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Non-Degradation and Pollution Control Alternatives under Clean Air Act of 1970

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NON-DEGRADATION AND POLLUTION CONTROL ALTERNATIVES UNDER CLEAN AIR ACT OF 1970

Introduction

Considerable interest in air quality has been regenerated in this country in recent months as a result of the present energy crisis. This is most noticeable in the areas where more abundant, higher polluting fuels may be substituted for less abundant, lower polluting fuels. This article will be devoted to investigating in detail the legislative enactment of the Clean Air Act of 1970 to determine more clearly the kind of pollution the Act was to eliminate and then to objectively analyze the air quality proposals under the Act to determine the proposals that will most nearly meet the objectives of the Act and optimize public welfare.

Legislative and Administrative History of Non-Degradation

The Clean Air Act of 1970[1] requires the Administrator of the Environmental Protection Agency (EPA) to establish national primary (health) and secondary (welfare) ambient air quality standards for each pollutant for which criteria has been issued.[2] Primary standards were set at levels requisite to protect the public health and were to be attained within three years.[3] National secondary standards, which are to be attained within a reasonable period of time, are set at levels requisite to protect the public welfare.[4] Enforcement of the Act was basically left to the states who must draft and submit an implementation plan to the EPA,[5] which would either accept or reject the plan depending on its adequacy.[6] If the plans were not consistent with the Act, the Administrator is to draft supplementary regulations.[7] Should

1. 42 U.S.C. § 1857 (1970).
2. 42 U.S.C. § 1857c-4(a)(1)(A) (1970).
3. 42 U.S.C. § 1857c-4(b)(1) (1970).
4. 42 U.S.C. § 1857c-4(b)(2) (1970).
5. 42 U.S.C. § 1857c-5(a)(1) (1970).
6. 42 U.S.C. § 1857c-5(a)(2) (1970).
7. 42 U.S.C. § 1857d-1 (1970).

a state not enforce an accepted plan the Administrator is required to enforce the plan in court.[8]

42 U.S.C. Section 1857c-5, which sets out requirements for state implementation plans, does not specifically mention control in those areas where the air is cleaner than that required by the secondary standards (clean-air areas). Mr. Ruckelshaus, the Administrator of the EPA, felt he did not have the power to require a policy of non-degredation and promulgated a regulation which allowed deterioration in clean-air areas up to the secondary standards.[9] The Sierra Club filed suit in the Federal District Court for the District of Columbia on May 24, 1972, seeking a declaratory judgment and injunction requiring the Administrator of the Environmental Protection Agency to disapprove state implementation plans which allowed significant deterioration of the air in clean-air areas. Judge Pratt held that:

> Having considered the stated purpose of the Clean Air Act of 1970, the legislative history of the Act and its predecessor, and the past and present administrative interpretation of the Acts, it is our judgment that the Clean Air Act of 1970 is based in important part on a policy of non-degradation of existing clean air and the 40 C.F.R. 51.12(b), in permitting the states to submit plans which allow pollution level of clean air to rise to the secondary standard level of pollution, is contrary to the legislative policy of the Act.[10]

The opinion was affirmed without opinion by the U.S. Court of Appeals and by the Supreme Court in a tie vote without opinion.[11]

These conclusions have been subject to criticism from many sectors of the country, yet these are conclusions of law. The questions are, after examining the rules and considerations which formed the basis of the conclusions, was Judge Pratts' opinion the correct construction and what is the scope of the "policy of non-degradation?"

8. 42 U.S.C. § 1857c-8 (1970).
9. 40 C.F.R. § 51.12(b) (1972).
10. Sierra Club v. Ruckelshaus, 344 F. Supp. 253, 256 (D.D.C. 1972).
11. Sierra Club v. Ruckelshaus, 344 F. Supp. 253 (D.D.C. 1972), *aff'd*, 4 ERC 1815 (D.C. Cir. 1972), *aff'd*, 41 U.S.L.W. 4825 (U.S. June 11, 1973).

Although 42 U.S.C. Section 1857c-5 does not explicitly require control in clear-air areas, the purposes section of the Clear Air Act states:

> (b) The purposes of this subchapter are (1) to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population.[12]

Actually, within this section there are two purposes: (1) to "protect" the air quality and (2) to "enhance" the air quality. Protect means "to defend or guard from attack" or to "cover or shield from injury or danger."[13] Yet the protection provided means no more than the techniques implemented in the Act to provide the protection. For instance, protection may be provided by the use of moral persuasion or, at the other extreme, by enforcement in the courts of a policy of absolute non-degradation. The former technique, as a practical matter, would provide no protection while the latter would protect absolutely.

The purpose section as it was originally drafted, without the "and enhance" language, had no enforcement techniques and therefore provided no protection. Not until later was "and enhance" added to the provisions by the Air Quality Act of 1967, which required the Secretary of the Department of Health, Education and Welfare to draw up control regions and air quality criteria. Administrative interpretation of this Act, and particularly of the "protect" purpose, was clearly that the purpose was designed to prevent deterioration in clean-air areas. In 1969, the National Air Pollution Control Agency promulgated guidelines for the adoption of air quality standards. Section 1.51 of Part I of the Guidelines stated, "Air quality standards which, even if fully implemented, would result in significant deterioration of air quality in any substantial portions of an air quality region would conflict with this expressed purpose of the law."[14] Although the Secretary had power to review the standards

12. 42 U.S.C. § 1857(b)(1) (1970).
13. THE RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE 1051 (1968).
14. NATIONAL AIR POLLUTION CONTROL ADMINISTRATION, GUIDELINES FOR THE DEVELOPMENT OF AIR QUALITY STANDARDS AND IMPLEMENTATION PLANS (1969).

adopted by the states, the procedures proved to be too complex, time-consuming, and inadequate, and a movement to "speed up, expand, and intensify the war against air pollution"[15] was initiated and culminated in the Clean Air Act of 1970.

The Air Quality Act, notwithstanding the inadequacies, represented the first national scheme[16] designed to control and abate air pollution and laid the groundwork for the Clean Air Act. Mechanisms within the Air Quality Act were retained in the Clean Air Act, but they were given additional effect by stronger enforcement provisions in the Clean Air Act. Secretary Finch's statement, which was read before both houses, indicated this trend:

> As you know, one of the express purposes of the Clean Air Act is "to protect and enhance the quality of the Nation's air resources." Accordingly, it has been and will continue to be our view that implementation plans that would permit significant deterioration of air quality in any area would be in conflict with this provision. *We shall continue to expect* states to maintain air of good quality where it now exists.[17] (emphasis added)

Congressional responses to inquiries into the scope of the policy were amazingly vague. Congressman Roger's response to an inquiry was typical: "If we start with any clean-air areas and try to keep them clean then we do not have to go back like we are thinking of doing now to build up support to clean up the environment."[18] Senator Muski who sponsored the bill stated:

> What we are all striving for is the ultimate goal ,and that is where there would be no manmade pollutants, and where we approach background levels. Since you can't do it tomorrow morning with whatever

15. H. REP. No. 1146, 91st Cong., 2d Sess. (1970).
16. S. REP. No. 403, 90th Cong., 1st Sess. 2-3 (1967).
17. *Hearings on Air Pollution before the Subcomm. on Air and Water Pollution of the Senate Public Works Comm.*, 91st Cong., 2d Sess. 132-133 (1970); *Hearing on Air Pollution Control and Solid Waste Recycling before the Subcomm. on Public Health and Welfare of the House Interstate and Foreign Commerce Comm.*, 91st Cong., 2d Sess. 297 (1970).
18. *Hearings on Air Pollution Control and Solid Waster Recycling before the Subcomm. on Public Health and Welfare of the House Interstate and Foreign Commerce Comm.*, 91st Cong., 1st Sess. 465, 475 (1970).

> mechanism you adopt—I think we have to consider all, including national emission standards put together—I hope, at least, we will—a mechanism that will begin to tighten the screws effectively.[19]

Comments such as Senator Muskie's indicate that many mechanisms were to be implemented to control and abate air pollution.

The Senate Report stated that deterioration should not be allowed where it was *"practicable"* to prohibit it, and that due to control and abatement techniques such as "best available technology, industrial processes, and operating practices —and care in the selection of new sites for new sources, land use planning and traffic controls" that deterioration need not occur.[20] The House Report stated:

> Effective pollution control requires both reduction of present pollution *and prevention of new significant pollution problems.* Therefore, particular attention must be given to new stationary sources which are known to be either particularly large scale polluters or where the pollutants are extrahazardous.[21] (emphasis added)

Both reports reflect that the policy of non-degradation is to be used as a stop-gap. However, neither report reflects a policy of absolute non-degradation, for obviously it would be difficult to construct a new source that did not deteriorate the quality of the air.

Having taken these considerations into account, the Administrator of the EPA in April of 1971 issued regulations which provided:

> The promulgation of national primary and secondary air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of any state.[22]

This regulation did not mean that "significant deterioration" would not be allowed under any circumstances. Air quality

19. *Hearings on S.3229, S.3466 and S.3546 (Air Pollution) before the Subcomm. on Air and Water Pollution of the Senate Public Works Comm.*, 91st Cong., 2d Sess. 68-69 (1970).
20. S. REP. No. 1196, 91st Cong., 2d Sess. 2 (1970).
21. *Supra* note 32, at 5-6.
22. 40 C.F.R. § 5012(c) (1972).

standards were not to be used as the justification for deterioration because there were other mechanisms which were to be utilized before significant deterioration would be permitted.

Only after a change of Administrators came the change in interpretation of the Clean Air Act, specifically the power of the Administrator to require states to submit plans which allowed significant deterioration in clean-air areas. Mr. Ruckelshaus' regulation stated:

> In any region where measured or estimated ambient levels of a pollutant are below the levels specified by an applicable secondary standard the state implementation plan shall set forth a control strategy which shall be adequate to prevent such ambient pollution levels from exceeding such secondary standard.[23]

This regulation would not require control of deterioration in clean-air areas. Regulation of pollution would begin only upon the clean-air area deteriorating to the secondary standards. Mr. Ruckelshaus defended his position before the Subcommittee on Public Health and Environment,[24] and before the Subcommittee on Air and Water Pollution.[25] Responses of both subcommittees were unfavorable, yet gave no additional guidance. Senator Eagleton's response is typical:

> I don't agree with you when you say that non-degradation is not part of the 1970 Clean Air Amendments. I think it is very much. Section 101(b), of subsection 1, reads as follows: the purposes of this title are, No. 1 to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population. HEW itself under the 1967 Air Quality Act talks of non-degradation in this way; in addition it was indicated earlier in this chapter that the ex-

23. *Supra* note 11.

24. *Clean Air Act Oversight, Hearings before the Subcomm. on Public Health and Environment of the House Comm. on Interstate ond Foreign Commerce,* 92d Cong., 2d Sess. 530-531 (1972).

25. *Implementation of the Clean Air Act Amendments of 1970—Part I, Hearings before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works,* 92d Cong., 2d Sess. 14-15 (1972).

> plicit purpose of this Act is to protect and enhance the quality of the Nation's air resources.[26]

Using this and other similar responses to develop a viable policy of non-degradation would be futile; yet the actual language, legislative history, and the administrative interpretations when taken as a whole manifest a non-degradation policy. However, none support the interpretation that non-degradation is a mechanism to be applied absolutely. Rather non-degradation is a control mechanism involving maximization of non-degradation to the greatest extent *practicable.* Control can be maximized by implementing control techniques, such as the best available control technology, industrial processes, and operating practices in site selection, land use planning, and traffic control, while also considering the socio-economic impact of alternative decisions. Yet, as broad as the aforementioned techniques are, it is reasonable to infer that Congress wanted a broad regulatory scheme not limited by the techniques mentioned, but rather one limited only by the available control technology.

NON-DEGRADATION STANDARDS

The EPA has now proposed four alternative plans for implementing the air quality standards of the clean Air Act of 1970. One of the these plans is to be the one selected as the method for complying with the Act.[27] The four alternative plans are:

1. *Air Quality Increment Plan.* This would set a national uniform limit on the allowable increase for pollutant concentrates over the ambient levels of those pollutants reached in 1972. With this alternative in effect, pollution levels in any locality where the 1972 levels were below federal standards could be increased only by a specified amount.

2. *Emission Limitation Plan.* This would set an emission ceiling for air quality control regions, and it would apply only to those regions with cleaner air throughout than is required by the federal air quality standards. Under this plan

26. *Id.*
27. 38 Fed. Reg. 18988-19000 (1973).

a particular locality can degrade its air quality severely as long as the regional average is maintained by the existence of clean-air areas elsewhere within the region.

3. *Local Definition Plan.* This permits each state to determine on case-by-case basis whether any new source of pollution within its borders is causing significant deterioration of the air quality. Regulaton would be done by each state under its own determinations of significant pollution.

4. *Area Classification Plan.* Every state would be required to classify each area in its territory into two zones of allowable deterioration. Zone 1 would be composed of ultra-clean areas where pollution deveopment is not intended to take place and would be very restrictive in the allowable increase in emission levels. Zone II areas would be held to the same permissible emission increases over 1972 levels as set forth in Alternative I above.

Each of these EPA alternatives recognizes that a certain level of pollution is necessary, if not desirable, with the question being how best to regulate the level of pollution within a given area. The resources allocation model which will be developed will provide an insight into answering this question.

THE ANALYTICAL MODEL

To provide this insight the anaytical model will be developed through use of the economics of resource allocation. In this model clean air will be one resource and polluted air the alternative, competing resource. This is basically the "real world" situation. Clean air has value for the health and enjoyment it provides society. Air also has value as a convenient, inexpensive way to dilute and remove wastes. Because it is impossible to have both clean air and polluted air simultaneously, the two compete. The value of any combination of clean air and polluted air is measured by the level of human welfare that is produced. This model is designed to provide a means to measure the changes in welfare produced by changes in the air quality.

The volume of air over any given area is for all practical purposes constant; so as the level of clean air is increased, the level of polluted air is correspondingly decreased, and vice versa, on a unit-for-unit basis. At various levels society will choose to substitute one unit of either clean air or polluted air for a certain number of units of the other. This relationship is analyzed by means of the marginal rate of substiution: the amount by which one resource is decreased as the amount of another resource is increased by one unit.[28] The following table illustrates a theoretical quantity of clean air which must be given up for each increase in polluted air with wefare held constant at 100.

Table 1. Relationship indicating rates of substitution with welfare constant.

Quantity of polluted air (X)	Quantity of clean air (Y)
0	100
10	80
20	60
30	40
40	20
50	0

The marginal rate of substitution is expressed as the ratio of $\triangle Y/\triangle X$, where $\triangle$ means "change in."[29] In this example the marginal rate of substitution of polluted air for clean air is -20/10 or -2 (the minus sign should be dropped because in the portion of the welfare curve as set forth in Figure 4 where resources compete it will always be negative).[30] For simplicity's sake the marginal rate of substitution has been held constant in this model at 2 as it will make the later stages of the model easier to understand. In the real world the marginal rate of substitution varies at different levels of resource substitution, and in the normal situation with competitive resources the marginal rate of substitution between the two is increasing.[31] That is, increasing amounts of one must be sacrificed for each successive unit increase in

28. E. HEADY, ECONOMICS OF AGRICULTURAL PRODUCTION AND RESOURCE USE 140 (1961).
29. *Id.* at 141.
30. *Id.*
31. *Id.* at 209.

the other. It must be realized, however, that the marginal rate of substitution cannot determine the rate at which society will substitute one resource for another such as polluted air for clean air or vice versa; it can only analyze the substitution rates as society determines them to be.

The marginal rate of substitution of polluted air for clean air set forth in Table 1 above can be graphically depicted as follows:

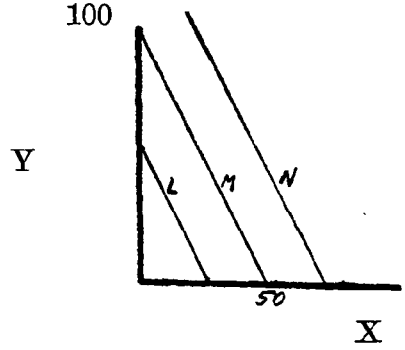

Figure 1. Marginal rate of substitution of polluted air (X) for clean air (Y).

As the welfare level is increased or decreased from the 100 level in Table 1, there would be numerous lines depicting the marginal rate of substitution of polluted air for pure air both above (N) and below (L) the marginal rate of substitution line (M) set forth in Table 1.

The next step in building the analytical model is to determine the welfare that a given amount of money allocated between polluted air and clean air could buy. If $1,000 were allocated for air quality, the entire amount could be spent purifying the air and a certain level of welfare would be achieved. If the entire amount were devoted to compensation to those damaged by the adverse effects of pollution another level of welfare would be achieved. Between these two extremes the $1,000 could be spent on various amounts of clean-up or compensation to produce other levels of welfare. This is graphically depicted by what economists call an opportunity curve, as depicted in Figure 2. The welfare oppor-

tunity curve depicts the maximum level of welfare that can be achieved at the $1,000 expenditure level for various com-

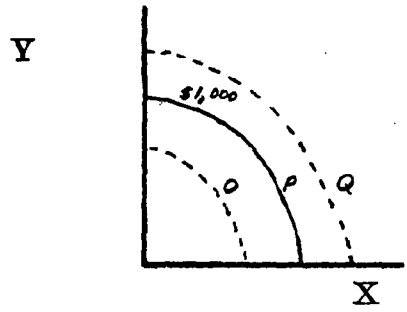

Figure 2. Welfare opportunity of various combinations of polluted air (X) and clean air (Y).

binations of polluted air and clean air. The curve is concave to the origin indicating that the resources are competing.[32] There are numerous welfare opportunity curves above and below the $1,000 curve depicted (P) depending on whether the amount of money expended is above (Q) or below (O) $1,000. In the real world society will have to determine the welfare which is produced from various combinations of clean air and polluted air at a given level of expenditure, but once the welfare levels are determined, the model provides a means of analysis.

The final step in the model is to superimpose the lines depicting the marginal rates of substitution over the welfare opportunity curve to determine that combination of resource allocation which will produce maximum welfare at a certain level of expenditure. In the real world as well as the model the principal constraint on welfare is the amount of money available to be spent between the competing resources. In the model only one welfare opportunity curve will be used. Superimposed on this will be the marginal rate of substitution ines for pure air and polluted air. This is depicted in Figure 3. Optimum welfare is obtained at the point at which the welfare opportunity curve is tangent to the marginal rate of substitution line (M) of polluted air for clean air.[33] There

32. *Id.* at 213.
33. *Id.* at 244.

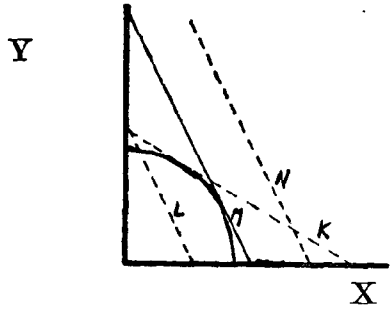

Figure 3. Welfare optimization metween polluted air (X) and clean air (Y).

are theoretically an infinite number of marginal rate of substitution lines, but only three other are depicted. Line L contacts the welfare opportunity curve, but because it is not a point of tangency, optimum welfare is not reached. Line N would permit a higher level of welfare, but the present level of expenditure is not sufficient to reach it with this welfare opportunity curve. Line K illustrates the point of optimum welfare under a different marginal rate of substitution of polluted air for clean air.

At the point of tangency of the marginal rate of substitution line with the welfare opportunity curve, optimum welfare, the marginal rate of substitution is inversely equal to the price ratio: $\triangle Y/\triangle X = P_x/P_y$ ($\triangle$ is the "change in" and P_x and P_y are the price of the two resources).[34] This means that polluted air may be substituted for clean air with an increase in total welfare when the marginal rate of substitution, $\triangle Y/\triangle X$, is less than the price ratio, P_x/P_y.[35] Conversely, clean air may be substituted for polluted air when the marginal rate of substitution is greater than the price ratio. Turning to the model, the substitution of polluted air for clean air will always increase welfare when the slope of the welfare opportunity curve is less than the slope of the marginal rate of substitution line.[36] Conversely, substitution of clean air for polluted air will always increase welfare when the slope of the welfare opportunity curve is

34. *Id.* at 239.
35. *Id.* at 240.
36. *Id.* at 245.

greater than the marginal rate of substitution line. In simple terms this means that welfare is increased whenever the lines move towards the point of tangency.

Applying this model to the Clean Air Act of 1970 will provide a clearer understanding of its effect on welfare optimization. As previously pointed out in this article, the national secondary standards under the Act place a limit on the permissible level of pollution, and regardless of welfare optimization, the Act will not permit pollution levels beyond this limit. Therefore in Figure 4 the model has been constructed with an air pollution limitation, Line Z. Also in this figure

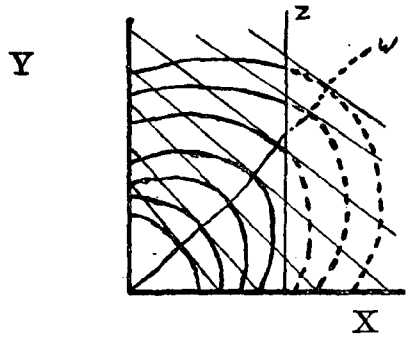

Figure 4. The Clean Air Act of 1970 and welfare optimization between polluted air (X) and clean air (Y).

two other changes from the basic model are obvious: first, numerous welfare opportunity curves have been depicted showing increasing expenditure for air quality, and second, the marginal rates of substitution have been allowed to increase as more units of pollution are exchanged for units of clean air. This figure more accurately depicts the real world situation. It is obvious that the secondary standard, Line Z, provides not only a limit to the pollution level but also a limit to welfare optimization. Without a radical shift in the marginal rate of substitution of polluted air for clean air, a point is reached beyond which tangency of the welfare opportunity curve and the marginal rate of substitution line is no longer possible.

By tracing the points of optimum welfare in Figure 4 with Line W an optimum welfare curve is depicted. Due to

the construction of the model only a portion of the curve is depicted. In Figure 5 the entire optimum welfare curve is

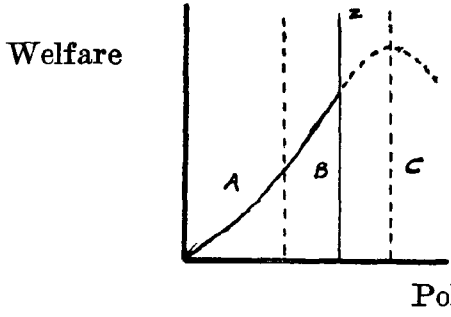

Figure 5. Relationship of resource input to optimum welfare.

depicted on the level of pollution in the air. There are three primary segments to the welfare curve. In segment A the air is so clean that welfare increases at an increasing rate as low levels of pollutants are discharged into the air.[37] This would be possible in that region where the air quality is not noticeably reduced by the pollution level and neither health nor enjoyment are affected. Welfare is increased by the air diluting and carrying away wastes. A good share of the country, and certainly the major population centers, have already passed through this segment. In segment B welfare is still increasing through the removal of waste through the air, but welfare is increasing at a decreasing rate.[38] As the pollution level increases the adverse effects of the polluted air are becoming increasingly important and are reducing the benefits being gained by the waste removal, but each increment of pollution, through waste removal, is still returning increased welfare. As suggested by the EPA alternatives, this is the situation in most of the country. This is the segment depicted in Figure 4 above, and the secondary standard, Line Z, has been added to depict how it provides a barrier to possible higher levels of welfare optimization. Finally, in segment C pollution has become so severe that each additional increment of pollution reduces welfare.[39] Now society will

37. *Id.* at 91.
38. *Id.* at 92.
39. *Id.*

begin to clean up the air because welfare is increased as it does so. Society will continue to clean up the air until it reaches the border line between segments B and C because at this point welfare is maximized.[40] The secondary standard, because it is below the maximum level of pollution before welfare would begin to be reduced, prevents society from reaching this maximum level of optimum welfare. The alternatives proposed by the EPA suggest that the country as a whole is in segment B, but is short of the barrier established by the secondary standards in the Clean Air Act of 1970 because each alternative suggests that additional pollution would be permitted before the air quality standard in the Act is reached.

The analytical model will now be used to evaluate the air quality alternative plans proposed by the EPA keeping in mind the congressional purpose behind the Act. EPA Alternative 1, the Air Quality Increment Plan, sets a national uniform limit on the allowable increase in pollution as set by the federal standards. Localities presently below the standard woud be allowed to increase their pollution levels, and presumably those localities above the standard would be forced to clean up their air. Under this alternative, once pollution has reached the standard it must be stopped regardless of the effect on society's welfare optimization. This alternative is depicted in Figure 4, but it will be reproduced in part in Figure 6. As previously noted, the secondary standard, Line Z, will stop the pollution level at a certain point,

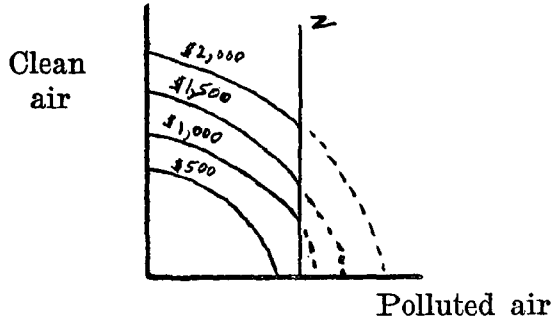

Figure 6. EPA Alternative 1.

40. *Id.* at 93.

and at that point the welfare opportunity curve becomes vertical. No marginal rate of substitution lines have been drawn in this figure because it is obvious that as the level of expenditure is increased the possible marginal rates of substitution which could provide tangency with the welfare opportunity curve, and thus provide optimum welfare, are decreased. Except for those welfare opportunity curves of a sufficiently low level or of a shape that the entire curve is to the left of the standard, Line Z, society's opportunity to optimize welfare and the resource substitution choices that could optimize welfare are both affected by this alternative. In a single statement, this alternative reduces the choices that society would have in optimizing its welfare, and the more money society chose to spend in the air quality area the more limited its choices would become. This alternative is in general within the congressional purpose of preventing significant new pollution, but in certain very clean areas raising the pollution level to the secondary standard would result in a significant increase in pollution over the present levels.

The second EPA aternative, the Emission Limitation Plan, sets a ceiling for pollution emissions similar to that in EPA Alternative 1, except that under this plan only a regional average need be maintained. Therefore, individual areas could choose to severely degrade their locality's quality if there were sufficient other clean localities to maintain the regional average. The region as a whole would have similar welfare optimization problems as in Alternative 1, but individual localities would have considerably more freedom to develop their own welfare opportunity curves and marginal rates of resource substitution. Assume Figure 6 represents the region as a whole, and that within this region there are two localities. Town A has a very restrictive pollution standard and a high marginal rate of substitution of clean air for polluted air. Town B has a less restrictive pollution standard and a low marginal rate of substitution of clean air for polluted air. Assuming both towns are happy with their air purity, it can be seen in Figure 7 that both can optimize their welfare, and assuming that their pollution levels when averaged are within the regional limitation, this alternative has

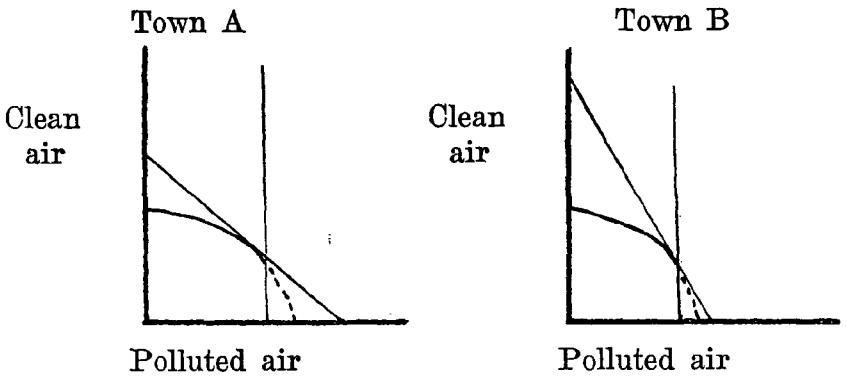

Figure 7. EPA Alternative 2.

been satisfied. The result is that in the local area, the area of highest concern to the individuals living there, each locality would have a much better opportunity to achieve its optimum welfare because each locality could adjust its own pollution situation to more closely conform to its marginal rate of substitution of clean air for polluted air. The only limitation on the individual locality would be for those which would tolerate high pollution levels because they would be limited to the extent that there were offsetting clean areas. This alternative would only be within the congressional purpose of no significant increases in pollution level if it were applied to the regional average, and possibly not even there if the region as a whole was very clean at the outset. If applied at the community level the congressional purpose would be violated by those communities and localities that significantly increased their pollution levels even though other communities or localities reduced their pollution level because the congressional purpose does not speak in terms of tradeoffs.

Alternative 3, the Local Definition Plan, permits each state to determine on a case-by-case basis whether any new source of pollution within its borders is causing significant deterioration. Each state apparently will determine which pollution sources it will permit and the level of pollution permitted. Under this alternative, local choice and welfare should be optimized to a greater extent than any of the other

alternatives suggested. Each state could determine, in effect, its own pollution standards because if it feels that welfare would be increased through approval of a new industry or mode of operation, even though the pollution level might be increased, it woud be permitted to make that choice. Presumably choices would also be made that would reduce pollution as well. Turning to the model as a means of illustration, in Figure 8 there is still the pollution limit, Line Z, which was present in Alternative 1, but in this case local choice would be permitted to move it further to the right, Line Z', to permit higher pollution levels. Local choice could also move the line to the left, but this discussion will assume a

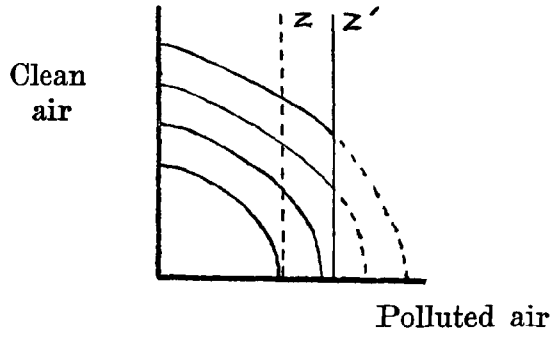

Figure 8. EPA Alternative 3.

shift to the right because this allows society a greater opportunity to optimize welfare because it will allow tangency of the welfare opportunity curve with a greater variety of marginal rate of substitution lines. Because the state pollution level as a whole is made up of the pollution levels of numerous localities as in Alternative 2, this alternative as well would allow more communities greater freedom to optimize their welfare through greater latitude in their welfare opportunity curves and marginal rates of substitution. Unfortunately while this alternative allows the greatest opportunity for welfare optimization it also provides the greatest deviation from the federal standard and the congressional purpose. If local communities are going to be given the power to exceed the federal standard for pollution levels then certainly there will be widespread significant increases in pollution levels,

particularly in those situations where the wind will effectively blow the pollution out of the community which is causing and authorizing it.

Alternative 4, the Area Classification Plan, requires each state to classify the various areas in its territory into one of two zones of pollution. Zone II would have to meet the same pollution standards as in Alternative 1. Zone I areas would be ultra-clean areas of lower pollution levels. This alternative is the most restrictive in terms of the opportunity to optimize welfare. The net effect is that pollution will be averaged out at a lower level than that permitted in Alternative 1, and with correspondingly less opportunity to optimize welfare. In Figure 9 the model is the same as that set forth in Alternative 1, except that the limitation on pollution, Line Z, through the averaging process is moved to the left, Line Z^{II}, because the level of pollution will be less throughout the area.

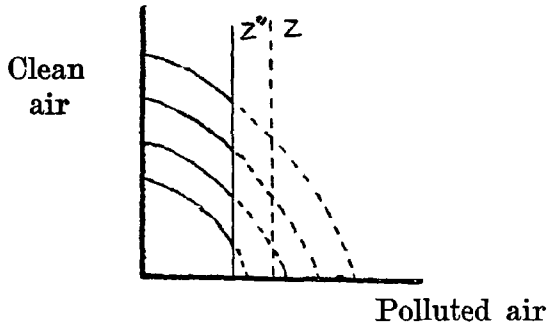

Figure 9. EPA Alternative 4.

Obviously this makes it more difficult to reach optimum welfare because the possible marginal rates of substitution that will allow tangency are reduced, particularly at higher levels of expenditure. In the same manner as increased opportunity for welfare optimization through increase in the pollution level resulted in greater likelihood of violation of the congressional purpose of no significant increase in pollution in the previous alternative, the decreased likelihood of welfare optimization due to the decreased pollution levels more closely meets the congressional purpose.

CONCLUSION

From the point of view of allocating resources to achieve welfare optimization at a given level of expenditure, and taking into account the marginal rate of substitution of polluted air for clean air, both by given localities and society in general, EPA Alternative 3, the Local Definition Plan, would allow the greatest range of choice and best possibility to reach optimum welfare. Alternative 4, the Area Classification Plan, would give the least range to local choice and the least chance to reach optimum welfare. From the point of view of meeting the congressional purpose of no significant increase in pollution levels, however, the reverse is true. Therefore it becomes obvious that based upon these two considerations a compromise will have to be made. It would appear that Alternative 2, the Emission Limitation Plan, would most nearly provide the desired flexibility that society needs in the pollution area to achieve optimum welfare while still placing an effective limit on significant increases in pollution on the regional level. As in many things in society, the implementation of the Clean Air Act of 1970 involves the compromise between desirable objectives with true optimum welfare being found in that compromise.

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