

# The Automobile and the Regulation of Some of Its Non-Exhaust Impacts on the Environment\*

By Frank Grad, Albert J. Rosenthal *et al.*

## INTRODUCTION

The automobile lies at the heart of one of our country's most profound environmental and economic dilemmas. The mass availability of automotive transportation has become an integral part of the American life style, and the production, distribution and servicing of automobiles and the related fuel industry have become major elements of the American economy. In addition, a vast number of other industries and commercial interests (such as, notably, highway building and the recreation industry), as well as many urban concerns are related to the automobile. While the automobile is a mainstay of the American economy, a whole set of side effects—from the contribution to deterioration of air quality in urban areas, to urban congestion and urban noise—have made the automobile one of the principle foci of environmental, and most recently, energy, concerns.

It was to describe and analyze these side-effects, as well as to examine current and possible future means of minimizing environmental hazards, that a study was begun in September 1971—funded by the National Science Foundation (RANN—Research Addressed to National Needs), and sponsored by the Special Committee on Science and Law of the Association of the Bar of the City of New York, which also acted as advisory committee to the project.

The results of that study have recently been published by the Legislative Drafting Research Fund under the title *The Automobile*

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*and the Regulation of Its Impact on the Environment.*† The main emphasis of the study—as in most recent studies that focus on the automobile—was on problems of the regulation of automotive air pollution. The chapters here reproduced—Chapters 10, 11, and 12—however, deal with other aspects of the environmental impact of the automobile—in the areas of noise, water pollution and solid waste—that should receive greater attention than they have in the past.

The investigators primarily responsible for the work are Professors Frank P. Grad and Albert J. Rosenthal, of Columbia Law School, who acted as co-directors of the study at the Legislative Drafting Research Fund, and Laurie R. Rockett, associate director; Professors James A. Fay and John Heywood, at the Massachusetts Institute of Technology, who assumed responsibility for the technical automotive portion of the study; and Professors John F. Kain, Gregory Ingram, and David Harrison at the Harvard University Department of Economics, and Thomas Tietenberg at Williams College, who were responsible for the economic analysis.††

#### NOISE POLLUTION CONTROL OF THE AUTOMOBILE

By Albert J. Rosenthal and Richard Hsia

Noise is increasingly being recognized as an element of environmental pollution. Sustained exposure to excessive noise levels gives

† F. GRAD, A. ROSENTHAL, *et al.*, *THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT*, pp. XIV, 481 (The Oklahoma University Press, Norman, Okla., 1975).

†† In addition, a number of other professionals made substantial contributions to the study. At Columbia University, special mention must be made of Jack Battaglia, who, as staff attorney, ably served the project for almost two years, and was responsible for significant parts of the legal research, and of staff attorney Stephen Munzer, who, during the last year of the study, added to the legal research and effectively helped to shape and prepare the final manuscript for submission.

Appreciation is due, too, to the members of the devoted staff of student research assistants, who participated in the project in various research capacities during their second and third years at Columbia Law School: John E. Baumgardner (Columbia 1975), Vivian Adler Berger (J.D. Columbia 1973), Barry A. Dubin (J.D. Columbia 1973), Lois B. Gordon (Columbia 1975), Richard Hsia (J.D. Columbia 1974), Stephen Lew (Columbia 1975) Christopher Mayer (J.D. Columbia 1974), Jean H. Meader (J.D. Columbia 1972), Gregory Paul (J.D. Columbia 1973), Eric Ranney (J.D. Columbia 1974), Stephen Ratner (J.D. Columbia 1974), Steven L. Schwarcz (J.D. Columbia 1974), Robert P. Sugarman (Columbia 1975), Robert A. Weiner (J.D. Columbia 1973), Henry Welt (J.D. Columbia 1972), and Jo-Ann Whitehorn Tisman (J.D. Columbia 1972). At Harvard University, other participating professional staff included Gary Fauth and Eugene A. Kroch.

rise to hearing loss, and may well have other deleterious health effects, of both a physiological and a psychological nature. In addition, there are adverse impacts on the quality of life, including interference with conversation, impairment of concentration and the ability to work, and interruption of sleep. Less measurable consequences may include individual irritability and, in the aggregate, social friction.<sup>1</sup>

## Sources

### Automobiles

Noise created by the normal operation of most models of automobiles is of comparatively small importance, whether measured against other environmental consequences of the automobile or against the noise emitted by other types of motor vehicles, such as trucks and motorcycles. Although automobiles constitute, by far, most of the mobile sources,<sup>2</sup> it is arguable whether, either objectively or subjectively considered, automobiles are too noisy. That they are not, or at least need not be, is the consensus.<sup>3</sup> Nevertheless, be-

1. For documentation of these physical and social effects, see U.S. ENVIRONMENTAL PROTECTION AGENCY, NOISE FACTS DIGEST 02-001 to 03-023 (1972) (listing and abstracting all recent and relevant studies); Hildebrand, *Noise Pollution: An Introduction to the Problem and an Outline for Future Legal Research*, 70 COLUM. L. REV. 652, 655-65 (1970) [hereinafter cited as Hildebrand]; *Hearings on Noise: Its Effect on Man and Machine Before the Special Investigating Subcomm. of the House Comm. on Science and Astronautics*, 86th Cong., 2d Sess. (1960). See generally C. BRADON, NOISE POLLUTION: THE UNQUIET CRISIS (1971); W. BURNS, NOISE AND MAN (1968).

2. Through 1972, there were 118,618,162 registered vehicles in the United States, of which only 19,802,490 were trucks. THE WORLD ALMANAC 1974, at 141, 138.

3. See, e.g., ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, URBAN TRAFFIC NOISE: STRATEGY FOR AN IMPROVED ENVIRONMENT 11-12 (1969) [hereinafter cited as OECD]. Hildebrand, *supra* note 1, at 672, remarks that "[p]assenger car traffic . . . need not necessarily be irritating; many new car models are being equipped with better exhaust silencers and specially designed quiet tire treads." See also Angiola, Marshall & Thornton, Motor Vehicle Noise and the Proposed New York City Noise Control Code 3, 13 (1972) (unpublished seminar paper on file with the Legislative Drafting Research Fund of Columbia University) [hereinafter cited as Angiola *et al.*, N.Y.C. Motor Vehicle Noise]: "Cars, while numerically the largest user of the roads, are the least of the noise problem. Almost never, judging from more than two hours of measuring all kinds of vehicles that passed by, stopped, started, went uphill, downhill, or level, does a car produce more than 80 db(A) at a distance of 25 feet from the center of the lane in which it is traveling . . . Cars . . . are not a noise problem."

Compare Young, Noise Abatement—A Balanced Approach 174 (1972) (Society of

cause of the cumulative effect of exhaust and air intake systems, the engine, interaction of tires with road surface, and the aerodynamic "swish" of moving cars,<sup>4</sup> noise from automobiles may reach disturbing levels.<sup>5</sup>

The volume and pace of traffic is a critical element in the total level and quality of sound emitted. At the same distance, two identical automobiles will yield a noise level about 3 dB(A) higher than will one, four will yield 6 more dB(A) than one, while sixteen cars will emit 12 dB(A) more noise than a single automobile—subject only to some diminution by reason of the masking effect that a nearer car may have upon the sound waves emanating from one behind it.<sup>6</sup> If the volume of traffic creates congestion, the same

Automotive Engineers (SAE) Paper No. 720626), where it is said that "[w]e should attempt to lower noise levels so that health effects are eliminated. However, when this abatement level is achieved, we must resist extreme haste in further reduction of noise levels to reduce annoyance, until a proper technological and economic base is established. There is a totally inadequate long range research base on psycho-acoustic affects [*sic*] of noise on humans, and rapid reduction of standards to levels significantly below those required for physical safety is simply not needed or warranted by the present data base." Moreover, "[p]eople, even skilled noise experts, continue to become confused about pass-by noise which, in general, is not a health or safety problem due to short exposure times. It is primarily an annoyance or welfare problem. The most difficult problems are in consideration of noise as annoyance, measurement methods and enforcement." *Id.* at 176.

4. On the various sources of noise from automobiles see, *e.g.*, OECD at 25, 39 (fast-moving traffic, engine exhaust); Lyon, Noise Mechanisms in Automobiles and Trucks 1-3 (Lecture No. 15 in series Noise and Vibration in Transportation Systems, Apr. 7, 1970) (on file with the Legislative Drafting Research Fund of Columbia University) [hereinafter cited as Lyon, Noise Mechanisms] (engine exhaust, fan blade, gear box, tires, aerodynamic sources).

5. Concern with noise as an environmental problem and pollutant has been growing. In surveys of public opinion taken in urban areas, motor vehicle traffic is generally rated as the most distressing source of noise. In particular consult OECD at 21 *et seq.*; Bolt, Beranek and Newman, Inc., Analysis of Community Noise and a Plan for Noise Control for City of Boston Air Pollution Control Commission 17 *et seq.* (Rept. No. 2069, March 1971) [hereinafter cited as Bolt, Beranek and Newman, Inc.]. See also Lyon, Urban Noise Propagation 2 (Lecture No. 18 in series Noise and Vibration in Transportation Systems) [hereinafter cited as Lyon, Urban Noise Propagation]; Waters & Priede, Origins of Diesel Truck Noise and Its Control 256 (1972) (SAE Paper No. 720636) [hereinafter cited as Waters & Priede, Diesel Truck Noise].

6. A decibel is a comparative measure of sound pressure, recorded on a logarithmic scale. An increase of 10 decibels represents a sound pressure level 10 times as high. The "A" scale, generally employed to measure harm or annoyance to people, is weighted to reflect the characteristics of the human ear; it accords lower value to extreme, although audible, frequencies, assigning especially reduced weight to lower frequencies. A doubling in pressure means an increase of about 3 decibels. See U.S. ENVIRONMENTAL PROTECTION AGENCY, NOISE FACTS DIGEST 168, 174 (1972).

number of cars stopping and going, rather than flowing freely, will emit substantially higher noise levels.<sup>7</sup> The congestion endemic to urban centers aggravates a noise problem which reflection among buildings and sheer proximity make inevitable.<sup>8</sup> With each halving of distance between sources and listeners, sound pressure increases 6 dB(A).<sup>9</sup>

## Trucks

Despite the numerical preponderance of automobiles, where traffic consists of a mixture of automobiles and trucks, truck noise is likely to be so dominant as to make insignificant the contribution from automobiles.<sup>10</sup> Trucks emit sound levels which, on the average, are 10 to 15 decibels higher than those from cars.<sup>11</sup> The typical truck, in other words, generates between 10 to 32 times the sound pressure a properly maintained automobile can produce.<sup>12</sup> Assuming a differential of only 10 dB(A), the noise from a traffic mix which is 90 percent automobiles and 10 percent trucks would be dominated by truck noise; where the differential is 15 dB(A), a 3-4 percent truck mix would be sufficient to dominate.<sup>13</sup>

7. Bolt, Beranek & Newman, Inc., at 51.

8. See generally MAYOR'S TASK FORCE ON NOISE CONTROL, TOWARD A QUIETER CITY (New York City, 1970). See also OECD at 47.

9. Sound pressure generally varies with the inverse square of the distance from the source. Hence a doubling of distance would be measured by a 6 decibel reduction. See Lyon, *Automotive Noise Propagation in Open Areas* (Lecture No. 17 in series *Noise and Vibration in Transportation Systems*, Apr. 9, 1970) (on file with the Legislative Drafting Research Fund of Columbia University). See also Gatley & Frye, *Regulation of Noise in Urban Areas II-7* (August, 1971).

10. Bolt, Beranek and Newman, Inc., at 51. See also OECD at 28.

11. OECD at 26. See also Lyon, *Noise Mechanisms* at 5. For empirical confirmation see Angiola *et al.*, *N.Y.C. Motor Vehicle Noise*, at 4.

12. A comprehensive study of the relation between subjective rating of noise emitted by motor vehicles and objective decibel measurements with a sound level meter reveals that commercial vehicles are seldom able to comply with the 80 dB(A) criterion which appears to represent the demarcation line between "acceptable" and "noisy" for most vehicles. Indeed, many trucks reach the "excessively noisy" level of 92 to 95 dB(A). Waters & Priede, *Diesel Truck Noise*, at 257. Unless otherwise indicated, dB(A) levels stated herein reflect measurements made at a distance of 50 feet.

13. It has been said that on the average, as a practical matter, trucks will contribute equally to the median sound level when the density of trucks is 6 percent of the automobile density. Furthermore, 5 percent truck traffic will increase median sound levels by 3 dB(A), while boosting the standard deviation by about a factor of 3. Lyon, *Noise Levels Produced by Freely Flowing Traffic* 9 (Lecture No. 16 in

Trucks and automobiles are fundamentally different with respect to noise characteristics. Data on mixed traffic suggests that automobile noise rises 9 dB(A) for every doubling of average road speed;<sup>14</sup> truck noise, on the other hand, is largely independent of road speed.<sup>15</sup> Instead, truck noise and the rate of increase of truck noise are controlled mainly by the power unit.<sup>16</sup> For the sake of efficiency, trucks are usually operated at, or close to, full power.<sup>17</sup> Running the power unit at higher engine speeds produces greater power.<sup>18</sup> Full-power—maximum-speed operation makes lighter, more compact engines possible. As a result, vehicle weight for the same load-carrying capacity is reduced.

There are limits on the extent to which truck engine size and weight can be reduced, however. As a practical matter, truck engines will always be substantially larger than automobile engines,<sup>19</sup> and larger engines make louder noises.<sup>20</sup>

series Noise and Vibration in Transportation Systems, Apr. 9, 1970) (on file with the Legislative Drafting Research Fund of Columbia University) [hereinafter cited as Lyon, *Freely Flowing Traffic*]. See also Lyon, *Noise Mechanisms*.

Noise levels and annoyance also vary with the type of truck. For example, "[a]t speeds between 40 and 49 mph about 10 percent of dump trucks (the noisiest of standard trucks) exceed the 84 dB(A) level, while only 10 percent have a level lower than 78 dB(A). The mode distribution is about 82 dB(A). These values are all about 10 decibels higher than corresponding values for passenger cars . . . ." OECD at 28.

14. OECD at 29.

15. Lyon, *Freely Flowing Traffic*, at 9. To the extent that truck noise is caused by tires, however, speed is an important factor.

16. Waters & Priede, *Diesel Truck Noise*, at 258.

17. OECD at 28; Ringham, *The Truck Noise Problem, and What Might Be Done About It 154* (1972) (SAE Paper No. 720624) [hereinafter cited as Ringham, *Truck Noise Problem*]; Waters & Priede, *Diesel Truck Noise*, at 256. While this factor applies primarily to diesel, rather than gasoline, powered trucks, the former have increasingly come to dominate the field. See p. 443, *infra*.

18. Waters & Priede, *Diesel Truck Noise*, at 256.

19. "[E]verything in the mechanical system of a truck is bigger and heavier and presents larger radiative surfaces when compared with the automobile." OECD at 28.

20. Waters & Priede state that "[t]he larger engine structure will be excited by considerably greater forces (in an engine, piston area is increased while the pressure per unit area is maintained the same). . . ." Noise will increase 15-17 decibels per tenfold increase of engine cylinder volume. But the rate of increase of noise with engine size is less than that with engine speed. Moreover, because piston speed constitutes the design limitation in engines, larger engines must operate at lower speeds than smaller engines. Thus it may be that, for diesel engines of different size running at their rated speeds, the level of noise will be approximately the same, despite wide disparities in the power ratio. In short, engine noise is generally independent of the volume of work done per unit time, or horsepower, and the main criterion is the operational speed of the size of the time interval within which the operation of one

The truck noise problem, moreover, is not due solely to size. Gasoline engines for trucks, on account of cost considerations, have been replaced in commercial usage by diesel engines which consume only half as much fuel. The more efficient diesel engines operate at considerably higher peak pressure and higher rates of pressure rise which, in turn, create noise and vibration.<sup>21</sup> Power strokes in the combustion chamber create pressure increases, which in turn cause engine casing radiation, sometimes called "diesel knock."<sup>22</sup> Its intensity, depending on the combustion system, will increase at a rate of 28 to 40 dB(A) per tenfold increase of engine speed.<sup>23</sup> Diesel knock, engine exhaust, and fan and tire noise are the chief generators of truck noise.<sup>24</sup>

Thus significant progress toward a quieter environment depends upon reduction in truck, not auto, noise.<sup>25</sup> It had been generally believed that such a reduction would be expensive and, if required, would contribute significantly to the cost of food and many other necessities that are transported principally by truck. Certainly any technological solution must take cognizance of costs.<sup>26</sup> Experimental prototype trucks, developed and tested under the sponsorship of the

cycle of events is being performed by the machine. Waters & Priede, *Diesel Truck Noise*, at 263.

21. *Id.* at 256.

22. *Id.* at 260; OECD at 42.

23. Waters & Priede, *Diesel Truck Noise*, at 259.

24. Lyon, *Noise Mechanisms*, at 5; Ringham, *Truck Noise Problem*, at 155.

25. During 1971, 371,074 heavy-duty trucks were tested in a survey by the California Highway Patrol. Cooper, *California Laws and Regulations Relating to Motor Vehicle Noise 363-64 (1972)* (SAE Paper No. 720655). That only 1.9 percent of trucks sampled under 35 mph exceeded the California standard of 88 dB(A) at 50 feet, and only 1.5 percent were found in violation overall means that the standards are too lenient, not that trucks are sufficiently quiet. Young, *Noise Abatement—A Balanced Approach 174 (1972)* (SAE Paper No. 720626). See also presentation by Warren M. Heath, California Highway Patrol, at the American Industrial Hygiene Conference in San Francisco, May 17, 1972. By 1988, new trucks will have to meet a 70 dB(A) standard, as decibel limits will be made progressively more stringent. *Id.* at 17.

26. Waters & Priede, *Diesel Truck Noise*, at 256, remark that "road transport is generally very cost conscious. Economy is therefore one of the prime factors which has so far dictated the development of vehicle design and operational methods." See also Young, *supra* note 25, at 175: "If reasonable reductions of noise emission levels are accepted, cost increase may be measurable, but not excessive. Large reductions such as 6 dB(A) . . . or more may cause large cost increases, at least for some classes of engine powered equipment." Similarly, the OECD report observes: "Of course, noise levels cannot be reduced except at a price. What is often forgotten, however, is that there may also be a price to be paid for a passive attitude of doing nothing." OECD at 11. See also Ringham, *Truck Noise Problem*, at 157.

Department of Transportation, however, have yielded encouraging results, and it is quite possible that heavy trucks can be produced, without cost penalties, that would be no noisier than small automobiles.<sup>27</sup> If so, a major breakthrough in the control of traffic noise will have been accomplished.

Nevertheless, if the problem is to be approached through control of new trucks only, results will be discernible at an even slower pace than that predicted with respect to the impact of the automobile on air quality, given the much longer average useful life of a truck. If retrofitting of trucks now on the road is required, the costs not only in installation but also of maintenance are likely to be substantial. It will ultimately be a question for the public to decide whether, and then to what extent, the quieting of trucks is worth the price. In answering this question, the public must keep in mind that a quiet environment cannot truly be achieved without quiet trucks. Unless corresponding truck-design modifications come about, technological improvements which produce quieter automobiles will have negligible environmental impact.

### Buses

Despite their comparable size and use of the diesel engine, buses tend to be significantly quieter than trucks.<sup>28</sup> Although this might suggest that, to some extent, the technology for significant abatement of truck noise is presently available, buses themselves remain too noisy whether idling or accelerating. Because the primary functions of trucks and buses are different, technology which could substantially reduce bus noise would be infeasible for trucks. Far more easily than trucks, for example, buses could be outfitted with electric batteries that must be periodically recharged or exchanged.<sup>29</sup> Steam

27. See, e.g., Kaye, Patterson & Bender, Preliminary Noise Diagnosis of Freightliner Datum Truck-Tractor (Rep. No. DOT-TST-73-6, 1973); Kaye & Ungar, Acoustic and Performance Test Comparison of Initial Quieted Truck with Contemporary Production Trucks (Rep. No. DOT-TST-74-2, 1973).

28. Apparently, buses "produce significantly less noise than trucks of comparable size" because of "superior intake and exhaust silencers and acoustic treatment of the engine compartment." OECD at 28. "New York City buses are an amazingly consistent noise source. Passing by, they invariably registered in the low 80's, and most of them produced levels around 87 dB(A) when accelerating from rest . . . Buses . . . are not the problem, trucks are." Angiola *et al.*, N.Y.C. Motor Vehicle Noise, at 3, 11-12.

29. Electric buses which are "so quiet the only way one knew the engine was running was because the bus was moving" will provide the exclusive mode of trans-



buses<sup>30</sup> have been found to emit less exterior noise than diesel buses, but interior sound levels were similar or higher.<sup>31</sup> They do, however, reportedly produce up to 30.5 percent less carbon monoxide and up to 86 percent less hydrocarbons and oxides of nitrogen than conventional diesel buses.<sup>32</sup> Unfortunately steam buses appear to consume up to three times as much fuel as conventional diesel buses.<sup>33</sup>

### Other Vehicles

No technological barrier, however, prevents manufacturers and owners of motorcycles and sports cars from conforming to the noise levels of passenger cars generally.<sup>34</sup> Indeed, there is reason to believe that motorcycles and sports cars are sometimes deliberately manufactured—or later doctored—to generate high noise levels to meet a supposed consumer preference. If noise performance standards for autos, sports cars, and motorcycles, as well as deadlines for meeting such standards, were set pursuant to criteria of necessity and utility, neither motorcycles nor sports cars could, in the context of available noise-control technology, claim the social utility that may in the cases of trucks and buses temporarily justify excessive noise.<sup>35</sup> This would mean immediately forbidding all new automobiles, motorcycles, and sports cars from emitting more sound than the quietest of the standard models of automobiles now on the

portation on Roosevelt (formerly Welfare) Island. N.Y. Post, May 22, 1973, at 10, col. 3. See also N.Y. Times, June 1, 1973, at 39, col. 3 (Long Beach, N.Y., is testing an electric bus that “makes no noise and emits no gasoline fumes”).

30. Steam buses utilize “Rankine” cycle external combustion engines which burn kerosene or diesel oil outside the engine itself, generating the energizing steam.

31. N.Y. Times, April 8, 1971, § 1A, at 16, col. 1.

32. *Id.*

33. *Id.*

34. Although sports and passenger cars are equally noisy at freeway speeds, sports cars are considerably more noisy when accelerating. OECD at 26, 39-40. In comparative terms, “one motorcycle is as noisy as 30 passenger cars going by simultaneously . . .” Lyon, Noise Mechanisms, at 4. “Manufacturers have been given no incentive [or compulsion] for redesigning a system that is adequate for the space,” assuming it to be limited. OECD at 39. Indeed, the smaller engines of motorcycles imply that noise performance standards should be more stringent for motorcycles than for automobiles. For existing state regulation of motorcycle noise, see U.S. ENVIRONMENT PROTECTION AGENCY, LAWS AND REGULATORY SCHEMES FOR NOISE ABATEMENT 1-80 to 1-82 (1971) [hereinafter cited as LAWS AND REGULATORY SCHEMES].

35. Such criteria in the wake of expanding technological knowledge would suggest a progressive tightening of noise control standards which would be lowered as the necessity for noise became less and the increased cost compared to the utility of quiet was reduced.

road.<sup>36</sup> Such an approach does not bar technological progress, but simply recognizes that a major program for redesign of automobiles for the purpose of noise control is not required—at least until significant improvement in truck noise has been accomplished.

### *Relationship Between Automobile Noise Control and Emissions Control*

Because noise-control technology forcing is not required, control strategies to deal with noise pollution and with air pollution from automobiles appear at first blush to diverge. Yet control of air pollution which is possible only by improved technology is not at all incompatible with noise-pollution control. Indeed, they may be mutually reinforcing. For example, while converting noxious fumes into innocuous gases, a catalytic muffler, by filtering the exhaust, will at the same time assist the regular muffler. Depending on the alternative selected, noise reduction might still be a by-product even if alternatives to the internal combustion engine are developed or required for the purpose of satisfactory air pollution control. An automobile that is powered by an electric engine, for example, will be low-polluting—with respect to both air and noise. A gas turbine engine, on the other hand, may help reduce pollution, but add to the din.<sup>37</sup> Some, but not all, less radical engine redesigns would also be less quiet than the conventional internal combustion engine.

In general, when speaking of noise, fewer pieces mean greater peace. Lighter, smaller, and with far fewer moving parts, the

36. The OECD Transportation Task Force recommends that noise standards be set "in terms of the noise emission characteristics of the quietest 10 percent of the vehicles in each category." OECD at 12. A "category" test might be reasonable at the consumer level but not at the manufacturing stage if "category" is interpreted to mean "model." Setting standards in this fashion avoids the question whether noise standards should be set for people of average noise sensitivity, as some have suggested (Young, *supra* note 24, at 177), or for people of extraordinary sensitivity to noise. See generally Lyon, *Criteria, Standards and Limits for Traffic Noise* (Lecture No. 19 in series *Noise and Vibration in Transportation Systems*, Apr. 21, 1970) (on file with the Legislative Drafting Research Fund of Columbia University).

37. Greater attention directed at the noise problem might succeed in refining the noise characteristics of the gas turbine engine. Prototypes have shown improvement in this regard. Indeed, "gas turbine engines have been praised for their low noise levels—the engine gives off a subdued canine whine, instead of the familiar feline purr that turns into a roar when the diesel engine accelerates." Since gas turbines produce a different type of noise, albeit quieter, than that of piston engines, road engineers and vehicle designers are likely to continue to face noise problems in the future." Hildebrand, *supra* note 1, at 673.

Wankel rotary engine<sup>38</sup> not only holds promise for meeting the Clean Air Act standards but, in addition, possesses a low noise potential. Instead of pistons pumping up and down, the rotary motion means quieter, vibration-free performance. In contrast, inasmuch as the stratified-charge engine utilizes two combustion chambers<sup>39</sup> rather than the traditional single chamber of the conventional internal combustion engine, there is little reason to believe that the stratified-charge engine would be quieter than the conventional type. On the contrary, were the relationship simple rather than intricate, stratified-charge engines could be expected to be twice as noisy.

Control of mobile sources of air pollution need not conflict with noise-reduction goals. Technological mobile noise-control efforts can concentrate on the development of more durable and, if possible, less expensive exhaust mufflers. Complementary to this effort should be a systematic attempt to reduce the noise emissions from cars that have become, or that have deliberately been made, noisier. Deterioration of or tampering with the noise-control system, particularly the muffler, could be monitored by the states as part of their periodic safety inspection procedures.<sup>40</sup> To the extent that inspection programs also test for exhaust emissions, it would be relatively simple and inexpensive to incorporate within the same procedure noise-level tests in order more efficiently and more accurately to identify those cars which violate the noise performance standards. In addition to defective or missing mufflers, body rattles and similar types of noise resulting from improper maintenance could be readily identified in such an integrated testing program.

38. The Wankel engine has essentially only three moving parts, yet is capable of delivering 50 percent more power than the piston engine. The Wankel's rotors spin in an oval-shaped housing which, in effect, duplicates the pistons' four-part power stroke, consisting of intake, compression, ignition, and exhaust. Not only does the Wankel engine have about one-third as many parts as the piston engine, but it weighs about half as much as a piston engine of equal horsepower and is just half as big. Its compact size and light weight afford more room for pollution control equipment, such as a thermal reactor. A trend toward its widescale adoption has, however, recently been reversed because of possible inefficiencies in fuel consumption.

39. An auxiliary chamber, called the pre-cup, burns up the hydrocarbons and carbon monoxide, while a connected main chamber burns up most of the nitrogen oxides at a lower temperature.

40. For a survey of state noise control laws see 115 CONG. REC. 32188-32193 (1969). As of October 1969, 41 states had enacted laws requiring motor vehicles to be equipped with mufflers.

### *The Horn*

An independent, nevertheless symbolic, source of automobile noise is the horn.<sup>41</sup> The solution to the problem of this form of automobile noise is to be discovered not so much in the vehicle as in the vehicle's driver.

The mechanical capability to be quiet already exists—in theory if not in practice. Automobile noise presents a situation over which there is some human control; excessive noise is a function not only of the way an automobile is built but also of the way in which it is used and the extent to which it is abused. This implies that noise regulations should emphasize operational aspects rather than stress only structural factors or be framed in terms of product design. Noise-control legislation should not only rely on improved design of automobiles but also require their proper use. While these principles apply generally to all aspects of automobile-caused noise, they are of particular relevance to horn blowing. Although essential for safety in emergency situations, the horn is often abused in other, less urgent circumstances—most typically in congested urban traffic when noise levels are already high. While many state and local governments prohibit horn blowing except for the preservation of life or property,<sup>42</sup> these laws are inherently difficult to enforce and chronically disobeyed. In congested traffic, it may prove impossible for a law-enforcement officer to identify, with sufficient certainty to establish guilt beyond a reasonable doubt, the driver who has unnecessarily blown his horn.<sup>43</sup>

Consequently recent legislation enacted by some localities has

41. See Eldred & Sharp, *Are Present Horns, Whistles and Sirens Necessary for Communications?* (1972) (SAE Paper No. 720640).

42. Fifteen states have adopted statutes which specifically regulate horns in general language. ALA. CODE tit. 36, § 36 (1958); ARIZ. REV. STAT. ANN. § 28-954 (1956); ARK. STAT. ANN. § 75-725 (Supp. 1973); COLO. REV. STAT. ANN. § 13-5-104 (1963); GA. CODE ANN. § 68-1716 (1967); KAN. STAT. ANN. § 8-5, 102 (1964); ME. REV. STAT. ANN. tit. 29, § 1362 (Supp. 1973); MD. ANN. CODE art. 66½, § 12-401 (1970); MICH. COMP. LAWS ANN. § 257-706 (Supp. 1973); MO. REV. STAT. § 307, 170.1 (1972); ORE. REV. STAT. § 483.446 (1971); S.D. COMP. LAWS ANN. § 32-15-11 (1967); TENN. CODE ANN. § 59-901(a) (1968); TEX. REV. CIV. STAT. art. 670ld, § 133 (1969); WYO. STAT. ANN. § 31-204 (1967). For a survey of municipalities having analogous ordinances, see LAWS AND REGULATORY SCHEMES at 1-115 to 1-116.

43. If civil penalties are substituted for criminal prosecution, proof of violation could be determined by a mere preponderance of evidence, a standard perhaps less difficult to meet.

established decibel limits for horns<sup>44</sup> or has required so-called "city-country" horns, which give rise to significantly lower sound levels when the vehicle is stationary or moving at speeds less than 35 mph.<sup>45</sup> Nevertheless, the real problem remains in the unnecessary use of horns rather than in the sound levels they produce. A horn that is too quiet might fail to give warning in cases of legitimate use because of the competition of background noise prevalent in congested areas,<sup>46</sup> the interior noise in truck cabs emanating from the same vehicle, and the effects of interior soundproofing, air conditioning, radios, and tape decks in automobiles.

### *Legislation*

#### State and Local

State and local governments have adopted a variety of laws intended in whole or in part to reduce motor vehicle noise.<sup>47</sup> A number of such laws forbid "unnecessary noise" or "excessive noise" in general terms that are broad enough to encompass unwarranted horn blowing and cars with defective mufflers.<sup>48</sup> A later generation of state and local laws establishes decibel limits on emissions of

44. See, e.g., NEW YORK CITY, ADMINISTRATIVE CODE ch. 57, art. III, § 1403.3-5.17 (Supp. 1973) [hereinafter cited as N.Y.C. Noise Control Code].

45. Starting with 1974 models, all automobiles sold or operated within New York City must be equipped with such horns. See N.Y. Times, June 1, 1973, at 39, col. 4.

46. Section 1403.3-5.17 of the N.Y.C. Noise Control Code forbids motor vehicle horns giving rise to sound levels in excess of 75 dB(A) at 25 feet, while section 1403.3-5.03 of the same ordinance permits levels of 96 dB(A) for heavy trucks, 92 dB(A) for motorcycles, and 88 dB(A) for lighter trucks and automobiles at the same distance. There is serious reason to believe that these standards, in combination, would destroy the effectiveness of horns as warning devices in many situations.

The N.Y.C. Noise Control Code, in theory, permits code enforcement officers no discretion. A summons should be issued for every time a horn is blown in the city. On May 14, 1973, the city began a crackdown on horn blowers. N.Y. Times, May 1, 1973, at 21, col. 1; N.Y. Post, May 1, 1973, at 16, col. 1. See also N.Y. Times, May 20, 1973 at 40, col. 1; N.Y. Post May 22, 1973, at 16, col. 1.

47. For a survey of state and local noise control laws, see 115 CONG. REC. 32188-32259 (1969). See also S. LEWIN, A. GORDON, & C. HARTELIUS, LAW AND THE MUNICIPAL ECOLOGY 57-69, 75-87 (1970) (includes Model Noise Ordinance recommended by the National Institute of Municipal Law Officers); Spater, *Noise and the Law*, 63 MICH. L. REV. 1373 (1965).

48. See, e.g., CONN. GEN. STAT. ANN. § 14-80(e) (1970); KY. REV. STAT. § 189.020 (1973); MASS. ANN. LAWS ch. 90, § 16 (Supp. 1968); MO. REV. STAT. § 307.170 (1972); ORE. REV. STAT. § 483.448(3) (1971).

sound from specified types of motor vehicles. Some, such as those of the state of California<sup>49</sup> and the city of Chicago,<sup>50</sup> prescribe a scale of successively lower noise-emission levels for vehicles manufactured after certain dates in the future. Others, such as the New York City Noise Control Code, establish single sets of limits without regard to date of manufacture.<sup>51</sup> In theory, these approaches are superior to the general types of prohibition which were more common at an earlier date. Nevertheless, their efficacy remains contingent upon the availability of a comparatively large enforcement staff that is trained in the use of sound-level meters, the incorporation of accurate noise inspection procedures as part of periodic motor vehicle inspection, or both.<sup>52</sup>

### Federal

Federal involvement in this field has been recent. Federal highway legislation has required consideration of environmental consequences, specifically including noise, in the siting of new highways for which federal funds are committed.<sup>53</sup> To the extent that the National Environmental Policy Act also applies,<sup>54</sup> environmental statements would be required in which noise consequences would have to be evaluated not only in absolute terms but also in the weigh-

49. CAL. VEHICLE CODE § 27160 (West Supp. 1974).

50. MUNICIPAL CODE OF CHICAGO ch. 17, § 17-4.7(b) (1971).

51. Section 1403.3-5.03 prescribes lower limits for all vehicles other than heavy trucks, as of January 1, 1978, but regardless of date of manufacture. See also MUNICIPAL CODE OF CHICAGO, ch. 17, § 17-4.7(c) (1971).

52. See generally ARNOLD & RABKIN, COMPREHENSIVE REPORT ON NOISE POLLUTION CONTROL TO THE ERIE COUNTY LEGISLATURE (1972); Grad & Hack, *Noise Control in the Urban Environment*, 1972 URBAN L. ANN. 3.

53. Federal-Aid Highway Act of 1970, 23 U.S.C. § 109(h) (Supp. II 1973), states that "the final decisions on the project are [to be] made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing such adverse effects [as] . . . noise . . ." Section 109(i), 23 U.S.C. § 109(i) (Supp. II 1973), further provides that the Secretary of Transportation "shall develop and promulgate standards for highway noise levels compatible with different land uses and . . . shall not approve plans . . . for any proposed project on any Federal-aid system for which location approval has not yet been secured unless he determines that such plans and specifications include adequate measures to implement the appropriate noise level standards."

54. 42 U.S.C. §§ 4321-47 (1970). See generally Mayo, *Consideration of Environmental Noise Effects in Transportation Planning by Government Entities* (1972) (SAE Paper No. 720627).

ing of alternative routes as well as, presumably, alternatives to the proposed highway itself.<sup>55</sup>

The Noise Control Act of 1972 requires the Environmental Protection Agency to issue regulations concerning the noise emissions of a number of products sold in interstate commerce, specifically including motor vehicles and engines.<sup>56</sup> There is a danger, however, in that federal standards may interfere with the efforts of state and local governments to impose more stringent noise-emission limits to meet the peculiar needs of high-density urban areas. The Noise Control Act of 1972 is almost totally preemptive with respect to interstate trucks and buses, except to the extent that the Administrator of EPA explicitly authorizes more stringent local rules if "necessitated by special local conditions."<sup>57</sup> The preemption provisions for automobiles and motorcycles, however, are modeled upon those applicable to air pollution control: stricter state or local laws applicable to sale or registration of new cars are forbidden, but the state or local governments remain free to impose limitations on use.<sup>58</sup> Unless state and local standards coincide with federal regulations, the prohibitions on sale contained in the California, Chicago, and New York City legislation will be nullified; but the use of vehicles in violation of those standards can still be barred or conditioned.

### *Methods of Control*

Reduction of noise at the source by the imposition of noise-performance standards, presumably enforced by assembly-line testing in conjunction with the comparable programs for air quality purposes,

55. Cf. *Arlington Coalition on Transportation v. Volpe*, 458 F.2d 1323 (4th Cir. 1972), cert. denied, 409 U.S. 1000 (1973); *Ragland v. Mueller*, 460 F.2d 1196 (5th Cir. 1972); *Environmental Law Fund v. Volpe*, 340 F. Supp. 1328 (N.D. Cal. 1972); *Conservation Society of Southern Vermont, Inc. v. Volpe*, 343 F. Supp. 761 (D. Vt. 1972); *Northside Tenants' Rights Coalition v. Volpe*, 346 F. Supp. 244 (E.D. Wis. 1972).

56. Act of Oct. 27, 1972, Pub. L. No. 92-274, 86 Stat. 1234, 42 U.S.C. §§ 4901-18 (Supp. II 1973) [hereinafter cited as Noise Control Act of 1972]. Section 6(a), 42 U.S.C. § 4905(a)(C)(ii), (iii) (Supp. II 1973), requires the Administrator to establish noise emission standards for, *inter alia*, "transportation equipment" and "any motor or engine."

57. Noise Control Act of 1972, § 18, 42 U.S.C. § 4917(c) (Supp. II 1973).

58. *Id.* § 6(e), 42 U.S.C. § 4905(e) (Supp. II 1973). See also 1 F. GRAD, TREATISE ON ENVIRONMENTAL LAW § 5.03[1][d][ii], at 5-45 to 5-46, and § 5.03 [1][d][xi], at 5-54 to 5-56 (1973).

can be utilized in order to conform automobiles to the best presently available technology. This approach will result in substantial noise reductions for sports cars and motorcycles. For trucks and buses, it may be necessary to force noise-control technology. Assuming that relatively little, in terms of a cost-benefit analysis, can be accomplished through the radical redesigning of automobiles, and that an improved technology for trucks and buses may not be immediately forthcoming (or at least not quickly reflected in the characteristics of truck and bus fleets presently operating), the operation of vehicles, once acquired by the ultimate purchaser, must be controlled. Policing of horn blowing aside, traffic congestion must be alleviated. Traffic signals can be timed to pace the flow of traffic, minimizing acceleration and deceleration. Where possible, restraints on use should be placed upon all or certain categories of vehicles in specific areas. If trucks cannot be banned from the city altogether, they can be confined to selected, commercial streets, thereby separating the listener from the source of noise. Many residential streets can be held inviolate from truck, if not automobile, traffic. Nevertheless, zoning regulations presently in force include far too many checkerboard patterns of homes interspersed with commercial establishments that are dependent upon truck deliveries to permit substantial short-run improvement by this approach. However, some of the restrictions that would be helpful from a noise-reduction perspective would parallel desirable restrictions from the standpoint of reducing local concentrations of air pollutants. Thus economic and social costs of diverting traffic will be more tolerable where they pay for concurrent environmental improvement in air and noise quality.

A more systematic approach might be the creation of "noise zones."<sup>59</sup> Enforcing of zoning performance standards is difficult, however, because many noise sources are transient and not well suited for control by regulations aimed at particular areas or locations. Moreover, the granting of variances or exemptions in order to avoid hardship lends itself to turning exceptions into the rule.<sup>60</sup> Finally, topological or other reasons may foreclose such an approach. Nevertheless, there may be certain types of areas as those adjacent

59. Bolt, Beranek & Neman, Inc., at 82-86. 108-12. See also OECD, at 49; Note, *A Model Ordinance to Control Urban Noise Through Zoning Performance Standards*, 8 HARV. J. LEGIS. 608 (1971).

60. Yale Legislative Services, *Control of Motor Vehicle Noise Pollution 7* (prepared for Rep. T.H.D. Mahoney, Mass. General Court, March 1973).



to shopping centers that might effectively be zoned for noise quality; this procedure would seem particularly appropriate for adoption in connection with the approval of newly proposed areas of these kinds.<sup>61</sup>

In short, the urban environment must be planned to promote peace and quiet. Ideally, careful highway placement would solve much of the problem: traffic would be routed far from secluded communities. But progress in this direction will be plodding because of the investment in established roads, buildings, and businesses and the shortage of space. Although major improvement cannot quickly be achieved,<sup>62</sup> new building construction can minimize noise impact.<sup>63</sup> The Department of Housing and Urban Development may refuse to grant federal financial assistance to residential housing in areas where street noise would cause excessive interior noise levels.<sup>64</sup> This problem may often be solved through use of such means as air conditioning, double glazed windows, and other soundproofing construction materials. But availability of these techniques may depend on ability to remain within maximum permissible per unit costs,<sup>65</sup> if superblock or cluster developments cannot achieve sufficient economies of scale. Notwithstanding the breadth of these efforts, the existing housing stock and infrastructure limit their efficacy.<sup>66</sup> Assuming that mass transit is to

61. For similar regulation of "indirect" sources in the case of air pollution, see 40 C.F.R. § 52.22(b) (1974).

62. Some improvement can be obtained by having street repair crews exercise more care in filling potholes and repairing streets, because "[a] change in road surface from rough to smooth asphalt can lower the noise level from tire/roadway interaction by about 5 dB(A)." OECD at 42-43 (Fig. 11). It should be noted, however, that when very smooth asphalt is wet, it provides substantially lower traction than rough asphalt or concrete. *Id.* at 42.

63. See N.J. REV. STAT. § 55:13A-1 (Supp. 1971); N.Y. MULTIPLE DWELLING LAW § 84 (McKinney 1970); NEW YORK CITY ADMINISTRATIVE CODE, ch. 26, tit. C (1969), and discussion of these statutes in Grad & Hack, *supra* note 52, at 19-22. The design of highways can also be helpful. Cuts and tunnels may serve to shield surrounding areas from motor vehicle noise, although this depends in part upon their contours and the construction material used. See Lyon, *supra* note 9, at 2, 17-19. See also OECD at 47-48; Hildebrand at 673.

64. See Dep't of Housing & Urban Development, Circular 1390.2, Noise Abatement and Control: Departmental Policy, Implementation Responsibilities and Standards (Aug. 4, 1971); N.Y. Times, Nov. 5, 1972, § 8, at 1, col. 6; *id.*, Nov. 12, 1972, § 8, at 10, col. 1; *id.*, June 23, 1974, § I, at 34, col. 4.

65. See HUD Release No. 71-828 (May 12, 1971).

66. Retrofitting of existing buildings to reduce noise intrusion would achieve quicker results, but probably at a cost that would not be tolerable.

some extent a substitute for the automobile, the urban enigma is what to do with trucks,<sup>67</sup> because urban areas cannot do without trucks. Given the constraints upon environmental land-use planning, the need for an improved truck noise-control technology becomes more imperative, and the apparent experimental breakthroughs, mentioned above, become increasingly important.

Control of the noise emissions of individual vehicles involves both practical problems of enforcement and conceptual questions concerning objectives. Periodic, compulsory inspection would normally be preferable to roadside spot-checking, although a combination of both, with street measurement serving as a deterrent to deliberate or careless deterioration between inspections, might enhance the usefulness of a periodic inspection program which can reach all registered vehicles. Assuming that the testing method is fair and uniformly administered,<sup>68</sup> the pivotal policy decision is whether the noise-performance standards to be applied will be based upon vehicle operation under ideal conditions in open spaces or in a crowded urban context. Periodic off-the-street inspection could simulate uniform, ideal driving conditions. Scientific, computer-recorded and controlled noise-test regimes run on dynamometers could duplicate all conditions arguably within the driver's control—load, velocity, acceleration, and deceleration—without the competition of background noise and surrounding vehicles. If a vehicle satisfied standards under such conditions, it can be argued that the manufacturer, owner, or driver ought not to be penalized if the vehicle, once on the road, exceeds those standards because of such everyday factors as slow traffic movement, narrow streets with reflecting building surfaces, poor pavements, or interactions with the noise from other vehicles or other types of sound sources. On the other hand, the class to be protected by the noise regulations is the listeners, not the noisemakers. As far as listeners are concerned, testing under controlled, ideal conditions may, at times, have only

67. Gradually, markets and transshipment terminals can be relocated at the edges of cities or other places remote from where human comfort depends on low noise levels.

68. The Society of Automotive Engineers has recommended specific testing procedures. SAE J986a; SAE J672a. See Hillquist, *Methods of Vehicle Noise Measurement* (1972) (SAE paper No. 720403). The California Highway Patrol has found that the SAE New Vehicle Test Procedure has restrictions on the nature of measuring sites that make measurement in residential areas impossible. It has engaged in research designed to ease these restrictions. Cooper, *supra* note 25, at 364.

symbolic value. Arguably, noise-performance standards ought to be met at any time under any conditions. This does not necessarily mean that every vehicle manufactured or operated in the country has to be able to meet the worst of circumstances. At the same time, state and local governments can and should be encouraged to establish zones in which noise above certain levels will not be permitted, provide adequate notice on street signs of this fact, and enforce those limits against intruding vehicles regardless of the level of their noise emissions at other times and places.

#### WATER POLLUTION PROBLEMS RELATED TO THE AUTOMOBILE—CRANKCASE OIL DISPOSAL

By Stephen R. Munzer, Frank P. Grad and Stephen L. Schwarcz

Crankcase oil presents a problem because its disposal after ordinary use may damage the environment. All oils generally have adverse effects on natural bodies of water—they coat the surface and thereby prevent oxygen from reaching the water and sunlight from penetrating to the plants below. This retards photosynthesis and hence decreases the dissolved oxygen content of the water which is indispensable for fish and plant life. Crankcase oil occasions further problems because of the additives (chiefly detergents and metals) found in motor oil and because it acquires lead and other gasoline additives when used in automotive engines. Appreciable amounts of lead, barium, calcium, and zinc are found in most used motor oils;<sup>69</sup> one study indicated that 1.11 percent lead by weight, .0568 percent barium by weight, 0.17 percent calcium by weight, and 0.08 percent zinc by weight are typical in waste crankcase oil.<sup>70</sup>

#### *The Crankcase Oil Problem*

The general problem is how to dispose of waste crankcase oil. The precise extent of the problem is, however, difficult to determine,<sup>71</sup>

69. Environmental Quality Systems, Inc., *Waste Oil Recovery Practices/State of the Art 19* (report prepared for the State of Maryland and the United States Environmental Protection Agency, Dec. 1972) [hereinafter cited as *Maryland Report*].

70. *Id.* at 20, Table 5—"Typical Waste Automotive Oil Composition."

71. No exact statistics are available on the amount of waste crankcase oil collected at filling stations; even if they were available, it would not account for crankcase oil drained by automobile owners who change oil themselves. An early estimate by MIT indicates that petroleum oil leakage of all types from cars accounts for 36 percent of the petroleum leakage into the environment. See 73 *TECHNOLOGY REV.* 59

and for the most part it is necessary to construct estimates on the basis of such figures as are available. Nationally, about 1.1 billion gallons of oil are sold each year for automotive use.<sup>72</sup> Of this amount, other sources indicate that approximately 50 percent, or 550 million gallons, is used as crankcase oil in passenger cars, and another 35 percent, or 38.5 million gallons, is used as crankcase oil in trucks and buses and in other types of automotive engines.<sup>73</sup> Not all automotive lubricating oil, of course, becomes waste crankcase oil; some lubricating oil is not used in the crankcase at all,<sup>74</sup> and approximately one-third of all crankcase oil is lost through leakage or burning in the engine or as a result of being discarded in junked automobiles.<sup>75</sup> It would thus appear that annually about 400 million gallons of waste crankcase oil require disposal.<sup>76</sup>

### *Methods of Disposal and Their Economic and Environmental Impact*

This section canvasses the various methods by which waste crankcase oil is presently disposed of or might be disposed of in the future. An attempt is made to indicate the environmental impact of and, where relevant, the economic problems associated with these methods of disposal.<sup>77</sup>

#### Present Methods of Disposal

*Dumping on the Ground.* One way of disposing of waste crankcase oil is simply to dump it on the ground. It is unknown how

(Oct.-Nov. 1970). In the early 1970's an investigation was conducted by the United States Attorney's Office for the Southern District of New York into the illegal dumping of waste oil into sewers and rivers. None of the information gathered can be released, however, since it was obtained through grand jury subpoenas. It is not known how much data on waste oil has been acquired by oil companies or others connected with the petroleum industry.

72. *Maryland Report* at 3.

73. Mobil Oil Co., *Approximate Product/End Use Mix of Automotive Lubricants in the United States* (undated).

74. *Id.*

75. *Maryland Report* at 11, 14. The problem of junk car disposal is discussed in Chapter 12 of this report.

76. This figure does not seem greatly different from the American Petroleum Institute's estimate that 450 million gallons of waste oil of all types are disposed of yearly. Committee on Disposal of Waste Products, American Petroleum Institute, *Waste Oil Roundup . . . No. 1* (undated).

77. This section is not concerned with crankcase oil that is burned in automotive engines.

much crankcase oil is disposed of in this manner, but it seems safe to assume that many automobile owners who change their own oil succumb to the temptation. The attraction of ground dumping is that a car owner can generally manage, with little or no cost, to find a place to dump his oil where it will not cause him any harm or annoyance, even though it may be inconvenient or worse for others. Environmentally, the dangers are that the oil will seep into the ground and pollute the water table and that the additives in the oil will concentrate in plant life and possibly affect animals and men through the food chain.

*Roadway Use.* A related, though somewhat more discriminating, way to dispose of crankcase oil is to spray it on unpaved roads to suppress dust. An estimated 100 million gallons of waste oil are disposed of in this manner annually.<sup>78</sup> While costs of collection make this a more expensive method of disposal than simply dumping oil on the ground, use on roadway does produce a result (dust control) which would otherwise have to be achieved by different methods. There are, however, a number of significant environmental problems with this means of disposal. First, as in the case of indiscriminate dumping, there is a possibility of seepage and contamination of water and plant life. How seriously this possibility is to be taken is largely a function of the depth to which the oil penetrates the roadway surface<sup>79</sup> and whether it penetrates to the water table. Second, a large amount of the waste oil, together with lead and metallic additives, will leave the road surface with water runoff.<sup>80</sup> The oil and particularly the heavy metals may harm roadside vegetation. Third, particles from oiled roads may contaminate adjacent fields and crops. The surface of an oiled road contains a considerable amount of lead (approximately 200 mg/kg) from automotive emissions and from the waste itself. The lead adheres to dust particles on the road and can be carried by winds to adjoining fields and crops. One study has noted that this would be a problem in cases where roadside crops, such as lettuce or cabbage, are intended for direct human

78. *Maryland Report* at 131.

79. One study found no oil seepage beneath one inch of the surface. Freestone, *Runoff of Oils from Rural Roads Treated to Suppress Dust 1* (Edison Water Quality Research Laboratory Oct. 1972 (U.S. E.P.A. Rept. No. EPA-R2-72-054)) [hereinafter cited as Freestone, *Road Dust Report*].

80. *Id.* This study suggests that all but 1 percent of the waste oil leaves the road with runoff. *Id.*

consumption.<sup>81</sup> The study concluded that "the 70-75% of the oil applied which leaves the road by dust transport and run-off could have significant ecological effects as a result of the oil or its accompanying heavy metals or both."<sup>82</sup> The use of crankcase oil for roadway dust control thus has severe limitations as a means of disposal. Even if the results of the few published studies cannot be extrapolated to roads of other compositions, it is plain that there is a strong potential for environmental harm in roadway oiling.

*Discharge into Rivers and Sewers.* It is unknown how much waste oil is dumped into rivers and sewers. Yet one of the reasons for much recent water-quality legislation has been to reduce the amount of pollutants, waste oil among them, introduced into waterways. And a survey of overflow discharges in the New York City metropolitan area revealed that in the first hours after a heavy rain thousands of gallons of waste oil were flushed from a combined storm and sanitary sewer.<sup>83</sup>

This method of disposal has very little to recommend it. The discharge of waste crankcase oil into rivers and sewers is prohibited by much federal, state, and local legislation because such dumping may create a number of serious problems. Oil may pollute waterways and the oceans and the metal additives may harm fish and plant life. Moreover, oil may interfere with the operation of sewage treatment plants, either by clogging plants or by killing aerobic bacteria that help to degrade dissolved sewage. Finally, oil in combined storm and sanitation sewers<sup>84</sup> may aggravate overflow problems and conceivably could create a fire hazard in some metropolitan sanitation sewers.

*Re-Refining.* One method of disposal that offers some encouragement is collecting the waste oil and re-refining it so that it may be used again. This would seem to have the advantages of keeping

81. *Id.* The report found that soil samples taken from a wheat field 150 feet from an oiled road showed an average lead value of 24.0 mg/kg, which is a somewhat higher than normal concentration. Plant samples taken in this field showed an average lead concentration of 33.5 mg/kg, which is also higher than normal. *Id.* at 16.

82. *Id.* at 23.

83. Legislative Drafting Research Fund Telephone Interview with Mr. Thomas Glenn, Director and Chief Engineer, Interstate Sanitation Commission, March 21, 1973. The site was a combined sewer near New Town Creek (between Brooklyn and Queens). 24,000 gallons of waste oil (not including the water) were flushed out in the first four hours after a heavy rain in 1971.

84. See generally Field & Struzeski, *Management and Control of Combined Sewer Overflows*, 44 J. WATER POLLUTION CONTROL 1393 (1972).

most if not all of the harmful components of waste crankcase oil from the environment and of providing a useful end-product. In 1971, the re-refining industry had a 100-million-gallon-per-year capacity, though this was actually a decline from the 1966 capacity of 300 million gallons per year.<sup>85</sup>

At present, however, re-refining is not an economical method of disposal. Collecting the oil from service stations is expensive; collectors receive so little for waste oil that they must generally charge service stations one to three cents per gallon to collect it.<sup>86</sup> Marketability of re-refined oil is significantly hindered by prohibition of its use in many military vehicles,<sup>87</sup> regulations of the Federal Trade Commission,<sup>88</sup> and the possible reluctance of many consumers to use it. It is possible, though perhaps unlikely, that the federal excise tax of six cents per gallon on all lubricating oils other than cutting oil may also inhibit marketability.<sup>89</sup> Most importantly, there is no presently accepted commercial re-refinement process which is both economical and does not leave an oily sludge almost as difficult to dispose of as the original waste oil.<sup>90</sup> The contaminants in waste crankcase oil are dust, dirt, dilutants from unburned and partly burned gasoline, and insoluble decomposition products of the crankcase oil itself. The detergents used in motor oils keep these contaminants so well dispersed that they pass ordinary filters.<sup>91</sup> As a result, many processes for reclaiming waste oil are technologically or economically unfeasible, and of the remaining processes most leave a substantial amount of oily sludge.<sup>92</sup> Water dumping and burning of the

85. Comm. on Disposal of Waste Oil Products, American Petroleum Institute, *Waste Oil Roundup . . . No. 1*, at 3 (undated).

86. Comm. on Disposal of Waste Products, American Petroleum Institute, *Waste Oil Roundup . . . No. 2*, at 2 (April 1973) [hereinafter cited as *Waste Oil Roundup No. 2*].

87. See, e.g., Specifications MIL-12104B & C, ML-L46152 (engine oils), and MIL-L-2105B (gear oil). See Letter from Harry L. Ammlung, Director, Dep't of the Army, Mobility Equipment Research & Development Center, April 12, 1973, on file with the Legislative Drafting Research Fund of Columbia University. The letter lists and discusses a number of military oil uses for which virgin-based oil is required, and the reasons for this policy.

88. See 16 C.F.R. § 406.5(3) (1973) (labeling restrictions on use of term "re-refined" and other words of similar import).

89. INT. REV. CODE OF 1954, § 4091.

90. *Maryland Report* at 107.

91. See W. GRUSE & D. STEVENS, *CHEMICAL TECHNOLOGY OF PETROLEUM* 540-41 (3d ed. 1960).

92. See Bowen, *Waste Lube Oils Pose Disposal Dilemma*, 6 ENVIRONMENTAL SCIENCE & TECHNOLOGY 25, 26 (Jan., 1972).

sludge pose environmental risks, and land disposal techniques using bacterial degradation of the sludge are not yet fully tested.<sup>93</sup>

The commercial success of re-refinement thus depends on a number of factors. Some effort must be made to reduce costs of collecting waste oil and to remove impediments to marketing re-refined oil products. Advances are most essential, however, in the area of re-refining processes. While suggestions of "breakthroughs" have occasionally been intimated,<sup>94</sup> no firm evidence is available that a significant technological advance has been made. Nonetheless, even without great progress in these areas, re-refining may become commercially successful if petroleum shortages act to increase the price for which re-refined oil can be sold.

### Possible Future Methods of Disposal

*Incineration.* In turning to methods of disposal that are employed minimally if at all at present but which may have potential for significant use in the future, let us first consider the possibility of using crankcase oil in the incineration of municipal wastes. Refuse is often too high in water content to burn efficiently in municipal incinerators. Waste crankcase oil can be burned to dry out the wet refuse or to heat the air before incineration in order to increase combustion efficiency, or can be burned as a mixture with the refuse. A report by the GCA Corporation, published with EPA approval, indicates that crankcase oil can be successfully used to stabilize combustion in these ways,<sup>95</sup> thereby reducing emissions of particulates and uncombusted gases and lowering the amount of after-combustion residues of organic refuse.<sup>96</sup>

Nonetheless, no actual demonstration has yet been made of the effectiveness of burning crankcase oil in incineration. In this connection, better quality-control techniques by waste oil collectors might be necessary.<sup>97</sup> For example, the waste oil used for incinera-

93. See *Maryland Report* at 131-32.

94. See, e.g., *Wall Street Journal*, Feb. 7, 1973, at 10, col. 1.

95. S. Chansky, B. McCoy & N. Suprenant, *Waste Automobile Lubricating Oil as a Municipal Incinerator Fuel* (E.P.A. Rept. No. EPA-R2-73-293 Sept. 1973) (report by GCA Corporation published with EPA approval) [hereinafter cited as Chansky, *Incinerator Report*]. The EPA does not, however, necessarily endorse the "views and policies" of the report. *Id.* at 8.

96. *Id.* at 9.

97. The waste oil used in the GCA Corporation experiment was obtained directly from service station tanks and contained only trace amounts of water. However,



tion must not have so much water content as to interfere with proper burning and must not have so much sediment content as to result in unacceptable particulate emissions in the combustion gases. Problems of maintenance occasioned by lead buildup on burner surfaces also need to be investigated further.<sup>98</sup> Moreover, even if use of waste oil in incineration decreases the aggregate amount of air pollution while at the same time consuming the waste oil, there remains the problem of metallic oxide emissions, particularly lead, in the gases. Theoretical studies indicate that lead concentrations would be kept well below the EPA danger level,<sup>99</sup> but no empirical data is available for actual use in municipal incinerators. And, finally, doubts may be raised as to whether municipal incineration, causing as it does a significant amount of air pollution, should be encouraged rather than phased out, and in any case as to how much of the total amount of waste crankcase oil produced could be disposed of by this method.

*Use as Fuel.* Waste crankcase oil can also be used as heating fuel. For this purpose it could be burned alone or mixed with other fuels; burning may be done with or without prior treatment to reduce water and sediment content. According to the American Petroleum Institute, waste oil can be a good heating fuel, though it should be blended with at least three times the quantity of other fuels.<sup>100</sup> Pure waste oil burning can cause severe mechanical problems; in a recent test, almost half the ash content of the waste oil remained in the boiler as a white layer, covering the inside of the heat exchange tubes and severely fouling the boiler.<sup>101</sup> Even 25 percent waste oil

waste oil obtained from collectors may have a high water content, and this may impede the effectiveness of using it in incineration. See *id.* at 16.

98. No serious maintenance problems arose in the GCA Corporation experiment. *Id.* at 36.

99. On the assumption of one percent lead in waste crankcase oil, the average ground level lead concentration over a three-month period should vary between 0.20 and 0.01 micrograms per cubic meter, depending on distance from and orientation with respect to the incinerator. The danger level for lead concentration set by EPA is 2.0 micrograms per cubic meter, averaged over a three-month period. The results calculated above, however, assume that waste oil firing would occur during only about one-third of the incinerator's operating time and neglect the additional burning of waste oil necessitated during some periods by large accumulations of grass clippings and yard trimmings which have a high water content. See generally Chansky, *Incinerator Report 9*, 49, 55.

100. American Petroleum Institute, *Final Report of the Task Force on Used Oil Disposal 1* (1970) [hereinafter cited as *A.P.I. Report*].

101. G. Chappell, *Waste Oil Reprocessing 18* (rept. for Massachusetts Division of Water Pollution Control, Water Resources Comm'n, Jan. 1973).

burning usually results in higher maintenance costs than normal fuel oil because of ash formed during combustion of incompletely removed additives.<sup>102</sup> These deposits were found by one oil company to be so substantial that they would require a shutdown of the boiler for cleaning for a one-day period once every two weeks.<sup>103</sup> Nonetheless, the American Petroleum Institute has concluded that, from an overall combustion efficiency and maintenance viewpoint, waste oil burning should be encouraged.<sup>104</sup> This seems a reasonable conclusion. Forty billion gallons of No. 6 commercial fuel oil are sold each year,<sup>105</sup> while there is a need to dispose of an estimated 400 million gallons of waste crankcase oil annually.<sup>106</sup> If waste oil were mixed only several parts per hundred with normal fuel oil, combustion would be improved and extra maintenance costs reduced.

However, even if this would make use of waste oil in fuel feasible from a technical standpoint, several problems remain. First, some arrangements must be made to ensure that only a certain amount of waste oil is blended with normal fuel oil. The costs of collection and quality control may be significant. Second, there may be environmental reasons against burning fuel consisting partly of waste oil in residential or highly polluted areas, because of the metal pollutants (especially lead) and the additional quantity of particulate matter.<sup>107</sup> Third, even if burning such fuel is generally suitable in a given area, it may be difficult to retain enough flexibility to preclude its use during air pollution alerts.

*Re-Refining to Distillate Oil.* Another suggestion has been to re-refine the waste oil to distillate oil, and it is reported that the feasibility of such a venture is being investigated. However, the supply and price of distillate oil as compared to the supply and price of commercial fuel oil varies. While some time ago distillate oils were in short supply and commanded a higher price than com-

102. *A.P.I. Report 1.*

103. *Id.* at 5.

104. *Id.* at 1.

105. The 40 billion gallon figure was stated in an interview with Mr. Hugh S. Kelley of the Mobil Oil Company, conducted by the Legislative Drafting Research Fund on March 12, 1973, in New York City. This figure is in accord with a claim from a separate source that 34 billion gallons of the same type of oil were burned in 1971. See *Waste Oil Roundup No. 2*, *supra* note 86, at 2.

106. See p. 11-1 to 11-2 *supra*.

107. See generally *A.P.I. Report* at 14; Esso Research and Engineering Rept. No. 60142, Nov. 8, 1972, at 11.

mercial fuel oil, the situation has now reversed itself. Hence, the feasibility of re-refining to distillate oil depends not only on the development of a suitable technology but also on the ability to cope with fluctuations in supply and price.

### *Legal Regulation of Crankcase Oil Disposal*

#### Jurisdiction to Regulate

It seems fairly clear that the federal government would have jurisdiction to regulate the disposal of waste crankcase oil. Under the authority granted by the commerce clause,<sup>108</sup> the federal government has power to deal with any matter affecting interstate commerce. It is settled that this power exists even in matters whose actual effect on interstate commerce is rather remote.<sup>109</sup> Thus disposal of waste oil into non-navigable tributaries or into the ground, where it may seep to the water table and from there be carried to navigable waters from underground streams, may constitutionally be regulated by the federal government.<sup>110</sup> Again, federal power of regulation would reach methods of disposal that could affect air quality, such as using waste oil in heating fuel or municipal incineration.

It is, however, a closer question whether the federal government has exercised the full range of its constitutional powers in this area. The requirements of the Federal Water Pollution Control Act (FWPCA) prior to its 1972 amendment were limited to "interstate or navigable waters,"<sup>111</sup> which included only navigable waters and those "rivers, lakes, and other waters that flow across or from a part of state boundaries, including coastal waters."<sup>112</sup> Partly because of this jurisdictional limitation and partly because the conference procedure provided for in the Act did not prove to be an effective enforcement device,<sup>113</sup> some use was made of the Rivers and Har-

108. U.S. CONST. art. I., § 8.

109. See, e.g., *Wickard v. Filburn*, 317 U.S. 11 (1942). See also F. GRAD, G. RATHJENS & A. ROSENTHAL, *ENVIRONMENTAL CONTROL: PRIORITIES, POLICIES, AND THE LAW* 219-24 (1971).

110. See Hines, *Nor Any Drop to Drink: Public Regulation of Water Quality, Part III: The Federal Effort*, 52 IOWA L. REV. 799, 800 (1967).

111. See Act of Jul. 20, 1961, Pub. L. No. 87-88, § 7(a), 75 Stat. 207.

112. See Act of Jul. 20, 1961, Pub. L. No. 87-88, § 9, 75 Stat. 210.

113. See Act of Jul. 20, 1961, Pub. L. No. 87-88, § 7(c), 75 Stat. 207, and discussion in 1 F. GRAD, *TREATISE ON ENVIRONMENTAL LAW*, § 3.03[1][a], at 3-59 to 3-63 (1973) [hereinafter cited as GRAD].

bors Act of 1899<sup>114</sup> as a pollution control measure.<sup>115</sup> But that Act does not apply to matter "flowing from streets and sewers,"<sup>116</sup> and the 1972 amendment to the FWPCA effectively limits it to interferences with navigation.<sup>117</sup> Federal law following the 1972 amendment, however, is much more far-reaching and aims at the elimination of water pollution.<sup>118</sup> It seems clear that water discharge of waste oil is now effectively prohibited by federal law. The status of ground dumping, on the other hand, is less clear, since the federal effluent standards do not apply to subterranean waters. So far as use of waste oil for fuel or incineration is concerned, burning would be subject to local and state air pollution laws. Also, under federal law, ambient air quality standards have been set for some pollutants from burning waste oil—sulfur oxides, particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide.<sup>119</sup> No such standards, however, have yet been set for lead or the metal additives in crankcase oil.

Some state and local regulation already exists in this area, and additional state and local control—as an exercise of the police power—would be possible in those instances where federal legislation has not preempted the field. The Federal Water Pollution Control Act expressly confirms that states, their political subdivisions, and interstate agencies retain the right to adopt and enforce standards or limitations respecting discharge of pollutants and to set requirements respecting the control or abatement of pollution, except as expressly provided in the Act.<sup>120</sup> Moreover, they are expressly authorized to set more stringent standards or limitations than those imposed under the Act.<sup>121</sup> In the case of air pollution, while the Clean Air Amendments of 1970 assign responsibility for standard setting to the federal government and provide for some federal en-

114. Act of Mar. 3, 1899, ch. 425, 30 Stat. 1151.

115. See, e.g., *United States v. Standard Oil Co.*, 384 U.S. 224 (1966); *United States v. Republic Steel Corp.*, 362 U.S. 482 (1959). See also 1 GRAD, § 3.03[1][b], at 3-69 (1973).

116. Rivers and Harbors Act of 1899, § 13, 33 U.S.C. § 407 (1970).

117. 33 U.S.C. §§ 1342(k), 1371(a) (Supp. II 1973). See generally 1 GRAD, § 3.03 [1][b]; § 3.03[11], at 3-171 to 3-172.

118. 33 U.S.C. §§ 1251(a), 1281, 1311 (Supp. II 1973). See also S. REP. NO. 92-414, 92d Cong., 1st Sess. (1971).

119. Act of Dec. 31, 1970, Pub. L. No. 91-604, § 4, 84 Stat. 1678, 42 U.S.C. § 1857c-3 (Supp. I 1972); 36 Fed. Reg. 1502, 1515 (1971).

120. 33 U.S.C. § 1342(b) (Supp. II 1973).

121. 33 U.S.C. § 1370 (Supp. II 1973).

forcement measures, responsibility for enforcement is largely allocated to the states.<sup>122</sup> Further, a state or any of its political subdivisions is at liberty to adopt standards or limitations respecting emissions of air pollutants that are more stringent than those contained in the approved state-implementation plan or other requirement of federal law.<sup>123</sup>

It is plain that the federal government and the states are both in a position to exercise jurisdiction over the disposal of waste crankcase oil. If it is decided that regulation is advisable,<sup>124</sup> the question then arises whether it would be better for the federal government or the states, or both working together, to do it. While this question cannot be answered in detail until it is decided what strategies and types of control, if any, are needed, it is clear that cooperative strategies are in the main more fruitful. Regulation in this area should, then, follow the general lines of federal-state cooperation in the FWPCA and the Clean Air Act.

### The Advisability of Regulation

This chapter has thus far deferred the issue of whether the disposal of waste crankcase oil should be regulated at all, and if so, how. In confronting this issue one might take the previous discussion to support the following points. First, the mechanism of the market has not yielded a satisfactory method of disposal. Re-refining has not thus far proved to be an economical method of disposal on a large scale, and for that reason much waste oil has been dumped on the ground or discharged into sewers or waterways. Second, it is not clear that there is yet any technologically secure and economically feasible method of disposal. While some methods, like indiscriminate dumping or discharge, can be ruled out as possible solutions, such other methods as re-refining, use as fuel, and use in incineration are not at present technologically viable and not obviously cost effective. Third, existing data is insufficient to determine how serious a hazard is posed to the environment by waste crankcase oil. This is not to suggest that the hazard is trivial. On the other hand, we do not know how deleterious the effects of

122. 42 U.S.C. §§ 1857 *et seq.* (Supp. I 1972).

123. 42 U.S.C. § 1857d-1 (Supp. I 1972).

124. The federal E.P.A., under 33 U.S.C. § 1254(m) (Supp. II 1973), is required to make a detailed and comprehensive study of the waste oil problem, and report its results to Congress within eighteen months after October 18, 1972.

waste oil actually are on plant and animal life, and in any event the available evidence does not suggest that waste oil pollution is as serious a threat as those posed by air pollution from the automobile or by water pollution from industrial sources.

Additional considerations suggest that thoroughgoing regulation, e.g., in the form of controlling individual car owners and gas station disposal, would not be effective without undue administrative and enforcement costs. It has been estimated that 35 to 45 percent of all motor oil is purchased at retail outlets other than service stations,<sup>125</sup> and accordingly it must be assumed that a large part of this amount is changed by car owners personally. It is extraordinarily difficult to control individual habits of waste disposal. Too few persons feel that their small amount of waste oil will contribute in any meaningful way to the aggregate pollution problem; fines and other sanctions are almost useless because of the great difficulty in apprehending the polluter in the course of his act. While some amelioration could be achieved through public education programs, redesigning car engines so that motorists cannot change their own oil, or controlling retail sales of oil, each of these methods is expensive and in some cases implementation might be highly unpopular. In the case of service stations, one might attempt to monitor the amount of waste oil they collect. Yet it would be difficult to design such a program whose strictures could not be evaded by those inconvenienced by the new regulations, and a foolproof system would almost certainly be unpopular and expensive to administer. Objections of this type would also apply to attempts to ensure by regulation that waste oil would be properly collected by scavengers, that sludge from re-refining would properly be disposed of, and so on. In short, it is difficult to construct a system of regulation that would be both workable and cost effective.

It is thus easy to draw the conclusion that in the area of waste oil disposal the law should not be too heavy-handed and that it should seek to foster better and more economical technological methods of disposal. We can recommend several ways in which this might be done. One important way would be to alter some of the legal regulations that presently inhibit environmentally preferable ways of disposing of waste oil. For example, some unfavorable labeling rules applicable to refined oil could be modified or abandoned, and if

125. Factor, *Oil Pollution: The Real Problem 1* (undated) (rept. to the Jt. Legislative Comm. on the Environment, State of Connecticut General Assembly).

adequate quality control could be assured, it might be reasonable to allow re-refined oil to be used for certain military purposes from which it is now excluded. Re-refined oil might also be exempted from federal excise tax.<sup>126</sup> Another way to encourage technological development would be through grant programs under the Federal Water Pollution Control Act.<sup>127</sup> The 1972 Amendments to the FWPCA continued and expanded various research and development grants previously established. Research and demonstration projects relating to oil disposal are specifically authorized<sup>128</sup> to develop programs to eliminate pollution of navigable and ground waters.<sup>129</sup> Grants under the Act could to a significant extent be conditioned on compliance with standards relating to oil disposal and other provisions of the law.<sup>130</sup> By making use of such grants in aid the law could encourage the development of one or more suitable methods of disposing of waste crankcase oil.

#### SOLID WASTE PROBLEMS RELATED TO THE AUTOMOBILE— JUNK CAR DISPOSAL

By Frank P. Grad and Stephen R. Munzer

##### *The Problem of Junked and Abandoned Automobiles*

Approximately 9 million automobiles are taken out of circulation each year. Of this number, about 8 million are disposed of properly—they are taken by their owners to junkyards or other proper disposal sites or otherwise brought into the recycling process.<sup>131</sup> But the 10 to 15 percent, or approximately one million cars per year, that are abandoned on private property or, more frequently, in

126. For provisions of present law, see p. 460 and notes 87-89 *supra*.

127. 33 U.S.C. § 1255 (Supp. II 1973).

128. 33 U.S.C. § 1254(m) (Supp. II 1973). See also S. REP. NO. 92-414, 92d Cong., 1st Sess. 13 (1971).

129. 33 U.S.C. § 1252(a)(1) (Supp. II 1973).

130. 33 U.S.C. §§ 1256(e) and (f)(2) (Supp. II 1973). See generally 1 GRAD, § 3.03[3][a].

131. COUNCIL ON ENVIRONMENTAL QUALITY, ENVIRONMENTAL QUALITY—FIRST ANNUAL REPORT 115 (1970); ENVIRONMENTAL PROTECTION AGENCY, THE AUTOMOBILE CYCLE: AN ENVIRONMENTAL AND RESOURCE RECLAMATION PROBLEM 18-21 (1972) [hereinafter cited as *EPA Study*]; VAUGHAN, *The Administration Looks at the Abandoned Automobile*, INSTITUTE OF SCRAP IRON AND STEEL, PROCEEDINGS OF THE NATIONAL CONFERENCE ON THE ABANDONED AUTOMOBILE 5 (1970) [hereinafter cited as *ISIS Proceedings*].

public streets or other public places,<sup>132</sup> are a source of considerable annoyance. The abandoned automobile is composed of steel and other metals, and it is a matter of some significance that natural resources are wasted if the vehicle is not reclaimed.<sup>133</sup> There are, moreover, a variety of safety, fire, and possibly health problems caused by abandoned cars. They may become a traffic safety hazard by reducing the traffic flow capacity of streets. Children may be attracted to the dangerous hulks in their neighborhood and use them as playgrounds. Fires have been set in abandoned cars. It has also been suggested that they become breeding places for rodents and insects.<sup>134</sup> But the chief objection to abandoned automobiles, in our view, is esthetic. They are a blight on countryside and cityscape alike and create visual affront to those living in the neighborhood and to passing travelers. Thus it is important that as many abandoned hulks as possible be introduced into the recycling process in order to conserve natural resources, eliminate hazards, and preserve the esthetic quality of the environment.

In what follows it will be useful to distinguish two separate, though related, issues arising from the abandonment of automobiles. The first issue is what to do with the automobile once it has been brought to a collection point or junkyard. The second is how best to ensure that automobiles will not be abandoned or that if abandoned they may be collected without undue administrative costs and restraints.

### *The Recycling of Junked or Abandoned Automobiles*

The obvious answer to the first issue just raised is to recycle the materials in the automobile hulk. In this respect, the problem of the abandoned automobile is not distinguishable from the problem of recycling any other waste product, except that the automobile hulk is rather exceptional in its size and weight and therefore presents some special processing problems.<sup>135</sup> Nevertheless, it is similar to other abandoned objects in that it will be recycled if it is economi-

132. COUNCIL ON ENVIRONMENTAL QUALITY, ENVIRONMENTAL QUALITY—FIRST ANNUAL REPORT 115 (1970).

133. Vaughan, *supra* note 131, at 7.

134. *Id.*

135. See Dole, *Scrap Cars: A Resource out of Place*, in *ISIS Proceedings* at 30; Reichert, *Recycling Abandoned Automobiles: Do Present Laws Act as Bottlenecks?*, 2 ENVIR. LAW 105, 107-09 (1971).



cally profitable to do so. The issue of collection of abandoned automobiles is related to the issue of recycling because it is not economically profitable for the junk dealer himself to engage in the collection of abandoned automobiles. The average value of an abandoned automobile is not so great as to warrant the cost of hauling it from its place of abandonment to the junkyard. Indeed, the cost of hauling may exceed its value.<sup>136</sup> Thus, any municipal or other public collection system which hauls abandoned automobiles to junkyards for recycling provides a subsidy to the junk dealer and to the recycling industry.

These conclusions have been true for a considerable time; they may of course cease to be applicable if and when there is a dramatic rise in the price of scrap iron or steel. But for the present at least, market forces offer no solution to the problem.

The economics of automobile hulk recycling have been described in a number of studies.<sup>137</sup> It is clear that technical problems relating to the recycling of steel in automobile hulks have, on the whole, been solved.<sup>138</sup> The automobile cycle from the manufacture of the new car to the recycling of the discarded car has been clearly described.<sup>139</sup> When an automobile becomes inoperable through accident or obsolescence, it may be taken to a dumping ground or abandoned on public or private property. Generally, such an automobile will enter the recycling process by first being taken to a dismantler who accepts automobiles from consumers, local governments, insurance companies, and so on, and strips them of useful parts for resale. The residues, generally referred to as hulks, are then transported to scrap processors for final preparation before delivery to scrap users. The processors take stripped hulks from the dismantlers and may on occasion accept whole vehicles from other automobile collectors and even from some consumers. These hulks and vehicles are then subjected to a variety of operations designed to facilitate their reuse by steel and foundry industries. The process normally consists of reducing the bulk of the car either by compacting it or by cutting or otherwise dividing it into small parts through the use of shredders and shears. Equipment to conduct the baling

136. U.S. DEP'T OF COMMERCE, MOTOR VEHICLE ABANDONMENT IN U.S. URBAN AREAS 17-20 (1967) [hereinafter cited as *Dep't of Commerce Study*]; Reichert, *supra* note 135, at 107-09.

137. See *ISIS Proceedings*, *supra* note 131.

138. *EPA Study* at 12.

139. *EPA Study*.

or compacting operation and to shred or otherwise cut the automobile hulks into more easily transportable shape is fairly expensive, and recycling operations must be able to rely on a steady supply of such hulks in order to keep operating profitably.<sup>140</sup>

Each of the operations involved in recycling automobile hulks may create environmental damage of its own. The dismantler of automobiles may accumulate large piles of automobile hulks that are unsightly and, depending on their location, may violate some of the esthetic protective provision of the Highway Act.<sup>141</sup> He may also adversely affect the removal of abandoned hulks from the street by refusing to take additional vehicles into his yard if he is unable to handle them.<sup>142</sup>

The processing industry must normally clear the hulk of non-metallic substances prior to baling, shredding, or otherwise preparing it for reuse.<sup>143</sup> Normally, nonmetallic parts are simply burned out of the hulk, which gives rise to substantial air pollution problems.<sup>144</sup> In addition, processors may accumulate large inventories which will be unsightly. It should be noted that the accumulation of automobile hulks in a processor's yard may be directly related to the economic demand for scrap steel and that the unsightly piles in his yard may be the result of a declining demand for scrap.<sup>145</sup>

The scrap processing industry is further handicapped in disposing of an adequate amount of steel scrap by the problem of metal contamination. The failure to remove copper parts from automobiles, for instance, may adversely affect the quality and hence the price and demand for particular kinds of steel scrap. Thus the operations of the scrap processor are directly related to the automobile's construction in the first instance.<sup>146</sup> The task of the processor—and also his profit margin for the sale of high grade scrap—may be directly affected by the use of copper in the initial manufacture of the automobile or by the substitution of other less highly contaminating metals.<sup>147</sup> The automobile scrap industry is also affected by dis-

140. Dole, *supra* note 135, at 30.

141. Highway Beautification Act of 1965, 23 U.S.C. § 136 (1970).

142. *EPA Study* at 37.

143. *Id.* at 35, 42.

144. *Id.*

145. *Id.* at 42.

146. *Id.* at 12.

147. *Id.* at 16 (the use of aluminum instead of copper wire and the replacing of electric motor stators, presently wound with copper, with stators composed of permanent ceramic magnets of barium or strontium ferrites is suggested).

criminary freight rates which provide for a higher rate for the transportation of scrap than for virgin materials.<sup>148</sup>

Most automobiles are recycled for reuse in the manufacture of new vehicles and other steel products. The problem of unsightly accumulations of discarded vehicles, be it in junkyards or in the streets, arises not merely because some vehicles are not recycled—for most of them ultimately are—but also because of the time lag between the discarding of the vehicle and its entry into the recycling process.<sup>149</sup> This lag is almost entirely dependent on economic considerations. When the price of scrap steel is high, accumulations of hulks in junkyards and in the yards of processors are likely to move with considerable dispatch. It is also far more likely in that case that abandoned hulks will be collected and will be introduced into the process.<sup>150</sup>

### *Administrative Control of Abandoned Cars*

#### Titling and Impoundment Requirements

The second issue identified earlier relates to the administrative handling of abandoned vehicles. At present, many states have laws that interpose obstacles to the prompt collection and introduction of abandoned automobiles into the recycling process. These laws come under two headings, titling laws and impounding requirements.<sup>151</sup>

A number of states have rather severe titling laws. They provide that every vehicle must have a certificate of title and that no vehicle can be sold or otherwise transferred without such a certificate. They also require that on each sale or other disposition the old certificate be returned to the registering authority and that a new one be issued.<sup>152</sup>

Another set of laws which have made it more difficult to collect and dispose of abandoned cars have been the so-called impounding

148. *Id.* at 48. See *S.C.R.A.P. v. United States*, 346 F. Supp. 189 (D.D.C. 1972), *rev'd*, 412 U.S. 669 (1973).

149. *Dep't of Commerce Study* at 13.

150. See *EPA Study* at 66.

151. See *Dep't of Commerce Study* at 21-26.

152. *E.g.*, IND. ANN. STAT. § 9-1-2-1 (code ed. 1973); S.C. CODE OF LAWS, §§ 46-50, 46-150.15 to 46-150.16 (1963), 46-150.27 (Supp. 1971). Compare N.M. STAT. ANN. §§ 64-4-13, 64-4-13.1 (Supp. 1973) (eliminates impounding requirements for vehicles which are at least eight years old and are without a valid license plate).

requirements. These require the city or other local government agency to keep any found vehicle in a municipal impounding lot for a certain length of time, ranging from a few days to a full year, in order to provide time for the owner to be properly notified and to reclaim the vehicle.<sup>153</sup> Unduly lengthy impounding periods commonly result in overtaxed impounding space<sup>154</sup> and contribute to the slow removal of the inventory of the impounding lot. This in turn creates unsightly accumulations.

Both titling and impounding requirements are proper protective provisions when applied to an operable vehicle. The requirements were initially imposed in recognition of the fact that a vehicle may be valuable property, in many instances the most valuable object a person owns. Hence the requirement that it not be transferred without the proper certificate of title, or that if found in the streets it be impounded and the owner be given an opportunity to reclaim it, protects the owner's interest in his property.<sup>155</sup> But in many states these requirements also apply to abandoned vehicles and thereby considerably complicate the disposal of junk vehicles.<sup>156</sup> The law often makes little distinction between a vehicle in prime condition that has been left overparked in the street and a vehicle that has been abandoned.

The main problem of excepting abandoned motor vehicles from titling and impounding requirements is that of providing a satisfactory definition of an abandoned vehicle.<sup>157</sup> Statutory definitions of abandonment often include a description of the vehicle as old and worn out, ostensibly incapable of being operated in the manner for which it was designed. The physical appearance of the vehicle can be considered evidentiary of an intention not to reclaim it.<sup>158</sup>

153. *E.g.*, IND. ANN. STAT. 9-9-5-4 (code ed. 1973) (30 days); N.Y. VEHICLE AND TRAFFIC LAW § 1224(3)(c) (McKinney 1970) (5 days from mailing of notice); OHIO REV. CODE ANN. §§ 311.30, 311.31, 737.311 (1971).

154. *Dep't of Commerce Study* at 15.

155. *Id.* at 25-26.

156. *Id.* at 25. See also Reichert, *supra* note 135.

157. *E.g.*, IND. ANN. STAT. § 9-9-1-4 (code ed. 1973) (In addition to automobiles without valid license plates, mechanically inoperable vehicles, and partially dismantled vehicles, this definition also covers vehicles that are parked "on public premises continuously without being moved for a period of seven (7) days, except before legal or temporary residence of the owner."); N.Y. VEHICLE AND TRAFFIC LAW § 1224(i)(c) (McKinney 1970). Compare OHIO REV. CODE ANN. § 311.33 (1971).

158. *E.g.*, 21 DEL. CODE ANN. § 4401(b) (Supp. 1970); IND. ANN. STAT. § 9-9-1.5-3(b)(5) (code ed. 1973); N.C. GEN. STAT. § 153A-132(b) (1974) (applies

Lack of a current license plate is also cited as a factor suggesting abandonment.<sup>159</sup> The most frequent practice is to define an abandoned vehicle as one which has remained in one location for more than a certain length of time. Removal of a vehicle left in one location for a specified period is sometimes authorized whether or not the vehicle appears abandoned. Forty-eight hours is a common period, though many laws provide for different lengths of time<sup>160</sup> Some laws provide for the removal of abandoned vehicles without specifying the time period, which gives rise to the assumption that the vehicle has been abandoned, or without attempting to define what, precisely, constitutes abandonment.<sup>161</sup>

Many cities do not provide for the removal of abandoned vehicles that have been left on private property.<sup>162</sup> Of the state laws which provide for their removal, some cover only vehicles left without the consent of the property owner, while others also include those left with his consent.<sup>163</sup> A few even go so far as to include unlicensed or inoperable vehicles kept in the open by the owner on his own

to "junked vehicles which are otherwise already deemed abandoned"); OHIO REV. CODE ANN. §§ 311.33, 737.313 (1971).

159. *E.g.*, 21 DEL. CODE ANN. § 4401(b) (Supp. 1970); IND. ANN. STAT. § 9-9-1.5(b)(1) (code ed. 1973); N.Y. VEHICLE AND TRAFFIC LAW § 1224(1)(a) (McKinney 1970); OHIO REV. CODE ANN. §§ 311.33(E), 737.313(E) (1971).

160. *E.g.*, MICH. COMP. LAWS ANN. § 257. 252(b) (Supp. 1973) (48 hours). Compare ARIZ. REV. STAT. § 28-1401(1) (Supp. 1973) (36 hours); ILL. ANN. STAT., ch. 95½, § 4-200(b) (Smith-Hurd 1972) (2 to 24 hours on any highway or public place and 7 days on private property); IND. ANN. STAT. § 9-9-1.5-3(b)(2)(4) (code ed. 1973) (7 days on public premises or more than 48 hours on private property); N.C. GEN. STAT. § 153A-132(b)(2)(3)(4) (1974) (2 hours to 7 days depending on whether county operated, private or public property); N.Y. VEHICLE AND TRAFFIC LAW § 1224(1)(b)(c)(d) (McKinney 1970) (24 hours on any highway or other public place where there is no legal parking, 48 hours where there is legal parking, and 7 days on private property); OHIO REV. CODE ANN. § 311.33A (1971) (48 hours on public property and 72 hours on private); ORE. REV. STAT. § 483.382 (1971) (24 hours only if the Department of State Police or the Sheriff has reason to believe the vehicle has been abandoned, but otherwise 5 days on either public or private property); 23 VT. STAT. ANN. § 1103 (Supp. 1973) (4 days if left within the limits of a public highway).

161. FLA. STAT. ANN. § 705.16(2)(b) (Supp. 1972); N.H. REV. STAT. ANN. § 266: 1-6 (1966).

162. *Dept. of Commerce Study* at 23.

163. *E.g.*, IND. ANN. STAT. § 9-9-1.5-3(b)(4) (code ed. 1973) (without consent); N.Y. VEHICLE AND TRAFFIC LAW § 1224(1)(d) (McKinney Supp. 1973) (without consent); OHIO REV. CODE ANN. §§ 311.33(E) (1971) (without consent). The problem presented by the abandonment of motor vehicles on private property with the property owner's consent is largely a problem of zoning and licensing. See Reichert, *supra* note 135, at 114-15.

property.<sup>164</sup> A few states make no express provision for the removal of abandoned vehicles at all.<sup>165</sup>

A newer pattern of regulation which includes a more reasonable approach to the definition of abandoned vehicles is coming into use. Under these laws, simpler handling requirements are permitted for vehicles of lower value than for those of higher value. Some provide for police appraisal of the value of each abandoned vehicle so that it can be placed in one of two or three value classes. Some laws separate the vehicles into two groups, with \$100 or \$200 as the dividing line.<sup>166</sup> Sometimes three value groups are provided, such as under \$25, \$25 to \$100, and over \$100; in one city using such a three-tier classification, it has been estimated that about 25 percent of the abandoned vehicles fall in the low group, about 65 percent in the middle group, and only 10 percent in the high value group.<sup>167</sup> The reasoning offered in support of such classifications is that they provide simpler, less costly processing for lower value vehicles and limit the use of more costly and time-consuming property protective procedures, such as titling or impounding, for vehicles whose higher values warrant it. Thus notification may be simplified for lower value vehicles, impounding periods shortened or eliminated, and titling requirements simplified or eliminated when the vehicle is only fit for scrappage or dismantling. Provisions for disposal and for the distribution of the proceeds are also simplified.

### Notification and Auction Requirements

In addition to titling and impounding requirements, notification of owners and lien holders of vehicles which have been removed from the site of abandonment is generally required. The purpose is to protect the owner or lien holder against the loss of his property

164. Cf. *Leet v. Montgomery County*, 264 Md. 606, 287 A.2d 491 (1972), in which such a law was held unconstitutional as an uncompensated "taking" of property.

165. The states are Alabama, Louisiana, Maine, New Mexico, and South Carolina.

166. See, e.g., IND. ANN. STAT. §§ 9-9-1.5-6 to 9-9-1.5-7 (code ed. 1973) (\$100 dividing line); N.Y. VEHICLE AND TRAFFIC LAW § 1224 (8) (McKinney 1970) (\$100 dividing line if no license plate affixed); OHIO REV. CODE ANN. §§ 311.33(f), 737.313(f) (\$50), §§ 311.32, 737.32 (disposition of vehicles worth less than \$200 but which do not meet all requirements to be classified as junk motor vehicles); ORE. REV. STAT. §§ 483.388, 483.395 (1971) (\$100 dividing line).

167. *Dep't of Commerce Study* at 23-24.

and the authorities from being charged with proceeding without due process of law. Notification is usually by registered or certified mail, and in some instances advertisements in newspapers of general circulation may also be required. Owner identification may also be made with the help of the state motor vehicle agency. Generally, disposal of the vehicle by the city is forbidden until the owner has had a reasonable opportunity to collect the vehicle.<sup>168</sup>

The identification and contact of the owner who has abandoned his car, which may result from the notification requirement, may be used by some cities to compel an owner to dispose of his car properly or to pay the costs of disposal in accordance with the law. Generally speaking, notification requirements and attempts to identify the owner and compel him to dispose of his vehicle properly have met with little success and have usually been too costly and administratively burdensome to be worthwhile.<sup>169</sup>

Another common requirement which contributes to the delay in the processing of abandoned vehicles is that abandoned vehicles be sold or disposed of at public auction if they are not picked up by their owners from the municipal pound after the required holding period. Public auction is chosen because it is thought likely to assure a fair price.<sup>170</sup> This method of disposal is indubitably warranted for vehicles that have only scrap value. Moreover, the disposal of the proceeds from the sale of abandoned vehicles is also stipulated in the laws: first, to defray the cost of removal, impounding, and disposal; second, to satisfy any lien holder's interest if he has been located; third, to pay the balance to the owner if he has been located, and, if not, any balance to be transferred into a designated state or city fund.

At least one city, however, has handled the distribution of the proceeds of the sale of abandoned vehicles in a more convenient manner. Vehicles abandoned on private property are found to be a nuisance subject to a fine of up to \$50 per day after five days notice. The property owner and the auto wrecker cooperate in that the auto wrecker removes the vehicle without charge and is then allowed to retain the full proceeds from the ultimate sale. In such

168. See, e.g., IND. STAT. ANN. § 9-9-1.5-8 (code ed. 1973); N.Y. VEHICLE AND TRAFFIC LAW § 1224(3)(b) (McKinney 1970); OHIO REV. CODE ANN. §§ 311.301, 311.301, 737.312 (1971).

169. *Dep't of Commerce Study* at 25.

170. *Id.* at 26.

a situation, there is no other distribution of sales revenues.<sup>171</sup> Although this type of distribution affords much in the way of convenience, it is open to some objections. First, it is unclear why the wrecker, rather than the city or state, or all of these, should receive the proceeds of a sale.<sup>172</sup> Second, this distributional pattern may, if followed rigidly, unjustly affect owners of high-value vehicles.<sup>173</sup> Third, in any instance where the value of the vehicle exceeds accumulated fines, a scheme which does not attempt to give the owner part of the sale proceeds may be challenged, under the federal constitution, as a taking of property without just compensation<sup>174</sup> or in violation of due process of law.<sup>175</sup> The scheme could, of course, be defended,<sup>176</sup> but it will be important, as a minimum, to ensure that it does not allow such grossly disproportionate amounts from automobile sales to be given to wreckers or the city or state as to be unduly vulnerable to constitutional attack.

### *Legal Measures to Prevent Abandonment*

So far we have discussed some of the difficulties in recycling junked automobiles and have described and to some extent criticized current administrative practices for dealing with abandoned cars.

171. *Id.*

172. The Department of Commerce Study recommends that the proceeds be transferred directly into city or state funds. *Id.*

173. The Department of Commerce Study in fact suggests that distributing the balance of the proceeds to the owner is desirable, but only in the case of high value vehicles. *Id.*

174. *U.S. Const.* amends. V, XIV.

175. *Id.*

176. So far as the "takings" objection is concerned, it could be urged that the scheme is instead a *sanction* against the owner for violation of a valid regulation. See, as an analogy, the discussion in Note, *Forfeiture of Property Used in Illegal Actions*, 38 NOTRE DAME LAW. 727 (1963), and cases there cited. It could also be argued that the scheme is a necessary police action to preserve the environment, eliminate nuisance, and protect the safety and health of the public, rather than an "appropriation" for "public use." See, e.g., *Miller v. Schoene*, 276 U.S. 272 (1928). Cf. *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393 (1922). See generally Harris, *Environmental Regulation, Zoning and Withheld Municipal Services: Takings of Property by Multi-Government Actions*, 25 U. FLA. L. REV. 635 (1973); Sax, *Takings, Private Property and Public Rights*, 81 YALE L.J. 149 (1971); Sax, *Takings and the Police Power*, 74 YALE L.J. 36 (1964).

As for due process, the scheme described in the text does provide for five days notice to the owner, and could be argued to be "appropriate to the nature of the case" under the doctrine of *Mullane v. Central Hanover Trust Co.*, 339 U.S. 306 (1950).



In this final section we shall discuss legal efforts to prevent the abandonment of automobiles in the first place.

The most immediate and direct sanction routinely provided for is that of the criminal law. Abandonment of an automobile is generally a misdemeanor punishable by fine and under some laws by fine or imprisonment.<sup>177</sup> There are, however, few recorded convictions for the offense. In most instances abandoned cars are without license plates, and often the vehicle identification number has been defaced. Moreover, as has been pointed out, it takes considerable administrative machinery and is quite expensive to determine the ownership of an abandoned vehicle in order to prosecute the person who abandoned it.<sup>178</sup> Frequently, a car is abandoned on the road simply because it can no longer be driven. A person who abandons such a car may be financially unable to pay the fine imposed, and thus the only available sanction would be to impose a jail sentence. In effect, such a person would be jailed because he could not afford to drive a car that was capable of getting to its destination. It is not likely that criminal courts will impose drastic penalties in that situation, and imposition of a jail sentence on a person unable to pay the fine may be unconstitutional.<sup>179</sup>

In view of the inadequacy of the criminal sanction to deal with the abandonment problem, two other approaches have been explored. One is to make it easier for the municipality to seize and dispose of abandoned cars by relaxing titling and other formal requirements. This approach has been illustrated by some of the legislation already referred to and by the Council of State Governments' suggested legislation on abandoned motor vehicles, which will be described in greater detail below.<sup>180</sup>

177. *E.g.*, 21 DEL. CODE ANN. § 4414 (Supp. 1970) (fine \$25-\$100 or imprisonment 2-10 days, or both); N.Y. VEHICLE AND TRAFFIC LAW 1224(6) (McKinney Supp. 1973) (fine not exceeding \$100); OHIO REV. CODE ANN. § 311.99(c) (1971) (fine of \$50 to \$100 plus costs); ILL. ANN. STAT., ch. 95½, § 4-214 (Smith-Hurd Supp. 1973) (fine \$25-\$100 and disposition of the vehicle).

178. See note 168 *supra*.

179. The equal protection clause has been held to prohibit state courts from imposing jail fines and then automatically converting the sentence into a jail term solely because the defendant is indigent and cannot pay. *Tate v. Short*, 401 U.S. 395 (1971). *Tate* applies, however, only to indigents. Moreover, it does not preclude imposing a jail term in the first instance or when alternative means, *e.g.*, installment payments, are "unsuccessful."

180. Abandoned Vehicle Act, COUNCIL OF STATE GOVERNMENTS, 1973 SUGGESTED LEGISLATION XXXII 57 (1972).

The other approach is to devise economic sanctions to encourage the owner to take his vehicle to a junkyard rather than to abandon it. This approach, which has been rejected by the Council on Environmental Quality,<sup>181</sup> has a number of variants, but is essentially based on the principle of the "deposit bottle." The purchaser or owner of a motor vehicle would be required to deposit a sum of money as security in trust for the eventual cost of disposition of his vehicle. When he or a subsequent purchaser surrenders the vehicle to a junkyard, he can retrieve his deposit. If he fails to turn in the vehicle, then the government agency that collects the abandoned vehicle or the private trustee can reimburse itself for the cost it has incurred from the same fund. Under one such "deposit bottle" system, reflected in a bill introduced in Congress, a \$30 fee would have to be paid into a trust fund by the purchaser of a new car. The fee would be returned to the owner of the car when it is ultimately turned in. If a municipal agency turns in the car, it would be eligible to collect the fee.<sup>182</sup>

The Council on Environmental Quality has pointed out some of the problems of the "deposit bottle" scheme. Such proposals would

put an unfair burden on the owners of 85 percent of autos that are properly turned over to auto wreckers, in order to take care of the remainder which are not. Furthermore, the Council is not persuaded that the demand for auto scrap would be improved by such a system, nor that it would in fact influence the economics affecting abandonment. The resulting fund of payments would divert billions of dollars from other investments in the private economy. Administration and enforcement of the system would require excessive increases in government personnel and expenditures.<sup>183</sup>

There are also other reasons that make such a system objectionable. First, such a system is regressive in its impact, making it more costly for a person of lesser means to purchase a used motor vehicle. Second, the administrative machinery required to maintain such a system would be quite substantial and that cost again would have to be borne by other sources. Third, there is no assurance that the sys-

181. COUNCIL ON ENVIRONMENTAL QUALITY, ENVIRONMENTAL QUALITY—FIRST ANNUAL REPORT 116 (1970).

182. See *H.R. 15860*, 91st Cong., 2d Sess. (1970).

183. COUNCIL ON ENVIRONMENTAL QUALITY, ENVIRONMENTAL QUALITY—FIRST ANNUAL REPORT 116 (1970).

tem will work. The deposit system does not, after all, work too well for glass bottles. The real problem is the precise amount of the deposit. If the deposit is too high, it causes economic problems. If the deposit is too low, it might indeed encourage abandonments because the deposit is likely to be viewed as a prepayment of a public hauling or removal charge. It should be noted that setting the fee at a level which will be economically acceptable and which also provides a sufficient incentive for the return of a car to a junkyard does not necessarily reflect the cost of disposal.

A number of states have recently enacted legislation that deals expressly with abandoned automobiles. For instance, an abandoned vehicle act has been enacted in Indiana under which it is illegal to abandon a vehicle on any public or private premises in a location which is visible from any public place within the corporate limits of any city. Such an abandoned vehicle constitutes a public nuisance. The law creates a rebuttable presumption that the owner of an abandoned vehicle is responsible for its abandonment, and he is held liable for all costs incidental to its removal, storage, and disposal.<sup>184</sup>

Michigan has passed legislation to empower a local government unit to collect junked motor vehicles through a refuse collection center which it may establish.<sup>185</sup> In many states, junkyards must be licensed.<sup>186</sup>

North Carolina has enacted a statute authorizing its counties to adopt ordinances to deal with abandoned automobiles. It has some of the usual notification provisions, but it dispenses with titling—the auction sale of vehicles appraised over \$50 is required, but such sale at auction gives good title. A vehicle appraised under \$50 may be sold without an auction, and vehicles worth less than \$25 that are inoperable, dismantled, or damaged and five years old or older are defined as junk motor vehicles that may be sold without any further proceedings after a fifteen-day holding period. North Carolina has been more careful in its definition of an abandoned or junked vehicle. An “abandoned motor vehicle” is a car left on county property where parking is prohibited, more than twenty-four hours on

184. IND. STAT. ANN. §§ 9-9-1-6 (code ed. 1973); See also *id.*, §§ 9-9-1.5-6; N.Y. VEHICLE AND TRAFFIC LAW § 1224(8) (McKinney 1970).

185. MICH. COMP. LAWS ANN. § 325.299 (1973).

186. *E.g.*, MO. ANN. STAT. § 226.670 (Supp. 1974); N.H. REV. STAT. §§ 267-A:1 *et seq.* (1973); N.J. STAT. ANN. §§ 27-5E-1 *et seq.* (Supp. 1973). The licensing of junkyards relates directly to the problem of abandoning vehicles on private property with the consent of the property owner. See Reichert, *supra* note 135, at 114-15.

other county property, seven days on public grounds, or more than two hours on private property without the owner's consent. A "junked motor vehicle" is an abandoned vehicle which is *also* partially disabled, incapable of self-propulsion, or without a current license plate.<sup>187</sup>

In somewhat similar fashion, Tennessee has authorized the disposal of abandoned motor vehicles without titling or notification procedures if the vehicle is over five years old and has no engine or is otherwise completely inoperable.<sup>188</sup>

Titling and notice requirements have also been abolished in Virginia for abandoned motor vehicles that are clearly inoperable, or that by the nature of their condition "cannot be feasibly restored to operable condition." In such a case, disposal is authorized "by the person, firm, corporation or political subdivision on whose property or in whose possession such motor vehicle is found," but notice must be given to the division of motor vehicles.<sup>189</sup>

The National Symposium on State Environmental Legislation developed, and the Committee on Suggested State Legislation of the Council of State Governments in 1972 approved, a suggested State Abandoned Vehicle Act. Under the proposal, it is illegal to abandon a vehicle upon any highway, or upon any public or private property without the consent of the owner or person in lawful possession of the property. The act contains procedures to be followed in the removal and disposal of abandoned vehicles. These procedures simplify—or, in the case of vehicles of less than \$100 in value, abolish—titling and lengthy impoundment requirements. The proposal further provides for the licensing of storage and disposal facilities. Where opportunities for vehicle disposal are not economically available to owners of vehicles, the appropriate state agency is required to provide, by contract with private persons or political subdivisions, facilities for the collection and proper disposal of such vehicles at the request of the owner. Since it is recommended that the abandoned vehicles program be self-sufficient, optional methods of financing the program are provided. The fund to be used for the program is to be provided through one or more

187. N.C. GEN. STAT. §§ 153-9(54a), (54b) (Supp. 1971). See also OHIO REV. CODE ANN. §§ 311.33, 737.313 (1971).

188. TENN. CODE ANN. §§ 59.1608(a)-(e) (Supp. 1973).

189. VA. CODE ANN. § 46.1-555.7 (Supp. 1973).

of the following devices: (1) a refundable disposal tax on new or used vehicles; (2) a special tax on excess inventory held by persons licensed under the act (junkyards, wreckers, processors) or on the gross sales of new or used vehicles; (3) special fees for the title or registration of vehicles; (4) net proceeds of sales of impounded vehicles; and (5) "other appropriate" methods. The fund is to be used to encourage proper disposal in one or more of the following ways: (1) incentive, subsidy, or bounty to persons licensed under the act or to the last owner of record; (2) subsidy to private persons or political subdivisions to reimburse the costs of collecting, storing, or disposing of abandoned vehicles; and (3) other financial incentives as may be appropriate. Every person convicted of violating the act—including abandonment of an automobile—would be subject to a fine not to exceed \$500 or imprisonment for not more than six months in a county jail, or both.<sup>190</sup>

The solid waste problem presented by the automobile is, in our view, at bottom an economic problem: the abandonment of automobiles will decline or cease, and the prompt collection and recycling of cars that are no longer useful will occur, when this is economically profitable. In order that the aims of discouraging abandonment and facilitating collection and recycling might be realized more fully, we recommend that legal obstacles that have artificially inflated the costs of collection and recycling be eliminated wherever possible. Chief among these obstacles are many of the titling, impoundment, notification, and auction requirements—at least as applied to abandoned vehicles that are low in value. It is to be hoped that new regulatory developments in this area will continue. However, if elimination of such obstacles does not produce a satisfactory solution to the problem of abandoned automobiles, we would recommend that economic incentives, including the use of subsidies, be considered. Such consideration would be well within the national policy in this area. As early as 1965, Congress indicated that the abandoned automobile was, as part of a larger solid waste problem, of sufficient national concern to warrant a federal commitment.<sup>191</sup> In later legislation dealing with solid waste problems—

190. Abandoned Vehicle Act, *supra* note 182, at 62.

191. See *H.R. Rep. No. 889*, 89th Cong., 1st Sess. 7 (1965), accompanying S. 306, which became the Solid Waste Disposal Act of 1965, Pub. L. No. 89-272, Title II, 79 Stat. 992, as amended, 42 U.S.C. §§ 3251 *et seq.* (1970).

the Resource Recovery Act of 1970<sup>192</sup> Congress directed that studies be made of "recommended incentives (including Federal grants, loans and other assistance)" to accelerate recycling solid waste, "with special emphasis on motor vehicle hulks."<sup>193</sup> Thus, if the elimination of unnecessary legal obstacles does not achieve satisfactory results, incentives to better disposal of abandoned vehicles should be explored.

192. Pub. L. No. 91-512, 84 Stat. 1227, 42 U.S.C. §§ 3251 *et seq.* (1970).

193. *Id.*, § 104(a), 42 U.S.C. § 3253a(a)(5) (1970). Demonstration projects were also authorized. *Id.*