

PROCEDURAL GUIDELINES FOR AIR
QUALITY ASSESSMENTS AT WASTEWATER
TREATMENT FACILITIES

"Criteria for the Evaluation of
Candidate Mitigation Measures"

CONTRACT NO.

68-01-4790

urban systems research & engineering, inc.

CONTRACT NUMBER 68-01-4790

PROCEDURAL GUIDELINES FOR AIR
QUALITY ASSESSMENTS AT WASTEWATER
TREATMENT FACILITIES

"Criteria for the Evaluation of
Candidate Mitigation Measures"

CONTRACT NO. 68-01-4790

August 28, 1978

Prepared for:

Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Prepared by:

Urban Systems Research & Engineering, Inc.
1218 Massachusetts Avenue
Cambridge, Massachusetts 02138



Urban Systems Research & Engineering, Inc.

1218 Massachusetts Ave., Cambridge, Mass. 02138 (617) 661-1550

August 28, 1978

Mr. Jerry Kurtzweg
Transportation and Land Use Policy
Environmental Protection Agency - AW-445
Room 931 West
401 M Street, SW
Washington, DC 20460

Re: "Criteria for the Evaluation of Candidate Mitigation
Measures"

Dear Jerry:

Enclosed are twenty (20) copies of the first deliverable required under the scope of work of Contract No. 68-01-4790, "Procedural Guidelines for Air Quality Assessments at Wastewater Treatment Facilities." I am also sending copies to several of the EPA Regional personnel who have shown an interest in this project.

This deliverable spells out, in as much detail as possible, the criteria we will use to evaluate mitigation measures for inclusion in the guidebook to be produced under this contract. I hope to meet with you as soon as possible to hear your comments and reactions before actually applying these criteria to the evaluation of those measures included in the second contract deliverable, "Catalog of Candidate Mitigation Measures."

For your reference, I am also including a copy of Peter Guldberg's comments on the memos Tom McCurdy submitted to you on the use of the GEMPLUP model.

Sincerely,

A handwritten signature in dark ink, appearing to read "Michael".

Michael R. Alford
Project Director

/jmb
Enc:

TABLE OF CONTENTS

	PAGE
1.0 INTRODUCTION.	1
2.0 TECHNICAL EFFECTIVENESS CRITERIA.	4
2.1 Introduction	4
2.2 Evaluation Procedure	6
3.0 LEGAL CRITERIA FOR EVALUATING PROPOSED MITIGATION MEASURES	13
3.1 Introduction: The Legal Context	13
3.2 Legal Authority.	15
3.3 Form of Requirement.	19
3.4 Enforcement	20
4.0 ADMINISTRATIVE CRITERIA	22
4.1 Introduction	22
4.2 Evaluation Procedures.	24
5.0 SOCIO-ECONOMIC IMPACTS.	26
5.1 Introduction	26
5.2 Fiscal and Economic Impacts.	26
5.3 Political Feasibility.	28
5.4 Other Institutional Issues	29
5.5 Social Impacts	30

SECTION 1
INTRODUCTION

1.0 INTRODUCTION

This is the first formal deliverable under Contract 68-01-4790 "Procedural Guidelines for Air Quality Assessments at Wastewater Treatment Facilities." Its purpose is to define criteria by which the usefulness of various measures for the mitigation of secondary air quality impacts associated with wastewater projects can be evaluated. The original RFP listed five issues of concern:

- o Technical effectiveness;
- o Implementability;
- o Administrative Complexity;
- o Social/economic costs and benefits;
- o Enforceability.

On the basis of what has been learned to date, we have re-organized these five concerns into four disciplinary or research areas:

- o Technical
- o Legal
- o Administrative
- o Socio-economic

This was done to facilitate distribution of the work to our technical and legal consultants and also because certain of the RFP's concerns -- namely implementability, socio-economic, and enforcement -- have components that must be analyzed independently and eventually be handled by different staffs in the field.

Legal issues are to be evaluated in relation to three topic areas of authority for implementation of a measure, the form in which it is most effectively implemented, and methods by which it might legally be enforced. Technical issues are restricted to the effectiveness of a measure in reducing air pollution and the accuracy with which forecasting of reductions can be done.

Administrative issues involve all impacts of a measure on those who must implement it: the staff time and money required to conduct necessary preliminary analysis, formulate and negotiate its design, enforce it, and evaluate its effects. Socio-economic issues include the impacts of the measure on grantees and third parties (all others) at all stages of its design and use.

Table 1 outlines the four criteria areas, and arrays them against categories of mitigation measures discussed in our second report, which catalogues mitigation measures. In our research to date, we have discovered four basic types of mitigation approaches with distinctly different legal, technical, administrative, and institutional contexts.

The first three types are directly linked to the chain of causality between changes in the construction of new wastewater management facilities and changes in air quality: Step one in the chain is the construction of the facility itself; secondary impacts hinge entirely on the ability of the facility to serve additional population beyond that which is present in the community on day one. Step two is the arrival of new population, and the development or redevelopment of land in the service area to support it. The operational link in the chain is the third step, when, due to increased vehicle use, the introduction of new industry, etc., the new population causes increased in air pollution emissions that degrade air quality. Mitigation measures therefore fall into three parallel groups: those that affect the plants ability to serve new population (namely sizing), those that affect the pattern or timing with which new population and development will distribute itself, and those that place performance controls on new development to reduce its air population impacts.

A fourth category of "mitigation" measure has also been defined. We put it in quotes here because it lies outside the strict chain of causality that link project investment and air quality changes: some measure of interest to their contract do

not involve mitigation directly; they support it through aiding in enforcement or evaluation. There are not many of these, however. Examples would include the New Hampshire method of distributing state aid to wastewater facility, or the use of grant monies to support local initiatives in air pollution monitoring.

While we have not carried out the analysis of individual mitigation measures, we have included on Table 1, some general observations about the nature of the generic mitigation approaches as they relate to the criteria for review.

The rest of this deliverable is divided into four parts, one for each of the criteria areas: Section 2 discusses technical criteria; Section 3, legal criteria; Section 4, administrative criteria, and Section 5, institutional criteria.

Application of the criteria will serve three purposes. First, it will weed out any measures which should not be recommended in the guidebook under any circumstances; we expect, however that very few if any will be deleted entirely. Second, for the measures that do have potential applicability (most, if not all of the candidate measures) it will specify when and where to apply them, and how they should be modified and sharpened to improve their performance. Third and lastly, applying the criteria to the candidate measures will reveal how part of the Guidebook's content should be structured -- what tests are necessary to determine which mitigation measures are appropriate, what environmental, social, institutional, or economic impacts should be anticipated, and what enforcement techniques might be applied on behalf of a given measure in a particular.

SECTION 2

TECHNICAL EFFECTIVENESS CRITERIA

2.0 TECHNICAL EFFECTIVENESS CRITERIA

2.1 Introduction

In order to define the technical effectiveness of a mitigation measure, it is first necessary to understand the causal relationships that lead to secondary impacts from construction and operation of a wastewater facility. This sequence can be outlined simply as Waste Facility-->Land Use Change (growth)-->Air Pollution Emissions. Emission sources are:

- o residential complexes that appear along sewer lines;
- o other service-oriented land uses (commercial, industrial, office, government) that relate to residential development, and
- o motor vehicles used as transportation between developed areas.

This view of secondary impacts allows us to categorize mitigation measures into one of three categories:

<u>Mitigation Measure Category</u>	<u>Purpose of Mitigation Measures</u>
1	Limit the size, capacity, or usage of wastewater facilities
2	Improve the efficiency of <u>related land use patterns</u> or <u>limit the extent of development</u>
3	Reduce <u>VMT</u> , control emission rates of <u>sources</u> , or aid <u>removal/dispersion of emissions</u>

The fourth category of mitigation measures listed in Table 1 under "other" will not be evaluated for technical effectiveness, since it includes such efforts as monitoring, participation of grantees in regional planning efforts, and similar measures which do not have a direct effect on air quality in themselves.

TABLE 1

CRITERIA FOR EVALUATION OF
AIR QUALITY MITIGATION
MEASURES

CATEGORY	DIRECT MITIGATION			SUPPORT
	1	2	3	4
	Wastewater Facilities	Land Use, Growth	Air Pollution Emissions	Other
<u>LEGAL</u>				
1) Authority	Strong	← Variable →		
2) Form	Easier	← More complex		
3) Enforcement	Easy	← Harder		Variable
<u>TECHNICAL</u>				
1) Demonstrated Effectiveness	← Variable →			
2) Subjective Effectiveness	High	← Low		Variable
3) Accuracy of Effectiveness Estimate	Low	→ High		Variable
<u>ADMINISTRATIVE</u>				
1) Analysis	← Variable →			
2) Specifications	Easy	← Harder		
3) Enforcement	Easy	← Harder		Variable
4) Evaluation	← Variable →			
<u>SOCIO-ECONOMIC</u>				
1) Fiscal & Economic	← Variable →			
2) Political Feasibility	Easy	← Harder		
3) Other Institutional Issues	Few	← Variable →		
4) Social	← Variable →			

A priori we might expect that mitigation measures applied directly to the specifications of a new wastewater facility (reductions in pipe sizes, shorter staging periods, etc.) will be more positive in their effects than those applied indirectly to growth or to new emissions sources several years hence. While the implementability of such measure is indeed more certain than for the others, it does not follow that they have more positive effects: growth, for instance might proceed using alternative on-site technologies funded 100% locally. In fact, mitigation measures that apply to growth itself or to new emissions sources do, if implemented, have more easily predictable effects on air quality, since they do not operate through such a long and uncertain causal chain.

2.2 Evaluation Procedure

Technical effectiveness may be defined objectively in terms of percent reduction in air pollutant emissions, causally related to a wastewater project, which will result from application of a mitigation measure to the uncontrolled case. This approach assumes that:

- o each mitigation measure is evaluated individually;
- o the basis for evaluation is comparison with the "uncontrolled case" in which no mitigation measures are applied;
- o costs and legal issues do not affect the estimate of technical effectiveness and are to be evaluated separately.

The rules for estimating technical effectiveness are summarized in the following procedure.

STEP 1

Assign the mitigation measure to one of the 3 mitigation measure categories based on the description given in the previous section. (This has been done already in the second interim project report, "Catalog of Proposed Mitigation Measures.")

STEP 2

Gather data on how the measure has been applied in the past or on its expected performance when it is applied. From the data available, determine which of the following 4 bases for objectively estimating effectiveness will be used (basis 3 is better than 2, 2 is better than 1):

<u>Estimation Basis</u>	<u>Description</u>
3	Experience - Measurements or estimates of effectiveness are based on actual application of the mitigation measure sometime in the past.
2	Research Opinion - Estimate of effectiveness is based on research reports in the literature that address expected performance or causal relationships (e.g. the GEMLUP-II model).
1	Educated Guess - Estimate of effectiveness is based on a series of reasonable assumptions linking the effect of the mitigation measure on human behavior to air pollutant emission rates.
0	No Data - No data are available to even make an educated guess.

STEP 3

If the Estimation Basis is 0, skip to Step 4. Estimate the percent reduction in air pollutant emissions associated with a wastewater facility as follows:

Technical Effectiveness Category 3

The greatest impact on air quality from new wastewater facilities is likely to be increased mobile source emissions (CO, NO₂, NMHC) arising from greater VMT serving new land use

developments.¹ Thus, mitigation measures in this category will be primarily motor vehicle oriented, e.g., measures to reduce VMT through carpooling, public transportation and measures to reduce emissions such as inspection/maintenance. Since motor vehicle emissions are determined by the product of VMT and characteristic emission rates, any percent reduction in VMT passes directly through to an identical reduction in emissions. The only exceptions are if a measure significantly changes the light duty/heavy duty vehicle mix or average network speeds. These factors maintain a complex relationship with emissions and specific calculations using equations from an EPA publication² would be required. Other mitigation measures that involve direct emission controls on stationary and fugitive sources for SO₂ and TSP are generally associated with a known percent reduction figure.

One further means of mitigation is the planning of open space to act as a sink for various air pollutants. For example, use of open space next to a roadway reduces ambient levels of motor vehicles pollutants downwind by both filtering out particles and gases and serving as a buffer/ventilation zone to aid dispersion. Since the effectiveness of open space planning is determined by the design employed, specific calculations using data from EPA³ is required.

¹ Guldberg, P. and D'Agostino, R., Growth Effects of Major Land Use Projects (Wastewater Facilities); Volumes I and II, EPA-450/3-78-014a and b, Research Triangle Park, NC, March 1978.

² Office of Transportation and Land Use Policy, Mobile Source Emission Factors, EPA-400/9-78-005, Washington, DC, March 1978.

³ Comsis Corporation, Open Space As An Air Resource Management Measures, Volumes I and II, EPA-450/3-76-028a and b, Research Triangle Park, NC, December 1976.

Technical Effectiveness Category 2

VMT can be estimated by the product of land use development, trip generation rates, and trip lengths,

$$VMT = \sum_{i=1}^2 \left(\sum_{j=1}^n \text{Trip Rate}_{ij} \text{Land Use}_j \right) \text{Trip Length}_i$$

where:

i = trip type (work, other)

j = land use category (residential, commercial, etc.)

Since total land use is generally proportional to VMT, mitigation measures that limit the extent of all development in an area will produce an identical reduction in motor vehicle emissions. If a measure limits only certain categories of development, a different mix of land use will result. The resultant impact on air pollutant emissions will no longer be simple and proportional calculations using the trip generation rates given in Table 2-6 of Volume II of GEMLUP¹ will be necessary.

Mitigation measures that improve the efficiency of land use patterns (e.g., cluster housing, PUDs, integrated local/regional land use plans) will reduce emissions in three ways. First by reducing the number of trips per dwelling unit. Data from the GEMLUP-II case studies¹ indicates 1) an average of 53% of all trips are related to residential land use, and 2), that total residential based trip rates decrease from 21 to 44% when multiple family instead of single family detached housing is built. This range corresponds to everything from duplexes (21%) up to large, high rise structures (44%). These data can be used in conjunction with the percent of new housing that a measure will convey to multi-family to estimate the percent reduction

¹Ibid.

in emissions. The second effect is to reduce the length of the average trip by planning the infra-structure of a community for shorter travel distances. Since trip length is generally proportional to VMT, reductions in the average distance between development areas will translate directly to reductions in emissions. If a measure only affects residential land use, then shorter trip lengths will only occur on home-based trip. Data from the GEMLUP-II case studies indicates an average of 53% of all trips are home-based. The third effect is less significant and involves reducing the pollutants emitted for space heating of dwelling units. Construction of high-density units can reduce per unit emissions by up to 55%.²

Technical Effectiveness Category 1

Mitigation measures in this category limit the available capacity of a wastewater facility either directly through design of the plant or indirectly through limitations on hookup to the system. The net effect is the same -- to limit available, unused capacity. The statistical model developed in the GEMLUP-II study¹ indicates that it is reserve capacity in the collection network of a wastewater facility which is the most significant causal factor for induced land use growth, principally in the residential and manufacturing categories. In addition, treatment plant capacity was found not to be an important causal factor. The variable RECAPI in the GEMLUP-II model measures the percent of reserve capacity of the collection system in the year of construction (defined as unused capacity in mgd divided by base year peak flow in mgd). The variable RESERVE, measuring

¹ Ibid.

² Real Estate Research Corp., The Costs of Sprawl, prepared for the Council on Environmental Quality, Washington, DC, April 1974.

the percent of total capacity which is unused and available, can be computed from RECAPI as follows:

$$\text{RESERVE} = \text{RECAPI}/(\text{RECAPI}+100)$$

A one standard deviation changed in RECAPI translated to an increase/decrease in available, unused collection capacity of 18.7%. The GEMLUP-II path analytic model¹ specifies that this amount of change in RECAPI produces a 23.2% increase/decrease in residential dwelling units 10 years later (the variable RES), namely:

$$\begin{aligned} & \left(\begin{array}{c} \text{Net Causal Effect} \\ \text{From RECAPI to RES} \end{array} \right) * \left(\begin{array}{c} \text{Standard Deviation} \\ \text{of RES} \end{array} \right) * \left(\begin{array}{c} \text{Mean of} \\ \text{RES} \end{array} \right) \\ & = 0.34 * 5945 \div 8714 = 23.2\% \end{aligned}$$

Since residential land use is directly related to vehicle trips and total VMT, it can be deduced that an 18.7% increase in available, unused collection capacity affects a 23.2% increase in air pollutant emissions. Or equivalently, a 10% increase in capacity leads to a 12.4% increase in emissions. This relationship can thus be used to estimate the percent reduction in emissions associated with mitigation measures in this category. }

For example, if a wastewater collection network is planned for expansion from 10 to 25 mgd and base year peak flow is estimated to be 8mgd then,

$$\text{RESERVE} = (25 - 8)/25 = 68\% \text{ of capacity would be unused and available}$$

If the design of the plant is later scaled down to 20 mgd, then,

$$\text{RESERVE} = (20 - 8)/20 = 60\%$$

¹ Ibid.

The decrease in available, unused capacity due to redesign is,

$$\frac{68-60}{68} = 11.8\%$$

Thus, the reduction in emissions associated with the redesign is

$$11.8\% \times 1.24 = 14.6\% \text{ reduction in emissions}$$

STEP 4

Summarize the results for each mitigation measure in terms of percent reduction in air pollutant emissions (if data are available to estimate). Otherwise, provide a subjective estimate of its effectiveness based on other available information or professional judgment.

SECTION 3

LEGAL CRITERIA FOR EVALUATING PROPOSED MITIGATION MEASURES

3.0 LEGAL CRITERIA FOR EVALUATING PROPOSED MITIGATION MEASURES

Every mitigation measure--whether it focuses on technical design or configuration, staging of construction, SIP planning, transportation management, land use controls, or other regulatory provisions--will be tested by applying to it a number of legal criteria:

- o Is EPA authorized by law to insist on the measure? |
- o Is the grant applicant or another party authorized by law to promise and to undertake implementation of the measure? |
- o In what form should the undertaking be expressed, and what are the legal implications of using one or another form? |
- o In order to guard against actual or threatened failure to implement the measure, what remedial enforcement powers may EPA exercise? |

These issues constitute the major legal dimensions of assessment for purposes of this project.

3.1 Introduction: The Legal Context

From a legal point of view, the construction grant agreement between EPA and the public management entity, together with ancillary promises or representations, will in most instances be the critical focal point for programming mitigation measures. The vehicle for dispensing Title II funds is called a "grant", but in point of law the relationship between the parties is more contractual than donative in nature, and the extensive body of law concerning federal contracts for subsidization of public works will accordingly apply. Federal agencies enjoy broad but not unlimited Constitutional powers to condition monetary grants upon undertakings by the grantee that go beyond the direct or immediate purpose for which the money is awarded. See, e.g., "The Federal Conditional Spending Power," 70 Northwestern Univ.

L. Rev. 293 (1975). This body of law may indicate outer limits on EPA's power to demand and enforce mitigation measure. While we do not expect this issue to be of great prominence in this project, it could be significant in evaluation planning--related mitigation measures. For instance, a grant condition requiring the use of cluster zoning might be interpreted as an unwarranted override of local choice.

local
choice

A related question of Constitutional significance is whether a federal agency may impose enforceable requirements upon state or local governmental agencies to exercise their regulatory powers or to commit their resources in furtherance of a federal program. EPA itself backed down from placing this question properly before the Supreme Court for a definitive holding on the enforceability of CAA/SIPs promulgated by EPA. See EPA v. Brown, 431 U.S. 99 (1977), and cases cited therein. The question has been answered in the negative by three out of four circuit courts, but it remains for further legal research whether an affirmative answer would be given in the context of grant agreements.

For most mitigation measures, however, the principal sources of legal evaluation will not be Constitutional law but federal statutory law:

- o The Clean Air Act, especially § 316 (conditioning mitigation measures on absence of approved and adequate SIPs), and § 110(a)(5) (posing possibility of viewing sewage treatment facilities as indirect sources of air pollution).
- o The Federal Water Pollution Control Act, especially § 208 (requiring comprehensive impact assessments for 20-year regional wastewater management plants), and § 204 (a)(5) (conditioning eligible reserve capacity on defensible population estimates).
- o The National Environmental Policy Act, interpreted by the courts as being not merely an environmental full-disclosure

law, but a law imposing on federal agencies the substantive obligation, in decision-making, to weigh environmental factors and to minimize environmental harm. See, e.g., Conservation Council v. Froehlke, 473 F.2d 664 (4th Cir. 1973).

Each of these laws has been interpreted and elaborated by regulations of EPA, to which detailed reference will also have to be made in assessing mitigation measures. It is a familiar principle of administrative law that an agency must observe its own duly adopted regulations, which structure and constrain the exercise of administrative discretion.

These, then, are the major sources of Constitutional, statutory, judicial and regulatory law by which issues of legal authority, form and enforceability will have to be decided in connection with particular mitigation measures.

3.2 Legal Authority

There are two sources of law to which reference can nearly always be made in tracing EPA's authority to demand a mitigation measure as a condition for awarding a construction grant: Constitutional principles of federal grant law, as evolved mainly by the courts, and the overall mandates of NEPA with reference to major federal actions affecting the quality of the environment. In addition, it will be useful to construct a preliminary correlation of types of mitigation measures with more specific sources of legal authority:

<u>Principal Authority</u>	<u>Type of Measure</u>
FWPCA §§ 204 (a) (5) and 212(2) (c); 40 CFR Pt. 35 Subpt. E, as amended.	Change in design, configuration or staging of project, so as to avoid excessive capacity.
Ditto; also FWPCA § 208 and 40 CFR Pts. 130-131.	Change in configuration to avoid "hot spots" from localized congestion.

FWPCA §§ 201 (g) (2) (A)
and 208; 40 CFR Pts.
130-131, especially
§ 130.31(c).

Prior completion and approval
of relevant portions of 208
plans that take air quality
impacts into account, and con-
sistency of project with such
plans.

FWPCA § 208(b) (2) (c)
(ii) in light of (b)
(2) (E)

Commitment to regulate sewer
connections to meet, in part,
emission density limitations.

FWPCA § 208 generally;
40 CFR § 130.34(a) (2)
(iii) and § 130.10 (3).

Commitment to implement trans-
portation control strategies,
such as public transit provision,
other VMT reduction, I&M program.

Same provisions of 40
CFR.

Commitment to divulge informa-
tion and plans to SIP planners,
and to engage fully in SIP
revision process.

CAA § 110(a) (5)

Commitment to adopt mitigation
measures to keep air pollution
induced by indirect source
from thwarting attainment of
air quality standards.

CAA § 316

No particular commitment, when
State has in effect and is
carrying out an adequate SIP.

Numerous questions may have to be addressed concerning the
meaning and application of these legal authorities. For example,
does CAA § 316(b) constitute an independent source of authority
to condition construction grants on mitigating measures, or does
it only serve to restrict the exercise of such authority, which
is presumably to be found in some other source? Section 316(c)
preserves the applicability of NEPA to construction grants.

Does this mean that NEPA can be used to justify stricter mitiga-
tion measures than even an approved SIP for a PSD area might
require? We will review the Senate, House, and conference reports
on the Clean Air Act amendments and, if necessary, will go back
to transcripts of the Congressional hearings to define, as
closely as possible, how Congress intended §316 to adjust water
and air planning to each other. For instance, the section as

written appears not to have resolved the question of what power the administrator may have to impose grant conditions on 201 projects if he decides that the approved SIP does not meet the full requirements of § 316.

Another range of issues concerns the degree of discretion still left for EPA to exercise, under the new Cost-Effectiveness Analysis Guidelines, 40 CFR Pt. 35 Subpt. E App. A, in determining how much reserve capacity it will allow in any particular project. The formalities of choosing, disaggregating and approving population projections, set forth in Appendix A, would seem to indicate that EPA has no right to demand the use of different projections. The provisions for staging of treatment plants and interceptors are also quite specific. On the other hand, some room for discretionary decision-making does appear on the following points:

- o EPA can decline to fund any portion of a project that proposes to include additional capacity beyond the determined cost-effective capacity, or may decide to limit federal funding to not more than would have been allowed if the project had not included such excessive capacity. § 10.
- o A staging period of up to 40 rather than 20 years may be used for sizing interceptors, if the grantee can demonstrate that the longer period would reduce secondary effects on air quality (as, e.g., by taking pressure off a "hot spot" that would otherwise occur somewhere else). Might not EPA demand, on its own initiative, that a grantee consider this possibility? § 8f(2).
- o A municipality may stage construction of a treatment plant for a shorter period than the designated maximum, in order to control adverse secondary impacts. Might not EPA demand, on its own initiative, that such a shorter period be used? § 8e(2).
- o Where extension of an interceptor through environmentally sensitive areas is necessary to interconnect two or more communities, the

grantee must reassess the need for it, analyze its secondary environmental impacts, and provide for "appropriate mitigating measures." It will ultimately lie within EPA's discretion to determine whether such interceptors are needed and what mitigating measures will satisfy the purpose of this provision. §8f(1).

- o No precise numerical guidelines are set forth for disaggregating estimates of substate regional populations among the service areas of particular facilities for which 201 grants will be sought. Accordingly, EPA may have retained some discretion to decide that a population estimate for a particular project area is too high or too low.

On the other side of the grant agreement, it will be necessary to determine whether the grantee or other promisor has the legal authority and capacity to carry out any specified mitigation measure. Municipalities and districts derive their legal powers from provisions of State constitutions, enactments of State legislatures, and local government charters, all as interpreted ultimately by State courts. It will not be possible, in the course of this study, to trace all the relevant ways in which these delegations of power may vary from one State to the next. Rather, judicial case law will be searched for instances where a local government was held to lack the necessary legal power to implement mitigating measures, and a checklist will be formulated of questions to be answered by all contracting beneficiaries as evidence of their legal capacities.

Supporting legal research will also be undertaken on the question whether, under the Supremacy Clause of the Constitution, a grant agreement with the Federal Government may empower a municipal grantee to pursue mitigation measures for which State law alone furnishes no authority. Cases under the Federal power act have raised the issue of whether Federal grant law makes the conditions of Federal grants supreme, particularly in areas where state authority is silent on an issue, but conceivably extending to circumstances where Federal and state laws are in conflict. This issue is an important one for our purposes.

3.3 Form of Requirement

The legal formalities of the contracting process may be of critical significance in determining both the authority to undertake a mitigating measure and its enforceability.

For example, if the undertaking is not written down, or if it appears only in a letter from some local official to which the grant agreement makes no reference, it may not be a legally enforceable undertaking. Nor will it be enforceable if the promise is formulated in such a way as to require action beyond the power of the promissor himself to take. A local board of sewer commissioners might promise, for example, to lay a proposal for emission density zoning before the city council, but could hardly guarantee that it will be adopted. Moreover, even assurances given by city councillors or executives may be of only symbolic effect, since they usually have no authority to make binding commitments on behalf of their successors. See, e.g. NRDC v. EPA, 478 F.2d 875 (1st Cir. 1973), 5 ERC 891. The ideal solution might be to require proof that the necessary local ordinance has already been adopted, before concluding the construction grant agreement. Such an insistence might, however, unduly delay the 201 program. A suitable fall-back position might be to require 1), that the undertaking to mitigate be clearly spelled out in the grant agreement itself, and 2), that the parties signatory to the agreement include all agencies responsible for implementing the mitigating measures. But this approach also raises problems, especially where an essential part is not also going to be a beneficiary of the treatment services to be provided by the project.

The foregoing analysis is intended merely to illustrate, in a preliminary way, the importance of legal form as a criterion for assessing any proposed mitigation measure. In fact, the measure to be undertaken must be defined by one or another formulation. Different measures may call for different forms, and the forms may also vary according to whether EPA can and will

insist on a fully enforceable agreement, as well as according to the manner in which it might be enforced (discussed further below in 3.4).

Special difficulties may arise in cases where it is not appropriate to tie mitigating measures to single grant agreements, but where those measures should be undertaken on a broader scale with reference to a number of 201 projects constituting the wastewater management program for an entire metropolitan area. Collateral agreements might be one way of dealing with this problem. These would be separate agreements between EPA and one or more grantees (or even non-grantees who are interested parties to the grant agreement) in which the parties concerned agree to mitigation strategies. They would be entered into concurrently with one or more construction grant agreements, but would free the timing and scope of a mitigation strategy from any direct link with a particular grant. Finally, the mitigation program might be divided into stages that are geared to the prospective sequence of grant agreements. These and other possible solutions will be carefully explored.

3.4 Enforcement

There are at least two major techniques that EPA could employ to correct actual or threatened failures to carry out the contemplated mitigation measures after a construction grant has been awarded:

- o Sue for breach of contract, with a demand for specific performance or for return of the grant money.
- o Withhold further construction grants, either for succeeding steps of the same project or for succeeding projects, until such time as the violation has been corrected.

The second of these methods might well be preferred, for a number of reasons: The expenses and delays of litigation, the political sensitivity of suits by the Federal Government against

municipalities, the ease of simply withholding further funds. Moreover, if the formal sequencing of grants is geared to the progress and maintenance of mitigation measures, as the second enforcement method contemplates, it may not matter much whether those measures are incorporated in strictly enforceable form into the grant agreements themselves.

For purposes of the present study, enforceability and modes of enforcement will be considered as they bear upon the choice, the formulation, and the sequencing of mitigation measures as conditions to the award of one or more construction grants.

SECTION 4

ADMINISTRATIVE CRITERIA

4.0 ADMINISTRATIVE CRITERIA

4.1 Introduction

The 201 grants process is administered either by the Regional offices, or in various degrees of cooperation with the states. In all cases, however, NEPA responsibility remains with EPA. The focus of the administrative criteria for the review of air quality mitigation measures is on the NEPA process, and how it relates to the administration of 201--whether that administration is primarily a state or federal function.

The prime emphasis of the administrative evaluation criteria should be in assessing the burden each places on the 201 program in terms of staff time and other resources that may have to be committed to analyze, implement, enforce, and evaluate mitigation approaches.

Analysis

Various degrees of analysis must be undertaken in order for a mitigation measure to be selected and specified. A certain part of the analysis will be conducted directly as part of the NEPA evaluations of a given grant project, and will follow procedures that are to be developed under Task 3 of this project, the Guidebook design task. An additional margin of analysis will, however, be required to determine, for instance, how much capacity must be subtracted from a given facility to achieve forecasted results, how a project ought to be staged, or how a sewer tap allocation program might be designed. The staff time and other resources* spent in such analysis must be considered explicitly in an evaluation of a mitigation measure.

*Computer time, travel costs to site, etc.

Implementation

Staff resources must also be allocated to negotiate a particular measure's implementation with the grantee. Where a measure involves compliance by third parties (the general purpose government, for instance, if the grant is to go to a special purpose district), we would expect increased costs of implementation. Also to be included in this stage of the evaluation are legal costs of specifying grant conditions in the most appropriate (enforceable) form. Measures associated with the design of the facility itself will probably be easier to administrate than those that require the development and acceptance of grant conditions.

Enforcement

Enforcement is critical to any mitigation measure's success, but we recognize that, to date, enforcement of grant conditions has generally ranged from minimal to non-existent. Administrative costs for enforcing a mitigation measure therefore cannot be considered cut and dried, but general estimates of what would be involved and necessary. For each mitigation measure, potential enforcement problems will have to be anticipated and the appropriate administrative response specified. Burdens on the administrator could then be characterized in general terms with regard to staff time (light to heavy), legal consultation (none to substantial), coordination requirements within and outside of EPA (none to substantial), etc.

Questions as to whether or not a given measure is, in fact, legally enforceable ^{will} ~~can~~ be evaluated separately, as discussed in Section 3 above. Measures that have to do with facility design will, by definition, be enforced once the plant is constructed; enforcement will be a significant issue only for categories 2-4.

Evaluation

Another criterion that might be considered under administration is that of evaluating the performance of a given mitigation

measure after it is implemented and enforced. This evaluation is, of course, optional, but we feel it is appropriate to consider evaluation as one of the criteria for reviewing potential measures. Evaluation needs would have to be specified for each measure. They would include one or more of the following:

- o monitoring of air quality;
- o annual or other periodic checks on grantee performances (rate of allocation of sewer taps, degree of participation in SIP development);
- o evaluation of social or economic impacts of a measure;
- o liaison with third parties whose participation in the measure is required.

These sets of activities could serve, of course, as necessary prerequisites of enforcement, but we prefer to consider them as almost an optional administrative function.

Evaluation of a measure's performance would mainly be carried out by those regions or states with the time and interest to follow up on mitigation initiatives, so that future initiatives could be sharpened and improved.

4.2 Evaluation Procedures

Administrative evaluations necessarily will have two components--those contingent on the legal and technical evaluations independently performed, and those that can be done independently on the basis of past experience.

Contingent Evaluations

Following the technical evaluation, it will be possible to assess resource needs for analyzing each mitigation measures. These will be quantified where possible in terms of average hours or days of time necessary to design the technical specifications of a certain mitigation measure. This level of effort estimation will be most critical for measures having to do with

the design of the plant; other measures, in categories 2-4, can be expected to pose somewhat fewer analytical burdens wherever use of forecasting models (such as GEMLUP) is not required, but overall the level of analysis effort is expected to be variable.

Following the legal evaluation, information will be available on the level of effort required for drawing up necessary contract documents, going through specified enforcement procedures and negotiating both with all parties involved. Measures associated with the design of the facility itself (category 1) can be expected to pose the fewest administrative burdens.

Independent Evaluations

The greater part of the administrative evaluation of mitigation measures will be to review literature, make further telephone contacts, and independently assess the administrative requirements for analyzing, implementing, enforcing, and evaluating each mitigation measure. For each measure, we will seek specific findings on administrative variations according to:

- o EPA Region, State;
- o type of grantee (single purpose vs. general purpose government);
- o who conducts the 201 program (EPA or state);
- o whether or not third parties are involved in the measure's implementation, enforcement, or evaluation;
- o other administrative context (whether grantee is in non-attainment area, PSD area, or other district which may pose coordination requirements on the implementation or enforcement of a measure.)

SECTION 5

SOCIO-ECONOMIC IMPACTS

5.0 SOCIO-ECONOMIC IMPACTS

5.1 Introduction

Socio-economic impact assessment covers a wide and loose array of issues. The focus of our review of candidate mitigation measures will be on three groups of socio-economic impacts-- groups which seem most critical to successful implementation and enforcement of various measures and whose analysis is feasible within the resource and time constraints of this project. The groups are:

- o Fiscal and economic impacts
- o Political feasibility
- o Institutional issues
- o Social impacts

Since socio-economic impact analysis can be complex and open-ended, the focus here should be on practical issues. Our concerns here are roughly the obverse of those considered under Administration: the assessment should focus on the obligations and responsibilities of those outside EPA--the grantees themselves, their related governments, interested third parties (neighboring governments, business, other agencies and decision-making bodies not involved in 201 grants), and the affected communities at large.

Under a concurrent EPA-sponsored study, Development of an Approach for Estimating and Ranking Socio-economic Effects of Alternative Water Quality Management Strategies, USR&E is researching most of the same issues that are of concern here. We have drawn upon that study for guidance.

5.2 Fiscal and Economic Impacts

There are two general areas of concern here which we feel are appropriate to use as evaluation criteria:

- o Direct costs of implementation;

- o Impacts on public revenues and expenditures.

Costs of Implementation

For some measures, such as adjustments to the wastewater facility's design (category 1 measures) local costs of implementation will be small or non-existent. For measures affecting land use and growth (category 2), implementation costs will be higher-- they could include staff costs for designing and administering a sewer tap allocation plan, costs for writing and enforcing new ordinances, etc. Measures that focus on controlling emissions directly (category 3) could involve these costs plus expenditures for equipment and monitoring. Costs of implementation will clearly vary from community to community. We, therefore, will not be able to go into much quantitative detail on costs, but will seek to identify and describe cost categories (staff, legal consultation, other direct costs), with anecdotal data concerning past implementation taken into account as appropriate.

Impacts on Public Revenues and Expenditures

Impacts on public revenues will arise primarily out of the effect a given measure exerts on the timing and extent of community growth. Thus, they will be associated mainly with category 1 and category 2 measures; category 3 measures, which regulate emissions sources directly, are not expected to tie in directly with the main sources of municipal revenues. To be considered are:

- o Property Tax Revenues: Measures which curtail growth will usually tend to diminish property tax revenues, although they may have either a positive or negative effect on property values. The intervening variable of property value must be singled out for analysis in addition to the measure's impacts on gross receipts. With the CWA 1977 amendments, the property tax increases in importance, since it can only be used for O&M and capital amortization costs.

- o Sales Tax Revenues: This source is also contingent on population growth, but it also is affected by any constraints that might affect residential and commercial land use independently.
- o Connection Costs and User Fees: The issue here is not the ability of the community to meet its obligations, since all these costs are recoverable under the regulations, but rather the incidence of these costs on the community itself. Downsized systems will often tend to have higher per capita costs for connection and use than the original design, due to economies of scale.

These other measures that will be evaluated under category 4 which includes such approaches as New Hampshire's system of allocating state assistance monies on an annual rather than a lump-sum basis, may also have indirect fiscal and economic effects. If a community cannot guarantee its bondholders all payments of principal and interest when due because of a possible cut-off of federal grant participation associated with a grant condition, it may have difficulty finding buyers, which would in turn push interest rates up.

Other indirect costs associated with a mitigation measure, such as multiplier impacts through local firms and business, probably cannot be evaluated competently within the time and budget constraints of this phase of the project. Anecdotal information in this area will be taken into account, however.

5.3 Political Feasibility

Some measures may be politically feasible under all conditions. For instance, most category 1 measures (modifications to the wastewater facility itself) can be specified unilaterally and are virtually self-enforcing. For other measures, however, political feasibility will be critical. Some may be feasible only where the grantee is a general purpose government, or where the enforcement of the measure will be complete within the administration under which it is negotiated. There is no rigorous

method by which political feasibility, important as it is, can be evaluated systematically. The analysis will have to rely heavily on past experience with a measure, or on suppositions or comparisons. Evaluation will hinge on the following issues:

- o the degree to which the problem being resolved is perceived by the community as sufficiently important to do something about
- o the extent to which the measure conforms to local traditions and attitudes
- o the extent to which the measure is perceived as having a high priority relative to other governmental activities
- o the extent to which citizens have an appropriate input into the choice, design, and administration of the measure
- o the extent to which the measure has sufficient visibility and direction to indicate that something is being done about the problem
- o the likelihood that the measure will receive voluntary compliance
- o the extent to which implementation of one approach will foreclose opportunity for action in other areas (e.g. will implementation require diversion of public or private resources which will prevent the achievement of other more pressing public objectives)

5.4 Other Institutional Issues

The most critical institutional issue (determining if the grantee has the authority to carry out the measure) is a legal one, and its analysis is covered above. Other institutional issues can also be highly important, however, and concern both the design of local institutions in relation to how the measure must be carried out, as well as coordination between all institutions involved.

In relation to each mitigation measure, the following questions must be analyzed, in terms as specific as possible to

the various types of grantees likely to be called upon to implement a particular measure:

- o For each measure, are functions clearly defined and assigned; is the chain of command clear?
- o Is there overlap or fragmentation of responsibilities between levels of government or among agencies?
- o What is the minimum level of resources necessary to implement the measure, and how are they measured?
- o Is there adequate coordination between related programs and agencies?

5.5 Social Impacts

Social impacts associated with various mitigation measures will be generally beyond the scope of the evaluation criteria, but we intend to note any mention of impacts in the following areas: if they are found:

- o land use and housing
- o public services
- o recreational activities
- o historic and cultural resources
- o sensory quality (visual quality, noise, odor, etc.)
- o quality of life
- o public health and safety

We doubt that any measure will be eliminated from consideration grounds related to these areas, but it will be important to discover if any of the mitigation measures have important side effects which will have to be evaluated on a case by case basis before the measure can be implemented in a particular situation.