vantage Almost Anywhere and Help Prevent Litter at the Same Time!!**, RJ Reynolds, 1996. <http://legacy.library.ucsf.edu/tid/sig01d00> (accessed 23 Sep 2009).
113. **Weekly activity report for R.J. Reynolds Tobacco Company.** Promotion: Keep America Beautiful Pocket Ashtray (T90), RJ Reynolds, 1997 Sep 5. <http://legacy.library.ucsf.edu/tid/xdg01d00> (accessed 17 Sep 2009).