

## POLLUTION CONTROL IN SINGAPORE

Although the degradation of the environment has been proceeding for a long time, it is only in recent years that we have become aware and concerned over its deterioration. The 70's is likely to be characterised as the decade of action against environmental decay. And the 80's will hopefully be a decade of consolidation and improvement of environmental legislation. Hitherto, we have always accepted the pollution of our environment as an undesirable but uncontrollable consequence of progress; but since the 1970's there has been a realisation that degradation and pollution may inflict irreversible damage to the environment with which nature may not be able to cope.

Environmental laws cover a myriad of topics including pollution, coastal-zone management, forest conservation, parks, wildlife, mineral development and cultural environment. This paper will deal with certain aspects of pollution in Singapore; the causes and sources of pollution, the types of control, particularly the relevant laws and the cost considerations of pollution control. No attempt will be made to define pollution, for the line is often difficult to draw and the delineation varies from person to person; instead the article will focus on forms of pollution such as water pollution, air pollution, noise pollution and pollution through solid wastes.

The emphasis in many developing countries over the last two decades has been on economic development. In Singapore, the means to economic progress has been through industrialisation. Unfortunately, industrialisation is probably the major contributor to the degradation of the environment. Furthermore, abatement and prevention usually add nothing to commercial profits and so any action taken will only be an unwelcome cost to the industrialist. As a result, the initiative in pollution control must and has almost exclusively come from the government. To curb pollution, statutes and regulations were passed and an enforcement machinery was established. Thus the Environmental Public Health Act was passed in 1968<sup>1</sup> and an Act to Prevent Pollution of the Sea was passed in 1971.<sup>2</sup> The anti-pollution unit was set up under the supervision of the Prime Minister's Office in April 1970 and two years later the Ministry of The Environment was formed.<sup>3</sup> The two bodies were set up with the hope of initiating a more co-ordinated and effective effort to combat pollution.

There are three basic means of pollution control in Singapore today. They are:

\* This article is based on a paper to be presented at the Third Environmental Law Seminar to be held in Singapore from 27-31 March 1983.

<sup>1</sup> Now Cap. 155, Singapore Statutes, 1970 Revised Edition.

<sup>2</sup> Prevention of Pollution of the Sea Act No. 3 of 1971.

<sup>3</sup> In September 1972.

- (1) informal and social control;
- (2) legal control; and
- (3) administrative control.<sup>4</sup>

Pollution control restricts the activities of individuals by seeking to ensure that these activities are carried on in a way that will not pollute the environment. This necessarily requires a regulatory system imposing restrictions on members of the society. Therefore legal control is essential. The most useful means of legal control is to require a minimum standard of acceptable conduct. However, there are only a few provisions in Singapore's pollution control laws under which standards are fixed; in most cases the provisions are flexible, giving the relevant authorities and agencies wide discretion to decide on appropriate measures.<sup>5</sup> One also has to bear in mind that law reflects but does not determine the morals of a society; ultimately the most effective control lies in the individual who conforms as a result of what Arnold Reitze calls "his ingrained socialization".<sup>6</sup>

Administrative control in Singapore is exercised in various ways. The Ministry of The Environment (the Minister or other designated officer) regulates existing and potential pollution problems through its system of granting or withholding permits and approval for plans and projects<sup>7</sup> and through orders and regulations.<sup>8</sup> However, as is true in most situations of administrative discretion the effectiveness of this form of control depends very much on the government's commitment to environmental protection. It is here that there is often a balancing of interest between the economic needs and interests of industry with public interest to prevent pollution and protect the environment. It is not often, in a developing country that the latter triumphs over the former—the "Sumitomo Affair"<sup>9</sup> provides an example of such a triumph, which one hopes, demonstrates the government's firm commitment to combat pollution.

This article focuses on legal and administrative controls. The relevant statutes and regulations will be evaluated in the light of the following criteria:

- (1) Do the laws provide for enforceable sanctions and realistic penalties?

<sup>4</sup> This classification is modified from that used by Arnold W. Reitze Jr. in, *Environmental Law* (1972 Edition, North American International).

<sup>5</sup> For example, the granting of permission to use premises as scheduled premises under the Clean Air Act 1971, is a matter solely within the discretion of the Director of Air Pollution Control and the Minister.

<sup>6</sup> *Ibid.*, at pp. 1-54.

<sup>7</sup> For example, before the Ministry of National Development's Building Control Division grants approval for building plans, guidelines are drawn up for permissible noise levels and other criteria to reduce noise pollution.

<sup>8</sup> For example, the control of construction of motor vehicles, *infra* p. 5.

<sup>9</sup> See the reports in *The Straits Times* of 16th November 1979, 31st October 1980 and 1st November 1980. In this "affair" the government refused to budge from its stand of requiring a petrol-chemical complex to construct the more costly but less polluting, enclosed ground level flare system of burning off unwanted hydro-carbons (which will be produced when the complex is in operation) before granting approval of building plans.

- (2) Do the laws set out clear standards to be met or are the standards vague, leaving a great deal of discretion to the administrators?
- (3) Are the laws being enforced or are they merely filling the pages of the statute books?
- (4) Do the statutes demonstrate coherence and uniformity?
- (5) Does the prevailing pollution control strategy make sense from a technical point of view i.e. are the standards too lenient or are they unrealistically strict?
- (6) Does the legislature have the capacity to alter the law to meet changing circumstances, for example, in technology?

#### AIR POLLUTION

It was not until the Industrial Revolution in the eighteenth century that air pollution became a serious problem in the world. In Singapore the problem did not affect us till about the 1970's when with rapid industrialisation, urbanisation and the great increase in the number of motor vehicles, the problem became serious. Air pollution has aroused greater concern and consequently more action than other forms of pollution, probably because its effects can be seen and felt by a large section of the population. The combustion of petroleum fuels in power stations and oil refineries produces sulphur dioxide and smoke and the combustion of gasoline produces carbon monoxide, lead and other pollutants. Thus air pollution originates from sources that may either be stationary or mobile. As a result of the uncertainty and complexity of the sources and effects of air pollutants, statutes have tended to rely on technology to set minimum standards.

#### *Control of Emissions from Stationary Sources under The Clean Air Act 1971<sup>10</sup>*

Although the Clean Air Act defines air pollution<sup>11</sup> to mean "the emission into the air of any air impurity" it only governs emissions from stationary sources. Control measures provided for under the Act are implemented by the Director of Air Pollution Control, as appointed by the Minister under section 3 of the Act. The Act controls emissions from trade and industrial premises, which have been categorised into scheduled and non-scheduled premises. Before any premises can be used for any of the purposes stated in the Schedule, written permission must be obtained from the Director.<sup>12</sup> The purposes stated cover a wide range of works from cement and concrete works to chemical, gas and petroleum works. The Schedule was amended in 1980<sup>13</sup> to provide for stricter control over those premises being used for the storage of toxic or volatile chemicals. The criteria used seems to be industrial works which have a high potential for pollution. The Director can grant permission subject to certain con-

<sup>10</sup> No. 29 of 1971.

<sup>11</sup> Section 2(1).

<sup>12</sup> Section 4(1).

<sup>13</sup> Clean Air Act (Amendment of Schedule) Notification, S.127/1980.

ditions such as installation of control equipment and other actions to lessen the emission of air pollutants.<sup>14</sup> The Act does not give the Director any guidelines as to when permission is to be granted or refused; for he can refuse permission "if *he is of the opinion* that the occupier is likely to cause or increase air pollution..." (emphasis mine).<sup>15</sup> Anyone who is aggrieved by the decision of the Director may appeal to the Minister, whose decision shall be final.<sup>16</sup>

This aspect of air pollution control is mainly administrative in nature. As such very much depends on the Director's and the Minister's commitment to pollution control. The discretion to control use of industrial premises together with a programme for the inspection of factories to check on sources of emission and to test for compliance with emission standards have been quite effective in bringing air pollution from stationary sources within control.<sup>17</sup> In addition a system of screening proposals for new factories was also introduced to ensure that the sites chosen are environmentally compatible with their operations. A procedure has been established whereby the Economic Development Board, Jurong Town Corporation and the Planning Department refer applications for sites for new factories to the anti-pollution unit for comment.<sup>18</sup> This has resulted in the establishment of an Industry and Environment Committee to vet such applications.<sup>19</sup> It can be said from the number of cases referred to the Committee and rejection of some of these cases that the authorities have not neglected environmental considerations in granting approval to industries.<sup>20</sup>

The Clean Air Act also prohibits the emission of dark smoke<sup>21</sup> and controls the emission of air impurities within certain stated standards.<sup>22</sup> Under the Clean Air (Standard) Regulations 1972<sup>23</sup> passed under the Clean Air Act "dark smoke" is defined as any smoke which is as dark as or darker than shade number 2 of the Ringelmann Chart.<sup>24</sup> The Regulations also lay down an elaborate list of the standard of concentration of air impurities that are permitted. The standard varies according to the industry and the air pollutants in-

<sup>14</sup> Section 5.

<sup>15</sup> Section 4(3)(b).

<sup>16</sup> Section 17.

<sup>17</sup> In 1980 a total of 2,181 factory inspections were carried out as compared with 1,834 in 1979. 17 notices were served on various factories to abate air pollution. In addition the number of building plans referred to the unit for comments increased from 141 in 1979 to 187 in 1980 (Statistics obtained from Anti-Pollution Unit's Annual Report, 1980).

<sup>18</sup> See Anti-Pollution Unit's Annual Report, 1973.

<sup>19</sup> See Anti-Pollution Unit's Annual Report, 1974.

<sup>20</sup> The number of applications for industrial premises referred to the anti-pollution unit for comment increased from 964 in 1979 to 1,244 in 1980. A total of 41 applications were not supported because the proposed activities were incompatible with the surrounding environment.

<sup>21</sup> Section 9.

<sup>22</sup> Section 10.

<sup>23</sup> No. S. 14, S.L. Supplement No. 3 of 1972.

<sup>24</sup> This was a device produced by Professor Ringelmann, which consists of black cross-hatching on a white background of card, wood or other material, in such a manner that varying determined percentages of the white background are obscured. The chart is then held up by the observer and the general impression compared with the colour of the smoke emitted.

volved.<sup>25</sup> Where no standard has been prescribed for any particular pollutant, the occupier is to use the "best practicable means as may be necessary to prevent or minimise air pollution".<sup>26</sup> This lack of a clear standard is not desirable for it provides a ready means for occupiers to evade the Act. Fortunately the list specifying the permissible emission standard is rather comprehensive and covers almost all the common pollutants.<sup>27</sup>

The Clean Air Act was amended in 1975 by the Clean Air (Amendment) Act.<sup>28</sup> The purpose of the amendment was to provide for better control of air pollution and for more effective enforcement. In pursuance of this, the definition of "industrial and trade premises" in section 2(1) of the Clean Air Act was broadened to include construction sites, so that air polluting activities carried on at these sites would also be brought under control.

Any person who fails to comply with the provisions of the Clean Air Act is guilty of an offence and liable to a fine of not exceeding ten thousand dollars and in the case of a continuing offence, a fine not exceeding five hundred dollars for each day during which the offence continues.<sup>29</sup> Also any person who contravenes any provisions of the Clean Air (Standards) Regulations is guilty of an offence and shall be liable on conviction to a fine not exceeding five thousand dollars and in the case of a continuing offence, to a further sum of two hundred dollars for each day during which the offence continues. The penalties provided are theoretically severe enough to deter; however, in practice the fines imposed are not very high. For example, there were forty prosecutions for open burning in 1980. A total of thirty-six thousand, seven hundred and eighty dollars were imposed as fines. The highest fine imposed was two thousand dollars and the lowest fine was only one hundred dollars.<sup>30</sup> It is the writer's opinion that higher fines should be imposed because as yet there is neither stigma nor pain attached to a conviction for a pollution offence. Polluters should be made to feel the pinch in the form of higher fines. The position cannot be permitted whereby it is cheaper to pay a fine than to comply with pollution laws. In this regard a sufficiently high minimum fine should be imposed for second and subsequent offences.

In air pollution control, the administrative agency (i.e. the Ministry of The Environment) has shown a capacity to alter the law to meet changing circumstances and improved technology. For example, the Clean Air (Standards) Regulations 1972 were amended in 1978<sup>31</sup> to provide for stricter control over the emission of certain air pollutants such as dust, acid gases, chlorine and carbon monoxide. This is as it should be for with improved technology and better control equipment the emission of air impurities can more easily be kept lower.

<sup>25</sup> Regulation 4.

<sup>26</sup> Section 10(2).

<sup>27</sup> The Clean Air (Standards) Regulations, 1972; Regulation 4.

<sup>28</sup> No. 5 of 1975.

<sup>29</sup> Section 23.

<sup>30</sup> Statistics obtained from the Ministry of The Environment.

<sup>31</sup> S. 43/1978.

The Clean Air (Prohibition On The Use Of Open Fires) Order was passed in 1973.<sup>32</sup> The Order prohibits the use of open fires in any industrial or trade premises. It was passed to control open burning of industrial wastes which could give rise to excessive low level smoke emission and localised haze problems.

Except for the Clean Air Act, which only applies to trade and industrial premises, there is generally a lack of coherence and direction with regard to control of air pollution from other stationary sources. Although industries and factories are the main polluters of the air, individuals do contribute (not insignificantly) to air pollution. These are dealt with haphazardly under several Penal Code provisions against creating nuisances<sup>33</sup> and also under section 7 of the Minor Offences Act<sup>34</sup> which makes it an offence to burn any material to the annoyance or inconvenience of the public. These provisions do not constitute the sort of pollution control system which is essential to any sound environmental management programme. The standard laid down is vague and uncertain and the penalties are very light.<sup>35</sup> It is hoped that the authorities will look into this aspect of air pollution and provide a better and more co-ordinated scheme of control.

#### *Control of Emissions from Motor Vehicles*

Control of pollution from mobile sources is provided in the Road Traffic Act<sup>36</sup> and the regulations passed under it. The law deals with smoke and visible emissions from motor vehicles and covers both the construction and the use of the vehicle. Section 30 of the Act provides that if any "smoke or visible vapour" is emitted from a motor vehicle which causes annoyance or injury or damage to persons or properties, then the owner and the driver shall be guilty of an offence that is punishable with a maximum fine of five hundred dollars. This provision is neither satisfactory nor very effective. Firstly, what may be an annoyance to an individual may not be an annoyance to the enforcement officer. And secondly, the amount of toxic gases emitted from a car at any particular time would be of such a small amount that it would be very difficult to show injury or damage to persons or properties. In addition, rule 32 of the Motor Vehicles (Construction and Use) Rules<sup>37</sup> requires that every motor vehicle shall be so constructed that no avoidable smoke or visible vapour is emitted therefrom and rule 33 provides that the vehicle shall be so constructed or equipped with such device as to prevent the escape of gas from the crank-case of such motor vehicle into the atmosphere. Rule 95 controls the use of motor vehicles and prohibits the use of a vehicle which will result in emission of smoke or other

<sup>32</sup> No. S. 38.

<sup>33</sup> See for example section 268 and section 278 of the Penal Code, Cap. 103, Singapore Statutes, 1970 Revised Edition. Section 268 makes it an offence to cause annoyance to the public and section 278 more specifically makes it an offence to vitiate the atmosphere so as to make it noxious to the health of persons.

<sup>34</sup> Cap. 102, Singapore Statutes, 1970 Revised Edition.

<sup>35</sup> A maximum fine of fifty dollars in the case of section 7, Minor Offences Act, two hundred dollars in the case of section 268 Penal Code (provided for under section 290) and five hundred dollars in the case of section 278, Penal Code.

<sup>36</sup> Cap. 92, Singapore Statutes, 1970 Revised Edition.

<sup>37</sup> S.L. Supplement No. 55 of 1974.

visible vapour which will cause damage to any property or person. This rule suffers from the same defect as section 30 of the Road Traffic Act. Because of the vague standard and the light penalty provided these rules are really nothing more than a perfunctory attempt to deal with pollution from motor vehicles. In this aspect of air pollution control we can perhaps learn from our Malaysian neighbour, where the Motor Vehicles (Control of Smoke and Gas Emission) Rules 1977<sup>38</sup> prohibit any person from using any motor vehicle which emits smoke of a density exceeding 50 Hartridge Smoke Units or its equivalent. This is certainly a more precise and effective control of emission of smoke from motor vehicles.

That the effort to control pollution from motor vehicles is uncoordinated and lacklustre may further be seen from the several indirect measures to control pollution from emissions of motor vehicles. These measures are aimed at restraining the growth of car ownership and the use of motor vehicles. One such measure was the increase in road tax and the imposition of the additional registration fee for purchase of motor vehicles. Another measure to reduce air pollution from motor exhausts within the city areas was effected through an area licensing scheme, restricting entry into the city areas between certain hours.

This piecemeal effort to control pollution by motor vehicles is probably so, as a result of the cost consideration. There is no doubt a consensus that emissions from motor vehicles must be controlled, but the real problem is whether it is possible to control the emissions with existing technology within acceptable costs. In the United States, for example, catalytic emission control equipment must be installed in vehicles, as a result of which consumers pay more for their cars. In addition lead has to be removed from the petrol so as not to damage the emission control equipment. This raises the cost of petrol. At present, Singapore's anti-pollution standards for cars are less strict than in the United States and Japan. It has been found that Japanese cars in Singapore produced more pollution than the same cars sold in Japan.<sup>39</sup> The local agents of several car manufacturers have estimated that if our laws require the same emission standards as Japan and the United States, then the prices of cars will increase by about ten per cent.<sup>40</sup> It is submitted that even although the costs involved may be quite high, stricter measures should be taken because motor vehicles are one of the major sources of air pollution. If these preventive measures are not taken now the abatement costs will be even higher when the problem becomes more acute.

#### NOISE POLLUTION

Noise is everywhere and in fact the amount and extent of noise, especially in urban areas, has been on the increase. Yet the efforts to control noise pollution have not worked and have failed to prevent, control or abate noise. The legislature has not put sufficient emphasis on controlling this form of pollution. The laws or regulations that exist are inadequate and are usually aimed at abating rather than

<sup>38</sup> P.U.(A) 414, see Rule 6.

<sup>39</sup> See the report of *The Straits Times* of September 17, 1981.

<sup>40</sup> See the report of *The Straits Times* of September 18, 1981.

preventing noise. Furthermore, the penalties provided are usually low and enforcement is generally poor.

### *Noise as a Statutory Nuisance*

Section 14(g) of the Minor Offences Act prohibits the beating of drums and blowing of horns or other instruments in any public place. Section 14(i) makes it an offence to operate gramophones and loud speakers in public places which cause annoyance or inconvenience to the public. Both offences are punishable with a maximum fine, not exceeding fifty dollars!

Other than this provision (and the provisions relating to the construction and use of motor vehicles) there are no other legislative provisions relating to noise control. There is no legislation regulating noise from construction works which is one of the major sources of noise pollution in Singapore. At most, the contractor can be charged with nuisance of a public nature under section 51(1) of the Environmental Public Health Act<sup>41</sup> or section 268 of the Penal Code. Section 87 of the Environmental Public Health Act which gives the Commissioner the power to control excessive or offensive noise may be used against him. But these provisions do not deter in view of the light penalties provided. Their effectiveness is further reduced by provisions which put one of the major sources of noise pollution beyond their control *i.e.* the operation of aircraft. Section 9 of the Air Navigation Act<sup>42</sup> provides that no action shall lie in respect of trespass or nuisance by reason only of the flight of aircraft over any property at a height above ground which having regard to wind, weather and all the circumstances of the case is reasonable so long as the statutory provisions governing flight are observed. But this form of noise must exist until a technical solution can be found to the problem of aircraft noise. One can only trust the administrative agency concerned to minimise the noise caused and to maintain some balance between the necessity of having airflights and public health.

A group of specialists in a report given sometime in June 1974<sup>43</sup> was of the view that legislation to control noise in Singapore is impossible to draft without data obtained from an island wide survey which is beyond the capability and manpower resources presently available. The data is presumably required to formulate the standard to be imposed to determine excessive noise. It would appear that this report has been taken rather seriously for up till now little has been done to control noise in Singapore. It is true that standards can be useful for setting goals and as guides to the degree of control needed to achieve the goals, but it is not impracticable to have laws which control and yet do not set specific technical standards. Take control of air pollution from scheduled premises under the Clean Air Act<sup>44</sup> for example. There are no specific standards of air quality formulated and the standard set is vague and subjective; yet, there is at least a set of coherent rules to control the pollution. If legal controls have to await scientific research or sound scientific based

<sup>41</sup> Cap. 155, Singapore Statutes, 1970 Revised Edition.

<sup>42</sup> Cap. 87, Singapore Statutes, 1970 Revised Edition.

<sup>43</sup> See the report of The Straits Times of June 27, 1979.

<sup>44</sup> *Supra*, pp. 215-217.

information then it could be a long time yet before legal controls will come; by which time matters could have got much worse. The writer would therefore urge the government to look into the immediate provision of a set of coherent and realistic laws for the control of noise and then when technical data is obtained improvements may be made to these laws.

### *Noise Caused by Motor Vehicles*

The law governing noise from motor vehicles is to be found in the Motor Vehicles (Construction and Use) Rules 1974. The rules require every vehicle to be fitted with a silencer to reduce noise caused by the escape of the exhaust gases from the engine.<sup>45</sup> The rules also prohibit any person from using a vehicle which causes any excessive noise or use a motor vehicle in a manner so as to cause excessive noise. Furthermore, although every vehicle must be fitted with an audible warning instrument,<sup>46</sup> subject to certain exceptions, gongs, bells, sirens and two-tone horns are forbidden.<sup>47</sup>

The standards laid down by the rules are rather vague. Enforcement of these rules against noise from moving sources is also difficult. Still, these rules provide some control against noise from motor vehicles and until improved technology makes improved legislation possible, they will have to do.

One may comment that noise pollution control in Singapore is still rather unsatisfactory. The tendency is for sanctions to be aimed at abating noise rather than preventing it. The emphasis should be on preventing the noise from ever occurring. There should also be rigorous enforcement of such preventive measures. In many countries, noise pollution control laws use the decibel limit concept.<sup>48</sup> The decibel limit is used to measure the intensity of sound. This concept of setting specific standards is preferable to the existing laws in Singapore which simply prohibit "excessive noise". An initial step can be taken to draft laws imposing decibel limits in controlling noise from industrial and construction sites. This is because the measurement of noise level from these sites is easier than from mobile sources of noise. It is true that in the case of the other sources of noise pollution laws imposing decibel limit can be difficult to enforce because of the problem of measurement but this limited initial step will be a step in the right direction.

### SOLID WASTE POLLUTION

For Singapore, a country with a small land area, environmental problems associated with handling and disposal of solid waste are of particular importance. Unfortunately legislative provisions dealing with solid waste disposal and management have been confined to general health or nuisance laws and control of dumping and anti-littering laws.

<sup>45</sup> Rules 31 and 90.

<sup>46</sup> Rule 23.

<sup>47</sup> Rule 99.

<sup>48</sup> For example, the United States. See Yannacone and Cohen *Environmental Rights & Remedies*, Vol. 2 (1972, The Lawyers Co-operative Publishing Co.) pp. 391-413.

*Statutory Control*

Most statutes governing solid waste management are aimed at preventing accumulations of rubbish. The Environmental Public Health Act,<sup>49</sup> first passed in 1968, is concerned with the maintenance of a healthy environment. The Act empowers the Commissioner of Public Health to cause public streets to be cleaned<sup>50</sup> and at the same time imposes a duty on owners of premises abutting a private street to keep the street free of rubbish and filth.<sup>51</sup> The Act also empowers the Commissioners to undertake to collect rubbish and refuse.<sup>52</sup>

The Act provides for the first time comprehensive provisions against littering and depositing refuse in any public place.<sup>53</sup> This section is the main anti-littering law in Singapore and provides for a maximum fine not exceeding two thousand dollars. Although it is generally true to say that environmental health laws and enforcement have brought the solid waste problem (especially the littering problem) under control, it has not been eliminated. For example, illegal dumping prosecutions have increased from 208 in 1980 to 257 in just the first eight months of 1981.<sup>54</sup> The number of littering offences is not showing any signs of slowing down.<sup>55</sup> This form of pollution, more than any other, demonstrates that the emphasis placed on legislation and regulations in pollution policy can never be entirely successful. Here some form of "social engineering" is required. People must be made to change their habits. This can be done by educating the people and through campaigns designed to make it socially undesirable to pollute.

The other problem with solid waste control is that it lacks a conceptual approach.<sup>56</sup> The laws have tended to be concerned with the ordinary citizen in his role as the ultimate consumer; to ensure that he does not litter or dump rubbish and to prevent rubbish accumulation. A more effective approach may be to direct preventive and abatement measures at the source of the problem, that is at the soft drinks manufacturer who produces the bottled drinks or the fast food chains which serve food in boxes and bags and so on. Legislation can be passed to require deposits by consumers when they purchase goods and refund of such deposits when the containers or receptacles are returned. Other possibilities include requiring containers and receptacles to be made of material that burn or decay easily or materials which can be recycled or reused. The latter may encourage manufacturers to collect these containers and receptacles after the consumers have used them. Or a duty may be imposed on the manufacturers to collect their cans or bottles or boxes after use. Other possibilities include requiring packaging, canning and bottling techniques to pro-

<sup>49</sup> Cap. 155 Singapore Statutes, 1970 Revised Edition.

<sup>50</sup> Section 9.

<sup>51</sup> Section 10.

<sup>52</sup> Section 12.

<sup>53</sup> Section 28.

<sup>54</sup> See the report of The Straits Times of October 2, 1981.

<sup>55</sup> According to statistics supplied by the Ministry of The Environment in 1979 there was a total of 19,989 convictions for littering and in 1980 there were 15,996.

<sup>56</sup> See J.K. Canagarayar, "Control of Pollution From Solid Wastes", *Revue de Droit*, Vol. 7 numero 2 1977. In this section of the article I have benefitted from discussions with my colleague J.K. Canagarayar.

duce receptacles which are attractive and can be used by the consumers after the products have been consumed. The government should look into the possibility of introducing such measures if they want to see a more successful programme against solid waste pollution.

#### POLLUTION OF INLAND WATERS

This section will deal with pollution of reservoirs, rivers, canals and streams. In addition to solid waste which may be discharged into these water bodies, of particular concern to environmentalists is the discharge of industrial effluents. Industrial effluents have been responsible for much of the pollution of inland waters. They arise as a result of industrial activities where liquids are used in the industrial process.

Control over the discharge of pollutants into inland waters is mainly through the Water Pollution Control and Drainage Act<sup>57</sup> and the regulations passed thereunder. The method of control which the Act has adopted is to ensure that the effluents are either discharged into the sewerage system or treated to an acceptable level before being discharged into the watercourses. The Act makes it an offence to discharge any oil, chemical, sewerage or trade effluent into any waterbody.<sup>58</sup> It would appear that the offence is one of strict liability for the section does not require proof of fault, the only requirement is that the person caused the discharge.

Where trade effluent is discharged into a public sewerage system or any watercourse, which is dangerous to health or safety, the Minister is empowered to direct the occupier of the premises to cease the discharge or to cease the work which produces the trade effluent or treat the trade effluent. At the same time under the Trade Effluent Regulations 1976<sup>59</sup> the Director can grant permission for trade effluent to be discharged into a watercourse. Allowable limits for the different contaminants contained in the effluent are set out in regulation 12. The standards set would seem to be to ensure that the pollutants are within the extent which can be absorbed by the environment. However, under no circumstances can anyone discharge trade effluent into any watercourse within a natural catchment area.<sup>60</sup> This is necessary because reservoirs in Singapore extract water from these watercourses, which end up as drinking water for the people.

Under the Act the Director has the power to require the owner or occupier of farm premises to provide facilities for the removal, treatment and disposal of waste matter. The government has expressed an intention to require pig farmers to instal waste pollution control facilities, as part of a reorganization of the pig farming industry, a highly pollutive activity.<sup>61</sup>

The discharge of solid waste into waterbodies is governed by the Environmental Public Health Act. Section 28(2) and (3) make

<sup>57</sup> No. 29 of 1975.

<sup>58</sup> Section 14(2).

<sup>59</sup> S. 122/76.

<sup>60</sup> Regulation 3.

<sup>61</sup> See the report of The Straits Times of October 27, 1979.

it an offence for anyone to deposit any refuse or rubbish into any stream, river, drain, channel, watercourse or reservoir.

In this area of pollution control, administrative agencies dominate. They have been given wide powers to require treatment of trade effluent. But in order that pollution of inland waters be brought within control more treatment facilities have to be provided. Either the government or the industries will have to bear the initial cost of these facilities. In either case the consumers ultimately pay for a cleaner environment; in the form of higher taxes or higher prices of consumer goods.

#### POLLUTION OF THE SEA

Pollution of the sea is caused by both shipborne and non-shipborne sources. Discharge of refuse into the sea is as much pollution as discharge of oil by tankers, but the latter poses a more serious problem of control, prevention and abatement. Pollution of the sea by waste is usually a national problem in that it is generally confined to the territorial waters of Singapore. As such its control is within Singapore's legislative competence. On the other hand, pollution caused by oil spills poses problems which extend beyond territorial limits. As a result control in this area has been international in its character, through international conventions and treaties.

##### *Pollution Within the Territorial Waters of Singapore*

This is governed by the Prevention of Pollution of the Sea Act<sup>62</sup> and regulations passed under the Port of Singapore Authority Act.<sup>63</sup> The former Act makes it an offence to discharge oil or a mixture containing oil into Singapore waters from any vessel or any place on land or from any apparatus used for transferring oil from or to any vessel.<sup>64</sup> The offence is one of strict liability although the Act itself provides several defences available to the offender.<sup>65</sup> These include discharging the oil to secure the safety of the vessel or to prevent damage to any vessel or cargo or to save lives. The Prevention of Pollution of the Sea Act also makes it an offence for any vessel<sup>66</sup> or any person<sup>67</sup> to discharge or throw any refuse or other waste matter into Singapore waters. In addition, regulation 87 of the Singapore Port Regulations, 1977<sup>68</sup> provides that "No person shall throw, discharge, deposit or cause to be thrown, discharged, or deposited into the waters of the port any ashes, solid ballast, sludge or any other matter without the permission of the Authority."

The Port of Singapore Authority is given the power to provide facilities to enable vessels to discharge or deposit oil residues, refuse and other waste matter and to require every vessel in Singapore to make use of such facilities.<sup>69</sup> The facilities provided include garbage

<sup>62</sup> No. 3 of 1971.

<sup>63</sup> Cap. 173, Singapore Statutes, 1970 Revised Edition.

<sup>64</sup> Section 4.

<sup>65</sup> See section 5.

<sup>66</sup> Section 6.

<sup>67</sup> Section 7.

<sup>68</sup> S 318/77.

<sup>69</sup> Section 8.

collection barges which provide garbage removal services to vessel anchored within port waters. In addition there are slop-treatment facilities at the Slop and Sludge Reception and Treatment Centre at Pulau Sebarok. The legislative provisions and measures are enforced by the anti-sea pollution unit of the Port of Singapore Authority.

### *Pollution Outside the Territorial Waters of Singapore*

Pollution of the sea outside the territorial limits of Singapore is also governed by the Prevention of Pollution of the Sea Act, 1971. This Act was passed to give effect to the International Convention for the Prevention of Pollution of the Sea by Oil signed in London in 1954. Under this Act it is an offence for any Singapore ship<sup>70</sup> to discharge any oil into the sea outside the territorial limits of Singapore.<sup>71</sup> At first sight this may appear to be an exercise of extra-territorial jurisdiction by the Singapore legislature, for under international law no state has jurisdiction over the high seas. But this is not so, because control is only exercised on Singapore registered ships, unlike the provision governing pollution within territorial waters which extends to "any vessel" or "any place on land" or "any apparatus used for transferring oil from or to any vessel".<sup>72</sup> Because no state has jurisdiction over the high seas, this form of control can only be successful if most of the major maritime nations are signatories and each assists the other in enforcing the Convention. The offence is again one of strict liability but the special defences available for pollution within territorial waters are also available here. In addition to these, it is also a defence to show that the oil was discharged as a consequence of damage to the vessel and that all reasonable steps were taken to prevent the escape of oil or that the escape of oil was because of leakage and that the leakage was not due to want of reasonable care.<sup>73</sup>

Existing technology is not very effective in controlling oil spills in the open seas. Depending on wind, ocean drifts and tidal currents, an oil slick can spread rather quickly. It has been estimated that if an oil spill takes place within ten miles of Singapore and with a wind of fifteen knots blowing inland, the oil will move onto the shore in just two hours.<sup>74</sup> Furthermore enforcement is difficult. When oil has been discharged it is difficult to know or detect which vessel has discharged it. This means that the only really effective way to control pollution of the seas is through preventive measures. As a result the really important and promising parts of the laws are those which require preventive measures. Under the Prevention of Pollution of the Sea Act, the Minister may make regulations requiring all ships in Singapore waters to be fitted with equipment to prevent oil pollution.<sup>75</sup> The Prevention of Pollution of The Sea Regulations 1976<sup>76</sup> require every company listed in the regulations to keep a stock of not less

<sup>70</sup> A "Singapore ship" is defined in s. 2(1) of the Act to mean "a ship registered under Part XIII of the Merchant Shipping Act."

<sup>71</sup> Section 3.

<sup>72</sup> Section 4.

<sup>73</sup> Section 5(2).

<sup>74</sup> See Paper presented by Richard Kilpert on "The Handling of Oil Spills" at the Regional Workshop on Water Resources, Environment and National Development, Singapore 1972.

<sup>75</sup> Section 9(1).

<sup>76</sup> S. 254/1976.

than 10,000 litres of readily usable dispersants.<sup>77</sup> In the event of an incident resulting in the pollution of the sea by oil, a company may be required to provide the dispersants and assist in combating the pollution. This is part of the emergency action procedure against oil pollution.

Other preventive measures include prohibiting the transfer of oil between 6 p.m. and 6 a.m. in Singapore waters unless the requisite notice has been given.<sup>78</sup> Compulsory pilotage is required for every vessel of three hundred gross registered tonnage and above navigating in the sea specified in the Schedule to regulations passed under the Port of Singapore Authority Act.<sup>79</sup> This is to reduce the possibility of collision in the port areas.

In addition to these preventive measures which apply within territorial waters, nations should look into developing rules for controlling navigation on the high seas. For example, the establishment of recommended routes in congested areas of the high seas. In this regard, a step in the right direction was taken when the three countries bordering the Straits of Malacca *viz.*, Malaysia, Indonesia and Singapore established a scheme for traffic separation in the Straits. This scheme has been adopted by the Inter-Governmental Maritime Consultative Organisation. This scheme will hopefully reduce the number of collisions in the Straits of Malacca.<sup>80</sup>

#### *Civil Liability for Pollution of the Sea*

The legislative provisions outlined above impose criminal sanctions on the polluters. In addition, there are legislative provisions with respect to civil liability for oil pollution by merchant ships. This is mainly governed by the Merchant Shipping (Oil Pollution) Act 1981,<sup>81</sup> which was passed to give effect to the International Convention on Civil Liability for Oil Pollution Damage signed in Brussels in 1969.

The Act makes the owner of a ship strictly liable for any damage caused in the area of Singapore and for costs of any measures taken to prevent such damage, which occurs as a result of discharge of oil.<sup>82</sup> The owner however is not liable if he can show that the discharge resulted from an act of hostilities, or was due to the act of someone who was not the servant or agent of the owner, or was due to the negligence of the government in maintaining navigational aids.

In addition if the owner incurs liability without his actual fault or privity, his liability is limited to 133 special drawing rights for each ton of the ship's tonnage.<sup>83</sup> This limitation of liability does not extend to ships registered in non-Convention countries.<sup>84</sup> This is pro-

<sup>77</sup> Regulation 4(1).

<sup>78</sup> Regulation 11(1).

<sup>79</sup> S. 72/1973.

<sup>80</sup> For a more detailed discussion see Zakaria M. Yatim, "Problems of Pollution in Malaysia" [1978] 2 M.L.J. xlvi.

<sup>81</sup> No. 15 of 1981. This Act replaces the Civil Liability (Oil Pollution) Act 1973.

<sup>82</sup> Section 3(1).

<sup>83</sup> Section 6, for the conversion of a drawing right into Singapore dollar, see section 7(3).

<sup>84</sup> Section 11.

bably to put pressure on major maritime nations to become signatories to the Convention. To ensure that shipowners will be able to pay for any damages they incur the Act requires any ship carrying in bulk a cargo of more than two thousand tons of oil to carry compulsory insurance against liability for pollution.<sup>85</sup>

It is not clear whether the Act has displaced common law remedies available to victims of oil pollution. On the one hand section 5 provides that where oil is discharged from a ship, whether the owner incurs a liability under section 3 (which imposes civil liability for oil pollution) or not he shall not be liable otherwise than under that section for any such damage or cost as is mentioned therein. On the other hand section 18 provides that if after a discharge of oil from a ship preventive measures are taken without which liability would have been incurred under section 3, he shall be liable for the costs of such measures, notwithstanding that section 3 does not apply. These two sections would seem to be inconsistent and only judicial decision can resolve the inconsistency. It is the writer's view that common law remedies should not be available for the recovery of the items of damage stated in section 3; otherwise the limitation of liability scheme would be meaningless.

#### WHO PAYS AND WHO BENEFITS FROM POLLUTION CONTROL LEGISLATION

Cost considerations loom large in any pollution control measures. It is not realistic to lay down as a target an absolutely pollution-free environment. The cost will be too high. The target is to find the most economic way to maintain a reasonably pollution-free environment. However, cost considerations should not be given more than its due weight. There is a tendency to do this because whereas costs are easy to calculate it is difficult to calculate or measure the benefits of a cleaner environment.

As a general rule, the Singapore laws on pollution control are premised on the principle that the polluter must bear the costs of pollution. The "polluter pays for the pollution" concept is reflected in Singapore's legislative provisions in two ways:—

- (1) Where the legislation imposes civil liability the polluter is generally required to pay for damage caused and the costs of cleaning up the polluted condition.
- (2) Where the liability is criminal he is required to pay by way of fines. Often he is also required to pay the cleaning up costs.

The best example is provided by the Prevention of Pollution of the Sea Act, which lays down explicitly that the polluter shall "pay for the costs incurred by the appointed authority..." in cleaning up the pollution.<sup>86</sup> In the case of civil liability incurred by the polluter, the Merchant Shipping (Oil Pollution) Act imposes on him a liability to pay for both the damage caused and the cost of measures taken to prevent or reduce any damage. In situations such as these, where abatement measures have to be taken after the pollution has been

<sup>85</sup> Section 6.

<sup>86</sup> See sections 13 to 16.

caused, it is only fair to ask the polluter to pay for the costs of pollution. Further examples of laws reflecting the "polluter pays for his pollution" concept are instances of fines being imposed for littering, dumping refuse, emission of dark smoke, discharge of trade effluent and causing of excessive noise.

The weakness of this approach lies in the fact that it requires the identification of the polluter, so that its efficacy depends very much on effective enforcement of the law and we have seen that pollution control laws are notoriously difficult to enforce. The second weakness lies in the fact that this principle cannot compensate for the loss that results from ecological damage and the like.

Another principle of cost-allocation used in our legislative provisions seems to be "cost lies where it falls". This is especially true of laws which require preventive measures to be taken. Take the case of treatment of trade effluent; the Water Pollution Control and Drainage Act requires the owner of premises to treat trade effluent before discharging it.<sup>87</sup> The owner must obviously bear the cost of doing so. Or take the case of the Clean Air Act which empowers the Director of Air Pollution Control to require the owner of scheduled premises to instal and operate control equipment.<sup>88</sup>

The main problem with this principle of cost-allocation is that the distributive effects of such cost increase are often not taken into account. For example, under the Motor Vehicles (Construction and Use) Rules 1974, every motor vehicle must be so constructed that no avoidable smoke or visible vapour is emitted<sup>89</sup> and it must be equipped with devices to prevent the escape of gas from the crank-case.<sup>90</sup> It must also be fitted with a silencer to reduce noise.<sup>91</sup> All these requirements will increase the costs of the manufacturers. They will invariably increase the price of the final product, so that ultimately consumers bear the cost; and "cost lies where it falls" actually becomes "cost falls on the consumer." There is nothing wrong with this outcome, if it is a result of a conscious policy to distribute the costs of control fairly, for consumers are after all beneficiaries of a clean environment. But more often than not, no thought is given to distributive effects. Moreover some costs can fairly be passed on to consumers, some cannot. The increased cost of motor vehicles should arguably be borne by consumers who are making use of them and polluting the atmosphere, but the increased cost that will result if manufacturers are required to use recyclable materials for containers etc. (if the suggestion made is taken) should be borne by the manufacturers and not allowed to be passed on.

Sometimes the government takes upon itself the cost of pollution control. This is necessarily so where the facilities provided are of general benefit, for example the government has taken upon itself the task of cleaning the streets<sup>92</sup> and constructing drains and sewers.<sup>93</sup>

<sup>87</sup> Section 19.

<sup>88</sup> Section 5.

<sup>89</sup> Rule 32.

<sup>90</sup> Rule 33.

<sup>91</sup> Rule 31.

<sup>92</sup> Section 9, Environmental Public Health Act.

<sup>93</sup> Section 4, Water Pollution Control and Drainage Act.

But of course, the expenses come from revenue obtained through taxation which again means that the people are bearing the cost.

Each principle of cost-allocation has its merits. The appropriate response is to use each principle in appropriate situations so as to distribute the cost of control fairly. This requires thought being given to who should bear the cost, who benefits most from the measures taken and distributive effects of control measures. The end result is that more resources are needed to run the economy of the country but this is a necessary price we pay for a cleaner environment.

#### CONCLUSION

In this review of Singapore's pollution control measures, one observes that the emphasis has been on regulatory measures. Such measures are most useful for laying down minimum standards to be met and they are certainly a necessary part of any environmental programme, but they can never be totally successful in combating pollution.

Perhaps the government should look into the use of economic controls and incentive schemes instead of penal sanctions to control pollution. This may encourage industries to adopt better control methods and equipment. In this regard section 19(A) of the Income Tax Act<sup>94</sup> provides such an incentive. This section provides that, where a person instals any equipment or device for the purpose of preventing, controlling or reducing air pollution or water pollution, he is permitted to take an accelerated capital allowance of thirty-three and one third per cent of the capital expenditure incurred, for a period of three years. This is in lieu of the initial and annual allowances permitted under section 19.

A more effective incentive might have been to allow expenditure on pollution equipment as a deductible expense (which can be taken immediately in one lump sum) rather than as an allowance, which has to be spread out over the life of the equipment. Such positive incentive schemes have other problems; the main one being the fact that pollution control methods and equipment are unprofitable, which makes incentives rather ineffective. To use an example given by Reitze — "No man will spend \$10 to bring himself a benefit simply because the government promises to return \$5."<sup>95</sup> One alternative is to make use of negative incentives; to use the tax system to penalise polluters.<sup>96</sup> But ultimately even economic controls will not be totally successful. The final solution lies in social control; changing people's attitudes and habits.

SOON CHOO HOCK\*

<sup>94</sup> Reprint Supplement 1976 No. 1, Singapore Statutes.

<sup>95</sup> Reitze's, A.W., *Environmental Law* Vol. 1 at pp. 1-75.

<sup>96</sup> For a more detailed discussion of negative tax incentives, see Reitze, *ibid.*, at pp. 1-82.

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