United States Environmental Protection Agency
EPA Science Advisory Board (1400A) Washington DC
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AFFORDABILITY CRITERIA FOR SMALL DRINKING WATER SYSTEMS: AN EPA SCIENCE ADVISORY BOARD REPORT

A REPORT BY THE ENVIRONMENTAL ECONOMICS ADVISORY COMMITTEE OF THE EPA SCIENCE ADVISORY BOARD (SAB)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

December 30, 2002

OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

EPA-SAB-EEAC-03-004

Honorable Christine Todd Whitman
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Subject: Affordability Criteria for Small Drinking Water Systems: An EPA Science Advisory Board Report

Dear Governor Whitman:

The Environmental Economics Advisory Committee (EEAC) of EPA's Science Advisory Board (SAB) met on June 13, 2002, and again on August 12, 2002 to review a number of aspects associated with the Agency's affordability criteria that is used to determine the availability of small drinking water system variances under the Safe Drinking Water Act.

The charge to the SAB's Environmental Economics Advisory Committee asked for advice in four general areas. 1) EPA's basic approach to determining affordability for small systems (i.e., comparing average compliance costs with an expenditure margin), 2) components of the affordability determination method (i.e., use of median household income, alternatives to the 2.5% affordability threshold, calculation of the expenditure baseline), 3) the application, focus and/or definition of affordability (i.e., the use of separate national level affordability criteria for ground water vs. surface water systems; the need for making affordable technology determinations on a regional rather than a national basis), and 4) whether financial assistance should be considered in EPA's national level affordability criteria.

In this letter, we highlight only a few of the EEAC's findings. First, the Committee believes that EPA's basic approach to assessing the affordability of National Primary Drinking Water Regulations (NPDWRs) for small systems is justified on the basis of equity and efficiency considerations, as well as considerations of administrative practicality. At the same time, the Agency should be aware of the limitations of this basic approach, and modify it where appropriate and possible.

In particular, the Agency should consider options of system consolidation, and take these into account when analyzing the nature and duration of any relaxation of drinking water quality requirements. In addition, the Agency should recognize that in light of significant existing heterogeneity among small systems, the use of a national trigger as a screening device suggests

the adoption of a fairly low affordability threshold. Partly because of this, the Committee encourages EPA to develop clear and formal guidelines about when variances should be granted at the local level, and the Committee encourages EPA to conduct research — to be shared with community water suppliers — into possible mechanisms for achieving greater equity in distribution of water costs to individuals.

If the basic approach is maintained, the Agency should consider lower measures than median income that better capture impacts on disadvantaged households, recognizing that the effect of such a lower percentile, either within water districts or across water districts, would be to make it easier to trigger the affordability threshold. The Agency should also consider lower percentages than the current 2.5% as the income percentage for the national level affordability threshold. We say this because the national affordability threshold has never been exceeded, but some small water systems appear to have genuinely struggled with costs, suggesting that the 2.5% rule is too high. However, a change should be made *only* in conjunction with the development of clear and formal guidelines about when variances should be provided at the local level.

We appreciate the opportunity to review and provide advice on the Agency's small system affordability criteria. The EPA Science Advisory Board would be pleased to further discuss any of the recommendations described in this report, and we look forward to your response.

Sincerely,

/Signed/

Dr. William Glaze, Chair
EPA Science Advisory Board

/Signed/

Dr. Robert N. Stavins, Chair
Environmental Economics Advisory Committee
EPA Science Advisory Board

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ABSTRACT

This report represents the conclusions and recommendations of the U.S. Environmental Protection Agency's Science Advisory Board regarding the EPA affordability criteria which determines whether variances shall be available to small systems as they implement maximum contaminant level regulations under the Safe Drinking Water Act. The Agency asked the SAB for advice on: 1) EPA's basic approach to determining affordability for small systems (i.e., comparing average compliance costs with an expenditure margin), 2) components of the affordability determination method (i.e., use of median household income, alternatives to the 2.5% affordability threshold, calculation of the expenditure baseline), 3) the application, focus and/or definition of affordability (i.e., the use of separate national level affordability criteria for ground water vs. surface water systems; the need for making affordable technology determinations on a regional rather than a national basis), and 4) whether financial assistance should be considered in EPA's national level affordability criteria.

The report presents the SAB's findings and recommendations on the Agency's charge questions. The report notes that Agency's basic approach is justified on the basis of equity and efficiency considerations, as well as considerations of administrative practicality. The SAB also addressed limitations of the basic approach and suggested EPA modify it where appropriate and possible. They encouraged the Agency to consider options of system consolidation when analyzing the nature and duration of any standards relaxation and noted that the use of a national trigger as a screening device suggests the adoption of a fairly low affordability threshold. The SAB encouraged EPA to develop clear and formal guidelines about when variances should be granted at the local level, and to conduct research into possible mechanisms for achieving greater equity in distribution of water costs to individuals. The report carries additional recommendations.

KEY WORDS: Affordability; Affordability Criteria; Variances; Small Systems; Community Water Systems; Compliance Technologies; MCLs; Safe Drinking Water Act

U.S. Environmental Protection Agency
EPA Science Advisory Board
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1. BACKGROUND

1.1 Statutory Context and the Affordability Concept

When EPA establishes a National Primary Drinking Water Regulation (NPDWR) it must consider the impact of regulatory compliance on small community water systems (those with a service population of 10,000 or fewer). Major provisions for dealing with this issue are linked to the concept of "affordability." EPA must identify affordable "Small System Compliance Technologies" for each rule, and if affordable compliance technologies are not available, EPA must identify "Small System Variance Technologies" in lieu of compliance technologies. Even though the variance technologies may not achieve compliance with the Maximum Contaminant Level (MCL) – the standard -- or Treatment Technique in the rule, the variance technology still must achieve the maximum reduction/inactivation that is affordable while considering system size and source water quality. Further, the variance technology must be "protective of public health." In addition, States are authorized to grant "Small System Variances" from the MCL/Treatment Technique for the life of the variance technology.

Affordability is a concept provided for in the Safe Drinking Water Act to assist in making decisions on the need for variance technologies and variances. EPA developed the National Level Affordability Criterion to be used in making the decision on whether affordable compliance technologies exist for small systems. EPA determines affordability of a rule through the following relationship:

E M = A T - B

where:

EM (**Expenditure Margin)** is the maximum increase that can be imposed by treatment and still be considered affordable),

AT (Affordability Threshold) is the upper limit for the cost of water bills including costs for treatment, distribution, and operation (the current Affordability threshold is 2.5% of Median Household Income -- MHI), and

B (Baseline component) is from current annual water bills and median household income.

If the projected compliance cost for the rule is less than the available expenditure margin then the technology is affordable.

The National Level Affordability Criteria determination was published in August 1998. EPA identified the Affordability Threshold of 2.5% MHI. Data sources used by EPA to develop the baseline component included the Community Water System Survey (CWSS) and the US Census. MHI was selected as the metric because EPA preferred using an average metric instead of a worst case. The threshold was tied to costs associated with other risk reduction activities that could be carried out at the household level. EPA contemplates updating the baseline data and the methodology.

EPA consulted with the Science Advisory Board's Drinking Water Committee (DWC) on the development of their affordability criterion during a June, 1998 meeting. The DWC decided

to prepare an Advisory as a result of that interaction (EPA SAB, 1999). Among other things, that Advisory stated that the documentation on the affordability criteria would benefit from "...additional input by economists and policy analysts."

1.2 The Charge

In the final charge (dated March 26, 2002) EPA asked the SAB to consider the economic issues associated with the methodology for developing their national-level affordability criteria, as well as the factors that were used to establish the criteria. Specifically, EPA asked that while, "Taking into consideration the structure of the Safe Drinking Water Act and the limitations of readily available data and information sources, what is the [SAB's] opinion of the Agency national level affordability criterion, [the] methodology for deriving the criterion, and [the] approach to applying that criterion to national primary drinking water regulations? As part of the committee's review EPA asked the SAB to respond to the following questions:

a) What is the SAB's view of the Agency's basic approach of comparing average compliance costs for an NPDWR with an expenditure margin, which is derived as the difference between an affordability threshold and an expenditure baseline?

b) If the basic approach is retained, should a measure other than median income that captures the impact on more disadvantaged households be used as the basis for the affordability threshold? If so, what alternative measures (for example 10^{th} or 25^{th} income percentile, poverty level income) should the Agency consider and why? What would be the likely effect of such alternatives on existing and future national level affordable technology determinations?

c) What alternatives should the Agency consider to 2.5% as the income percentage for the national level affordability threshold and what would be the likely effect of such alternatives on existing and future national level affordable technology determinations? What basis should the Agency use to select from among such alternatives? Should the Agency use costs of other household goods and services or risk reduction activities as a basis for setting the affordability threshold as was done in the development of the current criteria?

d) Does the Committee believe the Agency should consider other approaches to calculating the national "expenditure baseline" than those used by the Agency heretofore?

e) Does the Committee believe that separate national level affordability criteria should be developed for ground water and surface water systems?

f) Should the Agency include an evaluation of the potential availability of financial assistance (for example Drinking Water State Revolving Fund) in its national level affordability criteria? If so, how could the potential availability of such financial assistance that reduces household burden be taken into consideration?

g) Is there a need for making affordable technology determinations on a regional rather than a national basis? Does adequate readily available information exist to support such an approach? EPA is still exploring the degree of flexibility afforded by SDWA to make regional determinations, but would appreciate the Committee's advice on whether such determinations are feasible and warranted.

1.3 Review Documents

EPA provided the SAB with the following documents that explain issues associated with the affordability criteria under the Safe Drinking Water Act.

a) Report to Congress (March 2002)
b) Final Arsenic in Drinking Water Rule (small systems excerpt)(January 2001)
c) Small System Compliance Technology List for the Surface Water Treatment Rule and Total Coliform Rule (EPA 815-R-98-001)
d) Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996 (EPA 815-R-98-002)
e) Variance Technology Findings for Contaminants Regulated Before 1996 (EPA 815-R-98-003)

2. CONSIDERATIONS AND RECOMMENDATIONS

2.1 General Conclusions

EPA's basic approach to assessing the "affordability" of National Primary Drinking Water Regulations (NPDWRs) for small systems is intended to address the reality that small systems frequently face higher costs of meeting given standards. If the anticipated cost of compliance would put small systems (on average, on a national basis) above an "affordability threshold," then such systems are allowed to apply for variances. The Committee finds that this basic approach is justified on the basis of equity and efficiency considerations, as well as considerations of administrative practicality.

Although EPA's basic approach has merit, the Agency should be aware of its limitations, and modify it where appropriate and possible. In particular, the Agency should consider options of system consolidation, and take these into account when analyzing the nature and duration of any relaxation of drinking water quality requirements. In addition, the Agency should recognize that in light of heterogeneity among small systems, the use of a national trigger as a screening device suggests the adoption of a fairly low affordability threshold. The Committee strongly encourages EPA to develop clear and formal guidelines about when variances should be granted at the local level, and the Committee encourages EPA to conduct research — to be shared with community water suppliers — into possible mechanisms for achieving greater equity in distribution of water costs to individuals.

If the basic approach is maintained, the Agency should consider measures other than median income that better capture impacts on disadvantaged households. Within-district income inequalities (to the extent that the poor are not protected from cost increases) and between-district income inequalities argue for the use of lower income percentiles than median income. The effect of such a lower percentile, either within water districts or across water districts, would be to make it easier to trigger the affordability threshold.

The Agency should also consider lower percentages than the current 2.5% as the income percentage for the national level affordability threshold. The national affordability threshold has never been exceeded, but some small water systems appear to have genuinely struggled with costs, suggesting that the 2.5% rule is too high. EPA should consider a lower percentage than 2.5, but a change should be made *only* in conjunction with the development of clear and formal guidelines about when variances should be provided at the local level.

Should the Agency consider other approaches to calculating the national "expenditure baseline?" The Committee finds that there is no better approach to calculating the national expenditure baseline, but it wishes to remind EPA that the national-level determination of affordability can serve only a screening function. Again, the Committee encourages the Agency to develop guidelines for the case-by-case assessment of affordability in individual water supply systems that seek a variance.

Finally, the Committee recommends that EPA make its affordable technology determinations on a regional — or even local — basis, rather than a national basis. Regional income measures and expenditure baselines would capture affordability relative to the resources available in a community more accurately than the current national values. On the other hand, continued reliance on a national affordability threshold is necessary to implement a fairness goal.

2.2 Responses to specific Charge questions.

2.2.1 Charge Question 1. What is the SAB's view of the Agency's basic approach of comparing average compliance costs for an NPDWR with an expenditure margin, which is derived as the difference between an affordability threshold and an expenditure baseline?

2.2.1.1 Overview

This question asks for the Environmental Economics Advisory Committee's (hereafter, the Committee's) view of EPA's basic approach to assessing the "affordability" of National Primary Drinking Water Regulations (NPDWRs) for small systems. EPA's basic approach is intended to address the reality that small systems frequently face higher costs of meeting the given standards. The basic approach is to allow small systems to apply for variances if the anticipated cost of compliance would put such systems (on average, on a national basis) above an "affordability threshold."

The Committee finds that the basic approach is justified on the basis of equity and efficiency considerations, as well as considerations of administrative practicality. At the same time, the EEAC recommends that the Agency consider some modifications of the basic approach to address important long-run efficiency issues and to deal more effectively with heterogeneity among small systems. These findings stem from attention to the following questions: (a) Is special treatment for small systems justified on the basis of equity and efficiency? (b) Is the special treatment afforded small systems under the basic approach superior to the alternative of Federal financial compensation to small systems? (c) Is it reasonable to employ a national "trigger" to allow for special treatment? Below we address each of these questions in turn.

2.2.1.2 Efficiency and Equity Issues

The Committee finds that efficiency considerations support the basic approach. We find that considerations of equity also support the basic approach, although — as discussed below — competing equity concerns would tend to favor an alternative approach.

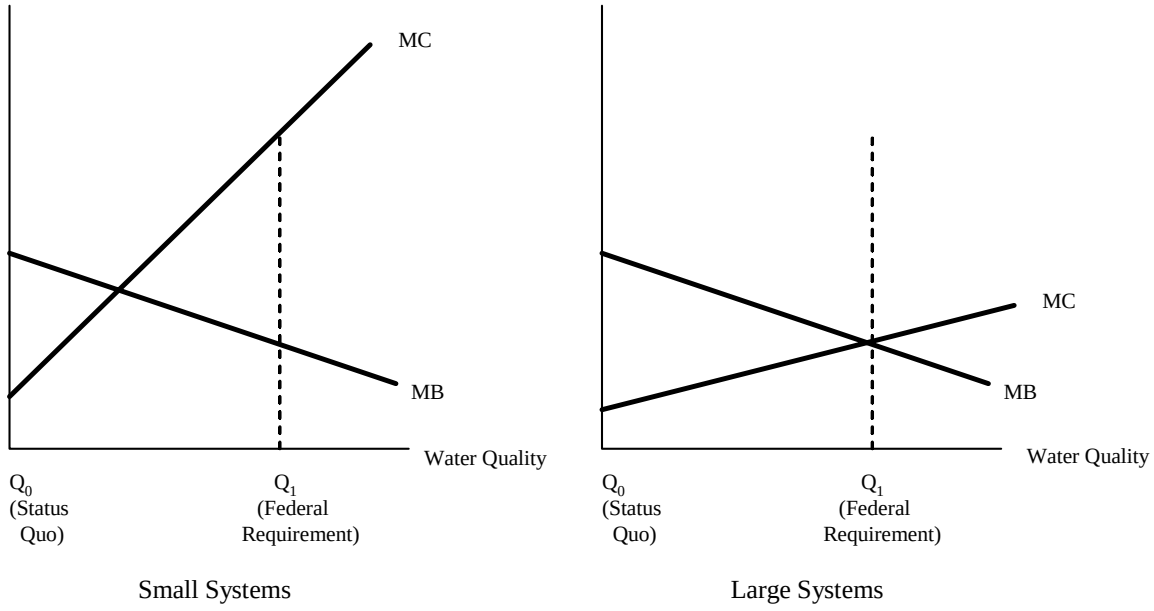
a) Significance of Differences in Cost, Income, and Benefits

The equity and efficiency issues are closely linked with differences between small and large systems in the costs and benefits of improvements in drinking water quality, as well as differences in average incomes. To clarify the issues, it is useful to begin with the simplest case, where the systems differ only in terms of cost of changes in drinking water quality, and then to move to more complex cases involving other differences as well. In all cases, it is assumed that the Federal standard enforces a level of water quality that for large systems is reasonably efficient (marginal costs are less than or equal to marginal benefits[1]).

[1]Marginal costs refer to the increment to total cost associated with a unit increase in drinking water quality improvement, and marginal benefits refer to the increment to total benefits associated with a unit increase in drinking water quality improvement. We display the marginal benefit curves as downward sloping to allow for the possibility that the marginal benefits or willingness to pay for drinking water quality declines with improvements in drinking water quality. The qualitative conclusions from this subsection are unchanged in the limiting case where the marginal benefit curves are flat (that is, where the willingness to pay for water quality is constant within the range of water quality under consideration).

Case 1: All systems (large and small) have identical marginal benefit schedules for improvements in drinking water quality, and identical average incomes of water customers. But small systems have higher marginal costs of achieving improvements in drinking water quality.

The situation is depicted in the figure below. Under these circumstances, it is inefficient for small systems to meet the same standard (Q_1) as the larger systems. Relaxing the drinking water quality requirement for small systems improves efficiency. Requiring small systems to meet the standard Q_1 may also be inequitable since small systems must pay greater unit costs than



Case 1

large systems but receive the same benefits per unit. Thus relaxing the requirement for small systems may also improve equity.

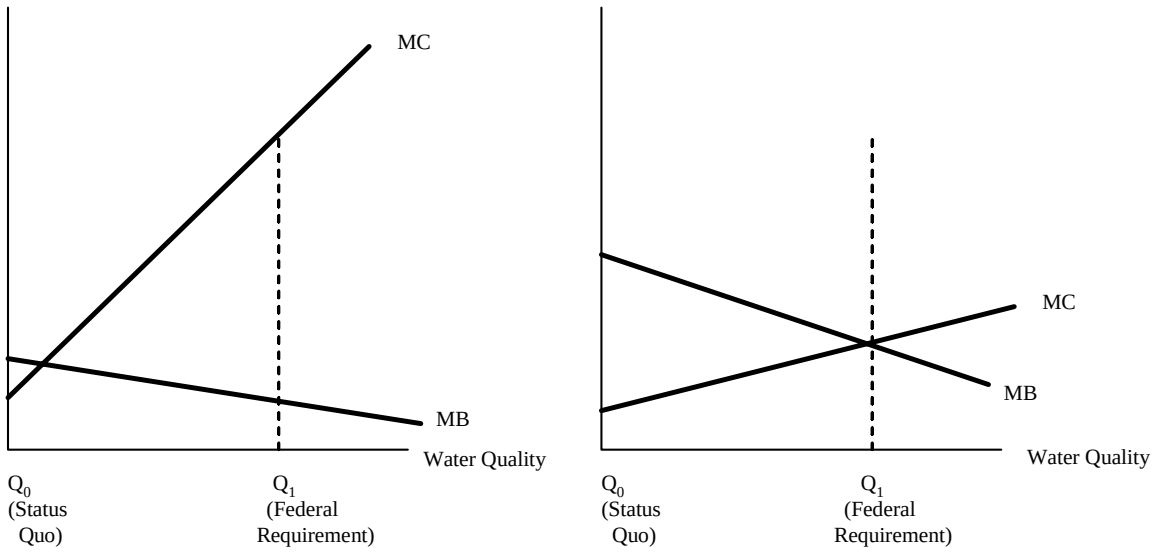
Case 2: Customers of small systems are assumed to have lower than average incomes than customers of larger systems. Otherwise same as Case 1.

By assumption, this case does not alter the marginal cost and marginal benefit curves relative to Case 1. Thus the efficiency argument is unchanged. But, relative to Case 1, the equity argument for modifying the requirement is strengthened in this case, since meeting the regulations would involve a greater relative income sacrifice for customers of small water systems.

Case 3: Marginal benefits of water quality are smaller, in general, for customers of small systems than customers of large systems. Otherwise same as Case 2.

In this case, the marginal benefit schedule, as well as the marginal cost schedule, is lower for small systems. The lower marginal benefit schedule could reflect the fact that customers of small systems have lower incomes and hence lower willingness to pay for water quality increases. The situation is depicted below.

This circumstance intensifies both the efficiency argument *and* the equity argument, relative to case 1. The lower Marginal Benefit schedule for the small systems intensifies the efficiency argument because now, for customers of small systems, the net benefits of meeting the Federal standard (Q_1) would be lower than in cases 1 and 2.



Case 3

Thus, under certain circumstances, both efficiency and equity considerations favor easing the requirements for small systems. To the extent that small systems have higher marginal costs, there is both an equity and efficiency basis for modifying the requirements for small systems. To the extent that average incomes are lower for customers of small systems, the equity argument is strengthened. To the extent that MB rises with income, the equity and efficiency arguments are strengthened further.

b) Safe Drinking Water as a Right

One might adopt the view that safe drinking water is a right that all citizens should enjoy. Whether or not safe drinking water is a right is fundamentally a question of equity. To the extent that this view is correct, the economic analysis changes. If safe drinking water is a right, then

property rights have changed and this right is now an asset owned by everyone, including people in small water systems in poor communities.

The change in property rights affects the efficiency calculation. In the previous analysis, where no basic right to clean water was assumed, efficiency calculations depended on individuals' willingness to pay for improved drinking water quality. In contrast, if it is assumed that people have a basic right to drinking water quality, then the efficiency calculations need refer to individuals' willingness to accept reduced drinking water quality – that is, the amount required to compensate them for each marginal reduction in that quality.

Under these circumstances the calculation of efficient levels of drinking water quality, in small and large systems, would be based on diagrams somewhat different from those used above. The diagrams would involve schedules for marginal required compensation (or willingness to accept) and marginal cost-savings, as functions of the *reduction* in drinking water quality. Efficiency is maximized where the marginal cost-saving from reduced use of resources for drinking water treatment equals the marginal required compensation (or willingness to accept) for reduced drinking water quality. In general, the marginal willingness to accept schedule lies above the marginal willingness to pay schedule considered earlier: hence the shift in the definition of rights implies that, other things equal, the efficient level of drinking water quality is higher.

The question of rights is related to the evaluation of Federal assistance as an alternative to the basic approach. We indicate its relevance in subsection 2.2.1.3 below.

c) Long-Run Efficiency Considerations

The basic approach could produce negative efficiency consequences over the longer term, because it could retard the movement toward efficient consolidation. The incentives to consolidate small, inefficient systems are weakened when such systems are granted variances from the Federal standards. The Committee recommends that the EPA review, on a case by case basis, the options for consolidation of small systems. In circumstances where consolidation is a viable long-run alternative for small systems, the EPA should take this into account in deciding the nature and duration of any relaxation of the drinking water quality requirements for these systems.

2.2.1.3 The Alternative of Financial Compensation

An alternative to the basic approach adopted by EPA would be Federal financial assistance to small communities to subsidize the cost of meeting drinking water quality standards, and thereby reduce costs to residents in areas using small systems.[2] We consider the attractiveness of this alternative in terms of equity, efficiency, and administrative practicality.

The alternative of Financial Assistance may find support from the viewpoint that safe drinking water is a basic right that all citizens should enjoy, and that the Federal government may have the responsibility to protect that right (or compensate individuals who lose this right). Under this viewpoint, the Federal government would be obligated either to provide financial assistance to enable localities to pay for water treatment that leads to safe drinking water, or alternatively to compensate localities to the extent that their right is not protected and they do not have high drinking water quality.

[2]This would be in addition to whatever financial assistance is already available.

The arguments for or against this viewpoint are mainly equity arguments. We cannot settle these equity issues here. However, we note that the loss of drinking water quality in small systems is sometimes due to activities by individuals or industry in the same localities. When the responsible parties are local, the argument that the Federal government (as opposed to other parties) has an obligation to compensate individuals or provide assistance seems weaker. Indeed, some would claim that Federal assistance is warranted only when there is no obvious other party that is responsible for degrading drinking water quality. In addition, we note that this alternative poses significant practical difficulties. Instituting such assistance would require a change in the statute, which would require an act of Congress. Such considerations seem to render this alternative less attractive than the basic approach.

2.2.1.4 The Usefulness of a National "Trigger"

Under the Agency's basic approach, small systems become eligible for consideration for variances if the costs for systems, on a nationwide basis, exceed an affordability threshold.[3] If small systems collectively meet this condition, then a "trigger" is pulled in the sense that individual small systems can apply for a modification to the requirements. Given the considerable heterogeneity among small systems in terms of their costs and benefits, as well as the incomes of local customers, the use of a national trigger based on national averages is problematic. Ideally, it would be better to allow all water supply systems to apply for special relief from the Federal requirements, and consider every applicant on a case-by-case basis. But it may be necessary to employ this initial eligibility approach in order to reduce administrative costs.

The use of this national "trigger" justifies setting the affordability threshold based on considerations of heterogeneity. When a national trigger is employed, the risk exists that small systems as a whole will not face costs that entitle them to apply for modified rules, even though particular small systems face costs well in excess of the affordability threshold. In this case, certain small systems would not be able to apply for modifications to the regulations, even though their costs are well above the threshold. For this reason, the affordability threshold should be relatively easy to reach, to avoid the possibility of penalizing particularly costly small systems. A balance needs to be struck between the desire to screen applicants and the desire to avoid excluding particularly high-cost systems.

2.2.1.5 Summary

In sum, the Committee finds that the basic approach has merit. Efficiency and equity considerations tend to support this approach. Moreover, this approach seems superior to the alternative of providing financial compensation to small systems.

The Agency should be aware of limitations to the basic approach, however, and modify it where possible. In particular, the Agency should consider options of system consolidation, and take this into account when considering the nature and duration of any relaxation of drinking water quality requirements. In addition, the Agency should recognize that in light of the heterogeneity among small systems the use of a national trigger as a screening device suggests the adoption of a fairly low affordability threshold.

[3]Note that the application of variance technologies may still cause significant cost increases for some systems, partly because some systems may have no treatment *ex ante*.

The Committee encourages EPA to develop clear and formal guidelines about when variances should be granted at the local level. In addition, the Committee encourages EPA to conduct research — to be shared with community water suppliers — into possible mechanisms for achieving greater equity in distribution of water costs to individuals. In particular, EPA could provide suggestions to local authorities for alternative pricing mechanisms, such as lifeline rates,[4] as instruments for easing the financial burden on low income households.

2.2.2 Charge Question 2. If the basic approach is retained, should a measure other than median income that captures the impact on more disadvantaged households be used as the basis for the affordability threshold? If so, what alternative measures (for example 10th or 25th income percentile, poverty level income) should the Agency consider and why? What would be the likely effect of such alternatives on existing and future national level affordable technology determinations?

2.2.2.1. Measures other than Median. If the basic approach is retained, should a measure other than median income that captures the impact on more disadvantaged households be used as the basis for the affordability threshold?

There are grounds for consideration of measures other than median income. The first concern about using median income arises from income inequality within water districts. Water bills are paid at the household level. Even if the median household can afford to pay the increased water bill, poorer households within a water district may find it unaffordable. This argues for considering the use of a lower percentile than the median. On the other hand, using a lower threshold might reduce drinking water quality for more affluent members of a community who may want cleaner water enough to be willing to pay fully for the attendant costs. Alternative funding mechanisms — such as lifeline rates — could be an effective means of distributing costs to non-low-income households. In this case, the aggregate affordability for the water district is the issue, which would argue for median (or even mean) household income.

A second concern about using median income as the basis for the affordability threshold arises from income inequality across water districts within a size class. EPA makes a national level determination for all water districts within a size class. As long as the median household income for all water districts in a given size class is high enough, then no water district within that size class may be considered for a variance. This result holds even though the increase in water bills may far exceed 2.5% of median household income for some water districts within the size class. Income inequality across water districts within a size class is particularly troublesome, because there is no easy way to protect poor districts, as there is with poor households within a water district through redistributing costs among households.[5]

[4]Lifeline rates refer to block pricing structures, sometimes employed with electricity, whereby the first block — intended to represent what may be considered to be "essential uses" of electricity — is priced very modestly in an effort to protect low-income households.

[5]An alternative to median income is mean income. Support for median income comes from concern that a few wealthy households could skew mean income. In addition, it is the median voter that is pivotal in a voting context. Support for mean income comes from the fact that it is tied to generally accepted welfare measures: mean willingness-to-pay and mean willingness-to-accept. Further, mean income is an indication of the total income in a water district, and may be a superior measure of how able a district is to subsidize its lowest income households.

2.2.2.2 Alternative Measures. If so, what alternative measures (for example, 10th or 25th income, poverty level income) should the Agency consider and why?

Within-district income inequalities (to the extent that the poor are not protected from cost increases) and between-district income inequalities raise arguments for consideration of lower income percentiles than median income. There are several approaches that could be taken. One option is to keep the current formula but specify a lower income percentile within water districts (for example, 10th or 25th percentile). This approach would increase the likelihood that an affordable compliance technology would not be found, and the entire class of communities in a category would be eligible to apply for variances.

A second option, designed to address the between-district income inequality issue, is to consider whether a certain percentage of districts (for example, 10% or 25%) fall below the threshold. This threshold could be set using median income or some lower income percentile as in the first option. If that percentage of communities falls below the threshold, then those communities that could show that they fall below the threshold would be eligible to apply for variances.

A third option would be to base the threshold on some measure of dispersion, such as variance or standard deviation, in addition to the median. For example, instead of median income level, an alternative would be to take the income level at 1, 1.5, or 2 standard deviations below the mean. If the baseline component is set in the same manner, then this approach would act similarly to the first option.

The Committee believes that dealing with between-district income inequalities is important, perhaps through something like option 2 or 3. While there is consensus on the Committee that income inequality argues for looking at income levels below the median, how far below the median is less clear. Perhaps the 25th percentile or 1.5 standard deviations below the mean is reasonable, but this is a value judgment for which we can offer no hard and fast guidance.

2.2.2.3 Effects of Alternatives. What would be the likely effect of such alternatives on existing and future national level affordable technology determinations?

The effect of a lower percentile, either within water districts or across water districts, would be to make it easier to reach the affordability threshold.

2.2.3 <u>Charge Question 3</u>. What alternatives should the Agency consider to 2.5% as the income percentage for the national level affordability threshold, and what would be the likely effect of such alternatives on existing and future national level affordable technology determinations? What basis should the Agency use to select from among such alternatives? Should the Agency use costs of other household goods and services or risk reduction activities as a basis for setting the affordability threshold as was done in the development of the current criteria?

While the answer to this question ultimately requires a judgment about fairness and equity, EPA might consider looking to public policy decision rules in the health sciences and/or transportation safety to determine whether their criteria are consistent with other policy decision-criteria. Given that the main benefit of a drinking water quality system is to reduce morbidity

and/or premature mortality, a comparison with health sciences and/or transportation safety seems appropriate. For example, in health economics, rules of thumb regarding whether a treatment is cost-effective are apparently routinely applied to assess treatment options (Garber and Phelps,1997[6]). The cost-effectiveness threshold used in the health sciences could be compared with the cost effectiveness of spending 2.5% of the median income on drinking water system technology to see if comparable affordability criteria are being used. Similar comparisons might prove valuable from transportation safety policy and/or nutrition studies.

While such comparisons may be useful, they are unlikely to provide conclusive guidance. Thus, in addition to these comparisons, EPA might consider the fact that the national affordability threshold has never been exceeded; hence the "trigger" necessary for variances to be considered has never been activated. This fact, in conjunction with the evidence presented to the Committee suggesting that some small water systems have genuinely struggled with costs, suggests to us that the 2.5% rule is too high. This, in turn, suggests that a lower cutoff should be used, resulting in more likely triggering of the variance rule.

In this case, one would hope that superior state or local data and judgment will be used to allow variances on a case-by-case basis, resulting in the provision of a variance only when a clear and compelling case is established. The committee is concerned that local agencies may be under pressure to grant variances in many cases, whether the local situation calls for it or not. So, while it is desirable to allow low-income, small water districts faced with very expensive (per capita) system upgrade requirements to be granted variances when such upgrades would create real financial hardship, it is important that variances not be granted when the hardship is not severe. To help assure that this balance is preserved, we suggest that EPA consider a lower percentage than 2.5, but that this change be adopted *only* in conjunction with the development of clear and formal guidelines about when variances should be provided at the local level. The process of developing such guidelines and their implementation is not likely to be simple or without costs, but we believe it is imperative if the threshold value is to be changed.

2.2.4 <u>Charge Question 4</u>. Does the Committee believe the Agency should consider other approaches to calculating the national "expenditure baseline" than those used by the Agency heretofore?

A national-level determination tends to neglect the variation in costs or other economic circumstances that would be found if one looked individually at the different water utilities within a given size category. In effect, a national-level determination focuses attention on the central tendency of the cost distribution, and neglects its dispersion. Many of the equity issues that underlie the concept of affordability, however, are associated with the variation in costs.

Given the variation in costs, we believe it is important that the national-level determination of affordability serve only a screening function. The Committee encourages the Agency to develop guidelines for the case-by-case assessment of affordability in individual water supply systems that seek a variance. That said, our answer to the question is: there is no better approach to calculating the national expenditure baseline that we could recommend.

The Committee has concerns about the use of any expenditure baseline. Including an expenditure baseline in the formula implies that only the cumulative effect of drinking water regulations matters to the determination of affordability. This is inconsistent with making variances available for regulations that impose especially high costs on small systems. It has the

[6]Further work on this subject is by Pedram and Briggs (2001) who develop an affordability curve for a range of program budgets.

undesirable effect that early regulations are likely to be considered affordable, whereas later, after the affordability threshold has been exceeded, even regulations with trivial costs to small systems will not. An alternative would eliminate the expenditure baseline from the formula and evaluate the affordability of each set of regulations incrementally. Using such an incremental approach, however, would require a lower affordability threshold to offer sufficient protection to users of small systems.

2.2.5 Charge Question 5. Does the Committee believe that separate national level affordability criteria should be developed for ground water and surface water systems?

The argument for a separate affordability criterion for water systems utilizing ground water stems from the fact that a significant number of (typically) small rural communities have historically been able to draw upon groundwater as their source of supply with little or no treatment. The facilities of these water systems may consist of little more than a pump, elevated storage tank, and simple chlorination system to prevent contamination in the distribution system. Such a system may employ only a part-time, relatively narrowly skilled operator, and have a footprint no larger than the base of the tower of the tank. It is argued that for these communities to comply with drinking water quality regulations would entail incurring fixed costs of establishing a "whole treatment system" rather than simply adding on to an existing system.

In our judgment, the affordability criterion should be the same for groundwater and surface water systems. While it may be true that many groundwater sources require little treatment, some surface water supplies also require little treatment. There is great variation in treatment costs for both surface water and groundwater-based systems. Furthermore, historic expenditures are not relevant, for historically nearly all systems had minimal treatment. Cost and the ability of the community to pay are the issue, not the source of supply.

2.2.6 Charge Question 6. Should the Agency include an evaluation of the potential availability of financial assistance (for example Drinking Water State Revolving Fund) in its national level affordability criteria? If so, how could the potential availability of such financial assistance that reduces household burden be taken into consideration?

Funding is available to assist small systems through the Drinking Water State Revolving Fund and the Rural Utilities Service of the U.S. Department of Agriculture. These programs employ affordability as one, but not the exclusive criterion for awarding assistance. Whether these funds are adequate to assist all small systems that have difficulty meeting drinking water standards is unclear. There is also uncertainty regarding the ability of small systems to apply for these funds. Testimony from the National Rural Water Association indicates that “many small systems fail to take advantage of the opportunity because they are unaware and often not capable of doing the administrative work to secure the grant or loan.”

If this funding is readily available to many or most systems facing affordability problems, it seems appropriate to take the availability of this funding into account in determining national level affordability. Under this scenario, the ability of systems to afford treatment is clearly affected by the availability of this funding, and the affordability assessment should take these sources into consideration. On the other hand, if funding is not commonly available to many systems, then the fact that it is available to some should not affect the determination. Systems should have the affordability determination made using the factors that influence them; if external funding sources are not likely to help them meet a new requirement, the affordability

determination should not take into account funding that will not reach most communities. EPA should strive to provide information to small systems to help them realize what options are available to them. This recommendation is not limited to small system affordability issues, rather, it should be applied more broadly to all drinking water issues.

2.2.7 <u>Charge Question 7</u>. Is there a need for making affordable technology determinations on a regional rather than a national basis? Does adequate readily available information exist to support such an approach? EPA is still exploring the degree of flexibility afforded by SDWA to make regional determinations, but would appreciate the Committee's advice on whether such determinations are feasible and warranted.

2.2.7.1 Regional vs National Determinations. Is there a need for making affordable technology determinations on a regional rather than a national basis?

The committee supports making determinations on a regional or even a local basis. It also supports adding an urban/rural distinction. Regional income measures and expenditure baselines would capture affordability relative to the resources available in a community more accurately than the current national values. However, a national affordability threshold is necessary to implement the fairness goal.

2.2.7.2 Available Information. Does adequate readily available information exist to support such an approach?

Income data are readily available for a more disaggregated analysis, but EPA derives the expenditure baseline from a survey whose sample may be too small for reliable regional values. Even if an expenditure baseline continues to be part of the formula and data do not support regional variation in this value, using regional income measures would still improve the current formula.

REFERENCES

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