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ASSESSMENT OF STATE NEEDS  
FOR TECHNICAL ASSISTANCE  
IN NPDES PERMITTING

Program Evaluation Division  
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## Executive Summary

This pilot study surveyed the technical problems six delegated States are facing in writing permits under the National Pollutant Discharge Elimination System (NPDES) and identified examples of technical assistance that States suggested EPA could provide to ameliorate some of these problems. The six States which were included in this survey are Pennsylvania, West Virginia, and Delaware in Region III; and Ohio, Indiana, and Michigan in Region V.

### Water Quality and BPJ-Based Limits Are Most Problematic

Although States most often write effluent limitations on the basis of national technology-based regulations (Effluent Limitations Guidelines), most of their technical problems occur with limitations based either on Water Quality Standards or on Best Professional Judgment. Effluent Limitations Guidelines provide a more secure technical and legal basis than the other types of permit limits, which are very resource-intensive and susceptible to legal challenge.

### States Have Unmet Needs for Technical Assistance

Despite an on-going technical assistance program in EPA, delegated States have unmet needs for technical assistance. The likely explanation for these unmet technical needs are that there are problems for which EPA has not provided technical assistance, or else that States did not receive, use, or benefit from the assistance that is available for such problems.

### Technical Problems Arise in Three Major Areas

The important technical problem areas identified by States include treatability and control technologies, water quality impact analysis, and environmental and health effects. Control of toxic and non-conventional pollutants, particularly organic chemicals, is a problem that cuts across all three of these areas. Among the specific problems in these areas are the following: lack of information on treatment processes or controls for particular pollutants, knowing how to do realistic water quality modeling of toxics and non-conventionals, obtaining site-specific water quality and hydrologic data, evaluating impacts on aquatic biota or human health, and testing for acute and chronic aquatic toxicity.

### States Suggest Similar Forms of Technical Assistance

For many of these technical problems States share common views about the forms of assistance that may be beneficial. The most commonly cited forms of assistance are clearinghouses for technical information, such as on treatability or toxicology; EPA technical experts, such as industry experts or toxicologists; tools for problem-solving, such as water quality modeling programs adaptable to small computers; and training for overall capability, such as workshops on toxic impact evaluations. The appropriate form depends on the nature of the technical problem and the goals of the assistance.

### Technical Assistance Must Be Approached Systematically

For any technical assistance program it is essential to communicate with States about their needs, to evaluate the effectiveness of past technical assistance, and to build on known successes. In these ways the most important technical problems affecting environmental protection can be targeted and the appropriate forms of technical assistance can be determined.

### Technical Assistance Can Improve State Permit Programs

The benefits to be expected from technical assistance are faster permit issuance and better quality permits, but technical assistance will not necessarily reduce the permit backlog by FY 1985. The expected result of ameliorating technical problems in permit writing is ultimately to produce more environmentally sound effluent limitations that will better protect the environment. However, States need more resources to reduce the backlog of permits they now face.

### Technical Assistance Cannot Resolve All State Problems

Technical assistance is not the only action needed from EPA to resolve technical problems in NPDES permitting. In particular, establishing national policies in important technical problem areas, such as guidelines for Best Available Technology that are lacking for certain primary and secondary industries, is necessary to create a framework for managing many technical problems. Also, some States face serious management, personnel, or administrative problems for which assistance may be desirable.

## CHAPTER I

### BACKGROUND TO STUDY AND STATE SUMMARIES

#### A. Introduction

The Program Evaluation Division (PED) conducted a pilot study of technical assistance needs of six States delegated responsibility for issuing permits under the National Pollutant Discharge Elimination System (NPDES) Program. This project was an outgrowth of the findings of the State/Federal Roles Task Force (September 1983) concerning the importance of technical assistance from the Environmental Protection Agency (EPA) to delegated States. The pilot study, requested by the Deputy Administrator, was designed to collect information about technical problems delegated States are facing in writing NPDES permits and their views about technical assistance the EPA could provide to ameliorate those problems. PED also asked a few exploratory questions about possible assistance from EPA with the administrative and management functions of the NPDES permitting program in delegated States.

Throughout this study, PED worked with the Technical Support Branch of the Office of Water Enforcement and Permits and the Permits Section of the Water Management Divisions in Regions III and V. The study findings are relevant mainly to their work. However, the examples of technical problems States identified and the technical assistance they suggested relate to the work of other units of EPA responsible for helping to implement the NPDES permitting program, for example, the Office of Water Regulations and Standards and the Office of Research and Development.

Concurrent with PED's study of States' needs for technical assistance, the Office of the Comptroller conducted an inventory of EPA resources and activities currently involved in technical assistance. The results of this inventory are presented in a separate report, "Technical Assistance Activities in Selected Offices Under the NPDES Permit Program," and are not discussed explicitly in this report.

This report shows technical problem areas identified by States where technical assistance needs are apparently unmet. It describes the types of assistance States believe would be useful in the future and suggests actions to strengthen the provision of technical assistance under the NPDES program.

The focus of this report on States' technical problems is not meant to imply that these are the only problems or even the most important problems affecting the writing of NPDES permits.

Some States in this survey see resource and management problems as more important in affecting implementation of the permitting program. Other States view EPA's performance of oversight as far more problematic and troublesome than technical problems themselves, and they would rather discuss the Agency's oversight practices than technical assistance. Nevertheless, technical problems and technical assistance are an important aspect of the NPDES program, and because they are the focus of this report these other problems will not be discussed in any detail.

Technical assistance is a dependent activity of EPA, not an end in itself. EPA's technical assistance activities derive from national program direction and policies: without clear national policies and goals, effective provision of technical assistance is difficult to achieve. Because all of the States in the study raised important concerns about national program direction and the lack of specific policies in key areas of the permitting program, we have included the States' recommendations on policy decisions needed to provide a framework for managing and resolving technical problems in permitting.

#### B. Scope and Results of Pilot Study

PED designed this pilot study to test the feasibility of assessing the technical assistance needs of a few States in one major program. This approach required identifying the relevant information; developing a method of collecting the data; testing this method and analyzing the data; reporting on the results to the Office of Water and the Deputy Administrator; and evaluating the pilot study. This report contains the results of the study. PED's evaluation of the study method will be presented to the Deputy Administrator in a separate paper subsequent to issuing this report in final form.

The scope of the project reflects three basic decisions. The first was to define the term "technical assistance" to refer to information, tools, or capability of a scientific, engineering, or technological nature provided by EPA to a State for the management of a problem for which the State is primarily responsible. A key feature is that the State uses such assistance voluntarily. Attachment A contains the complete definition of technical assistance that we used in this study.

The second decision was to select a major program that many States are directly administering (i.e., where States have been delegated the program), where large workloads exist, where there was a history or record of technical assistance from EPA, and where EPA had been directly administering the program in the past. The National Pollutant Discharge Elimination System (NPDES) permitting program met these criteria. Because of time constraints, pretreatment was not included.

PED used written questionnaires mailed to respondents in six States, and then interviewed the respondents. The purpose of the follow-up interviews was to clarify the written responses in the questionnaires. In some cases this resulted in a more in-depth discussion of the technical problem area and suggested assistance than was provided on the questionnaire. However, the findings of the study are taken primarily from the written questionnaires. Wherever interviews produced useful illustrations or specific examples of a technical problem, we have incorporated them into the findings.

Although we included permitting of both municipal and industrial sources, most of the technical problem areas concern permitting of industrial sources. However, problems with effluent limitations based on water quality standards affect both industrial and municipal sources. For example, one State has many municipal sources on water quality-limited stream segments. In that State, technical problems associated with the use of water quality standards are affecting the municipal permitting and compliance program and decisions on advanced waste treatment requirements.

In the recommendation that States made about future technical assistance, they addressed the substance of the assistance but not how or by whom it should be provided. It is EPA's management responsibility to decide what action steps would be necessary to meet some or all of the needs outlined in this report. Whatever these actions may be, consultation with States before and during the planning stages will significantly contribute to the effectiveness of future technical assistance.

### C. Summary of State NPDES Permit Programs

This section provides some background on the NPDES permit programs of the six States we surveyed in order to give a context for the technical assistance needs they have identified.

The six States were selected from two EPA regions: West Virginia, Pennsylvania, and Delaware from Region III; Ohio, Indiana, and Michigan from Region V. All of these States have delegated NPDES permit programs -- four were delegated between 1973 and 1975, one in 1979, and one as recently as 1982. Although all the States lie in the eastern half of the country, they are geographically and economically diverse: they include an Atlantic coastal State, two Great Lakes States with a mix of light and heavy industries, a mid-western agricultural State, and two mountainous States with coal mining and associated industries.

The following sub-sections discuss the present and anticipated workload of the six States, the resources they have devoted to NPDES permit writing, and the organization and structure of their programs.

Overall Workload Stable But Majors Will Increase

The total number of permits confronting the six States is fairly stable over the period FY 1983 to 1985. Although there are cyclical fluctuations due to permit expirations and occasional surges in minor permits, the average number of permits per State per year is expected to remain near the FY 1983 level of between two and three hundred. The actual number of permits written by the States ranged from 39 to 426 in FY 1983. Except for coal mines, new issuances represent a small proportion of the workload.

The recent and anticipated workload does, however, reveal some substantial fluctuations over the period FY 1983 to 1985 when considered in terms of the types of sources being permitted. These types include municipal majors and minors, industrial majors and minors, and "others".<sup>1</sup> The percentage of both municipal and industrial majors is expected to increase three to four-fold over the period, with each kind of major reaching a level of about 15% of the workload. Municipal minors fluctuate broadly while industrial minors will decrease steadily from about half of the workload in 1983 to one-third in 1985. Overall, weighting each year's percentage by the number of permits in that year, the average workload for the period is comprised about 40% of industrial minors, 25% of municipal minors, 20% of "others", and 10% or less each of municipal and industrial majors.

Although they constitute a small percentage of the overall number of permits, municipal and industrial majors present problems and complexities that demand a disproportionate share of a State's resources. Industrial majors are especially burdensome because of the potential for complex toxic discharges.

On the average, States incorporate effluent limitations for toxic pollutants in better than half of the permits they write. However, the kind of toxics they consider varies; for example, one State considers only heavy metals, cyanides, phenols, and non-organics. Also, some States are only beginning to gear up for the broader range of toxics (including the priority pollutants and others), while others indicate that their workload in toxics varies directly with the number of industrial permits.

The effluent limitations written in permits consist primarily of one of three different types, each with varying demands on a State's resources. There are limitations based on promulgated Effluent Limitations Guidelines (ELG); those based on Water Quality Standards (WQS), where ELG or municipal secondary controls are not sufficient to meet such standards; and those based on Best Professional Judgment (BPJ), where there are no applicable ELG and no indication of a violation of Water Quality Standards.



The States surveyed in this study use effluent limitations based primarily on ELG more frequently than the other limit types for both toxic and conventional pollutants. Limitations based primarily on WQS are next most frequent for both kinds of pollutants, while BPJ-type limitations are uniformly the least frequently used by these States. Little change is expected by these States in the relative frequency of the permit limit types.

Limitations based primarily on BPJ or WQS are considered the most problematic by the States surveyed. BPJ-based limitations require an excessive amount of time in order to become familiar with treatment technologies and to gather the information necessary to set limits that are defensible; consequently, many of the States deliberately avoid doing BPJ-based limitations and wait for ELG to be promulgated. WQS-based limitations are similarly resource-intensive: States must collect and analyze data on the receiving waters, develop Water Quality Standards appropriate to the site, and perform modeling or wasteload allocations. Having usable Water Quality Standards in place facilitates the process but does not eliminate the need to do other site-specific work, including modeling.

In contrast to the ad hoc nature of most limitations based on BPJ or WQS, those based on ELG are more generally accepted by industry and therefore more defensible. In addition, ELG have the sanction of EPA, giving States more confidence when using them as the basis for a permit limit.

#### Staff Resources To Remain at Constant Level

The number of personnel and work-years these States have available for handling their permit writing workload is projected to remain stable over the near future. In FY 1984 the number of permit writers<sup>2</sup> ranges from two to sixty-five, while the number of work-years (the time actually spent by these permit writers) ranges from two to seventeen. Four States anticipate no changes in these resources in the next few years, while two States expect small increases. This relative constancy partly reflects the workload, but many States are also under budgetary constraints that limit their resources. One State indicated a need for 7-8 additional permit writers (a 25% increase) in order to handle its workload.

The experience of these permit writers varies with the kind of pollutant and type of effluent limitation involved. For writing limitations for toxic pollutants at the level of Best Available Technology (BAT) or more stringent Water Quality Standards, about a third of the permit writers who responded indicated that they have much experience (roughly 3-7 years)

while nearly half indicated they have little or none. In terms of types of limitations for toxic pollutants, these permit writers have the most experience in doing ELG-based limitations (over a third have much experience), followed by WQS-based (one quarter have much experience). They are least experienced in doing limitations for toxics based on BPJ (about a half have little or no experience), partly because they have avoided doing BPJ limitations.

The experience of these permit writers in doing various limitations for conventional pollutants is similar. Again, they are most experienced in writing ELG-based limitations (over half have much experience), and least experienced in doing BPJ-based (over a third have little or no experience).

#### State Organizations Vary Significantly in Structure and Permit Duties

The six States surveyed vary markedly in the degree of centralization of their programs and in the specialization of permit writing responsibilities.

The range of centralization and specialization in the survey sample is illustrated by two of the States. One has a decentralized program to better suit the geographic distribution of the State's sources (heavy industry in one area, mining in another). Each of its five district offices does permit writing, compliance monitoring, and technical support, while permit writers are responsible for numerous functions, including drafting permits, developing limitations, and doing both compliance and enforcement. The central office has a primarily managerial and administrative role. In contrast, in another State the program is highly centralized and specialized. All permit writing takes place at the State capital. Permit writers primarily coordinate the drafting of permits and do not develop limitations or perform other functions. Technical support such as doing wasteload allocations is provided by other offices.

Of the six States surveyed, four have centralized programs and four require their permit writers to perform major functions other than permit writing. In addition, in four States permit writing is specialized according to the type of source; generally, permit writers in such States are divided between municipal and industrial, but there are often further specializations by industrial category, and in one case there is an entire section devoted just to coal mining.

Footnotes

1. The operational definitions are as follows:  
A municipal major discharges at least one million gallons per day or serves a community of at least 10,000 people. Minors are the remaining dischargers.  
An industrial major is defined by a formula that assigns certain weights according to the magnitude of the following factors: toxic pollutant potential, plant and stream discharge, conventional pollutants, potential for public health impacts, and water quality limitations. Ratings above a certain level are majors, others are minors.  
"Others" comprise primarily minor coal mines in two States. Region V uses the classification of "significants" as a subset of majors to distinguish them from those for non-contact cooling water.
2. The number of permit writers indicated does not reflect all the resources devoted to permit writing. The term "permit writer" is used generally to refer to the person who develops effluent limitations and incorporates them into a permit. In at least one State, however, permit writers are so specialized that they merely incorporate into a permit limitations that are developed by another office. The numbers do not include administrative or technical support for permit writers, nor other activities (e.g., compliance, enforcement) to which a permit writing staff may devote its time.

## CHAPTER II

### SOME COMMENTS ON EPA'S PAST AND PRESENT TECHNICAL ASSISTANCE

Not all of the technical problems and needs identified in this study are necessarily new or unknown to EPA. In fact, EPA has provided technical assistance in a number of the problem areas to be discussed in the next chapter. To fully appreciate the technical problems States face, it is important to understand that they occur in the context of an on-going technical assistance program which is intended to address such problems.

In this chapter several of the major forms and examples of EPA's recent technical assistance activities will be discussed as a way of providing this context. This is not intended as a comprehensive inventory of the technical assistance EPA provides (which is provided in the report of the Office of the Comptroller), nor is it a formal evaluation of these activities and products either by the surveyed States or by this project team. Rather, in the course of the study of present and future needs States were asked a few questions about past technical assistance in order to provide some background for the study, and their comments and evaluations are useful for understanding the present status of States' problems and needs.

The technical assistance EPA has provided in the NPDES program covers a wide range of subject areas and a number of different forms. The areas include treatability and control technologies, industrial processes, economic achievability, self-monitoring, toxicity testing, toxicity reduction evaluation, water quality-based toxics limitations, effluent guidelines, Best Management Practices, and Best Professional Judgment. The forms in which the assistance has been delivered include technical manuals, technical support or guidance documents, site surveys, consultation, expert assistance, workshops, computer programs, contractor assistance, and others. Four particular forms or examples of EPA technical assistance received the most comments by the States we surveyed and will be discussed briefly below -- the Treatability Manual, Effluent Limitations Guidelines Workshops, consultation, and contractor assistance.

#### Treatability Manual Must Be Made More Usable

The Treatability Manual, which is now in its second edition, is a compendium of available information on the "priority" toxic pollutants put together by the Effluent Guidelines Division and the Office of Research and Development. It contains several large volumes covering physical, chemical, biological, and treatability data on these toxic pollutants; descriptive information

on numerous industrial categories; and performance data on various treatment technologies. A volume giving cost estimates for these technologies was withdrawn from the second edition but will be reissued upon completion. A User's Guide is provided to give cross references and other aids in using the different parts of the manual.

Although the States we surveyed agree on the need for this information, most find the Treatability Manual to be difficult to use and inadequate in its present form. The organization of the manual is considered too complicated, even though a User's Guide has been prepared to facilitate usage. Also, States are concerned that while abundant information is given, it is not always specific enough and its source and reliability are uncertain. Other comments are that there is insufficient information on technical design; that achievement ranges are too broad and overlapping to allow determination of best technology; that some removal efficiencies appear to be suspect; and that there is no cost information.

Several suggestions were offered by States for improving the Treatability Manual. The material could be organized by chemical and by industry with cross-referencing and indexing so that specific information can be easily found (this is the intended purpose of the User's Guide). Also, the manual could focus more fundamentally on the principles of treatment technology, describing what kinds of pollutants a particular technology will address; this would foster a better understanding of treatability and allow writers to deal with problems not specifically covered in the manual.

#### Effluent Limitations Guidelines Workshops Are Useful But Could Be More Substantive

EPA has held a series of workshops around the country as a means of educating State permit writers about newly promulgated Effluent Limitations Guidelines (ELG). Coordinated by an EPA contractor, the workshops generally include presentations by staff involved in the development of a guideline, discussion by State personnel of specific permit cases, and a question and answer session. The workshops attended by the States we surveyed include those for coal mining, steam electric, metal finishing, copper forming, and iron and steel ELG.

States generally feel that although they can be useful the workshops devote too much time to procedural aspects of the regulations and not enough to their substance or applicability. Much of the information provided in the workshops is already contained in the relevant development document. However, the States find the workshops particularly valuable for learning how other States address specific permit problems, for hearing an industry's point of view, and for establishing contacts in EPA who can be consulted later.

One apparent limitation on the effectiveness of ELG workshops is the travel time and cost necessary for attending them. This is a major barrier to State participation. Travel grants or more widely held workshops would help solve this problem. Another solution would be to send workshop teams to individual States, where they could instruct all permit writers and discuss problems specific to the sources in each State.

#### Consultation With EPA Staff Occurs Often and is Helpful

Consultation with EPA staff on technical as well as policy matters is the most common form of assistance cited by these States. This may take many forms: a telephone request for information or interpretation, a more formal request for an EPA position on a policy or technical issue, or direct involvement by an EPA expert in the drafting of a permit. Consultation may occur with Headquarters, a Regional Office, or another office such as the Office of Research and Development depending on the nature of the problem, the availability of expertise, and the facility of contact.

The technical assistance provided by EPA experts for specific industrial categories is the most successful and highly praised consultation these States received. Exemplary in this regard is the assistance of an expert in the iron and steel industry. This individual assisted these States in drafting permits or limitations for several complex cases and in some instances actually participated in negotiating sessions with industry; the States valued his knowledge of the industry and his understanding of the content and applicability of the ELG. In general, States value industry experts because the States themselves cannot individually develop this expertise for all the industrial categories (and their specific toxic pollutants) for which they must write permits.

One problem States identified with the consultation process is that, depending on the nature of the question, they do not always get prompt answers in final form. Sometimes this is due to a genuine confusion within the Agency on a technical or policy matter. But often the problem is that official positions take much longer than "draft" answers, and EPA staff try to respond according to the urgency of the need. Draft or indecisive answers do, however, put States in a tenuous position when negotiating with industry.

#### Contractor Assistance Is Variable In Quality and Can Be Costly

Four of the States surveyed mentioned that they had received EPA contractor assistance for specific projects. Most of the examples they gave relate to developing specific permits or doing water quality studies.

In these cases States used contractors to augment their own limited staff and resources. Because the quality of contractors is variable, such assistance can involve a considerable cost to the States in terms of time and resources invested. For instance, one State said that it will have to repeat the work done by a contractor in preparing an engineering report and proposed permit limitations. Another State cited the case of a contractor who in drafting several permits for chemical and plastics manufacturers proposed limitations and monitoring requirements for an unjustifiably large number of priority pollutants. In these cases the end product was not useful and States felt that they did not get the expected benefits. In other cases, however, the investment States make in managing a contract can be worthwhile.

Another problem States cited with contractor assistance is the delay that sometimes occurs in procuring promised assistance. One State, for example, asked for EPA contractor help in setting up a program for issuing general permits. EPA Headquarters responded with a project to determine whether other States have similar needs. Not until one year later did the State receive its desired contractor assistance, too late to implement the project as planned.

\* \* \* \* \*

The preceding examples give some indication of the effectiveness of EPA's recent technical assistance activities. Such products as the Treatability Manual are intended to address known or anticipated problems States have in writing NPDES permits. Only through a formal evaluation, however, can the effectiveness of past and present technical assistance in addressing these problems be accurately determined.

## CHAPTER III

### TECHNICAL PROBLEMS AND NEEDS IDENTIFIED BY STATES

#### Introduction

The six States we surveyed were given the chance to respond to an open-ended question about what technical problems they have in NPDES permit writing. Both permit managers and permit writers were asked to describe any past technical assistance received for a problem and to suggest technical assistance that EPA could provide for the problem in the future. In addition, permit writers were asked to identify the relevant subject areas, permit limit type(s), effects, and benefits for each problem they identified. Supplemental information was obtained in personal interviews. Because the study was designed to elicit a wide representation of technical problems, we have included every well-defined problem cited by one or more States.

A few of the technical problems identified by States are of a very general nature. For instance, several States expressed the need for training in overall permit writing: what kinds of limits and regulations apply to what situations; how to do a permit based on BAT or BCT, Water Quality Standards, or Best Professional Judgment; what statutory deadlines and requirements must be followed, etc.. Although several States have written their own manuals or guidance documents for this purpose, they lack the time and resources to provide basic training for their permit writers and would like EPA to do so.

Some of the technical problems States identified involve policy issues or problems with EPA actions. A major instance of these are the technical problems that arise because of the lack of promulgated Effluent Limitations Guidelines and the need to apply Best Professional Judgment in their stead for certain industry categories. Although these problems and others (such as setting cancer risk levels) could be resolved by developments or changes in EPA's own work, under the present circumstances they pose a complex mixture of technical and policy difficulties that cannot be ignored in the context of technical assistance needs. Consequently, in the suggestions for EPA action that follow each identified problem, both technical assistance actions and policy actions are given, the first delineated by three stars (\*\*\*), the second by two section symbols (§§).

The technical problems identified by States fall about equally into three broad subject areas: treatability and control technologies, water quality impact analysis, and environmental and health effects. The first category involves problems related to municipal or industrial processes and the technologies used to control and treat their wastewater; economic achievability of treatment or control is included here. The second category involves problems related to assessing the impact of effluent



on the quality of the receiving water, most notably water quality modeling; problems in doing wasteload allocation are a subset of this group. The third major category, environmental and health effects, focuses on problems in assessing toxicity and in using water quality criteria and standards. Several other important problem areas such as Best Management Practices are discussed at the end of the section. An outline of these major problem areas and sub-sections is given in Fig. III-1.

There was surprising consensus among States and between the two Regions on the most important technical problems currently confronting State NPDES permit programs. Not only did many of the same problems crop up in different States, but the terms States used to describe them and the remedies they suggested were frequently repeated. Generically the problems involve the unavailability of needed information or knowledge, the lack of State resources or expertise, and complexities or weaknesses in current policies and regulations. The effects of these problems on State programs is consistently to delay permits, to make them less defensible, or to diminish their effectiveness in protecting the environment.

While States suggest a variety of technical assistance actions to remedy these problems, the recurrent themes are that EPA should provide a clearinghouse or reference center for providing technical information, experts for consultation on specific problems, and tools and training to enable States to manage problems on their own. Clearinghouses would be useful in providing up-to-date, specific information on toxic effects and treatability. Experts could be provided in such areas as toxicology and industrial control processes, and in fact industry experts for major categories are frequently mentioned as useful and desirable assistance. Tools and training would be effective assistance mechanisms in dealing with water quality modeling problems.

The problems described below are being faced by States now and will likely assume more importance as States do more permit limits for toxic pollutants. The technical problems frequently affect the kind of permits States can do and the workload they can reasonably handle. Although there are other, non-technical problems impeding the permitting work of States, the technical problems relate directly to the work States do to improve and maintain water quality through effluent limitations. Hence, there is a certain urgency in the needs States have expressed for technical assistance.

**Fig. III-1 Outline of Technical Problems Identified by States**

- A. Problems and Needs in the Area of Treatability and Control Technologies**
  - A.1. General Problems**
  - A.2. Specific Control Problems**
  - A.3. Assessing Economic Achievability**
- B. Problems and Needs in the Area of Water Quality Impact Analysis**
  - B.1. Water Quality Modeling**
  - B.2. Obtaining Background Data**
  - B.3. Special Wasteload Allocation Problems**
- C. Problems and Needs in the Area of Environmental and Health Effects**
  - C.1. Assessing Toxicity**
  - C.2. Obtaining and Using Criteria and Standards**
- D. Problems and Needs in Other Areas**

### A. Problems and Needs in the Area of Treatability and Control Technologies

The technical problems and needs for technical assistance in the area of treatability and control technologies are discussed first in terms of general, broad-based problems; then in regard to specific industrial and municipal control problems; and finally in terms of assessing economic achievability. A summary of the problems in this area is given in Fig. III-2.

#### A.1. General Problems

States identified the following general problems in treatability:

- obtaining sufficient information on treatment processes and pollutant control
- keeping track of relevant information or regulations
- evaluating applications and permits in terms of the adequacy of data or of effluent limits
- doing technology-based (BAT or BCT) limitations by Best Professional Judgment

Although these problems overlap and interact to some degree, each represents a particular impediment in the States' permit-writing programs.

- o States do not have sufficient information on particular treatment processes or controls for particular pollutants.

States need more information on the treatability of many pollutants such as toxics and non-conventionals; on specific removal efficiencies for a particular treatment system and pollutant; and on the control of particular effluents such as acid mine drainage or landfill leachate. Such information is necessary in the writing of BPJ and water quality-based limitations, and without it the permits are less defensible and the permitting process less efficient. As one State put it, we are "flying blind now" because of the lack of useful information on treatability and control.

EPA's Treatability Manual was developed with this need in mind, but the States think that it does not provide enough detail and information on pollutants and treatment processes. In particular, the data base is considered too small and unreliable, the removal efficiencies are thought to be too broad and in some cases suspect, and the information on fate and transport is considered sketchy.

Aside from the Treatability Manual, States generally found it useful to consult with experts in the Effluent Guidelines Division of EPA or with other EPA "industry experts" for particular industry categories. Such individuals explain in detail the industrial processes and available control technologies of an industry such as iron and steel.

Fig. III-2 Summary of Problems in the Area of Treatability and Control Technologies

	<u>Technical Problem</u>	<u>Some Suggested Technical Assistance</u>
General Problems	Lack of information on treatability and control	Industry experts for various categories More detailed information in Treatability Manual
	Keeping track of relevant information or regulations	Clearinghouse on treatability information Industry teams
	Lack knowledge of industrial processes	Computer-based information on particular industries and control technologies Industry experts
	Difficulty in doing BAT/BPJ	Reference center on toxics and State actions Industry experts
	Effect of waste from secondary industries on small POTWS	Research on controls for such secondary industries
Specific Control Problems	Limits for changing batch operations	None
	Controls for abandoned mines	Design manual for mine seals Workshops, demonstrations
	Controls for large-scale agri-business	Develop control technologies
Assessing Economic Achievability	Assessing economic achievability; without a cost test	Procedure or model relating cost to financial status Listing of personnel in Effluent Guidelines Division

For this problem States recommend the following technical assistance:

- \*\*\* Revise the Treatability Manual to provide more detailed information with a broader data base
- \*\*\* Conduct research in areas of treatability and control where information is scanty
- \*\*\* Provide industry experts for various industry categories to help apply treatability criteria to specific plants

o States have difficulty keeping track of information or regulations relevant to treatability and control.

States do not have the resources or the means to find all the available technical information on treatability or to keep abreast of developments in treatability such as treatability of toxics by the chemical industry. Even in situations for which there are Effluent Limitations Guidelines, it can be difficult in a specific case (for example, coal piles) to find the applicable regulations on control and their rationale. The effect of this problem is, first, to undermine the validity of permit limits, since they may not be based on the best or most current information; and, second, to delay the permitting process because of time consumed in searching for the necessary information.

The only assistance mentioned in regard to this problem are newsletters put out by the Office of Water on Effluent Limitations Guidelines. These were found to be useful as a reference for applicable control regulations.

For this problem States recommend the following technical assistance:

- \*\*\* Set up a clearinghouse or central reference system that would catalogue all technical reports and studies on pollutants and wastewater treatment technologies and all applicable regulations and development documents; make this system easily accessible to States as by computer
- \*\*\* Provide industry teams for consultation on the available information and regulations

o States sometimes lack the knowledge of industrial processes necessary to evaluate the adequacy of permit applications and permit limitations.

Knowledge of the processes used in an industry is a prerequisite to establishing pollutant controls, yet States lack such knowledge in certain cases. They have difficulty in determining what pollutants may actually be present in an effluent, and therefore cannot assess the adequacy of the data submitted by the applicant in this regard. Furthermore, even for industries for which there are Effluent Limitations

Guidelines, they may not be able to assess the adequacy of specific limits in a particular case without better knowledge of a plant's operations. The result is delay in permit issuance and uncertainty in the limits proposed.

The main assistance EPA has provided for this problem consists of a few industry experts such as for the iron and steel industry. Consultation with such individuals can be fruitful because they collaborate in the analysis of applications and in the setting of limits.

For this problem States recommend the following technical assistance:

- \*\*\* Designate industry experts for various industry categories
- \*\*\* Develop computer-based information on particular industries and relevant control technologies

- o States have particular difficulty in doing permit limits for Best Available Technology based on Best Professional Judgment (BAT/BPJ).

Virtually every State we surveyed has problems in dealing with industries for which Effluent Limitations Guidelines are not yet promulgated or for which guidelines are not going to be promulgated. The latter case includes the so-called secondary industry categories and the many pollutants other than priority pollutants and common non-conventional pollutants. For a variety of technical and practical reasons States have difficulty establishing controls and limits on the myriad of small industries and commercial enterprises (such as truck washing terminals) which, although not covered by guidelines, may discharge highly toxic chemicals. Of particular concern among those industries for which guidelines are expected but not yet promulgated are organic and inorganic chemicals and pesticides. The lack of technical information on treatability and the lack of knowledge of industrial processes makes it nearly impossible for the average permit writer to set competent limits on these highly complex industries. As a result, most States are avoiding permits that require BAT/BPJ and instead working on permits for industries which are already covered by guidelines. Among the consequences of this problem are a major delay in permit issuance, major re-scheduling of the States' workloads, and frequent controversy or litigation where a State attempts to set limits.

The main assistance EPA has provided for this problem is the Treatability Manual (discussed above) and a workshop on BPJ. The latter arose out of a series of questions posed by one State, and while the responses to these questions and the workshop itself were found useful they were considered to be tentative (not in final form) and not sufficiently specific.

For this problem States recommend the following technical assistance:

- \*\*\* Provide industry experts for consultation
- \*\*\* For non-primary industry categories, develop general "effluent limitations guidelines" (not specific to an industry) and create a reference center that provides data bases on classes of toxics and information on how other States have handled such cases

and the following other EPA actions:

- \$\$ Promulgate Effluent Limitations Guidelines for all primary industry categories; if unable to do so, at least develop policies on how to write permits for BAT/BPJ in the interim

#### A.2. Specific Control Problems

The preceding general problems are manifested in a number of specific control problems which States said they are now confronting. A number of examples of such control problems, each of which was provided by one State, are given below; they involve municipal treatment works, industries, mining, agriculture, and sanitary landfills. The limitations or controls needed must usually be determined by Best Professional Judgment.

- o Determining the effect of industrial waste from secondary industries (not under pretreatment) on small municipal treatment works

In the State which cited this problem the most common source of such wastewater is landfill leachate discharging into sewers. Because the State -- which has not yet been delegated the pretreatment program -- lacks adequate knowledge of the effect of industrial pollutants on small treatment plants, it cannot adequately assess what pollutants might upset the plants and prevent them from meeting their effluent limitations. With such knowledge permit limits could be more readily established and satisfied, and secondary industries could pretreat their wastes more effectively. The State would like the following technical assistance:

- \*\*\* Provide research on controls necessary for secondary industries discharging into small activated sludge plants
- o Determining best treatment technology and corresponding effluent limitations for changing batch operations and variable product lines

The presumption behind technology-based limitations is that the industry's product and production process are constant, yet there are companies (such as chemical manufacturers) which make

different products in batches, with as many as several hundred products or intermediates overall. The permit writer faces a very difficult and time-consuming task in determining what limits to apply to such a discharger. The Treatability Manual is so general and the achievement ranges so large that it cannot be used effectively in this situation. No suggestions were offered regarding EPA action to ameliorate this problem.

o Determining appropriate controls for discharges from abandoned mines

All coal mine permits are now plagued by the uncertainty surrounding post-mining treatment -- specifically, whether to require perpetual treatment or merely mine seals, and if the latter, what kind of seal. Existing Effluent Limitations Guidelines are ambiguous on this issue (even though EPA apparently has responsibility for it), with the result that coal companies contest control requirements and permit writers are uncertain what to require. For instance, a pending case in the State which cited this problem involves a dispute between the State and a company about the relative effectiveness of two types of seals of significantly different cost. The State would like the following technical assistance:

- \*\*\* Develop a design manual for mine seals
- \*\*\* Offer workshops, consultations, and demonstration projects

and the following other EPA actions:

- §§ Develop a clear policy toward the regulation of post-mining discharges

o Determining control methods for large-scale agribusiness, such as piggeries and poultry feedlots

Such agricultural operations produce large amounts of manure which is stored on the premises before being applied in land treatment; this practice causes heavy organic loadings in the runoff. The State which identified this problem believes that existing Effluent Limitations Guidelines on livestock feedlots do not address operations of this scale and that applicable control technologies have not yet been developed. This State is beginning to develop such controls, but it would like EPA to provide the following technical assistance:

- \*\*\* Develop control technologies for large-scale agribusiness operations



### A.3. Assessing Economic Achievability

Permit writers must assess economic achievability when doing BAT/BPJ and indirectly when doing limits based on water quality standards. Yet several States indicated that they have difficulties in determining the affordability or reasonableness of treatment levels that they might have to require for municipal treatment works, industries, or commercial enterprises. This problem applies particularly to toxic and non-conventional pollutants, which may have severe limitations which demand sophisticated and elaborate treatment; but it may also arise with conventional pollutants, such as total suspended solids, which are treated by clarifiers that can be quite costly.

- o States have difficulty assessing economic achievability without more information on how particular costs are related to a company's financial situation.

States need a basic cost test to justify the treatment levels they impose. The problem arises particularly with small, non-primary industries and commercial enterprises, for whom the large costs of wastewater treatment might be crippling. Without sure knowledge of the actual economic effects, States face delays in permitting and are less confident about the limits they impose; in fact, one State even acknowledged that it avoids permits where treatment is costly and affordability cannot be conclusively demonstrated.

Technical assistance has been received for this problem in the form of a manual, a guidance document, consultation, and contractor assistance. The Treatability Manual attempts to analyze costs but it is criticized for not relating them to finances. The Economic Achievability Guidance Document is not considered very useful because it does not give steps for determining economic achievability in specific cases. The Office of Water of EPA has been consulted by one State; according to the State NPDES program manager, OW said that "not much is considered" in determining economic achievability, but apparently his staff got more assistance through numerous consultations with the Effluent Guidelines Division. Another State is in the process of trying to secure EPA contractor support for an affordability project related to municipal compliance.

For this problem States recommend the following technical assistance:

- \*\*\* Develop a step-by-step procedure for determining the relation between cost and financial status, giving a comparison between plant costs and corporate finances; perhaps develop computerized economic models or formulas to determine the appropriate treatment level
- \*\*\* Provide case studies and examples of economic achievability situations

\*\*\* Provide and maintain an up-to-date listing of Effluent Guidelines Division personnel for each industry

and the following other EPA actions:

SS Promulgate guidelines on economic achievability

A related problem in economic achievability arises in developing water quality-based effluent limitations for primary industry toxics based on EPA's water quality criteria. Because these criteria are extremely stringent, the resulting requirements may not even be achievable, economically or otherwise. This problem will be discussed further in the section on environmental and health effects.

#### B. Problems and Needs in the Area of Water Quality Impact Analysis

The technical problems and needs for technical assistance in the area of water quality impact analysis involve difficulties in doing water quality modeling, difficulties in obtaining site-specific background data necessary for impact analysis, and special problems related to wasteload allocations. A summary of the problems in this area is given in Fig. III-3. In all cases these problems refer to effluent limitations based on water quality standards; they pertain primarily to toxic and non-conventional pollutants.

##### B.1. Water Quality Modeling

Most of the States we surveyed feel that they cannot adequately assess the impact of a discharge on the quality of a water body because they lack the necessary knowledge and tools, in particular, realistic, verifiable, and easily usable water quality models. While certain branches of a State's water quality division may be familiar with basic wasteload allocation models for dissolved oxygen, most of the actual permit writers do not share this knowledge, and the capability for modeling other pollutants is severely limited at present.

- o In general, States lack knowledge of how to do realistic modeling of a pollutant's concentration and fate in a water body.

Instead of attempting to do more sophisticated modeling, most States do a far simpler calculation of water quality impact -- a linear or straight dilution calculation combining in proportion to the discharges the concentration of a pollutant in the effluent and its concentration in the receiving water body at a specified low flow. This approach does not take into account either the hydrodynamics of a water body, including

Fig. III-3 Summary of Problems in the Area of Water Quality Impact Analysis

	<u>Technical Problem</u>	<u>Some Suggested Technical Assistance</u>
Water Quality Modeling	Lack knowledge of water quality modeling	Workshops on water quality modeling Short water quality modeling computer programs
	Need models for toxics and non-conventionals	Consultation on models for various pollutants
	Need models for different geographic situations (e.g., estuaries)	Develop models for estuaries and other geographic situations
	Keeping abreast of available models	Newsletter on water quality modeling Computer reference system for water quality models
Obtaining Background Data	Lack water quality data	Site-specific data collection and analysis
	Lack hydrologic data	None
Special Wasteload Allocation Problems	Developing limits in absence of formal wasteload allocation study	Procedure or formula for water quality limits Model studies of wasteload allocations
	Allocating toxic pollutants	Guidance on allocating toxics loadings
	Allocating pollutants already in violation of standards	(Develop policy for such allocations)

turbulence, sedimentation, and flow patterns, or the fate and activity of a pollutant once released into a water body. As a result, the effluent limitations derived from such calculations are of questionable validity and are subject to dispute and contest by the applicants. More importantly, the permit writer has no assurance that the limits imposed will actually protect environmental quality, or that they will do so most efficiently. If the limits are too high water quality standards will be violated; if too low, resources will be lost (including construction grant money for municipal treatment works) in achieving unnecessary treatment levels.

States have received some assistance for this problem in the form of a model (QUAL) for dissolved oxygen and guidance documents on processes for allocating wasteloads. They recommend the following technical assistance:

- \*\*\* Provide workshops and manuals on the use of water quality modeling
- \*\*\* Develop short water quality modeling programs for use on small computers that would give a quick check of impacts based on only a few input parameters

o In particular, States need water quality models for toxic organics and non-conventional pollutants.

Not only do States not know how to model such chemical species; they also do not know whether such models exist, or where to obtain them if they do. This problem will become more frequent and more significant as States increasingly take on chemical industry permits (whether by guidelines or BPJ) and do more effluent toxicity testing.

The following actual cases illustrate this problem:

--- One State has a critical problem in modeling total residual chlorine, which results from chlorination required for municipal treatment plants. To satisfy the State's strict water quality standards for chlorine, the permit writers use simple dilution without considering the effect of organic matter on chlorine or other possible reactions in a stream. The State is concerned about requiring limits that are overly strict and costly. But it does not know whom to talk to; the regional EPA office cannot provide assistance on this problem. The State recommends the following technical assistance:

- \*\*\* Provide workshops or consultation on the use and availability of water quality models for total residual chlorine
- Another State is having difficulty evaluating a 301(g) variance request involving allocated discharges of ammonia because it is using a desk-top model with unverified

literature values for the reaction rates. It spends a lot of time running the model with different values on a trial-and-error basis, and even more time in negotiating with the applicant over the model and values used. The State lacks the capability and resources to do the detailed river study that would be necessary in order to calibrate and verify the model. The State therefore recommends the following technical assistance:

- \*\*\* Provide technical assistance or funding to do the site-specific river model for ammonia
- \*\*\* Provide guidelines on how to do different types of wasteload allocations

and the following other EPA actions:

\$\$ Finalize procedures for responding to 301(g) variance requests

- o States need water quality models for a variety of geographic situations, especially for estuaries.

Most of the models that have been developed and distributed apply to free-flowing streams. For coastal States, however, the use of estuarine models is essential; without them it is difficult to evaluate the water quality impacts of small amounts of a pollutant on a tidal stream. Wasteload allocation guidance documents do not address this problem, and so the following technical assistance is recommended:

- \*\*\* Develop models for use on estuarine systems as well as other geographic situations
- o States have difficulty keeping abreast of the water quality models that are available.

The Office of Water's newsletters are a good source of information about what models are available and who is using them. It is recommended that EPA expand this technical assistance service and

- \*\*\* Provide a newsletter on water quality modeling and a computer reference system for water quality models

## B.2. Obtaining Background Data

Although water quality impact analysis requires site-specific data on background pollutant levels and other water quality or hydrologic characteristics, States often lack the resources to obtain this information for any given permit.

- o States often lack data on the water quality of a given site that they need for water quality impact analysis or modeling.

The kinds of water quality data needed but often lacking for a given site are concentrations of various pollutants, especially organics; levels of dissolved oxygen; and temperature. Without such data it is difficult if not impossible to set defensible effluent limitations. But obtaining the data is highly time-consuming and resource-intensive, since field work is usually required, especially for smaller sites. The result is that permits are delayed or, if issued, are often contested.

The States surveyed had not received assistance from EPA for this problem, although in one instance the U.S. Geological Survey had collected site-specific data for a particular wasteload allocation problem. The States recommend the following technical assistance:

- \*\*\* Provide manpower and analytic laboratory services for site-specific data collection and analysis, acting as a neutral data collector and analyst on the model of the U.S. Geological Survey

- o States often lack the data necessary to determine the design discharge of the receiving water, especially for small streams.

Water quality impact is generally assessed at low flow, in particular the seven-day ten-year low flow (7Q10) of a stream. This flow can be derived either statistically or directly from an historical record, but in either case it is necessary to know the basic hydrologic characteristics of a stream and its watershed. Such information is not, however, usually available for small streams, and regional data and charts may not be appropriate. Because many municipal treatment works and industries are located on small streams (many coal mines are even in the headwaters), States must conduct a time-consuming site survey for each case. Assistance has been received from the U.S. Geological Survey by one State for such studies. No suggestions were offered for EPA assistance for this problem.

An interesting corollary to this problem arises in determining the receiving water flow appropriate to mine discharges. The use of 7Q10 has been successfully refuted by coal companies because mine discharges correlate with stream flow (with a phase lag) and the critical discharges do not occur at low flow. States therefore fall back on the Effluent Limitations Guidelines. If the appropriate flow were determined, more coal permits would be defensibly water quality-limited.

### B.3. Special Wasteload Allocation Problems

Although all of the previous problems in water quality modeling and data collection arise in doing limits for multiple dischargers, wasteload allocations present special problems of their own.

- o States may have difficulty developing water quality-based effluent limitations in the absence of a formal wasteload allocation study.

A formal wasteload allocation study including water quality modeling is the best way to set limitations on multiple dischargers to a water body, but such a study can be beyond a State's resources or capability. As a result, a State may have to rely on technology-based limitations even for receiving water bodies that are water quality-limited, an alternative that may have a negative effect on the water's quality.

For this problem States recommend the following technical assistance:

- \*\*\* Develop a standard procedure or formula for making water quality-based limits in the absence of a formal wasteload allocation
- \*\*\* Make available model studies of wasteload allocations
- \*\*\* Provide manpower for more detailed wasteload allocation studies

- o States have difficulty in determining how to allocate toxic pollutants

Most wasteload allocation studies and assistance have been in regard to conventional pollutants, yet the re-issuance of permits and greater attention to water quality limitations require that an approach to allocating toxics loadings be developed. Under present circumstances States have difficulty defending the limits for toxics which they impose. They recommend the following technical assistance:

- \*\*\* Provide guidance on how to allocate loadings of toxic pollutants

- o States have difficulty in determining wasteload allocations for pollutants which are already in violation of water quality standards.

One State confronts this problem of allocating pollutants which are already in violation of its standards in every major industrial permit. A major river bordering the State is carrying excessive loads of iron and copper, and the State has decided on requiring zero discharge of these species even though it

questions whether uses are really being affected. The result is a delay in permit issuance and contests of the zero-discharge requirement. A further complication is that the river first flows from another State whose standards for iron are higher and are not being violated. This presents a further problem in defensibility and compliance.

For this problem the following EPA actions are recommended:

- SS Develop a policy or procedure for such allocations, including suggestions on how to devise and implement an equitable allocation; the policy should consider water uses which are not impacted even though water quality standards are violated

#### C. Problems and Needs in the Area of Environmental and Health Effects

The technical problems and needs for technical assistance in the area of environmental and health effects are concerned primarily with assessing toxicity and with obtaining and using criteria and standards. Much of the difficulty here derives from uncertainties in scientific understanding of toxic effects, but some of the problems are also due to gaps, inconsistencies, and impracticalities in relevant policies and regulations. A summary of the problems in this area is given in Fig. III-4.

##### C.1. Assessing Toxicity

The problems States identified in assessing toxicity include evaluating the impacts of effluent on humans and aquatic biota, conducting toxicity tests, and establishing biomonitoring programs and requirements.

- o States have difficulty evaluating the potential impacts of toxic chemicals (especially organics) on human health and aquatic biota.

Every State we surveyed has a major if not critical problem in trying to determine how components or mixtures of chemicals in an effluent would affect health or environment. One reason is the dearth of toxicological data on many of the substances commonly found in effluents, especially organic chemicals; also lacking is information on site-specific aquatic effects, including the combined (synergistic or antagonistic) effects of various discharges into a water body. Another reason for the problem is a lack of expertise in toxicological evaluation. However, much of the information needed is not available or involves issues at the frontier of science. For instance, one State expressed difficulties in determining potential human



Fig. III-4 Summary of Problems in the Area of Environmental and Health Effects

<u>Technical Problem</u>	<u>Some Suggested Technical Assistance</u>
Assessing Toxicity	
Evaluating impacts of toxics on human health and aquatic biota	Workshops on toxic impacts Expert testimony by toxicologists
Testing for aquatic toxicity, especially chronic toxicity	Consultation on testing Newsletter on testing in various States
How to implement biomonitoring requirement	Guidance on implementation
Obtaining and Using Criteria and Standards	
Lack of water quality criteria and standards, especially for toxic organics	Reference center on toxics Experts for consultation
Setting toxic risk factor for human health	(Policy on risk factors, especially for cancer)
Discrepancy between criteria and cancer risk level	None
Impracticality of limits based on EPA criteria	Laboratory assistance to improve detectability

health effects from bioassays (which are on animals); they complained that EPA avoids this issue, but of course it is a central problem in toxicology to extrapolate human health effects from effects on other animals.

This problem delays the issuance of permits and makes States less confident of the limits that they set. States' evaluations of toxicity must be consistent and reliable in order to withstand judicial review. In one case a State is vacillating about imposing effluent limitations on an industry for zinc, even though it sees the potential need, because it is reluctant to engage in a court battle based on uncertain information about effects.

Little or no identifiable assistance has been received by the States for this problem. They recommend the following technical assistance:

- \*\*\* Provide assistance for site-specific evaluations of toxic effects
- \*\*\* Do research and review existing information on toxicological effects on aquatic life and human health
- \*\*\* Provide expert testimony by toxicologists for specific cases
- \*\*\* Conduct workshops on the impacts of various chemicals in different water bodies

- o States are unfamiliar with tests and procedures for determining aquatic toxicity, especially chronic toxicity.

In order to evaluate toxic aquatic impacts States must often conduct or require toxicity tests. Yet States often do not know what tests to use or they lack procedures for determining certain kinds of toxicity, such as chronic toxicity. Acute toxicity data may be helpful in the latter case but it is not sufficient for understanding the chronic or combined effects, and there is no consensus on how to test chronic toxicity. In such cases States are unsure whether their allowances for a discharge are really protecting the environment. This problem is getting more acute as States look more at toxics impacts and begin to work on permits for the organic chemical industry.

The assistance these States have received from EPA for this problem includes a manual, consultation, and testing procedures. The Toxicity Testing Manual ("Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms") was praised as beneficial and useful. It is informative, understandable, and clear, and it enables States to impose whole effluent toxicity testing requirements. However, it does not cover testing for chronic toxicity, and because it is general in scope it requires follow-up consultation with someone who is familiar with the document or with the procedures outlined. Such consultation has been provided effectively by the West Virginia regional EPA laboratory. Another EPA

laboratory in Minnesota has developed some chronic toxicity tests which are being used by one State to develop a biological testing program.

For this problem States recommend the following technical assistance:

- \*\*\* Provide additional consultation regarding tests to use and the availability of test organisms
- \*\*\* Provide a newsletter on testing done in various States, with contacts indicated
- \*\*\* Conduct research on when to require tests for chronic toxicity

and the following other EPA actions:

§§ Develop a policy on uniform chronic toxicity testing procedures

- o In general, States are unclear about how to implement the requirement for biomonitoring.

States are being encouraged to set a biomonitoring requirement (testing the aquatic toxicity of wastewater) but they are short on guidance for implementing it. They want to know how to establish a biomonitoring program, what regulatory basis to use for it, and how to write a biomonitoring requirement in a permit. Without this information they face delays in issuing permits. States therefore recommend that EPA

- \*\*\* Issue guidance on implementing the biomonitoring requirement

## C.2. Obtaining and Using Criteria and Standards

The problems States identified in obtaining and using criteria and standards concern the lack of standards and criteria, the determination of risk factors, the discrepancy between criteria and risk factors, and the effects of overly stringent criteria and standards.

- o States have difficulty setting water quality-based effluent limitations due to the lack of water quality criteria and standards for many pollutants, especially toxic organics.

Many pollutants, especially toxic organic chemicals, have not been assigned water quality criteria or water quality standards based on them. Permit writers confronting such species in an effluent must establish some limit in order to protect health and environment and to satisfy the generic restriction on toxics in water bodies, but without such criteria they have no basis for determining a justifiable limit. This delays and undermines the permit process.

States would like EPA to provide the following technical assistance:

- \*\*\* Set up a reference center with information desks for classes of toxic pollutants
- \*\*\* Provide designated experts for consultation

and recommend the following other EPA actions:

§§ Develop water quality criteria for additional toxic organic pollutants

- o States have difficulty in obtaining or determining a meaningful toxic risk factor for human health.

One of the major factors in setting water quality criteria and standards for toxic pollutants is to determine an allowable level of risk (of cancer, mutagenicity, teratogenicity, etc.). Yet such a risk factor is often lacking for toxics, and States cannot therefore set meaningful standards on which to base effluent limitations. The result is that permits are either delayed, contested, or not issued at all. In one particular case a permit writer faced the problem of limiting the discharge of benzene, for which there was no water quality standard and no consistent level of risk (it varied according to the means of exposure); the application has been drawn out in a series of negotiations between the company and State and Federal authorities.

States recommend that EPA do the following:

§§ Set meaningful risk factors for all major pollutants; in particular, set a clear risk factor for cancer

- o States have particular difficulty doing water quality-based limitations when there is a discrepancy between water quality criteria for drinking water and the cancer risk level.

In some instances the available information on toxicity is conflicting and presents serious problems for the permit writer. For instance, according to one State the water quality criterion for arsenic is one thousand times the cancer risk level. Although no suggestions were offered, it is clear that a consistent policy is needed for dealing with health risk.

- o Effluent limitations based on EPA's water quality criteria are often excessively low and impractical for States to implement.

States consider many of EPA's water quality criteria for toxics to be extremely stringent and low. When they are used

as a basis for determining effluent limitations the latter may be below the level of detection for a pollutant (one State cited methylene chloride as an example) or not even achievable in any practical way. This could result in a compliance problem. Accordingly, both States and applicants find it difficult to accept such limits and there are delays in decision-making and prolonged negotiations about how to proceed. One State has decided to use the criteria only if the discharge involves a public water supply stream.

The problem of detectability is particularly troublesome to States and is mentioned in another context in the next section. In one State limits were set for dioxin based on water quality standards but they were below the analytical detection limit. In another State a limit for total residual chlorine for a poultry processing facility was calculated out at a concentration of less than the detectable limit; because the company could not achieve this limit and there was no way to monitor it, the State had to rationalize a higher effluent limit.

Although no assistance has been received for this problem, States recommend the following technical assistance:

\*\*\* Provide laboratory assistance to develop techniques to analyze pollutants to the levels of the standards.

and the following other EPA actions:

§§ Provide guidance on how to impose reasonable limitations in cases where a designated limit is not detectable

§§ Provide more meaningful (realistic) water quality criteria

#### D. Problems and Needs in Other Areas

There are several other areas in which important technical problems and needs for technical assistance arise. Brief mention is made here of problems and needs in source monitoring, pollutant measurement, and Best Management Practices.

o States lack a sound, usable technical basis for determining the frequency of source monitoring requirements.

The frequency required for an applicant's self-monitoring must be neither too low nor too high; if it is too low violations may go undetected, while if it is too high the burden on the applicant is excessive. Yet States lack a ready technical means for setting the frequency and may have to bargain with the applicant because of lack of defensibility.

EPA is currently developing through contractor work a statistical methodology for determining monitoring frequency. However, it is criticized for being too complicated for use by permit writers, for requiring too extensive a background in statistics and computers. The following technical assistance is recommended:

- \*\*\* Develop a simple manual that most permit writers can use for determining monitoring frequency
- \*\*\* Develop (or re-package) a program suitable for small computers for general usage; retain the more complicated computer model for special cases and provide consultation on its use
- o Detection limits for pollutants vary with the testing laboratory and States have no way of determining if these limits are appropriate.

This problem arises frequently in industrial applications where many pollutants are listed as "not detectable". Without being able to evaluate the data further, a State may issue a permit that does not limit a potentially harmful pollutant.

EPA published minimum detection limits and testing methods for priority limits in proposed form in 1979, but these have not yet been promulgated in final form. It is recommended that EPA

- SS Publish in final form and periodically update minimum detection limits for all priority pollutants and list the preferred method and cost involved

and that EPA provide the following technical assistance:

- \*\*\* Provide information on the achievability and reliability of lower detection limits
- o States have difficulty implementing the requirement for Best Management Practices (BMP) in the absence of final guidance.

The current BMP guidance document is in draft form and some of the States surveyed do not find it usable as a basis for defending permit requirements. States have in fact been challenged on BMP requirements that they issue. Often, however, they will find alternative means (such as a RCRA requirement) for imposing controls on the plant grounds, but they clearly would like more definitive guidance on BMP if not actual regulations or guidelines. An alternative viewpoint was provided by one State, which sees no purpose in final guidance on BMP from EPA and avoids applying BMP where possible.

One State also said that it is difficult for a permit writer to evaluate a plant's operational practices to determine if they are equivalent to BMP. Inadequacies in operating procedures may be hard to distinguish from the many variables (such as age of equipment or structural defects) which can legitimately cause effluent problems.

Besides the guidance document EPA has provided a workshop on BMP, which one State cited as being relatively good.

States recommend the following technical assistance:

- \*\*\* Provide final BMP guidance including how to evaluate an applicant's BMP plans

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

This section of the report provides a summary of the findings and conclusions about the nature of the technical problems delegated States are facing in their permitting work. It highlights some of the States' recommendations for technical assistance from EPA and presents the implications of this pilot study for future technical assistance in the NPDES permitting program.

This project was designed to identify technical problems that States are facing in writing NPDES permits and to elicit recommendations from the States on the types of technical assistance that could ameliorate these problems. The report shows that technical problems do exist and that States see ways in which technical assistance from EPA could help them be more efficient and effective in protecting the environment. The report also shows that other EPA actions to issue national policy and regulations would ameliorate some technical problems or make them more manageable.

A summary of the findings and conclusions is as follows:

- o States most often write effluent limitations derived from national technology-based regulations and these are considered the most defensible.

The effluent limitations written in NPDES permits consist of one of three different types, each with varying demands on a State's resources. There are limitations based on promulgated Effluent Limitations Guidelines (ELG); those based on Water Quality Standards (WQS), where ELG or municipal secondary controls are not sufficient to meet such standards; and those based on Best Professional Judgment (BPJ), where there is no applicable ELG and no indication of a violation of Water Quality Standards. Of these three approaches, the States surveyed in this study most often write effluent limitations based on ELG, and they consider them to provide a more secure technical and legal foundation. They use WQS less frequently and BPJ least frequently to develop effluent limitations.

- o There are important technical problems in writing effluent limitations based on either Water Quality Standards or Best Professional Judgment.

Effluent limitations based on WQS and BPJ are considered the most problematic by the States surveyed. Most of the technical problems and suggested assistance in the study relate to these two types of limitations. As a consequence of these technical problems, which cause development of these types of limits to be very resource-intensive and susceptible to legal challenge, most of the States have



waited for EPA to promulgate the ELG for Best Available Technology (BAT). Although many of the States have deliberately avoided doing BPJ-based limitations, the slowness with which EPA has promulgated the ELG, the fact that the ELG do not always set limits for important pollutants in the effluent, and continuing litigation with industry have resulted in requests for technical assistance in doing BPJ-type limitations.

o Delegated States have unmet needs for technical assistance from EPA.

During this pilot study, States were asked whether they had received any technical assistance from EPA to help with the technical problems they identified. As shown in Chapter II, the States cited some specific examples of assistance, such as consultation with industry and other technical experts, which they considered to be very effective. However, in the majority of cases, either they did not recall having received any assistance related to the technical problem or they cited problems with the technical assistance they did receive.

There are a number of possible explanations for this perception of unmet needs on the part of States. One possible explanation is that States use the term "technical assistance" in a different way and therefore did not cite those activities classified as technical assistance by EPA; however, this is unlikely because States acknowledged that the definition of technical assistance used in this study generally conforms with their usage. Another unlikely possibility is that States did receive useful technical assistance from EPA but could not recall it later; yet States repeatedly were able to recall assistance that was helpful in the past and to relate it to present technical problems.

More likely explanations for these unmet needs are either that States did not receive technical assistance or that they did not use or benefit from the assistance that is available. In the first case, there are a number of problems for which EPA has just not provided technical assistance. Where it has, the products and activities may not have reached the States; while the study provides no direct evidence of this, comments by the Office of Water Enforcement and Permits suggest that the procedure of notifying, transmitting, and distributing technical assistance to States is not working as planned. In the second case, the study provides some evidence that States did not use some of the technical assistance products because of their perceived lack of relevance, timeliness, or utility.

- o Important technical problem areas include treatability and control technologies, water quality impact analysis, and environmental and health effects.

The technical problems where States see a need for EPA technical assistance fall into three broad subject areas: treatability and control technologies, water quality impact analysis, and environmental and health effects of pollutants. These subject areas bear some relation to the three types of permit limitations: water quality impact analysis is relevant mainly to WQS-based limits, aquatic and health effects to WQS and BPJ-based limits, and treatability and control to ELG, WQS, and BPJ alike. However, we have not discussed the subject areas in relation to each type of effluent limitation because many of the problems cut across the different types of limits.

Examples of technical problems that States cited in the three broad subject areas are as follows:

1. Treatability and Control Technologies

- Obtaining sufficient information on treatment processes or controls for particular pollutants
- Keeping track of information or regulations relevant to treatability and control
- Doing permit limits for Best Available Technology (BAT) based on BPJ

2. Water Quality Impact Analysis

- Knowing how to do realistic modeling of a pollutant's concentration and fate in a water body
- Obtaining site-specific data for water quality impact analysis or modeling
- Developing water quality-based effluent limitations in the absence of a formal wasteload allocation study

3. Environmental and Health Effects

- Evaluating the potential impacts of organic pollutants on human health and aquatic biota
- Setting water quality-based effluent limitations in the absence of EPA water quality criteria for organic pollutants
- Knowing tests and procedures for determining acute and chronic toxicity for aquatic species

- o Control of toxic and non-conventional pollutants cuts across the problem areas States identified.

States face important problems in controlling toxic and non-conventional pollutants regardless of whether the effluent limitation is based on ELG, WQS, or BPJ. Treatability and control, water quality impacts, and aquatic and health effects of toxic and non-conventional pollutants are significant problems for every State in this survey. Although some States have developed means of identifying pollutants of concern or can measure and model their water quality impacts, other States are only beginning to acquire the knowledge, methods, and personnel to develop the requisite effluent limitations for toxic pollutants.

The most commonly named category of pollutants for which States face technical problems listed above are organic chemicals. Non-conventional pollutants such as chlorine are also a problem.

- o States share common views about the forms of assistance that may ameliorate certain technical problems.

By form of technical assistance we refer to the means or mechanism of providing assistance to States. These forms include written reference materials, training workshops, laboratory analyses, and so on. The form is different from the content of the assistance, which involves the technical or scientific subject matter of the assistance. Although forms of assistance can be separated from the content, technical assistance is most meaningful when we consider the form and content together.

States suggested certain forms of assistance more commonly than others. These were clearinghouses for technical information, experts for consultation for specific problems, problem solving tools, and training for State employees.

In the following we briefly describe and give examples of the forms of assistance that may be useful in different problem areas:

#### 1. Clearinghouses for Technical Information

A clearinghouse is a central location for cataloguing and making available technical reports, studies, and other information on specific subject areas. It would provide States with up-to-date information from a variety of sources that they could integrate and apply to specific permit problems. The material in a clearinghouse could be designed according to the particular needs of States and could include the results of EPA, industry, or academic research as well as evaluations by EPA of the validity and significance of these materials.

**Examples:**

- Clearinghouse on controls for specific pollutants and wastewater treatment technologies
- Clearinghouse on toxicity data bases for different classes of toxic pollutants, including specific cases of how States have handled toxics

**2. Technical Experts**

A technical expert has knowledge and experience in relevant policies, regulations, and technical subject matter, as well as in the work of permitting; and the capacity to synthesize and apply such knowledge and experience to particular problems. An expert is in a position to keep current with information from EPA, industry, and academic research. The individual would work on a person-to-person basis with State personnel to resolve permit problems; subject areas could include particular industry categories, aquatic or human toxicology, and so on.

**Examples:**

- Experts on the use and availability of water quality models for specific substances
- Experts in toxicity who could provide advice and testimony on limitations for specific toxic pollutants

**3. Tools**

Technical problem-solving tools include methods of problem analysis and techniques for calculating specific permit limitations. These tools are desired by States in a number of different subject areas and could be packaged in the form of computer software as well as hard-copy manuals.

**Examples:**

- Short water quality modeling programs for use on small computers
- Method for quick determination of economic achievability

**4. Training**

The goal of training is to enable State personnel to perform certain work independently and without the need for further assistance. Training can take many forms, including quick workshops, intensive sessions over a period of days, or extended courses over months. The nature of the subject matter and the degree of expertise desired determine how training is conducted. Also, depending on its focus and purpose, training can be conducted on the job or apart from actual work situations.

## Examples:

- Workshops on toxic impact evaluations for different classes of toxics and different types of water bodies
- Training on how to do different types of wasteload allocations
- o The appropriate form of technical assistance depends on the nature of the problem and the goals of the assistance.

Technical assistance in a particular subject area can often be packaged and delivered in a variety of forms; the nature of the problem and the purpose of assistance should determine the form or forms that are most suitable. For example, training is suitable for somewhat difficult subject areas such as water quality modeling which States should be capable of handling on their own, but experts are more appropriate for complex problem areas such as toxicology where no individual State could acquire or maintain expertise. In other words, forms of technical assistance should not be treated as though they have an independent function and value, but instead should always be tailored to the problem and purpose at hand.

- o Communicating with States about their needs and the appropriate form and content of technical assistance is essential.

Although it was not the purpose of this study to evaluate either past technical assistance or the process of delivering technical assistance, our findings indicate that there may not be sufficient communication between EPA and the States regarding their needs and the technical assistance EPA provides. Such communication is essential for targeting important problem areas and for determining the most appropriate forms of assistance in order that State NPDES programs can provide more effective environmental protection.

- o Systematic evaluation of States' views on past technical assistance is essential to better meeting States' needs.

Comments made by States on past technical assistance suggest that although EPA is producing assistance in important technical subject areas such as treatability and control technologies, there are specific problems with the form and content of the assistance. Systematic evaluation of selected technical assistance products is one approach to getting needed feedback from States on the effectiveness of EPA's technical assistance in resolving technical problems in permitting. This information is essential to improved planning and provision of technical assistance.

- o Building on known and agreed-upon successes in providing technical assistance is key.

The availability of technical experts for consultation with State offices is a known success, based on the reports in this study about the value of industry experts in resolving specific problems with individual permits. Examination of the circumstances under which technical experts can operate most effectively with States and identification of the requisite knowledge, skills, and experience of such experts is a logical next step to identifying experts for other industries such as the organic chemicals industry or for other subject areas.

- o The expected benefits of technical assistance are faster permit issuance and better quality permits, but not necessarily reduction of the permit backlog by FY 1985.

In almost every technical problem area States cited, the expected benefits of resolving the problem through technical assistance and/or policy decisions from EPA were either faster permit issuance, an improved scientific and technical basis for the limitations resulting in improved legal defensibility, or more environmentally sound effluent limitations.

Some States in this study stated, however, that even if EPA provided all of the technical assistance in the forms proposed and took other actions to issue national policy and regulations, these States could still not eliminate the backlog of NPDES permits by FY 1985. Additional permit writers and technical and clerical support in these States are necessary to reduce the large permit backlogs, and EPA technical assistance cannot make up the gap in resources.

- o Technical assistance is not the only action needed from EPA to resolve technical problems in NPDES permitting; in particular, establishing national policies in important technical problem areas is necessary to create a framework for managing many technical problems.

For many of the technical problems that they identified, States proposed actions by EPA in areas other than technical assistance. Many of these other actions consist of policy and regulatory decisions by EPA to establish a framework within which States can manage their technical problems.

For example, many technical problems arise from delays in issuance of regulations, such as the guidelines for Best Available Technology (BAT) for certain primary industry categories. The lack of such guidelines forces States to use (or to avoid) BPJ in doing permits for such industries, and BPJ-based effluent limitations are highly problematic. Another example of technical problems that derive from a lack of national policy or regulations is in regard to so-called secondary industries, for which EPA has no plans at present to issue

national technology-based regulations for BAT. States need information on the pollutants discharged by many of these industries and the technologies available to treat and control them. In this and other cases, States need EPA to provide a solid framework for their technical work and consistency in the approaches they are using.

Some of the States surveyed in the study also suggested that management, personnel, or administrative problems are having a more significant impact on NPDES permitting than technical problems. While the study did not assess these other problems, States were given the opportunity to make a few suggestions about assistance in non-technical areas that EPA could provide. One State would like assistance in organizing and managing information, while several States expressed the need for a better system for tracking permits. This whole area of management assistance and EPA's potential role in it is clearly worthy of further investigation.

DEFINITION OF TECHNICAL ASSISTANCE

This definition of technical assistance is to be used in conjunction with the questionnaires for State NPDES permit program managers and State NPDES permit writers. A brief working definition is followed by specific points of clarification and illustrative examples.

TECHNICAL ASSISTANCE IS THE PROVISION BY EPA TO A STATE OF INFORMATION, TOOLS, OR OVERALL CAPABILITY OF A SCIENTIFIC, ENGINEERING, OR TECHNOLOGICAL NATURE FOR THE MANAGEMENT OF A PROBLEM FOR WHICH THE STATE IS PRIMARILY RESPONSIBLE. SUCH ASSISTANCE IS UTILIZED AT THE DISCRETION OF A STATE AND CAN BE RENDERED IN A VARIETY OF FORMS DEPENDING ON THE SCOPE OF THE PROBLEM AND THE PURPOSE OF THE ASSISTANCE.

- o The subject matter included in technical assistance is scientific, engineering, or technological and does not include legal or management assistance.

For example, advice on ways to allocate wasteloads for water discharge (NPDES) permits is an instance of technical assistance; advice on procedures and priorities for States to reduce their backlog of such permits is an instance of management assistance.

- o The State has direct, day-to-day responsibility for the problem requiring technical assistance.

For example, EPA provides technical assistance when it helps a State that has been delegated the authority for NPDES permitting to write a particular NPDES permit.

- o Although it can be initiated either by EPA or by a State, technical assistance is utilized entirely at the discretion of a State.

For example, in writing a NPDES permit where there are no promulgated effluent guidelines, a State may make use of EPA's Treatability Manual or it may base its decision on information derived from other sources.

- o Technical assistance may involve either case-specific problems or a class of problems.

Case-specific assistance is rendered in response to a particular problem, such as a specific water permit decision; generic assistance is rendered in response to an entire class of problems, such as the issuance of water quality-based permits.

- o Technical assistance may result in short-term enhancement or it may strengthen a State's long-term capability.

For example, technical assistance includes laboratory services for which a State has no independent capability as well as technical training ("capacity strengthening") which would enable a State to perform such laboratory work on its own.



- o Technical assistance comprises a variety of delivery mechanisms, services, and tools which may or may not involve person-to-person interaction.

For example, technical assistance may be delivered through dissemination of written information (as in a clearinghouse), through expert advice and consultation, through loans of technical personnel, or through technical training. Technical assistance may also be rendered through services such as laboratory work or site surveys or through provision of analytical tools and equipment.

The form in which technical assistance is given generally depends on the nature of the problem and the purpose of the assistance. Some forms of assistance, such as written information, are appropriate for both case-specific and generic problems and for either short-term enhancement or capacity-strengthening. Other forms are more suited to a particular purpose or kind of problem, as illustrated below:

Problem: Purpose:	Case-specific Short-term enhancement	Generic Capacity-strengthening
Technical Assis- tance:	Expert advice and consultation Technical services (e.g., laboratory analysis)	Training (courses, workshops, etc.) Tools and methodologies (e.g., model studies)

- o Technical assistance is generally distinct from the following activities: special EPA studies of problems of federal concern; EPA research and development solely in support of national standard setting and other federal program activities; national information collection; EPA standard setting or program direction; direct program administration by EPA; and oversight of State programs.

In each case the problem involved is a direct federal responsibility. For instance, since EPA must set national standards for pollution control or environmental protection (e.g., Effluent Limitations Guidelines), the provision of information related to what these standards are constitutes dissemination of law. However, where there are no national standards and a State is responsible for setting limitations, provision of information by EPA on ways to use Best Professional Judgment constitutes technical assistance.