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Report

of

Audit

REPORT ON REVIEW OF EPA ADMINISTRATION  
OF WASTEWATER TREATMENT FACILITY  
CONSTRUCTION GRANTS PROGRAM

AUDIT REPORT NO. E1W2-11-022-052

JULY 16, 1973



U.S. ENVIRONMENTAL PROTECTION AGENCY

Office of Audit

Washington, D.C. 20460



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF AUDIT  
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WASHINGTON, D.C. 20460

JUL 16 1973

MEMORANDUM

TO : Mr. John Quarles  
Acting Deputy Administrator

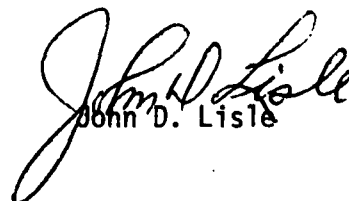
FROM : Mr. John D. Lisle  
Director, Office of Audit

SUBJECT: Report on Review of EPA Administration of Wastewater  
Treatment Facility Construction Grants Program.  
Audit Report No. E1W2-11-002-052

Enclosed are two copies of our audit report concerning the administration of the Wastewater Treatment Facility Construction Grants Program. This report represents a consolidation of the results of our review of the management of this program in four Regional offices and nine state agencies.

The findings and recommendations contained in this report have previously been provided to the responsible Headquarters or Regional EPA officials for review and comment. We have evaluated the comments provided and concluded that the actions contemplated should generally fulfill the intended purpose of our recommendations. Accordingly, we will require no further response to this report at this time. We do recognize, however, that the weaknesses described in this report will not be corrected until the corrective actions are actually implemented. We will, therefore, continue to monitor the actions to be taken and promptly advise you whenever such actions are deemed inadequate.

If you have any questions concerning this report, we will be pleased to discuss this matter in greater detail at your convenience.

  
John D. Lisle

Enclosures (2)

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REPORT ON REVIEW OF EPA  
ADMINISTRATION OF WASTEWATER TREATMENT  
FACILITY CONSTRUCTION GRANTS PROGRAM

PART I - DIGEST

PURPOSE AND SCOPE OF AUDIT

We have performed a review of selected activities comprising EPA's administration of the Wastewater Treatment Facility Construction Grants Program. During this review, audits were performed primarily at four (4) EPA Regional Offices and nine (9) state agencies. These included: Region II, Region V, Region VIII, and Region IX, Arkansas, California, Florida, Hawaii, Illinois, Kentucky, New York, South Carolina, and Utah. In addition, limited reviews of a specific nature were made at Headquarters, Region IV, Region VI, and in Maryland. This report represents a consolidation of the information and findings obtained in each of these component audits. The findings and recommendations developed during each component audit were previously provided the involved Regional officials for review and comment. Similarly, where the consolidation of information from the various component reports has necessitated overall recommendations to EPA management, we have provided copies of such findings and recommendations to appropriate Headquarters officials for review and comment. This report has accordingly taken into consideration any major differences raised by these officials.

Our review was directed primarily toward evaluating the manner in which EPA discharged its responsibilities in managing the Wastewater Treatment Facility Construction Grants Program. We did not review in detail all aspects of the Construction Grants Program, but instead concentrated our efforts on those areas identified to be in need of most attention. During our survey, we inquired into the systems utilized in (1) providing assistance to grantees interested in obtaining construction grants; (2) reviewing and evaluating grant applications, plans and specifications, contractual documents, etc.; (3) maintaining control over obligations and payments; (4) evaluating the compliance with grant terms and conditions; (5) ascertaining the status and adequacy of construction; and (6) assuring that the treatment plants are properly operated and maintained. Our review was conducted in accordance with the generally

accepted auditing standards prescribed by the Comptroller General in 1972 and accordingly included such tests of the accounting records and other auditing procedures as we considered necessary in the circumstances.

## SUMMARY OF RESULTS OF AUDIT

The quality of EPA administration of the construction grants program can, in our opinion, best be described as inconsistent. While the individuals involved with this program appear to be diligent and thoroughly committed to the objectives of the program, we found weaknesses in virtually every area examined. These weaknesses can be attributed to two major causes. These include:

1. Lack of Adequate Procedures. The construction grants program is a dynamic changing program. Yet the procedures being used in administering the program were written in 1968. Since that time, many changes have occurred. To deal with these changes, the regions each developed their own methods of administering construction grants. As a result, no two regions operate identically. This individual evolution has tended to keep EPA from evaluating the systems used and fully developing a system which could best fulfill EPA's administrative and technical requirements.

2. Resistance to Change. Since Federal officials running the construction grants program have been administering the program for years without current definitive guidance, such officials have developed traditional methods for administration. These officials tend to resist changes in methods of administration. For example, EPA, a couple of years ago, took steps to separate the administrative from the technical side of construction grant management. In our opinion, the division was made so that engineering or other technical personnel would spend most of their time on technical matters. We found during our review, however, that technical personnel were still spending a great deal of time on administrative matters.

Until EPA is successful in dealing with these problems, it is doubtful that administration of the construction grants program will improve to any significant degree.

The detailed findings developed during our audit are described below:

### Pre-Application Assistance

EPA management of the construction grant program could be improved through establishing controls to assure that adequate pre-application assistance is furnished prospective grantees. Such controls would help to assure that prospective grantees across the United States all have similar access to EPA for guidance and assistance and that appropriate efforts are being expended to assure that the grant applications and plans and specifications will be submitted correctly, thereby eliminating at least partially the need for time consuming after-the-fact reviews and corrections. In our review of three EPA Regional offices, we noted that

each office had a different approach to and put a different degree of emphasis on pre-application assistance. In addition, we found that comments and suggestions resulting from such assistance were not always provided to the state or applicant for further consideration. Furthermore, an insufficient advance review of projects approved, in one region, resulted in grant offers being made for: (i) projects that contained unallowable costs, and (ii) projects which did not contain necessary grant conditions (Page 10).

Regional officials generally concurred with our findings and indicated that appropriate corrective actions would be taken. We also believe that Headquarters should establish the necessary guidance to permit a more uniform approach to providing pre-application assistance.

#### Priority Systems

EPA policy and procedures regarding priority systems to be used in determining the relative need for wastewater treatment projects require evaluation, revision, and strengthening. During our review we noted that (1) officials in Region II had waived the requirement for a priority one-year listing in funding projects in the State of New York; (2) allotments of Section 8 funds in Region V were allocated by states to larger communities without regard to the established state priority systems; and (3) EPA in Region IX, through its approval of Federal funds for two water facility construction projects, had developed a policy that water reclamation facilities are eligible for Federal funding under Section 8 of that Act. As a result, there was no assurance that the projects most needed in these three regions to reduce and eliminate pollution were funded first (Page 17 ).

EPA officials generally agreed with our findings and recommendations and indicated that the recent passage of P.L. 92-500 would require a new look at all of the State priority systems.

#### Administration of Construction Contracting Practices

Improvements were needed in EPA procedures to assure that our grantees contracting practices properly complied with Federal requirements and adequately safeguarded the Federal interests. In this regard, we noted that (i) the grantee's procurement techniques for obtaining major items of equipment were overly restrictive, (ii) project plans and specifications were not always approved before grantees advertised for bids or awarded construction contracts, and (iii) adequate documentation was not obtained to support decisions to award to other than the lowest bidder. These weaknesses have resulted in EPA being involved in a rising number of complaints and have prevented EPA from assuring that the proposed plant will meet necessary Federal standards and be built at the lowest reasonable cost (Page 23).



The passage of the new Water Pollution Control Act and the issuance of new regulations governing the construction grants program have in our opinion provided the additional guidance needed to resolve these problems.

#### Engineering Agreements

EPA guidelines need to be established governing the selection of contractors, methods of contracting and administration of contracts used in obtaining consultant engineering services under sewage treatment construction grants. Such guidelines are needed to comply with OMB Circular A-102 and to strengthen EPA controls over consulting engineer costs. Our audit of three Regional offices disclosed several significant weaknesses in the area of contracting for consulting engineering services. These included:

- (i) Failure to go through a proper selection process, whereby a consultant's qualifications, experience, and costs to be charged were obtained and evaluated.
- (ii) Need for controls to assure that consulting firms were not acquiring subcontracts through a preferential position derived from participation in other planning activities.
- (iii) Lack of controls to assure that the cost of engineering services are properly enumerated in the engineering agreement, reasonable, and acceptable under the established Federal requirements.
- (iv) Need to require inclusion of standard provisions in contracts for engineering services. For example, none of the contracts reviewed contained the necessary clauses related to access to audit, level of effort, Equal Employment Opportunity, Ownership in Data, or termination.

Unless appropriate changes are made to strengthen EPA controls over the engineering contracts issued in conjunction with sewage treatment construction grants, we feel that EPA can have no effective way of controlling the approximately \$200 million of EPA funds authorized annually for use in obtaining engineering services (Page 31).

Both the Grants Administration Division (GAD) and the Municipal Waste Water Systems Division (MWWSO) generally agreed with our findings and recommendations and indicated that procedural guidelines were being developed which would resolve these problems.



### Status of Active Construction Grants

EPA has not established effective management information systems for determining the status of construction grants. In our audits of Region II, VIII, and IX, we found the management data concerning the status of approximately 800 active construction grants, was not determinable without a detailed review of grant records or reliance upon the memory of individuals associated with the grant. The lack of an effective information system precludes management from readily identifying grants with special problems and assuring that necessary corrective actions have been taken to resolve those problems preventing construction projects from achieving their established objectives (Page 46).

Regional officials generally concurred with our finding and indicated that appropriate corrective action would be taken.

### Interim and Final Inspections

Effective procedures should be established for performing interim inspections during construction of wastewater treatment plants or final inspections upon completion of construction. This will ensure that (1) the grantee's or consulting engineer's supervision of construction is adequate and work is proceeding satisfactorily, and (2) all work has been accomplished in accordance with approved plans and specifications and thus, resulted in a properly operable facility. During our Regional reviews, we observed varying degrees of priorities assigned these functions ranging from great emphasis placed on inspections, to assigning a very low priority for these activities. Consequently, in some regions, the required interim inspections were not always performed. Although these inspections have not always revealed major construction deficiencies, they serve to insure effective, economic, and efficient use of the huge Federal investment in the construction program. In addition, final inspections were not always accomplished in a timely manner. Final inspection reports did not always indicate whether the completed construction fulfilled the conditions of the grant and met water quality standards. We attributed these weaknesses to the fact that more than 50 percent of the engineers effort during final inspection was expended on non-engineering administrative functions (Page 51).

EPA Headquarters officials generally concurred with our findings and recommendations and indicated that new policies and procedures were being developed to provide additional guidance for interim and final inspections.

## Operation and Maintenance

Adequate procedures have not been established to assure that sewage treatment plants financed with Federal funds are being properly operated and maintained. Even though primary reliance for operation and maintenance (O&M) has been traditionally placed on the state, we found that many state agencies have not established a viable O&M program. Furthermore, EPA's own monitoring activities have not always been geared to the relative strengths and weaknesses of the state programs. Instead, little emphasis has been placed on the Region's O&M programs. Accordingly, in several Regions, few O&M inspections have recently been made; and no effective procedures have been established to assure that EPA is notified of plants which the state has found to have major operational and/or maintenance problems. Thus, the Regions have no basic knowledge of the actual quality of O&M provided by many of our grantees. Even in the instances where EPA has learned of significant O&M problems, actions taken to assure that such problems were corrected were inadequate. Follow-up was commonly infrequent and unsuccessful in stimulating necessary corrective actions. We found no instance where the Regions had even considered taking punitive actions such as withholding subsequent grant funds or initiating action to find the grantee in nonadherence to grant terms, conditions and assurances. In our opinion, unless EPA exhibits a willingness to enforce its own terms and conditions, grantees will quickly come to realize that such terms and conditions are meaningless and begin to violate these requirements in increasing numbers (Page 59).

Headquarters officials generally agreed with our recommendations and enumerated a number of actions being taken to correct the weaknesses. One item of note is the planned use of the permit program as a tool to assure that treatment plants will be properly operated and maintained.

## Obligation Procedures

Procedures governing EPA's obligation practices need strengthening to assure that once approved and obligated, construction grants projects proceed rapidly to construction. We noted, however, that obligations were based on preliminary estimates which were substantially over or under-stated. In addition, construction grant projects were commonly approved and funds obligated long before they were ready to go to construction. Even though EPA procedures called for the withdrawal of grant offers when satisfactory progress toward construction was not being made, we noted that such procedures were generally not followed. As a result, many of EPA's sewage treatment construction grants have remained in the "pending construction" status for more than two years. During this time, approximately \$35 million of construction grant funds were tied up on these projects, and accordingly, EPA was prevented from utilizing such funds on state projects ready to proceed or from reallocating such funds to other states for highly needed projects (Page 74).

EPA officials generally concurred with our findings and conclusions.

### Financing Construction Grants

EPA's procedures for financing wastewater construction projects have resulted in (1) severe cash flow problems for local agencies and (2) duplicative administrative reviews by EPA and the state. Our reviews showed that grantees, such as the Metropolitan Sanitary District (MSD) of Greater Chicago, experienced considerable financial hardship under EPA's after-the-fact reimbursement system. In addition, in Region IX, we noted grantees experiencing delays in receiving Federal progress payments under the construction grant programs. These delays, which sometimes exceeded two months, resulted primarily because the progress payment requests were being subjected to detailed regional reviews which duplicated actions already performed by state personnel. A more efficient system would be to authorize a single state agency to disburse Federal and state funds concurrently upon completion of its review of the grantee's progress payment request. This could be accomplished if EPA provides the state agency with an advance payment or letter-of-credit system and authorize its use for making payments on Federally sponsored construction grants. In addition to improving the timeliness of payment to grantees, the elimination of duplicative reviews would allow EPA personnel to direct their efforts to correcting other problems (Page 81).

Region IX and several Headquarters officials generally concurred with our findings and recommendations. The Deputy Assistant Administrator for Resources Management did not feel that we should move immediately in this direction. Instead, he recommended that the decision be delayed six months and then reconsidered by top EPA management after a detailed study of both programmatic and financial arrangements. Since this time has passed, we are again asking that the system for financing construction grants be changed.

### Accelerated Payments

Special procedures established to govern accelerated payments on reimbursable construction grants did not retain aspects of financial control traditionally a part of the payment system. As a result, we found that in Region II (i) payments were made to grantees contrary to grant terms and conditions, and (ii) full payments were made before completion of the construction projects. In some instances, final inspections of such projects identified operational problems which substantially hampered the effectiveness of the sewage treatment plants. By removing these controls, EPA retained no effective means of assuring that required actions would be taken to adhere to grant terms and conditions and to make the changes necessary to provide an effective sewage treatment system (Page 88).

Headquarters officials generally concurred with our finding and indicated that appropriate regulations were being issued to govern payments under construction grants.

#### Construction Grants Payment System

Procedures governing EPA's system of making payments on construction grants need revision to prevent regional officials from performing administrative functions which are properly the responsibility of our grantees. When we reviewed the payment systems in two regions, we noted that EPA technical personnel were reviewing the grantees accounting records and preparing the grantees claim for reimbursement. In another region, administrative personnel were preparing the grantees claim based upon original source documentation furnished them by the grantee. These systems prevents grantee institutions from becoming thoroughly familiar with EPA's financial, accounting, and grant requirements, and therefore, from being able to submit their own reimbursement claims (Page 93).

Regional responses to this varied. The Headquarters Grants Administration Division, however, concurred and stated that appropriate policies and procedures were being prepared clarifying this matter. Such policies and procedures will be included in subsequent revisions to the Regulations and Grants Administration Manual.

We have reviewed the responses which Regional and Headquarters officials have provided. On the whole, we believe that these responses will satisfy the intent of our recommendations. Accordingly, we will require no further response to this report under EPA Order 2750.1.

If we can provide any further information or additional copies of this report, please do not hesitate to contact the Office of Audit.

## PART II - FINDINGS AND RECOMMENDATIONS

### Pre-Application Assistance

EPA management of the construction grant program could be improved through establishing controls to assure that adequate pre-application assistance is furnished prospective grantees. Such controls would help to assure that prospective grantees across the United States all have similar access to EPA for guidance and assistance and that appropriate efforts are being expended to assure that the grant applications and plans and specifications will be submitted correctly, thereby eliminating at least partially the need for time consuming after-the-fact review and corrections. In our review of three EPA Regional offices, we noted that each office had a different approach to and put a different degree of emphasis on pre-application assistance. In addition, we found that comments and suggestions resulting from such assistance were not always provided to the state or applicant for appropriate consideration. Furthermore, an insufficient advance review of projects approved, in one region, resulted in grant offers being made for: (i) projects that contained unallowable costs and (ii) projects which did not contain necessary grant conditions.

The Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities discuss the need for appropriate Preliminary Project Planning and Engineering Reports. These guidelines list various principles which should be considered early in the planning process for water pollution control facilities. According to the guidelines, any questions concerning the proposed project or requests for deviations are to be resolved through consultation with the state water pollution control agency and the EPA regional office prior to submission of an application for Federal aid.

### System for Providing Pre-application Assistance

Programs established to provide pre-application assistance varied from region to region. As a result, prospective grantees did not always obtain the same degree of assistance needed to assure that the grant applications submitted would be acceptable to EPA. Even in instances where pre-application assistance was provided, we noted that appropriate comments or suggestions were not always referred to the grantee for correction.

### Region II

In Region II, pre-application assistance is provided through joint Federal-state meetings with the prospective grantees. Each month, representatives of Region II's Facilities Management Branch visit the state agency for a couple of days. During this time, both Federal and state officials are available for consultation. Prospective grantees and their consulting engineers may come in to discuss in detail the nature of their construction project and Federal and state technical and adminis-

trative requirements. According to Regional officials, this approach has been successful in that it provides personal contact with the grantees and helps keep local and state officials up-to-date with EPA's current requirements. These officials indicated that in their opinion the Region II emphasis on pre-application assistance was fully justified by the improvements being noticed in applications submitted by the states.

#### Region V

In Region V, we found that no regular pre-application assistance had been established. In fact, pre-application assistance to prospective grantees in this Region was rare. For FY 1973, the Construction Grants Branch forecasted only 79 pre-application visits. This represents only about 14 percent of the 580 grant applications expected to be received. We discussed this situation with responsible Regional officials who pointed out that the volume of project applications in Region V was so large that little time could be spared for pre-application assistance. In addition, these officials indicated that they did not think that technical assistance at the pre-application phase would have any significant impact on the quality of project submissions.

#### Region IX

In Region IX, the system in effect is not consistently applied. This system calls for Preliminary Project Planning and Engineering Reports, as outlined in the Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities, to be submitted to EPA for advance concurrent review. With the exception of California, these reports are not submitted in advance, but instead are submitted at the same time as the grant application. This normally occurs after the state agency has certified the project.

The California Water Resources Control Board (CWRCB) was established to exercise the State functions in the field of water resources. The CWRCB adopted regulations on April 1, 1971, for the administration of a joint Federal-State grant program for construction of wastewater treatment projects. These regulations establish the requirement that a project report be submitted by each potential applicant. Detailed guidelines for the preparation and submission of the project report are provided to each applicant and include the requirement that the project report contain sufficient information to permit evaluation of the physical and financial feasibility of the project. Upon receipt of the project report at the CWRCB, a copy is forwarded to EPA Region IX

for concurrent review. The State regulations also provided that an application for State and Federal grants may be filed at any time after the project report has been approved by CWRCB.

Because of the large number of grant applications forthcoming, it is important that the region perform as much advance review of these project reports as possible. Such action will help assure that construction projects are adequately reviewed before the grant is approved. The reviews provide EPA with an opportunity to comment upon the overall cost effectiveness, environmental compatibility, possibility of future modifications, conformance with EPA design guidelines, and any technological improvements that should be considered before resources are expended to prepare detailed plans and specifications.

As of February 21, 1972, project report files in Region IX contained 94 project reports on potential future construction grants from the CWRCB. Only ten of the 94 project reports contained evidence of EPA review. We did not attempt to determine the extent of EPA review but were only interested as to whether there was an indication that some review had been made. In some instances, reviewer's notes were included with the report, while in other cases the report was signed out by an engineer. However, there was no indication that 84 of the reports had been reviewed, including 4 received as early as April 1971. In addition, although 3 of the 10 project reports reviewed by EPA contained specific questions concerning the technical aspects of the proposed wastewater treatment plants, these questions were not provided to the state or applicant for resolution. An example of questions raised by EPA on proposed projects is summarized in the following subparagraph.

City of Anderson. The project report was received by the Region on September 17, 1971, and related to the construction of a treatment plant and interceptors at an estimated eligible cost of about \$2 million. The review by Regional personnel raised numerous points including: (i) the effect of the plant on the Master Plan, (ii) the handling of odors from the plant, (iii) whether the effluent would meet water quality standards in the summer months, (iv) the quantity of phosphate or nitrogen being placed into the river, and (v) Environmental Impact Statement inadequacies. In addition, the Regional review commented: "The City of Anderson has a severe problem of infiltration of ground water into the sewage lines. According to the project report, some of the sewer tributaries have an infiltration rate of three times the daily sewage flow.



Another portion of the system had a maximum daily infiltration rate of 1,350 gallons per acre. Yet the wastewater treatment plan offered seems to include the infiltration rate rather than working to eliminate it. It is questionable whether EPA's funds are legitimately spent if used to handle infiltration of this magnitude." The above questions were not referred to the State or the applicant for clarification or correcting.

To obtain maximum benefits from the advance review of the project reports, it is essential that the applicant be provided comments concerning questionable items and any suggestions for alternate solutions in a timely manner. Additionally, completion of the advance reviews and prompt resolution of any questionable areas would reduce the efforts required to process the large number of applications remaining to be submitted during the year.

#### FY 1971 Grant Offers

According to EPA instructions, FY 1971 Section 8 funds that were not obligated by September 30, 1971, were to be withdrawn for reallocation. To preclude the loss of these funds, Region IX offered 19 grants totaling \$18 million on September 30, 1971. These grants represented almost 25 percent of the obligations of FY 1971 funds. Our review of 7 of the 14 grants offered within California on the last eligible day of fund availability disclosed the following three instances where, in our opinion, additional emphasis should have been placed on the advance project reviews.

Ineligible Costs. A grant was offered to the Quechan Tribal Council (WPC-CAL-594) in the amount of \$273,000 for the construction of interceptor lines. Our review of the project files disclosed that \$115,000 of the proposed eligible cost was for the purchase of capacity rights within an existing wastewater treatment plant. Since these rights are a user charge and not a cost of construction, such costs are not eligible for grant participation. Although the state had noted these ineligible costs, EPA had not taken action to delete these costs as of the date of our review.

Feasibility of Water Reclamation Projects. The City of Glendale was awarded a grant (WPC-CAL-603) for construction of a 20 mgd wastewater reclamation plant to provide hydraulic relief to the sewer trunk line leading to an existing wastewater treatment plant. A grant offer was made in the amount of \$3.9 million. In most instances, a water reclamation project is only feasible if the water is to be reused. However, the proposed reuse of water for this project was quite general indicating that it would be used for irrigation or industrial

use with the remaining wastewater discharged into the Los Angeles River. Because the reuse was not well defined at the time of award, a condition was included in the grant offer requiring the applicant to provide a detailed water reuse program for seven mgd at the time the plant commenced operations and to demonstrate buildups to 20 mgd within a reasonable period of time. The potential reuses proposed by the city as a result of this condition included an immediate demand for five mgd with a potential increase to seven mgd for irrigation and future use of 5.5 mgd by the municipal steam plant for cooling purposes.

The proposed 5.5 mgd use by the municipal steam plant is contingent upon approval of a current project report which is on file at the region. This project is to provide facilities to upgrade and transmit the effluent from the reclamation plant constructed under project WPC-CAL-603 to the steam plant at a cost of \$897,000. Since the excess effluent from project WPC-CAL-603 is to be discharged into the Los Angeles River, it must be assumed that the effluent is already adequately treated. Therefore, a project to upgrade and transmit the effluent is not required and should not be eligible for a grant under Section 8. In addition, it is doubtful whether the municipality would be willing to finance the whole construction project in order to reuse a portion of the reclaimed water since the well water being used by the steam plant is adequate and available for continued use.

The above reuses indicate that the current use is only five mgd, or 25 percent, of the plant's 20 mgd capacity and the demonstrated maximum future use is limited to seven mgd for irrigation. Since the grantee has not demonstrated use for the reclaimed water as required by the grant, it is our opinion that the feasibility of project WPC-CAL-603 should be re-evaluated and consideration given to terminating the grant offer. Further, in the future, additional efforts should be devoted to reviewing the project reports applicable to reclamation projects to assure a reasonable use exists for the reclaimed water. During our review, we noted that other water reclamation projects were currently awaiting review, such as the proposed Walnut Valley Water District project.

Grant Conditions. The grant offer of \$500,000 was made to the City and County of San Francisco for a project (WPC-CAL-597) for improvements to remove macroscopic particulate matter and settleable solids at the southeast wastewater treatment plant. The grant offer did not contain the usual conditions included in other grants to the City and County of San Francisco which

required compliance with water quality requirements within specified time frames. This appeared to be an oversight and was probably due to the rush of issuing grant offers before the obligation authority expired. However, such oversights tend to reduce the enforcement tools available to EPA. For example, the region recently considered withholding grant payments to the City and County of San Francisco until such time as the City Board of Supervisors adopted a combined sewage master plan. Although payments under six grants with the City and County were affected, consideration was not given to withholding payments under project WPC-CAL-597 since the grant considerations did not contain the compliance time schedule.

### Conclusions and Recommendations

Because of the large number of grant applications forthcoming, it is important that the regions perform as much advance review of these project reports as possible. Such action will help assure that construction projects are adequately reviewed before the grant is approved. The reviews provide EPA with an opportunity to comment upon the overall cost effectiveness, environmental compatibility, possibility of future modifications, conformance with EPA design guidelines, and any technical improvements that should be considered before resources are expended to prepare detailed plans and specifications. We recommended that Region V officials develop a program to increase pre-application assistance to prospective grantees. In our Report of Management Audit of Region IX Administration of Sections 7 and 8 of the FWPCA, we recommended that the Regional Administrator initiate action to:

- a. Request all state agencies to forward advance copies of the Preliminary Project Planning and Engineering Report to EPA for concurrent review.
- b. Assure that preliminary project reports are reviewed in a timely manner and that any comments or suggestions resulting from the reviews are provided to the state and the applicant for resolution.
- c. Require a review of those FY 1971 projects for which grant offers were made on the last day of the obligation authority to assure their eligibility for a Federal grant and to determine whether ineligible items have been included in the grant.

### Management's Responses

Region V officials indicated that the tremendous volume of applications on file coupled with limited resources available rendered pre-application assistance to grantees impractical. Nevertheless, they agreed that the concept of pre-application assistance is very desirable and will

be used to the extent feasible in the future. They also pointed out as soon as various features of the amended law are clarified and implemented, the Construction Grants Branch anticipates holding one-day seminars with consulting engineers and major municipal officials in each state with two states already having requested this. Such seminars have been held in the past within the context of pre-application assistance because it was felt that this was the most effective way to carry out the function with the limited resources available. Region IX officials also generally concurred with the findings and recommendations. They also indicated that appropriate corrective actions have or will be initiated in shifting emphasis and manpower from the review of plan specifications to the review and evaluation of pre-certification engineering reports.

#### Auditor's Comments

Due to the inconsistencies between Regions in methods of furnishing effective pre-application assistance to construction grantees, EPA should formulate appropriate guidance, procedures and controls to ensure that a viable agency-wide pre-application system is formulated and adhered to.

### Priority Systems

EPA policy and procedures regarding priority systems to be used in determining the relative need for construction of wastewater treatment projects require evaluation, revision and strengthening. During our reviews we noted that (1) officials in Region II had waived the requirement for a priority one-year listing in funding projects in the State of New York; (2) allotments of Section 8 funds in Region V were allocated by states in larger communities without regard to the established state priority systems; and (3) EPA, in Region IX, through its approval of Federal funds for two water facility construction projects, had developed a policy that water reclamation facilities are eligible for Federal funding under Section 8 of the Act. As a result, there was no assurance that the projects most needed in these regions to reduce and eliminate pollution were funded first.

### Background

Section 8 of the Act provides for making:

"...grants to any state, municipality, or inter municipal or interstate agency for the construction of necessary treatment works to prevent the discharge of untreated or inadequately treated sewage or other waste into any water..."

In addition, the Act provides that:

"...no grant shall be made for any project under this section unless such project...has been certified by the appropriate state water pollution control agency as entitled to priority over other eligible projects on the basis of financial as well as water pollution control needs..."

### Waiver of Priority Listing

The New York State Department of Environmental Conservation (NYDEC) priority rating system was not used in funding wastewater facility construction projects during FY 1972. Based upon representations from State officials that sufficient monies were available to finance all wastewater projects including the pre-financing of the Federal share, Regional officials waived the requirement for the State's priority one-year listing. Projects were therefore approved on a "first come-first serve" readiness to proceed basis. However, in early 1972, the State halted its Water Program because of the shortage of State and local funds and the pending Federal legislation that would increase the Federal share on financing construction grants. As a result, (i) 67 of 205 completed

projects were for municipalities which had not been classified as major polluters while projects involving 10 major polluters were not funded, (ii) extensive slippage occurred between actual and planned accomplishments shown on the one-year listing and (iii) applications of major polluters were not being processed because of lack of funds.

#### Use of Section 8 Funds in Region V

Allotments of Section 8 funds for construction of wastewater treatments works are being allocated by states to larger communities without regard to the established state priority systems which provide predetermined amounts or percentages to major political subdivisions of the states and which require the remaining potential grantees to compete for the balance of funds. This has occurred in four of the six states in Region V. This method of allocation is not in accordance with the Federal Water Pollution Control Act, as amended, which requires that projects be certified by states only if they are entitled to priority over other projects on the basis of financial and water pollution control needs. As a result, there is no assurance that those projects most needed are being funded first, or that Federal funds are being most effectively used.

Our review disclosed that either through formal arrangements or tacit and special agreements, Federal funds are set aside by the states for agencies in Chicago, Illinois; Minneapolis, Minnesota; Detroit, Michigan; and Milwaukee, Wisconsin; without regard to the states' approved priority system. The setting aside of funds for these cities had the affect of reducing the amount of funds for which other potential grantees could compete.

For example, since 1967, over \$95 million of Federal grant funds of a total of \$191 million allotted to the State of Illinois have been used for projects in the Chicago Metropolitan Sanitary District (MSD) area without either the State or Region V determining that the approved projects were entitled to priority over other projects in the State.

For FY 1972, the State of Illinois expects that projects totaling about \$320 million will be funded. The State has revenue bond funds of \$200 million available for wastewater treatment plant construction. This amount along with the Federal funds of about \$87 million and local contributing funds, total about \$320 million available for wastewater treatment plant construction in the State. The Federal and State funds are expected to be divided equally between the State and MSD. Part of the State funds are expected to be used to pre-finance the Federal share of the projects' cost.

All project applications were submitted to the Illinois Environmental Protection Agency (EPA) for certification, but those submitted from MSD were not reviewed by the State in detail. The Illinois EPA relied upon MSD to submit its highest priority projects first. The State was not provided with information which would explain why MSD chose to fund projects in the order requested. Accordingly, neither the State nor Region V, EPA has assurance that the MSD projects certified are those having the highest priority in the State.

The Illinois EPA assigned a numerical priority to "State" projects based on points for factors, such as pollution control need, financial need, readiness to proceed, and stream use. For MSD projects; however, the projects were not ranked in priority order. Region V officials told us that for FY 1973, the State has agreed to assign priority ratings to MSD projects but would not rank them against other "State" projects in determining which projects would be funded.

Although technical judgments are involved in assigning point factors to determine priorities, we believe that some lower priority MSD projects will be funded in FY 1973 while "State" projects appearing to be of a higher priority will not. State projects will also not be funded because of insufficient funds, while MSD's current "needs-list" does not contain enough projects to use all the funds authorized MSD.

The severity of the storm water problem in the MSD area casts further doubt on the advisability of continuing to divide Federal grant funds equally between MSD and the State without incorporating the MSD projects in the State priority system. In this regard, we noted that MSD estimates that about one-half of the pollution load deposited into the receiving river systems was the result of combined sewer overflows. The Act did not, however, authorize the use of Section 8 construction grant funds for purposes of alleviating the problems caused by combined storm and sanitary sewers. Accordingly, MSD officials are of the opinion that additional Federal grants for advanced sewage treatment cannot solve the significant pollution problem in the MSD area as long as large quantities of sewage by-passed the sophisticated treatment plants after moderate rains.

Since the Act has now been recently amended to authorize the use of Federal grant funds for storm-water projects, it may be justified to authorize MSD more than 50 percent of the total Illinois Federal



allocation for their critical projects. MSD estimates that more than \$1 billion is needed to solve pollution problems caused by storm-water overflows.

#### Eligibility of Water Reclamation Projects

During our review of Region IX Administration of Water Programs, we noted that EPA's approval of Federal funds for two water reclamation facility construction projects in the State of California indicated that its policy was to consider water reclamation facilities eligible for funding under Section 8 of the Act. However, this policy has not been formalized in the Handbook of Procedures, Construction Grants Program. Since such a policy has a national impact on the Section 8 funds and one the priority for use of these funds, we believe a formal policy on reclamation should be formulated to assure uniform and equitable treatment of all other states. To illustrate the financial impact of reclamation, the Federal share of the two approved California projects is \$22.4 million. The reclamation features of these projects are estimated at \$8.3 million or 37 percent of the total. In addition, California's Interim Water Quality Control Plans and five-year municipal project lists include a number of projects with reclamation features. For example, in one of the 16 basin plans, the estimated cost of such projects is in excess of \$60 million. One of the two examples furnished the Deputy Assistant Administrator for Water Programs of approved projects that included water reclamation features follows:

Orange County Water District. The project (WPC-CAL-621) was estimated to cost \$10,905,000 (eligible portion) and consisted of a 15 million gallons per day (mgd) tertiary treatment facility. The Orange County Water District will obtain 15 mgd of existing effluent from the Orange County Sanitation Districts and subject it to lime coagulation, ammonia stripping, recarbonation, mixed media filtration, carbon absorption and breakpoint chlorination prior to groundwater injection. The proposed project was part of a larger scale project to provide a barrier against salt water intrusion into the groundwater basin. Both the County and the California Regional Water Quality Control Board have stated that the groundwater basin is presently in a near-full condition and is adequate to provide an effective barrier against salt water intrusion. The need for the project hinges upon County's planned increases in pumping high quality groundwater located on the coastal side of the basin and the limited recharge using Colorado River water of a poorer mineral quality. The County estimated that this increased pumping would necessitate a full scale barrier by 1978. The County further stated that the project would insure the continued availability of a water supply of requisite quality in the

event of impairment of quality or quantity of forthcoming water from the California State Water Project (imported Northern California water).

Based on the above, we believed that this project was related to water production rather than pollution control, prevention or abatement. The intent was to produce sufficient water for groundwater injection so as to maintain a salt water barrier and allow increased extraction without intrusion. Planned increases in extraction stem from a desire to upgrade the water supply above the quality available from Colorado River sources and provide a "hedge" against impairment of the forthcoming state water project supply. The Orange County Water District is a purveyor of water rather than a discharger and has not heretofore dealt in wastewater treatment. The project is not needed to abate or control pollution as the source of the secondary treated effluent (the Orange County Sanitation Districts) is currently in compliance with waste discharge requirements. The need to prevent impending salt water intrusion is elective on the part of the County. As alternatives, the County could rely more heavily upon imported water to maintain the salt water barrier.

The EPA, Region IX staff recommendation to the Office of Water Programs expressed the opinion that the tertiary plant was not eligible for Federal assistance as it did not abate, control or prevent water pollution. However, in an accompanying letter, the Region IX, Director of Air and Water Programs stressed that EPA should not be in the position of blocking water reclamation by an unnecessarily stringent interpretation of the Act. Apparently, the Office of Water Programs agreed with this opinion as it approved the project for Federal assistance under Section 8 of the Federal Water Pollution Control Act on November 12, 1971. A grant offer was made on December 31, 1971.

#### Conclusions and Recommendations

We believe there is a need to evaluate, revise and strengthen the priority systems in use to determine whether they result in awarding Section 8 grant funds in accordance with the Act. The need for priorities is most important when funds are limited and the available funds must be used in the most effective manner. We recommended that Regional officials in Region II assure that the New York State Department of Environmental Conservation, (1) use a priority system so that available funds will be used in the most effective manner in abating pollution and (2) the priority system should also be used in processing applications with the processing of applications for high priority projects expedited.

In our draft audit report on Region V Administration of Water Programs, we recommended that the Assistant Administrator for Air and Water Programs have the Office of Program Management Operations (1) identify all instances in the United States where projects are not being funded in the order of the States' priority systems, and (2) evaluate and require revision of priority systems as necessary, so that the major consideration in the order of funding projects will be the abatement of pollution. In our Report of Region IX Administration of Water Programs, we recommended that the Deputy Assistant Administrator for Water Programs should develop an EPA policy for the eligibility of water reclamation projects under Section 8 of the Act to assure that the proper funding priority is placed on such projects.

#### Management's Response

EPA officials generally agreed with our findings and recommendations. In Region II, officials pointed out that a special term and condition had been added to the New York State FY 1973 program grant requiring that the priority system be used in rating the state projects and that an acceptable priority listing be submitted to EPA. The Assistant Administrator for Air and Water Programs generally concurred with our finding on Region V and indicated that (1) historically the 1970 amendment favored urban areas and that, although the 1972 amendments will be more "needs" oriented, urban areas will continue to get the largest share of the funds; and (2) evaluations and revisions of state priority systems were already being made and that revised regulations would address this problem. If the measures described are implemented, this condition should be adequately resolved. The Assistant Administrator for Air and Water Programs also generally concurred with our findings on Region IX. The need for additional specific policy in this area became, however, unnecessary because the passage of PL 92-500 expanded EPA's participatory role to include the financing of certain water reclamation projects.

## Administration of Construction Contracting Practices

Improvements were needed in EPA procedures to assure that our grantee's contracting practices properly complied with Federal requirements and adequately safeguarded the Federal interests. In this regard, we noted that (i) the grantee's procurement techniques for obtaining major items of equipment were overly restrictive, (ii) project plans and specifications were not always approved before grantees advertised for bids or awarded construction contracts, and (iii) adequate documentation was not obtained to support decisions to award to other than the lowest bidder. These weaknesses have resulted in EPA being involved in a rising number of complaints and have prevented EPA from assuring that the proposed plant will meet necessary Federal standards and be built at the lowest reasonable cost.

### Equipment Procurement Techniques

Procedures governing the content of plans and specifications and other contractual documentation have not been adequate to prevent inappropriate restrictions in the competitive acquisition of major end items of equipment. This is particularly important since there has been an increasing number of complaints from prospective bidders that bidding procedures for equipment items were overly restrictive. Also, in at least one instance, a specific conflict of interest allegation was made because of the restrictive procedures.

The majority of construction contract bid specifications prepared for grantees by consulting engineer firms contain language which, to one degree or another, tend to restrict the competitive process. This restriction principally pertained to limitations as to the brand name of major items of equipment that could be bid on by the prospective construction contractors. However, in some instances, restrictions were also contained in the bid specification with respect to the manner in which the low bidder for the construction contract was selected.

Based upon our review in Regions VIII and IX, we found that approximately 60 percent of the bid specifications identified only one manufacturer per major item of equipment which could be bid on as being unequivocally qualified as technically acceptable. About 26 percent of the specifications provided for marginal competition in that at least two manufacturers were identified for at least 70 percent of the items. In only 14 percent of the bid specifications was adequate competition provided for. While the identification of qualified manufacturers was invariably followed by the words "or equal," which suggests that competition is present, we found that the procedures to be followed in qualifying alternate items of equipment to be quite burdensome and time consuming. These procedures effectively inhibit the bidding of alternate equipment and restrict free and open competition.

Further, the language of the bid specifications often provide that in the event an approved item of equipment subsequently fails to perform or is otherwise considered unsatisfactory, it will be replaced at the contractors expense. This additional element of risk, even though a contractor has taken the effort to qualify an alternate item of equipment, tends to further restrict the competitive process. We also found a number of instances where there was a substantial difference in price quoted by certain equipment manufacturers for the same item of equipment to different prospective construction contractors. The apparent reason for these differences was that certain construction contractors, by virtue of buying power, past dealings, etc., are able to obtain favorable prices. Thus, bid specification language which effectively restricts competition to single selected manufacturers of equipment will also tend to favor the larger construction firms by virtue of their ability to gain favorable pricing from those manufacturers.

In addition to the limitations placed upon the competitive bidding process by the identification of single brand names of equipment, problems also existed with respect to the manner in which the low bidder was determined for construction contracts. Generally, this problem pertains to a technique called "base bidding." Under this technique, bidders must submit a bid based on identified manufacturers of equipment. Although the bidders may quote alternate items of equipment as well, only the bid based on identified manufacturers' equipment will be considered in determining the successful bidder. This practice tends to further discourage free and open competition in the area of major items of equipment and will tend to favor the larger construction contractors as was discussed above.

The following cases illustrate the type of problems which can and usually do result whenever adequate controls are not established to assure that proper competitive bidding techniques are utilized:

1. One case where a complaint was made concerning a grantee's competitive practices occurred on Project WPC-CAL-621 (Orange County Water District). In this instance, the region did not contact the grantee to determine the validity of the complaint or the adequacy of the district's bidding procedures, but instead, sent the matter to the State agency for further referral to the grantee. In order to ascertain the adequacy of the bidding procedures, we reviewed the grantee's bid proposal. According to the "Major Items of Equipment and Material" section of the proposal, 17 different equipment items were to be bid upon. The suggested equipment brand names, which had been previously designated in the project specifications, were included in this section. Only a single brand name was specified in the proposal for 11 of the 17 equipment items while the other six had more than one brand shown.

The brand name, or equal clause contained in the general provisions of the bid package, contained specific requirements which had to be met before substitute equipment brand names could be accepted. Although space was provided on the proposal for bidders to write in substitute brand names, the language concerning the use of brand name or equal equipment, was quite restrictive and may have discouraged prospective bidders from seeking alternative sources.

2. Another case where complaints were received was under Project WPC-CAL-590 (Selma-Kingsburg-Fowler County Sanitation District). In this case, the wordage contained in the bid proposal allowed the district to award to a bidder whose bid exceeded the lowest bid by about \$310,000. This resulted because the low bidder specified an alternate material (reinforced plastic mortar pipe) in lieu of the clay pipe included in the specifications. Due to the provisions of the bid package, the alternative item, although referenced in the project specifications, would only be considered if the low bid for the clay pipe had exceeded the funds established by the district as available. Since the bid for the clay pipe did not exceed such funds, the alternate material was not considered. In this case, the region did not initiate action to determine whether the procedures followed by the district to obtain bids were restrictive. Instead, an opinion from the sanitation district's legal council was obtained reiterating that the award was made in accordance with the terms of the bid package.

3. Another question raised by the prospective bidder under Project WPC-CAL-621 concerned a possible conflict of interest. It was suggested that the consulting engineer who wrote the instrumentation specifications was also the president of the filter manufacturing firm cited in the project specification. Although we found that the president was hired as a consultant, he was not responsible for preparing those portions of the specifications which cited the brand name of his manufacturing firm. However, the use of consultants who are associated with equipment suppliers to participate in developing equipment requirements certainly creates the potential for conflict of interest and possible restrictions in the competitive bidding system.

The foregoing practices and procedures of the grantees and their consulting engineering firms are considered to be in conflict with the objectives of the Government as set forth in the Handbook of Procedures, Construction Grants Program and OMB Circular No. A-102. Chapter 10 of the Handbook requires competitive bidding practices in connection with procurement under construction grants. Paragraph 3.b. of Attachment 0 to OMB Circular A-102 states "all procurement transactions regardless of whether negotiated or advertised and without regard to dollar value shall be conducted in a manner to as to provide maximum open and free competition."

It should be pointed out that in late 1972, the State of California also performed a review of construction contract bid specifications with the objective of determining the extent of competition generated by the specifications. The state's conclusions were essentially the same as ours. That is, to various degrees, the bid specifications reviewed restricted the competitive bidding process. (See Appendix A of the report for the results of California's review.)

### Approval of Plans and Specifications

Additional regional attention is required to assure that grantees do not advertise for bids or award construction contracts until EPA has approved the project plans and specifications. Chapter 10 of the Handbook of Procedures, Construction Grants Program prohibits such actions and states:

"Following approval of construction plans and specifications, the applicant may be authorized to advertise the project for bids for its construction. The State agency and the Regional Office should stress in all contacts with applicants that the project must not be advertised or placed on the market for bidding until plans and specifications have been approved by the State agency and FWPCA, since disregard of this requirement may jeopardize the Federal grant."

In addition, the grant offers made by the region normally reiterate the fact that the bids should not be advertised until the plans and specifications are approved by EPA. Although grantee noncompliance with the handbook instructions and the statement in the grant offer concerning advertising for bids is quite common, the Region IX had not initiated adequate procedures to prevent such occurrences. An example of this situation occurred on Project WPC-CAL-621 (Orange County Water District). Bids for this project were advertised on January 18, 1972, even though EPA approval of the plans and specifications was not granted until March 16, 1972, approximately 2 months later. Additionally, under Grant WPC-CAL-593 (American Canyon County Water District), the plans and specifications were approved approximately 6 weeks after the construction contract was awarded and construction work was about 50 percent complete. In our opinion, the region should devote additional attention to monitoring grantee's efforts in this area.

### Selection of Lowest Bidder

Present EPA guidelines require a grantee to submit a justification or explanation for desiring to award a contract to other than the lowest bidder, these guidelines do not, however, require that necessary supporting documentation be submitted. Accordingly, after reviewing the justifications submitted in Region II, we concluded that sufficient information was not available upon which to make an evaluation of the grantee's decision.



Paragraph 62 of the Construction Grants Handbook provides that:

"The selection of the successful bidder under competitive bidding procedures is primarily a matter for determination by the applicant. The FWPCA is not charged with the responsibility of evaluating bids and awarding the contract in the same manner as in the case of a direct Federal contract. Rather its function is to determine whether the applicant has reasonably complied with the assurance required by the regulations and has not acted arbitrarily or capriciously. In those instances in which the applicant wishes to award to other than the lowest bidder, explanation and justification for such action must be submitted to the State agency and the Regional office. Any comments which the State agency may wish to make relative to the proposed action should be submitted promptly to the Regional Office."

In reviewing 23 construction projects selected at random, we identified three instances where award was made to other than the lowest bidder. Accordingly, we reviewed the instances in detail to determine whether the Region had obtained sufficient information to evaluate the reasonableness of the grantee's desire to award to other than the lowest bidder. During this review, we found that Region II complied with the requirements of the Handbook by having the grantee submit a letter of explanation from the consulting engineer and a statement from the city's attorney that the decision not to award to lowest bidder was legal and correct. Evaluation of this data indicated, however, that more detailed supporting documentation was needed to fully evaluate the reasonableness of the grantees desire. For example:

Oswego, New York; WPC-NY-386

Bid Selected - \$215,000, Low Bid - \$179,000, Increased Costs - \$36,000.

In preparing the plans and specifications for this project, the consulting engineer provided for a general construction contract which covered the construction of both a treatment plant and a sanitary outfall. In soliciting bids for this contract, prospective contractors were permitted to bid for the entire contract or separately for the outfall. The grantee wanted to award the contract to the Metzger Construction Corporation, who bid \$1,761,380 for the total general construction contract. This bid included \$215,000 for construction of the sanitary outfall. While the \$1,761,380 bid was the lowest overall bid received, another bidder, the Manson Construction Company bid only \$179,000 for constructing the plant outfall. The grantee wished to set aside the Manson Construction Company's bid because "The low bid...was irregular in that the Non-Collusion Certification required in Section 18 of the Instruction to Bidders

was not furnished." We noted that in New York, however, a mere technical omission resulting from a harmless error, such as the failure to submit a non-collusion clause, can be subsequently corrected and that such omissions do not necessarily make a bid nonresponsive. The information provided by the grantee, in this case however, did not provide any explanation as to the reason this omission was considered so significant that Manson Company's bid was non-responsive.

#### Raritan Township, WPC-NJ-262

Bid Selected - \$2,154,000, Low Bid - \$1,975,000, Increased Costs - \$179,000.

The low bidder was considered nonresponsive in that he apparently bid alternative pieces of equipment rather than the items specified in the plans and specifications. In addition, the correspondence from the grantee indicated that the low bidder was not clear with respect to what it would cost to build the plant as specified or what the differences were between his bid and the plant required by the plans and specifications. In reviewing the project file, we noted that no copy of the low bidder's proposal and accompanying identification of the errors in the proposal were provided to EPA. Thus, Regional officials did not apparently have specific knowledge of the deficiencies in the proposal. In addition, the Region was not furnished any copy of the low bidder's response or explanation of the so-called deficiencies. Instead, the Region had to rely on simply the grantee's explanation of the low bidder's position. In our opinion, such reliance results in EPA only seeing and hearing one side of the situation and therefore, prevents any real determination of the reasonableness of the grantee's decision.

#### Conclusions and Recommendations

Our review showed that procedures for administering grantees contracting practices were inadequate to assure that procurement techniques were not overly restrictive, grantees did not go to bid or award contracts before obtaining EPA approval, and contract awards were made only to the lowest responsive bidder.

We can understand that, since in the past grantees have traditionally provided a major portion of the funding for construction grants, the administration of the contracting process was left mainly in the hands of the grantees. The recent passage of the water pollution control bill, however, increased EPA's share of costs to 75 percent of the cost. The resulting decrease in grantee's cost to 25 percent or less will tend to lessen the grantee's concern about increased costs. Accordingly, we believe that it is time for EPA to strengthen its role in the administration of construction grants. Accordingly, we are recommending that:

1. Procedures governing the bidding procedures being followed, by grantees in procuring major end items of equipment, be strengthened by:

(a) Requiring the bid package to include the technical performance specifications for equipment and major supplies in lieu of specific brand names.

(b) Requesting that a written justification be included in the bid proposal when only one specific brand name will fulfill the requirements of the plans and specifications.

(c) Requiring a certification that individuals serving as consultants have not referenced their firm's brand name in any part of the project plans and specifications.

(d) Requiring that the award of construction contracts be determined based on the overall low bid with respect to any identified alternate equipment, accepted as being equal, and not on the basis of the bid price of the "preferred" equipment.

2. Appropriate regional emphasis be placed on reinstructing grantees of the importance of not advertising for bids or awarding construction contracts until the project plans and specifications have been approved by EPA, and in those instances where these instructions are not followed action should be taken to terminate the Federal grant.

3. EPA strengthen its guidelines related to the selection of other than the lowest bidder to require submission of documents to support the reasonableness of the grantee's decision. To be considered acceptable, we feel that the documentation should contain:

(a) Technical omission - an explanation of why the omission is considered so significant as to make the bid nonresponsive.

(b) Errors in Content or Make-up - copies of the proposals to be rejected as nonresponsive and accepted. These proposals should be accompanied by correspondence from the grantee identifying specifically the deficiencies in the proposal and explaining why the low proposal should be rejected. In addition, the prospective low bidder should be required to explain the deficiencies and provide his side of the situation.

#### Managements Response

The passage of the new Water Pollution Control Act and the issuance of new regulations governing the construction grants program have in our opinion provided the additional procedural guidance needed to resolve these problems. For example, the new water bill and the regulations provided clearer guidance against unnecessary restrictions in the competitive acquisition of major end items of equipment. Additionally, the new regulations call for increased emphasis on assuring that the grantee's procurement system is effectively used to assure that awards are made only to the lowest responsible bidder. If these guidelines are properly implemented and appropriate consideration is given to the matters

raised in this and the State of California study, problems with respect to the acceptability of contracting practices should be reduced.

## Engineering Agreements

EPA guidelines need to be established governing the selection of contractors, methods of contracting and administration of contracts used in obtaining consultant engineering services under sewage treatment construction grants. Such guidelines are needed to comply with OMB Circular A-102 and to strengthen EPA controls over consulting engineer costs. Our audit of three Regional offices disclosed several significant weaknesses in the area of contracting for consulting engineering services. These included:

- (i) Failure to go through a proper selection process, whereby a consultant's qualifications, experience, and costs to be charged were obtained and evaluated.
- (ii) Need for controls to assure that consulting firms were not acquiring subcontracts through a preferential position derived from participation in other planning activities.
- (iii) Lack of controls to assure that the cost of engineering services are properly enumerated in the engineering agreement, reasonable, and acceptable under the established Federal requirements.
- (iv) Need to require inclusion of standard provisions in contracts for engineering services. For example, none of the contracts reviewed contained the necessary clauses related to access to audit, level of effort, Equal Employment Opportunity, Ownership in Data, or termination.

Unless appropriate changes are made to strengthen EPA controls over the engineering contracts issued in conjunction with sewage treatment construction grants, we feel that EPA can have no effective way of controlling the approximately \$200 million of EPA funds authorized annually for use in obtaining engineering services.

### Background

While certain grantees, such as the cities of San Francisco, Chicago, and New York, perform their own engineering functions, the majority of grantees under the wastewater treatment facility construction grant program employ the services of consulting engineer firms. Services provided by these firms fall into three general categories: (a) preliminary work, (b) design activities, and (c) construction inspection and supervision. Preliminary work commonly includes such services as field surveys, preliminary project reports, review of prior studies, evaluation of waste discharge requirements, preliminary cost estimates, etc. Design activities involves the preparation of detailed plans,

specifications, cost estimates, etc. General engineering services are usually included in the design phase and involve assistance in securing, tabulating and analyzing construction bids, detailed check of construction drawings, periodic visits to the construction site, etc. Construction inspection usually involves full-time resident engineers and includes detailed inspection, quality control, construction progress payment reviews, "as built" drawings, preparation of certificates of completion, supervision of initial start-up, etc.

Agreements between grantees and engineering firms covering the above mentioned services take a number of forms. Usually a single agreement is entered into which covers all phases of engineering services. However, the fee provisions contained in such agreements can vary from a single fee covering all services to separate fees for each phase, or combination thereof. Common types of fee provisions used in engineering subcontracts include (a) lump sum, (b) percentage of construction cost, (c) fixed labor hour rates, and (d) actual labor cost plus a stipulated percentage.

The classification of engineering services and recommended fee structures, as well as discussions on the subjects of the consulting engineering practice, selection of the engineer, and contracts for engineering services are presented in the American Society of Civil Engineers' Manual No. 45, "A Guide for the Engagement of Engineering Services." The majority of the engineering firms reviewed subscribe to the principles and practices recommended in this manual.

#### Selection of Engineering Firms

While grantee institutions have in the past had to utilize competitive procurement practices in obtaining contractors to build sewage treatment plants, they have not been required to use such techniques in hiring the consulting engineers who will design and supervise the construction of these plants. Accordingly, the grantees have not had to go through a selection process whereby the qualifications, experience, as well as anticipated costs, have been evaluated. This has, in our opinion, led in some instances to the selection of less than highly qualified engineers and thusly to the many technical problems found by EPA engineers in reviewing plans and specifications. Similarly, the lack of a required selection process has prevented grantees from assuring themselves or EPA that the cost of engineering services proposed by their engineer actually represents a reasonable charge for such services.

Attachment O to Office of Management and Budget (OMB) Circular A-102 sets forth "Procurement Standards" to be used by state and local governments in administering Federal grants. This Circular requires that "all procurement transactions (by a grantee) regardless of whether negotiated or advertised and without regard to dollar value shall be conducted in a manner so as to provide maximum open and free competition." Since this

provision relates to all procurement, it is apparent that competitive procurement techniques should be utilized in obtaining consulting engineering services. The American Society of Civil Engineers (ASCE) seems to agree with this position. Their Manual No. 45 states,

"No two engineering firms have equal training, experience, skills, capabilities, personnel, work loads, and particular abilities. Selection of the firm for a specific project can mean the difference between a well-planned, low cost, successful project, or a mediocre and costly one."

In analyzing the procedures established to govern EPA's construction grants program, we noticed EPA requirements were totally silent with respect to the selection of engineering firms to design and supervise the construction of sewage treatment plants. Thus, this process has been left entirely in the hands of grantees.

We discussed this matter with responsible regional officials who indicated basically that the grantee communities simply select whoever they want. In addition, these officials indicated that during their visits to the grantee, they had seen no evidence that grantees regularly went through a selection process to assure that they obtained the services of the most qualified engineer available at a reasonable price. Instead, grantees normally pick an engineering firm simply on the basis of the representations of the firm as to its expertise in the field, word of mouth referrals, proximity of its offices to the grantee, or combination thereof. Once this selection is made, a continuing relationship is created between the grantee and the engineering firm not unlike the relationship between the grantee and its legal representatives and its certified public accountant. This relationship usually takes the form of a generalized consulting agreement which can provide for expert advice, comprehensive water management plans, staged or incremental sewage treatment facility plans, etc. These agreements are periodically up-dated to revise the fee provisions or incorporate, by specific reference, subsequent construction projects. The use of the more or less arbitrary selection process was illustrated during our discussion with EPA Regional officials by references to instances where consulting engineering firms were changed simultaneously with the change of city or county administrations or where engineering duties were split to various engineering firms within a community on a sort of "share-the-wealth" basis.

In reviewing construction grant project files in selected Regional offices, we noted that many of EPA's construction grant projects had encountered technical difficulties. For example, even after state review of plans and specifications, many of the projects submitted to EPA



contained technical weaknesses, such as by-passes, lack of back flow preventors, and need to modify electrical equipment to meet hazardous standards requirements. In Region II, our sample disclosed problems of these types in 43 percent of the projects reviewed. In addition, in Region VIII 28 of 52 O&M inspections (54 percent) revealed major design deficiencies in the sewage treatment plants. In 19 of cases, plant effluent did not meet applicable water quality standards. We feel that at least part of the responsibility for such deficiencies must rest with consulting engineer. Had the use of a formalized selection process been used, it is conceivable that a more qualified or experienced engineer, who might not have permitted such problems, would have been selected.

The use of a formalized selection system would also have provided both EPA and grantee personnel with better assurance that the costs to be charged for such services were actually reasonable. For example, when we reviewed grant files at the region and in the grantees offices, no instances were noted where there was evidence that the grantees had solicited fee quotations from two or more qualified engineering firms for services under the construction projects reviewed. Further, there was no evidence of aggressive negotiation by the grantee with respect to engineer proposed fee structure changes. Available documentation indicated simply that the grantee board of directors (or city council) agreed and passed favorably upon the proposed fees. Thus, there was no evidence that the proposed fees were reasonable.

We reviewed the engineering fees charged on selected construction grants across the United States to determine if there was a pattern which would help to identify the level of engineering costs considered reasonable. We found that engineering costs ranged from a low of three or four percent of construction costs to a high of between 20 and 25 percent. Since this analysis did not provide any clear indication of what represented reasonable engineering costs, we requested information as to what engineering costs the Regions felt was reasonable. In this regard, we learned that there was no overall guideline and that each Region had its own opinions as to how much engineering costs were considered reasonable. In fact, the Regions responses varied as widely as the percentages previously described.

After reviewing this situation in detail, we concluded that the only reasonable method of assuring that engineering costs would be reasonable would be through the application of appropriate competitive buying techniques during a formalized selection process. Therefore, we inquired into the reasons why engineers had not been requested to submit appropriate pricing information. We found that in the past the engineering profession, by means of the American Society of Civil Engineers' Code of Ethics, Guides to Professional Practices, etc., had prohibited or effectively prevented its members from submitting price quotations for engineering services. These restrictions had been lifted under the final judgment of the Southern District Court of New York, Civil No. 72 C 1776. Thus, there is now no reason why engineering firms should not be requested

and expected to furnish appropriate price quotations for the engineering services related to sewage treatment construction grants.

#### Use of Consulting Engineers with a Preferential Position

Our review disclosed that additional controls were needed to assure that consulting engineering firms were not acquiring subcontracts to design and supervise construction of sewage treatment projects because of a preferential position derived from participation in the planning process.

We noted one instance where a consultant had obtained several subcontracts within a basin area after being awarded a subcontract for services under a Federal Water Pollution Control Act Section 3(c) planning grant. In addition, this same consulting firm subsequently became a subcontractor under at least seven construction grants within the area for which the 3(c) planning grant applied. Because of its work in basin planning, we feel that appropriate inquiries should have been made to ascertain the reason this particular engineering firm was selected to act as engineer on the seven construction grants. Attachment O to OMB Circular A-102 states:

"The grantee should be alert to organizational conflicts of interest or non-competitive practices among contractors which may restrict or eliminate competitive or otherwise restrain trade."

Similarly, grantees should be expected to report possible conflicts of interest to appropriate EPA officials. This knowledge is important in determining the reasonableness of consulting engineering costs. Because of work performed under the planning grant, an engineering firm may be able to reduce the scope of its preliminary work under the construction grants. If this were the case, it would be necessary to limit the reimbursement under the construction grants or the consultant might be reimbursed twice for the same planning work under two separate EPA programs.

#### Responsibility of Engineering Firms

Engineering subcontracts do not provide for a designation of responsibility on the part of the engineer that the project as designed will be free of significant design deficiencies and, when placed in operation, will meet previously established parameters such as level of treatment, continuity of treatment, and water quality standards. In addition, as is mentioned in the paragraph entitled "Administrative Controls," there is no provision in the subcontracts for legal or financial remedies against the engineering firm should the project fail to meet design expectations. This, coupled with the manner in which engineering firms are selected and compensated, can result in a lack of incentive for technical excellence, use of short cut or "off the shelf" technology, and unwarranted additional expense to grantees and possibly EPA in correcting project deficiencies.

In illustration of the need to require grantees to provide for a clear assignment of responsibility and appropriate legal and financial remedies, it was determined that a significant percentage of Federally funded wastewater treatment facilities inspected by EPA Region VIII personnel were considered to be deficient. During the period February 1972 through December 1972, Region VIII personnel performed O&M inspections at 52 wastewater treatment facilities which were built, modified, or enlarged under the Federal construction program. Of the 52 plants inspected, 28 (or 54 percent) were considered to have major design deficiencies. Further, 18 plants (or 35 percent) were not meeting water quality standards for which they had been designed. This percentage would have undoubtedly been even higher if the O&M inspections had included full scale effluent sample analysis at all 52 plants. In addition to the above deficiencies, the inspection identified nine instances of significant infiltration problems. Examples of these deficiencies are as follows:

Longmont (Col. C080202). The grant application included the following statements which should have been basic considerations in the design of the project. "The construction under this project will provide adequate capacity to treat wastewater such that the plant will meet all standards." "The existing sewage treatment plant is inadequate; consequently, some sewage is bypassed after only primary treatment." "The planned addition and modification will correct the above situation, abating the health hazard and the detriment to fish and aquatic life." "It will correct the present pollution problem and will provide for continued freedom from such pollution even under the projected increased population of 1988." The EPA O&M inspection indicated that the completed project had major design deficiencies in that the effluent was not meeting water quality standards and the plant did not provide "freedom" from pollution under the current population, much less the projected 1988 population.

Upper Eagle Valley (Col. C080201). Assurances contained in this grant were that the project would be built in accordance with plans and specifications, that an O&M plan would be submitted before final inspection, and that the project would result in an operable plant. At the time of the final inspection, many deficiencies were noted including an excessive infiltration problem. Subsequent to this inspection, the consulting engineer stated "we do not know of any problems of infiltration within the system since the correction of the above referenced problems and feel that the system is entirely satisfactory, not only from an infiltration standpoint, but from all other respects." In a subsequent inspection, EPA asserted that significant infiltration problems could be blamed on (i) poor design and specifications, (ii) poor construction, and (iii) inadequate supervision of construction by the resident engineer.

In view of the importance of effective treatment facilities and the frequency with which significant design deficiencies are occurring under wastewater treatment facility construction grants, it is our opinion that safeguards need to be established to protect the interests of the Government and the intent of the program. These safeguards should include (i) the formal designation of responsibility to the consulting engineer firm for the sufficiency of the project design and (ii) the inclusion of provisions for appropriate legal and financial remedies against the engineering firm should the project prove unsatisfactory.

## Methods of Pricing

Additional controls are needed to assure that engineering subcontracts are sufficiently specific to safeguard the interests of the Federal government. Specifically, we found that most engineering contracts were generally not definitive with respect to nature and quantity of services to be provided or to the amount of costs to be incurred or billed for such services. In addition, most of the contracts utilized the less than desirable or totally unacceptable "percentage of cost" or "cost plus percentage of cost" methods. These weaknesses prevent EPA from having the information necessary to properly review the reasonableness of engineering costs proposed in our construction grant applications. Without improved guidelines in these areas, EPA can exercise no effective control to prevent consulting firms from realizing excessive profits.

## Contents of Subcontracts

Our review revealed that the subcontracts and supporting data used in obtaining engineering services did not contain the costing information necessary to permit either grantee or EPA officials to review the reasonableness of proposed costs or even to establish the overall cost of engineering services.

Attachment O of OMB Circular A-102 provides that

"Procurement records or files for purchase in amounts in excess of \$2,500 shall provide at least the following pertinent information: justification for the use of negotiation in lieu of advertising, contract selection, and the basis for the cost or price negotiated."

To be able to properly document the "basis for the cost or price negotiated," a grantee organization would have to have detailed cost or pricing data supporting the ceiling amount of the contract. This supporting data would have to spell out in detail the type and amount of services to be provided and the anticipated cost of each such service.

In reviewing the engineering subcontracts and available supporting documentation used under sewage treatment plant construction projects, we noted that not only were appropriate cost breakdowns not furnished, but also no ceiling amounts were normally included in the contracts. For example, in reviewing 23 projects selected at random in Region II, we found that all the subcontracts contained clauses calling for reimbursement on a cost-type basis. Since none of the documents spelled out, however, either the amount of services to be provided or the per unit costs of services, no determinations could be

made of the anticipated charges for such services. Similarly, since ceilings were not established for individual items or in most cases even for the entire contract, there was no way of determining the total cost of engineering services to be charged. As a result, we could not generally find any way to relate the amount of engineering services proposed in the grant application back to the corresponding contract.

Without improved controls calling for engineering subcontracts to spell out the quantities of services to be provided, the per unit charge for such services, and the total cost of services to be provided (ceilings), EPA can have no effective method of evaluating the reasonableness of costs proposed or of controlling the total amount of costs to be incurred for engineering services. Due to the fact that EPA's construction grant budget is now running at a rate of \$2 billion/year and that approximately 10 percent of such funds go for engineering services, we feel that such controls are essential to safeguard the \$200 million/year used annually for engineering services.

### Pricing Provisions

Appropriate guidelines concerning the types of pricing arrangements considered acceptable have not been established. Thus, many different types of pricing arrangements are commonly used. This is, in our opinion, contrary to the provisions of Attachment O to OMB Circular A-102 which states that "The grantee shall establish procurement procedures which provide for, as a minimum, the following procedural requirements... the type of procuring instruments used (i.e., fixed price contracts, purchase order, incentive contracts, etc.), shall be appropriate for the particular procurement and for promoting the best interest of the grant program involved." In reviewing the procurements of engineering subcontracts, we noted that the best types of procuring instruments were not being used. Specifically, we found that two basically unacceptable methods - percentage-of-cost and cost-plus-a-percentage-of-cost were commonly used. Such contracting methods have long been realized as undesirable in direct contract procurements by the Federal Government since they do not provide adequate controls to appropriately limit the amount of a contractor's or subcontractor's profit.

A more detailed discussion of the problems related to the use of these methods is provided below:

1. Percentage of construction cost. Approximately 90 percent of the engineering subcontracts examined provided for reimbursement of detailed plans and specifications services on a percentage of construction cost basis. Additionally, 70 percent of the subcontractors provided for reimbursement of general supervision services on this basis. The majority of these agreements incorporated the percentages given in ASCE Manual No. 45 as "Curve A" and "Curve B."

The ASCE Manual 45 was prepared in 1964 based upon survey data obtained in 1963. The "curves" formulated as a result of this survey had been subsequently revised on three occasions by means of the application of construction cost and engineering salary indexes. In addition, a new survey was conducted in 1971 and the manual was accordingly revised for the fourth time. Society representatives indicated that the sample plan and the input used in formulating the original curves and the 1971 revision were not saved and therefore unavailable for review. As discussed below, we observed many deficiencies in the survey which raise considerable questions as to the validity of using such curves in pricing the engineering services related to the construction of sewage treatment plants.

a. The society could not demonstrate that the firms solicited for participation in either the 1963 or the 1971 surveys were selected on a scientific basis so as to properly represent the universe as a whole. For example, in the 1971 survey a total of 1,430 questionnaires were sent out. It was not demonstrated that this was an appropriate sample size for the universe involved. In addition, no evidence was available to show that the 598 responses received was representative of the profession as a whole.

b. No attempt was made to stratify the sample selection or input data to recognize differences in firm size, geography, area of speciality, etc.

c. The data to be input by the responding firms was not well defined with respect to whether it should deal with completed projects only; total business volume, engineering cost only, engineering cost and profit, period of time covered, etc.

d. Input data was not selectively verified by the Society.

e. No follow-up studies were made to determine the validity of the use of the curve to establish reasonable engineering costs.

f. Rather than requesting input on current construction and engineering cost, the 1971 survey the questionnaire simply asked the firms to respond to "what changes should be made in the Manual 45 fee curves, based on a percentage of net construction cost and taking into consideration the needs of the client and the adequacy of compensation to the Engineer." The questionnaire then asked the firms their opinion as to what constituted reasonable fees on various size projects. Thus, the current version of the "curves" represents a consensus of opinion of 598 engineering firms as to the level of fees they consider desirable rather than actual experience with identifiable margins of profit.

Besides the basis' weaknesses in the use of the ASCE curve, the validity of using percentage of cost pricing provisions is in and of itself questionable. Unless the percentage to be used is determined through full and open competitive bidding, this method provides neither the grantee nor EPA with any method of assuring that the engineering firms level of profit is reasonable. Even ASCE itself has apparently recognized the shortcomings of this method of contracting in that the Manual itself points out that "over the years, engineering experience has established some approximate correlations between engineering costs and construction costs..." "The validity of the percentage of construction cost method rests upon the assumption that engineering costs vary in direct proportion to the cost of construction..." "This is a questionable assumption..." "When judiciously applied, and with due consideration of the ranges within which engineering scope may vary, they remain valuable as tools for general comparison..." (with other estimates). The pitfalls of this method of contracting are illustrated by the fact that in a review of the costs records of a consulting engineering firm involving three projects wherein the fee was based on a percentage of construction cost, we noted profit margins of 24 percent and 28 percent on two projects and a loss of 22 percent on the third. Thus, we concluded that the use of percentage of cost contracts is not equitable to either the Federal government, the grantee, or to the engineering firm.

2. Cost-plus-a-percentage-of-cost. For the most part, the reimbursement of the construction inspection phase was on a cost-plus-a-percentage-of-cost basis. In one part of the country, this method was used in 71 percent of projects reviewed. In another part of the country, such provisions were used in 78 percent of the projects. Some examples of the cost-plus-a-percentage-of-cost aspects of the subcontracts are illustrated below:

Midvale (Utah C490137). A grant, in the amount of \$1.2 million, was awarded on December 29, 1972, for the construction of a waste water treatment facility. The proposed engineering fees were covered by a subcontract dated April 27, 1972, between the grantee and the consulting engineering firm. The subcontract stipulated that "for the services of a qualified inspector, the District will pay the Engineers on a per diem basis based on employee cost plus 85 percent plus 10 percent. Expenses will be charged at cost plus 10 percent."

Littleton (Colo. C080319). A grant was awarded on December 29, 1972, in the amount of \$1.7 million, including estimated engineering fees of \$150,000 for the construction of a sanitary interceptor sewer. The engineering subcontract included two cost-plus-a-percentage-of-cost features. Construction engineering was to be reimbursed based on the cost of payroll plus 100 percent and other services were to be based on cost plus 130 percent.

Lowville, New York (NY-606). A grant was awarded on January 14, 1970, in the amount of \$509,200, including estimated engineering fees of \$63,000, to construct a replacement for the community's existing primary treatment plant. The subcontract with engineering firm indicated that the costs for inspection services shall be based on salary times a multiple of 2.5 to cover overhead and profit plus direct out of pocket expenses (i.e., subsistence, travel, special materials and/or equipment).

In most instances, the percentages used included factors for overhead costs and profit, but did not stipulate the specific amount of either. This can result in excessive profits being paid to the engineering firm. For this reason, the cost-plus-a-percentage-of-cost method of subcontracting is specifically disallowed by Attachment O for OMB Circular A-102. An illustration of the type of excessive profit which can be realized was demonstrated in a recent audit in which we noted that in one grant a consulting engineering firm realized a profit rate of over 30 percent. This percentage factor was determined by calculating the difference between the percentage awarded (for overhead and profit) in an engineering subcontract to the firm's actual audited overhead rate. With increased Federal participation in the construction grants program, it is our opinion that the principles contained in the cited OMB Circular should be implemented immediately in the awarding of new construction grants.

#### Administrative Controls

Virtually all engineering subagreements executed under waste water treatment facility construction grants fail to provide for sufficient administrative control over the activities of the engineering firms to adequately protect the interests of the grantee and the government. Further, if similar agreements are perpetuated, they would be additionally deficient from the standpoint of the requirements for subagreements as now set forth in OMB Circular No. A-102, Attachment O, "Procurement Standards." This condition is attributable to the fact that engineering subagreements are being written by the consulting engineering firms rather than the grantees. Specific deficiencies common to all or most of the agreements reviewed included the following:

##### 1. Right of Access to Subcontractors' Records

We found that none of the agreements examined provided for access to the engineering firms' records by the grantee to assure that flexibly priced agreements influenced by such factors as actual payroll cost, number of hours charged to the project, etc., are proper and supportable.



## 2. Approval of Level of Effort

The majority of agreements were undefined or were vague with respect to controls by the grantee over the level of effort the engineering firms can put into such portions of the project as construction supervision. Without such controls, the grantee has little influence over the reasonableness of such effort and its attendant cost.

## 3. Ownership of Data

While some of the agreements examined specifically conveyed ownership of all drawings, details, computations, and specifications to the grantee, the majority of these agreements were silent. Where the agreement is silent, it is assumed that the practice of the industry would prevail. The industry practice, as espoused in ASCE Manual No. 45, is that ownership of data rests with engineer unless other provisions have been made. As the engineering firm has been fully compensated for the execution of design data, and the Federal government will be paying the preponderate portion of this fee, provision should be made for the passage of ownership of all such data to the government. Not only is this equitable, but such an agreement could facilitate a program of technology transfer at nominal modification or redesign cost to projects of other grantees.

## 4. Provisions for Termination

The majority of the agreements examined did not have a provision for settlement in the event of termination. It was noted that those agreements which did provide for termination expressed it in terms of a no-cause, unequivocal termination to be settled on an actual cost or time and material basis (plus close-out costs). Procedures should be revised so that all engineering agreements include a provision for termination including the manner by which it will be effected and the basis for settlement. In addition, such a provision should describe the conditions where the contract may be terminated for default and for circumstances beyond the control of the grantee. This is especially needed in view of the apparently large number of plants contained major design deficiencies.

## 5. Other Provisions

In addition, the following common shortcomings in engineering subagreements should be provided for:

a. Subagreements should contain provisions or conditions which will allow for administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, provide for such sanctions and penalties as may be appropriate.

b. Subagreements in excess of \$10,000 should include provisions for compliance with Executive Order No. 11246, entitled "Equal Employment Opportunity" to include an affirmative action plan.

c. Subagreements in excess of \$2,500 shall provide that the contractor will comply with applicable regulations and standards of the Cost of Living Council in establishing wages and prices.

### Conclusions and Recommendations

Our review showed that many changes in the administrative policies and procedures are needed to comply with the provisions of OMB Circular A-102. Such changes are also needed to assure adequate controls are exercised over engineering services due to the vast increase in the percentage of Federal funds to be provided under the provisions of the new Water Pollution Control Act. We realize that it will be somewhat difficult to establish controls over engineering subcontracts in that such subcontracts are commonly entered into several years before even an application for a construction grant is submitted to EPA. Thus, we feel that the only reasonable way to resolve this problem is through the issuance of guidelines to the grantee community spelling out in detail the requirements which should be complied with. Among other provisions, these guidelines should:

1. require that the grantee go through a selection process including evaluations of the prospective engineering firm's qualifications, experiences, and estimated costs. This process should require the consideration of more than two independent engineering firms. The results of evaluation and basis for final selection should be properly documented and retained on file.

2. require that the grantee be alert for possible conflicts of interest. In this regard prospective engineering firms should be requested to provide information on any planning work or other activities which in any way relate to the conduct of the proposed project. Wherever a potential conflict of interest arises, grantees should be required to immediately report such matters to EPA.

3. require that engineering subcontracts or agreements place appropriate responsibility for the adequacy of the treatment plants on the engineers who designed and supervised construction of the plant. In our opinion, the EPA guidelines and agreements themselves should include appropriate provisions for taking appropriate legal action or utilizing other financial remedies should the need arise.

4. provide basic parameters to be used in determining the acceptability of various contracting methods. These parameters should:

a. require that ceiling amounts be included in all contracts.

b. require that appropriate supporting data be provided to spell out in detail the costs which comprise the ceiling. Such data should identify the types of services to be provided, the composition of such services, the quantity of services, and computation of the amount to be charged.

c. provide criteria to be used in determining the type of pricing provision considered most equitable to the grantee and the Federal government. This criteria should point out that the use of percentage-of-cost or cost-plus-a-percentage-of-cost pricing provisions is unacceptable to EPA.

5. require that subcontracts with engineering firms include the following provisions:

- a. Access to Records
- b. Level of Effort
- c. Ownership of Data
- d. Provisions for Termination
- e. Breach of Contract
- f. Equal Employment Opportunity
- g. Price Control

6. point out that if grantees do not comply with the provisions of these guidelines, then EPA will not participate in the cost of their engineering services.

#### Managements Response

Both the Grants Administration Division (GAD) and the Municipal Waste Water System Division (MWWSO) generally agreed with our findings and recommendations and indicated that procedural guidelines were being developed which will resolve these problems. MWWSO did point out, however, that we could not require our grantees to use competitive bidding. (For the complete text of managements response, see Appendices A and B of this report.)

#### Auditor's Comments

We agree that, under current guidelines, we cannot insist that grantees use competitive bidding in establishing the costs of engineering services. However, to assure that a qualified engineer is selected, the grantees should be expected to go through a selection process considering qualifica-

tions and experience. Additionally, should grantees decide to negotiate, instead of using competitive bidding, we believe that guidelines should be established for measuring the reasonableness of the amount negotiated.

We reviewed 23 project files selected at random to find if significant problems had arisen with respect to construction of the sewage treatment facility. Where such problems occurred, we examined the follow-up action taken to assure that prompt corrective action was taken. One of three examples reported to the Region follows:

Oswego, WPC-NY-386. On April 22, 1971, inspection of this plant indicated that the plant was 89 percent complete. Yet, at the time of our review in October 1972, 18 months later, there was no indication in the file whether or not the plant was completed or ready for final inspection. Had an adequate information system been available, this project would possibly have been identified as reaching the finalization stage and thus, provided impetus to the actions necessary for closing out this project.

#### Status of Construction Grants - Region VIII

The Region has approximately 230 active grants for construction of wastewater treatment facilities and the eligible costs for these grants was about \$112 million. We noted that 51, or 22 percent, of the 230 active grants were over two years old and represented about \$21 million in eligible project costs. In addition, 73, or 31 percent representing about \$59 million in eligible costs, were between one and two years old. Current management information concerning the current status of construction, adequacy of construction, compliance with grant target dates, special problems, follow-up actions and other pertinent data were not determinable without reviewing each individual grant file or, in cases where the grant file was inconclusive, relying on an individual's memory.

The Grants Administration Branch maintains a card file which contains certain financial data for each grant. Because the primary use of this file was for financial management purposes, information relating to special problems or current status was not recorded. Although information concerning the percentage of completion was often shown on these cards, the percentages were only recorded when a payment was requested. It was therefore necessary for managers to review grant files in detail to determine the current project status and whether any follow-up actions have been initiated. The number of such reviews and follow-up actions required to administer 230 grants warrants the establishment of management information system to identify grants requiring particular attention. One of four examples furnished the Region follows:

Salt Lake City, Utah (WPC-UTAH-93). A grant for the construction of a sewage treatment plant was awarded in August 1967. On February 17, 1969, the Federal grant was

increased to \$350,380. At this time the total eligible project costs were \$1,061,768. The project files indicated that the last inspection on this project was made on March 21, 1969. The inspection disclosed problems in operating the plant in a manner which would meet approved water quality standards. It also indicated that the main reason for the difficulties was due to "the unequal settlement of the basic components of the whole plan." The city requested Federal assistance on how to prevent the unequal settlement so that the plant would be operated and maintained in a normal manner. According to the files, the Federal inspector "was interested and willing to help...but at this time could only offer...condolences." The project files contained no other correspondence or follow-up inspections concerning this problem. The latest information available on the completion status of this project was as of May 1, 1970, indicating that it was 65 percent complete and that Federal funds of \$229,900 had been advanced. In our opinion, the region should have initiated follow-up action subsequent to the March 21, 1969, inspection to ascertain the adequacy of actions being taken by the city and whether the plant was being properly and efficiently operated.

#### Status of Construction Grants - Region IX

The Region has about 250 active grants for construction of wastewater treatment facilities. We noted that, although 70, or 28 percent, of the 250 active grants were over two years old, including a grant awarded in 1962, current management information concerning the status of construction was not determinable without reviewing each individual grant file. In our opinion, effective administration of these grants necessitates the development of a system to keep management informed of reasons for delays in completing the grants. Such a system would help to assure that problems are resolved and that grant conditions are fulfilled. Since the abatement of pollution is usually not effective until a project is completed, we believe timely completion of projects should be an objective of EPA.

The Grants Administration Branch maintains a card file containing certain financial data for each grant. Although the card was not specifically devised to record current project status or special problems, information concerning the percentage of completion was sometimes shown on these cards. The percentages were normally recorded only when a payment was requested. Our review of the information on these cards disclosed that the percentage of completion was not recorded for 55 of the 70 grants over two years old. In addition, the completion percentages for 32 projects had not been updated for over a year even though the projects' status were shown as over 80 percent completed at that time. It was therefore necessary

for managers to review each individual grant file to determine whether the project status was known or whether any follow-up action was required. The number of such reviews and follow-up actions required to administer 250 grants dictates a need for a management information system to identify grants requiring additional actions. This was evidenced by our review of eight grants awarded prior to December 31, 1969, which disclosed that follow-up action was overdue on four of the grants. One of four instances furnished Regional officials follows:

Estero Municipal Improvement District (WPC-CAL-295).  
This grant was awarded on January 4, 1967, for the construction of a wastewater treatment plant. On August 20, 1968, the grant amount was increased to \$191,400. A final inspection made by EPA on November 4, 1969, disclosed that the plant had significant mechanical and operational problems. The inspector therefore did not accept the project and recommended against any additional payments. Our review disclosed that there was a lack of management information available indicating the current status of the project. In fact, follow-up action on this grant was not initiated until April 7, 1972, or 29 months later. At this time, EPA was informed that the plant had never operated properly and that a lawsuit was pending against the consultant engineer and construction contractor. Timely follow-up would have disclosed that the problems had not been corrected at a much earlier date. At the present time, the grant assurance that the treatment works would be operated properly and efficiently after completion of the construction has not been fulfilled.

#### Conclusions and Recommendations

Our review showed that Regions II, VIII and IX did not have effective systems for identifying those projects with problems. As a result, EPA management was hampered in conducting its follow-up program to assure that appropriate corrective action was taken. We recommended that the Regions:

1. Establish a system which identifies the status of construction grants. This system should relate planned versus actual accomplishments and identify problems which hamper the timely completion of construction grants.
2. Assure that appropriate follow-up actions are taken to see that corrective actions are taken in a timely manner.

### Management's Comments

Regional officials in Regions II and IX generally concurred in the recommendation and indicated that corrective action has or will be taken to establish the necessary management information systems. Region VIII official's response has not been received to date.



### Interim and Final Inspections

Effective procedures should be established for performing interim inspections during construction of wastewater treatment plants or final inspections upon completion of construction. This will ensure that (1) the grantee's or consulting engineers supervision of construction is adequate and work is proceeding satisfactorily, and (2) all work has been accomplished in accordance with approved plans and specifications and thus, resulted in a properly operable facility. During our Regional reviews, we observed varying degrees of priorities assigned these functions, ranging from great emphasis placed on inspections to assigning a very low priority for these activities. Consequently, in some regions, the required interim inspections were not always performed. Although these inspections have not always revealed major construction deficiencies, they serve to insure effective, economic and efficient use of the huge Federal investment in the construction program. In addition, final inspections were not always accomplished in a timely manner. Final inspection reports did not always indicate whether the completed construction fulfilled the conditions of the grant or satisfactorily met water quality standards. We attributed these weaknesses to the fact that more than 50 percent of the engineer's effort during final inspection was expended on non-engineering administrative functions.

### Background

The responsibility for a properly operable wastewater treatment plant that will treat the wastes satisfactorily to meet water standards rests with the grantee directly or through its consulting engineer. In the past, the grantee's financial and other interests in the project were as great or greater than that of the Federal Government. Hence, greater reliance could be placed on the grantee and consulting engineer in their supervision of the project. However, with the recent passage of water pollution control amendments increasing the Federal share to 75% of the eligible costs, greater Federal technical overview to supplement the State's or grantee's reviews is warranted.

EPA, Construction Grant Memorandum (CGM) No. 71-17 states that "On projects in excess of \$1,000,000, at least one inspection during construction must be made, and additional inspections are desirable wherever possible. Smaller projects will be inspected on a random basis, as staffing permits. The purpose of a partial inspection is to determine that the project is being constructed in accordance with approved plans and specifications and that all Federal requirements are being fulfilled, and to review any specific problems that may have been reported on the project." According to the memorandum, the purpose of a final inspection is to "determine that all work has been accomplished in accordance with the approved plans and specifications to the satisfaction of all interested parties and that the project will result in an operable treatment facility that will treat wastes satisfactorily to meet water quality standards."

The memorandum also requires that the final inspection be performed before release of final payment.

Chapter 12 of the Handbook of Procedures, Construction Grants Program, also discusses inspections during construction and final inspection. The reports pertaining to inspections during construction are to contain all pertinent facts and findings relative to: (1) progress of work and purchase and delivery of major items of equipment, (2) adequacy of supervision provided by the applicant, (3) quality of work performed and compliance with approved construction plans and specifications, (4) important defects or omissions, (5) compliance with specified tests of materials and mechanical installations and (6) certificate of inspection and approval of work which may be required by any public agencies having jurisdiction. The handbook also indicates that reports prepared as a result of the final inspection are to include comments concerning the operability of the completed project.

### Interim Inspections

#### Region II

In the Region, great emphasis is placed on inspections. During construction they are used to assure that the plant is being built in accordance with plans and specifications. The final inspections serve to assure that the plant is properly operating. In 23 projects selected at random, a total of 99 inspections were made (the State performed 57 and EPA 42). We found that the Region was apparently doing an adequate job of inspecting plants. We did note, however, that follow-up on identified weaknesses was not systematic.

#### Region V

During FY 1972, the Construction Grants Branch made only 124 interim inspections although the work plans called for 375 such inspections to be made.

The Region did not retain the files once a project was closed out; therefore, we were unable to document any instances where the final inspection disclosed serious problems which might have been avoided if intermediate inspections had been made. However, the following illustration shows the importance of interim inspections since serious construction problems can be disclosed and corrected more easily during construction than when construction is completed. Further, some deficiencies may not be evident during the final inspection because subsequent work may cover the defects.

In December 1971, CGB engineers visited a project site in Geneseo, Illinois. Construction costs for the project totaled \$836,200 and Federal funds amounted to \$459,910. At the time of their inspection, the project was about 75 percent completed. The inspectors observed patched cracks in the concrete wall of a digester and commented on the poor quality of the concrete poured in one tank. Their observations were pointed out to the grantee and the project file was conspicuously annotated to alert engineers making the final inspection to the condition. Timely findings such as this are cost effective to the extent that they preclude the need for repairs and/or reconstruction after the project had been completed.

#### Region VIII

As of October 31, 1972, there were 21 active construction grants which exceeded \$1 million each, with a total value of \$70 million. Our review of 11 of these grants disclosed that required interim inspections had not been performed on 7 grants.

#### Region IX

Our review of construction grants accepted by applicants during FY's 1970 and 1971 disclosed that there were 60 individual projects, with a total value of about \$206 million, which exceeded \$1 million. We selected 42 of the grants, valued at about \$159 million, for detailed review and found that the required interim inspections had not been performed for any of the grants. One example furnished the region where required interim inspections may have detected significant operating problems was the City of San Clemente (WPC-CAL-421). Although the grant offer for this \$2.7 million project was accepted by the City on January 22, 1970, an interim inspection was never performed by EPA. However, the results of an EPA final inspection on August 2, 1971, indicated significant problem areas relating to equipment malfunctions, operational difficulties, structural deficiencies, and odor controls. Included in these problems was the fact that the concrete was leaking and that the pumps and clarifiers were not operating properly. In this instance, an interim inspection to determine the quality of the work performed and compliance with approved construction plans and specifications, should have disclosed the above problems prior to the final inspection.

In view of the significant investment of Federal funds in wastewater treatment projects, it was important that procedures be established assuring that the interim inspections will be performed. The inspections should not only be performed on projects in excess of \$1 million but also include some inspections of smaller projects. During our audits, we noted several instances where the performance of required interim inspections on these smaller projects may have detected significant operating problems.

## Final Inspections

Our review of the Regions' procedures for accomplishing final inspections disclosed that there were several areas where improvements were necessary. These included (1) performing final inspections in a more timely manner, (2) revising the format of the final inspection form to provide for those comments required by CGM No. 71-17, (3) taking necessary and timely follow-up actions in those instances where previous final inspections could not be made because of plant deficiencies, and (4) reducing the amount of engineering effort being expended on non-engineering administrative functions during final inspection.

### Timeliness of Final Inspections

A review of 21 final inspections performed in Region VIII in calendar year 1972 disclosed that there was more than a 6 month delay between the date the final inspection was requested and the date the inspection was performed by EPA. A review of 20 construction projects in Region IX which were awaiting final inspection as of March 10, 1972 disclosed an average of 21 months elapsed from the date the project was accepted by the grantee until a final inspection was performed by EPA. Many of these delays were attributed to the fact that the engineers were required to perform extensive administrative and fiscal functions in preparation for the final inspection. Additionally, the excessive delays in performing the final inspections were caused by the lack of formalized systems for identifying those projects ready for final inspection. In one region, this was evidenced by the fact that our review of the files for an additional 37 completed projects disclosed that they did not contain any reference to the dates that construction was completed or accepted by the grantee nor the dates that construction was completed or accepted by the grantee nor the date which a final inspection was requested. In our opinion, this condition could be improved by (1) maintaining a control listing showing the status of all grants awaiting final inspection, (2) increasing coordination with grantees to assure that EPA is notified of the completion of construction in a timely manner, (3) initiating the final inspections as soon as possible after the grantee has accepted the construction and not delaying the inspections pending the receipt of nonessential administrative and fiscal data, and (4) establishing target dates for completion of the final inspections and requiring an explanation of the reasons for any delays.

### Final Inspection Reports

Various forms are in use in the regions for reporting the results of final inspections. However, we noted instances where the form was not used or was only partially utilized. In one region, of the fourteen items included in the form, only four pertained to technical matters which were to be considered during the final inspection. In another region, a

review of the form disclosed that of the nine sections included, only one pertained to operational matters which were to be considered during the final inspection. The balance of the items were applicable to administrative and fiscal matters and included determining: (1) that the payroll certification was signed, (2) that there was a final pay estimate, (3) the amounts paid to construction contractors, and (4) the total costs expended for equipment and materials, engineering services, and legal and administrative services. Although the form provides space for a "yes" or "no" answer as to whether the grant offer conditions were satisfied, it does not comment on certain data required by CGM No. 71-17. For example, the form does not require the inspector to comment on whether work was accomplished in accordance with approved plans and specifications, if the project results in an operable treatment facility and whether the effluent satisfactorily meets water quality standards. In addition, the form also does not provide for the 13 specific items which CGM 71-17 requires to be reviewed, including the plant's structural adequacy and the effectiveness of its mechanical operation.

Because the requirements contained in CGM 71-17 were not included in the inspection form, there was no assurance that they were being adequately considered during the final inspection. Specifically, we found no evidence that the final inspection determined whether the effluent from the completed project was meeting water quality standards. This was illustrated by a final inspection performed by EPA on WPC-CAL-382 (Sacramento Central Sanitation District) which we observed on March 3, 1972. The final inspection report did not mention whether the effluent was meeting water quality standards. In this instance, a review of effluent test results was important since the plant was under a Cease and Desist Order from the State of California for violation of water quality standards. The State Regional Board inspections of this plant in July and August 1971 indicated "an inspection of the discharge into the Sacramento River revealed floating vegetable matter (lettuce, corn, etc.), plus small balls of grease. The discharge appeared brown in color after mixing with the river water. The floating and suspended solids were visible flowing by Cliff's Marina approximately 0.2 to 0.3 of a mile downstream from the point of discharge." In our opinion, the final inspection, as a minimum, should have been of sufficient detail to determine whether the above problems still existed.

#### Follow-up Actions

In one region, we noted the inability to complete its final inspections of 15 wastewater treatment plants because of various technical or administrative deficiencies which were detected during the final inspection. Although this situation indicated a need for effective follow-up action, the region had not initiated such action in a timely manner. One example of the types of problems which have affected the completion of the final inspection follows:

Morgan (490082). A final inspection was requested by the grantee in September 1971; however, the region did not perform the inspection until June 8, 1972. At the time of the inspection, it was found that the lagoons leaked and that it would be necessary to wait until the water line dropped in order to properly seal the lagoons. Additionally, the inspection report noted five administrative deficiencies related to change orders, purchase agreements, and invoices. In a subsequent final inspection performed by the region on November 16, 1972, the same general condition as found five months earlier was again noted. Consequently, this project still remains as an open project.

### Use of Engineers for Administrative Functions

One approach available to the regions to improve their interim and final inspection accomplishments is to reduce the amount of engineering effort being expended on non-engineering administrative functions during final inspection. Discussions with engineering personnel and our observation of an inspection indicated that at least 50 percent of the engineer's time during the final inspection process was devoted to administrative functions. These functions included (1) completing the grantee's Project Progress Report and Payment Request (FWPCA-10), and (2) reviewing the grantee's cost data for eligibility. It is our opinion that the preparation of the FWPCA-10 should be the responsibility of the grantee and not the EPA technical inspector. However, EPA should assure that the grantee is provided, through the GAD, the administrative guidance necessary to complete the form. Further, a review of grantee's cost data for eligibility is the primary responsibility of the EPA Office of Audit and not the technical inspector. Although the final inspection report should discuss those technical matters which have a bearing on costs, the actual reviews of the grantee's cost data for eligibility should be performed during the final audit. In our opinion, the amount of technical effort available to perform the required inspections would be increased if the above-mentioned non-engineering administrative functions were not performed by technical personnel during the final inspections. The final inspection could then be directed to the technical requirements of determining the operability of the completed plant and whether the plant's effluent meets water quality standards.

### Conclusions and Recommendations

Our review showed that EPA has not established effective procedures for performing interim inspections during construction at wastewater treatment plants or final inspections upon completion of construction. As a result, interim inspections were not always performed; final inspections were not performed in a timely manner; the format of the final inspection form did not provide for those comments required by CGM No. 71-17 nor was the use of the form made mandatory for all final inspections; and

technical efforts were being expended on non-engineering administrative duties such as preparing the grantee's Project Progress Report and Payment Request and reviewing the grantee's cost data for eligibility. In view of the significant investment of Federal funds in wastewater treatment projects, we recommended that the Regional Administrators initiate action to:

1. Perform the required interim inspections of all current construction projects in excess of \$1 million, and institute the procedures necessary to assure that future interim inspections of wastewater treatment plants are accomplished.

2. Improve the timeliness of final inspections by: (1) maintaining a control listing showing the status of all grants awaiting final inspection, (2) increasing coordination with grantees to assure that EPA is notified of the completion of construction in a timely manner, (3) instructing the Grants Administration Branch to request final technical inspections as soon as possible after the grantee has accepted the construction and not delay the inspections pending the receipt of non-essential administrative and fiscal data, and (4) establishing target dates for the completion of the final inspection and requiring the Program Evaluation Branch to explain the reasons for any delays.

3. Revise the format of the final inspection form to provide for those comments required by CGM No. 71-17 concerning the operability of the project and to delete requirements for information of a fiscal nature. Upon its revision, the use of the form should be made mandatory for all final inspections.

4. Assure that technical inspectors do not perform non-engineering administrative duties such as preparing the grantee's Project Progress Report and Payment Request (FWPCA-10) and reviewing the grantee's cost data for eligibility.

#### Managements' Responses

##### Regional Comments

Region V officials pointed out that because of the local professional competency and its own staff limitations, plant inspections was one area that invariably has been reduced when its Construction Grants Branch was faced with decisions on what can be done or what cannot be done. They also believed that there never has been contemplated a staff to permit intermediate inspections of such frequency as to impact correction of construction deficiencies and that plant inspection was a prime example where EPA can place greater reliance upon the technical efforts of other professionals. Region VIII officials have not responded to our findings and recommendations to date. Region IX officials concurred with the desirability of performing interim construction progress inspections and assuring that final inspections are efficiently and effectively carried out. The Region IX officials indicated that remedial actions would be taken to correct the weaknesses noted in our report.

### Auditor's Comments

Because of the varying degrees of emphasis assigned to the plant inspection function by the regions; inconsistencies and insufficiency of final inspection reports between regions; and lack of effective procedures for ensuring the performance of interim inspections or timely final inspections, we believe EPA should provide greater policy guidance and strengthening of procedures for plant inspections.

### Headquarters Response

Representatives of the Assistant Administrator for Air and Water Programs generally concurred with our finding and recommendation. In this regard, they indicated that new policies and procedures were being developed which would set forth guidance for interim and final inspections. They did, however, point out a concern regarding the basic objective of final inspections. Such inspections are, according to Program officials, "for the purpose of determining that the work is being and has been constructed in accordance with the approved plans and specifications and that all of the equipment is operating properly."

"After the final construction engineering compliance inspection, the performance requirements of the plant come under the responsibility of the Operation and Maintenance inspection requirements as outlined in the Federal Guidelines for Design, Operation, and Maintenance of Waste Water Treatment Facilities."

### Auditor's Comments

Each of the construction grants reviewed by our auditors contained specific terms and conditions requiring that the effluent from the plants meet the applicable water quality standards. It is our opinion, that the engineers making final inspections are expected to verify that these terms and conditions have been complied with before he may sign off on final payments.



## Operation and Maintenance

Adequate procedures have not been established to assure that sewage treatment plants financed with Federal funds are being properly operated and maintained. Even though primary reliance for operation and maintenance (O&M) has been traditionally placed on the state, we found that many state agencies have not established a viable O&M program. Furthermore, EPA's own monitoring activities have not always been geared to the relative strengths and weaknesses of the state programs. Instead, little emphasis has been placed on the Region's O&M programs. Accordingly, in several Regions few O&M inspections have recently been made; and no effective procedures have been established to assure that EPA is notified of plants which the state has found to have major operational and/or maintenance problems. Thus, the Regions have no basic knowledge of the actual quality of O&M provided by many of our grantees. Even in the instances where EPA has learned of significant O&M problems, actions taken to assure that such problems were corrected were inadequate. Follow-up was commonly infrequent and unsuccessful in stimulating necessary corrective actions. We found no instances where the Regions had even considered taking punitive actions such as withholding subsequent grant funds or initiating action to find the grantee in nonadherence to grant terms, conditions and assurances. In our opinion, unless EPA exhibits a willingness to enforce its own terms and conditions, grantees will quickly come to realize that such terms and conditions are meaningless and begin to violate these requirements in increasing numbers.

### Background

Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities were published in September 1970. The guidelines stated that "Effective operation and maintenance of municipal wastewater treatment facilities is an essential element in the preservation and enhancement of our Nation's waters. The tremendous investment of Federal, state, and local funds in these facilities must be protected." The guidelines also commented that some waste treatment facilities were frequently badly maintained and achieved far less than their designed efficiency levels. It was also brought out that EPA has an obligation to ensure that Federal funds are wisely spent."

Chapter 12 of the Handbook of Procedures, Construction Grants Program states that "Approximately one year after a sewage treatment plant constructed with Federal aid is placed in operation, a visit will be made to determine if the project is providing the service for which Federal assistance was approved. This inspection may be made by a representative of the state agency or by a representative of FWPCA. In either case, the inspector will prepare Form FWPCA-12, Sewage Treatment Plant Operation and Maintenance Practices Questionnaire, to record his findings." The handbook also provides that if the O&M inspections are

not performed by the state agency, they will be performed by Federal representatives. Additionally, Section 601.35 of Title 18 of the Code of Federal Regulations indicates that "The state will inspect the treatment works not less frequently than annually for the 3 years after such treatment works are constructed and periodically thereafter to determine whether such treatment works are operated and maintained in an efficient, economic and effective manner..."

In 1970, the General Accounting Office (GAO) issued an audit report concerning the Need for Improved Operation and Maintenance of Municipal Waste Treatment Plants. This audit report pointed out that:

"Our review of FWQA studies and records of plant inspections and our visits to selected waste treatment plants showed that plant O&M problems were widespread and had resulted in inefficient plant operations...These problems were generally attributable to (1) inadequate numbers of qualified plant-operating personnel, (2) inadequate controls over industrial sources of pollution, and (3) inadequate plant design or equipment deficiencies."

"Even when adequate provisions have not been made to prevent the occurrence of O&M problems, the effects of problems that occur can be minimized through procedures available for detecting and correcting improper or inefficient O&M. Existing State procedures, however, are in need of further development..."

To determine whether O&M has improved, we reviewed records and documentation in nine state and four regional offices and found that significant problems still existed. A detailed discussion of the problems identified follows:

#### Analysis of State Programs

Many necessary improvements have not been made in the state programs. Weaknesses in some state's certification, training, and application review procedures have permitted plants to operate without the necessary level and/or quality of staffing and without appropriate test equipment. Similarly, weaknesses in operational reporting and plant inspection requirements have prevented states from identifying O&M problems and thus from requiring appropriate corrective action being taken.

#### Programs to Provide Needed Personnel and Equipment

In establishing programs to assure that municipalities and other organizations operating sewage treatment plants had sufficient competent personnel and needed test equipment, states commonly relied on such techniques as certification, training, and review of grant applications. In reviewing state water pollution control programs, however, we noted circumstances similar to those identified in the GAO report. Specifically, we found that:

1. Many states still had only voluntary certification programs. Thus, such states had no method of assuring that the personnel running sewage treatment plants were qualified. Even where the state's certification program was mandatory, we found instances where the program contained significant deficiencies in concept or was not producing sufficient operators to meet the states needs. For example,

a. Legislation passed by Arkansas during calendar year 1971 requiring mandatory certification of municipal wastewater treatment plant operators has automatically qualified for licenses, operators who had not previously qualified. Moreover, such operators were not required to participate in any training programs to upgrade their knowledge of treatment plant operations.

b. The examinations for operation certification in Illinois were written in 1967 and have not been revised since. Individual questions on the examination for each of the various certification levels have not been changed. Thus, an examinee who failed an examination for a given level was required to take the same examination with exactly the same questions the next time he took the test. Furthermore, there was nothing to preclude the free exchange of test questions and answers among prospective examinees. This practice was not satisfactory since the examinees could limit their preparation to the specific questions known to be on the tests.

We also observed instances of different grading of the same answer from one test to the next. For example, on one test the answer given by the examinee to a question was marked incorrect and no credit given; but when taken the next time, the same answer was given partial credit. Consistency in grading should be an important part of the testing process.

c. Shortages of qualified operators existed in most all states. At the time of our review in Illinois, there were 2,000 sewage treatment plants in operation in the State. These plants require about 4,000 wastewater treatment plant operators. About 90 percent of all plants require certified operators and some plants require more than one certified operator. About 44 percent of the plants did not have operators certified at any level, and about 11 percent had operators who were certified at lower levels than required.

2. Appropriate emphasis was not always placed on training the operators needed to run sewage treatment plants. The Illinois EPA, for example, had not implemented an adequate program for training of sewage treatment plant operators. According to the approved FY 1972 program plan, about \$300,000 of local, state and Federal funds were to be spent in the training program. As of April 1972, the Water Division had spent no funds on operator training and had not established an effective program to identify training needs or resources in the state, develop standards for training curriculums, or evaluate the training that had taken place.

3. Reviews of construction grant applications have not always been adequate to assure that sewage treatment plants had necessary test equipment. As a result when we review the water programs in Kentucky and South Carolina, we noticed that many treatment plants did not have adequate equipment to test the effluent against the established discharge parameters.

Without adequate well-trained staff and adequate test equipment, it would appear difficult, if not impossible, to operate a plant at the most optimum level.

#### State Procedures for Monitoring O&M

Procedures established by state agencies have not been adequate to thoroughly monitor the quality of operation and maintenance of sewage treatment plants. In this regard, we noted procedures concerning the receipt and review of plant operating reports and inspection of sewage treatment plants needed improvement in seven of the nine states examined. Thus, state agencies frequently did not have actual knowledge as to whether or not sewage treatment plants within their jurisdiction were being properly operated and maintained.

#### Monthly Operating Reports

Procedures established to assure that monthly operating reports were properly submitted and reviewed were inadequate in four of the nine states reviewed. As a result, we found that reports showing the plant utilization and effluent quality were generally either not submitted by the plant operator or were incomplete. In addition, reports submitted were not regularly reviewed to identify plants which were not operating correctly.

Section C of the Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities states that it is "desirable" for plants to routinely file operating reports with the appropriate state agency so that the regulatory agency may use them in carrying out its responsibilities. Each of the nine states included in our review requires municipal and/or industrial waste treatment plant operators to submit monthly operating reports.

In reviewing the State Water Pollution Control Program, we noted that four of the nine states (44 percent) were having significant difficulties in obtaining the necessary data. These included the States of Hawaii, Illinois, Kentucky, and South Carolina. Typical of the types of problems identified in these states were the following:

### Illinois

During the first seven months of FY 1972, an average of about 1,525 plants were required to submit monthly reports to the State, but about 925 actually submitted them. Of the reports submitted, over 95 percent were determined to be incomplete by the Operator Certification Section. About 60 percent of the reports were incomplete in material respects.

Actions taken by the State to get plant operators to submit the necessary data was not successful. For example, as illustrated in the following table, the Pittsfield Sewage Works reports for a five-month period showed no improvement in report quality.

<u>No. of</u> <u>Report Factors</u>	<u>Sept. 71</u>	<u>Oct. 71</u>	<u>Nov. 71</u>	<u>Dec. 71</u>	<u>Jan. 72</u>
Required to be Reported	12	12	11	11	11
Not Reported	9	8	7	7	8

A review of selected plant reports submitted between October 1971 and February 1972 showed that almost one-half of the individual factors that should have been reported by plant operators were not.

The data on the monthly operating reports could have provided information useful to both state and local management if accurately reported and properly analyzed. Analysis of correctly reported plant utilization and effluent quality data could disclose trends which would result in early recognition and correction of problem areas. For example, consistently poor quality effluent readings at a plant which had all of the necessary equipment to produce acceptable effluent, could be the result of inadequate operator capabilities. If reports were correlated with level of operating training, it is possible that special attention to training operators or hiring better qualified persons would result in improvement of the plant's effluent. As another example, if the operator was well qualified and the plant was theoretically capable of handling normal loads, it is possible that the reports could even disclose machine failures or the presence of excessive pollutants in the influent.

### Plant Inspections

Adequate procedures were not established to assure that necessary inspections were made to determine whether sewage treatment plants constructed with Federal assistance were being properly operated and maintained. Accordingly, in five of the nine state programs

reviewed, we found that periodic inspections were either not made at all or were basically superficial in nature. As a result, these states had no reliable means of determining whether or not its plants were operating effectively in reducing the discharge of pollutants into their waters.

In 1971, CFR 18.601.35 was issued which required the states to inspect each plant constructed by grants awarded after July 1, 1970, at least once a year for three years after completion to assure that such plants are properly operated and maintained. States have the responsibility under the Federal Water Pollution Control Act for cleaning up the quality of water. This necessitates regular inspections of all sewage treatment plants to assure that the plants are operating in accordance with design specifications and meeting the requirements of the Act.

During our review of State Water Pollution Control Programs in nine states, we identified five states (55 percent) where significant weaknesses in plant inspection procedures hampered the effectiveness of the states O&M program. Such weaknesses were noted in the States of Arkansas, Florida, Hawaii, Kentucky, and Utah. A discussion of the typical weaknesses found in these programs is contained in the following paragraph:

#### Florida

In Florida the responsibility for inspecting wastewater treatment plants was delegated by DPC to the Bureau of Sanitary Engineering (BSE), Department of Health. We discussed the procedures used in assuring proper operation of sewage treatment works with BSE officials and learned that controls were minimal. Most work in this area was limited to a review of the monthly operating reports submitted by the sewage treatment plants. Through this review, BSE tries to identify deficiencies in operational data or laboratory analysis. There were, however, no follow-up checks made to assure that the data reported were accurate. The BSE had not established any procedure for periodic inspection of the operation and maintenance of sewage treatment plants. The inspections are made by County Health Officers and the plants were only visited when necessitated by public complaints or when drop-in visits were convenient.

#### Arkansas

Our review disclosed that Arkansas Department's program for inspecting wastewater treatment facilities has been limited in terms of both inspection coverage and control.

During past years, the Department has neither inspected nor planned to inspect all municipal facilities. Operational inspections are accomplished on a time available basis by field inspectors who are also responsible for handling complaints and obtaining monitoring data. Although valid data showing inspection volume was not maintained, available information indicated that only about half of the State's municipal facilities have been inspected annually. Inspection coverage of industrial and other facilities has also been limited.

The scope or coverage of each inspection is limited. The inspection includes a general observation of plant conditions but does not include a technical evaluation of a plant's operations and performance. Normally, tests are not made to determine the adequacy of treatment. Also, an evaluation is not made of the plant's staff and operating procedures. We were advised that the Department's inspectors are knowledgeable of effective plant maintenance conditions but are not trained to make technical evaluations of treatment facilities.

We noted a lack of control over the inspection program with respect to a records system. No documents or listings were maintained showing facilities to be inspected or inspection frequency. Forms showing the results of each inspection are prepared; however, all forms were not readily available and the inspection work accomplished was not tabulated and summarized in any meaningful manner.

In our opinion, the lack of a systematic inspection system prevents the State from having reliable knowledge of the effectiveness and efficiency of its treatment plants. Without such knowledge, the State is hampered in trying to judge the extent of pollutants discharged into the State's waters and in trying to determine what steps might be taken to reduce pollution. Similarly, the lack of definitive knowledge prevents the State from taking necessary actions to get plant operators to correct deficiencies in O&M. An illustration of how operational difficulties can adversely affect the qualities of a State's water is discussed below:

#### Wahiawa and Whitmore Village Sewage Treatment Plants

Grants were awarded in May 1968 for the Wahiawa plant (WPC-Hawaii-34) for about \$1.5 million and in March 1967 for the Whitmore Village plant (WPC-Hawaii-36) for approximately \$553,000. Final inspections of these plants were performed by EPA in June 1970. We found that the State has not performed any of the required O&M inspections. However, according to water quality monitoring data being submitted by the Wahiawa plant, the plant effluent readings for total nitrogen, total phosphate, and total and fecal coliform were quite high. A similar situation also existed

at the Whitmore Village plant, except for the fact that coliform readings were not provided nor obtained.

The necessity for the O&M inspection is further illustrated in various studies performed of State waters. For example, the February 1972 report on Oahu's water quality indicated that the Wahiawa Reservoir appeared to have been brought into an advanced state of eutrophy because these two sewage treatment plants were discharging sewage into the reservoir. A similar situation was also brought out in a letter from the U. S. Department of Interior, Fish and Wildlife Service, dated April 18, 1972. The letter stated that "The results of man's abuse and use of the reservoir for a waste receptical is evidenced by the substantial and chronic fish kills." We believe that the monitoring of the operation of these plants by the State through annual O&M inspections is an important tool in identifying and preventing such problems.

EPA performed an O&M inspection on the Whitmore Village plant in May 1971 and identified several operational problems. However, we noted that there was a lack of follow-up procedures by the State to determine if the recommendations included in the EPA O&M inspection were corrected. For example, the EPA O&M inspection of the Whitmore Village plant listed several mechanical problems and stated that "no provision was made for removal of floatable material in the final clarifiers nor settleable material in the chlorine contact chamber." It recommended that the necessary equipment to satisfy the mechanical problems be installed. There was no information available indicating that the State followed up on this or other problems noted.

#### Analysis of Regional O&M Activities

In the past, Regional EPA officials have not placed sufficient emphasis on O&M. Instead, primary responsibility for O&M was left in the hands of the states. Accordingly, we found that most EPA regions did not perform many O&M inspections and did not even receive reports from the states indicating which of the plants were experiencing considerable O&M problems. Even when EPA engineers did make inspections and find deficiencies in O&M, no effective follow-up system was utilized to assure that the necessary corrective actions were taken in a timely manner. Since sewage treatment plants can do little to improve the quality of our water unless they are properly operated and maintained, we believe the time has come to put new emphasis on O&M. Where state programs have been found to be inadequate, states should be required to strengthen such programs. Where state action is not adequate or requires time to implement, EPA regional officials should step in to fill the void.



Over the years, the Federal Water Pollution Control Act, as amended, has recognized the responsibility of the states in cleaning up the environment. Accordingly, such functions as operation and maintenance have traditionally been treated as part of the state responsibility. Even the GAO report issued in September 1970 stated.

"Also, since current FWQA plant O&M inspection procedures usually duplicate State inspection procedures without significantly complementing them, FWQA should discontinue plant inspections except for the purpose of periodically evaluating the State procedures."

### Federal Inspections

When we reviewed the O&M activities in four Regional offices, we accordingly found that little emphasis was placed on O&M. In Region IX, for example, our review of 75 construction grants, completed in FY's 1969 through 1971, disclosed that the region had performed only 3 of 122 required O&M inspections as shown in the tabulation below:

Plants Completed		No. of O&M Inspections	
<u>FY</u>	<u>No.</u>	<u>Required</u>	<u>Performed</u>
1969	18	49	3
1970	33	49	0
1971	<u>24</u>	<u>24</u>	<u>0</u>
Total	<u>75</u>	<u>122</u>	<u>3</u>

Similar circumstances were noted in Regions V and VIII. We discussed this situation with responsible Regional officials, who explained that O&M was given a low priority in the regions.

To determine whether our minimal coverage provided the needed assurance that sewage treatment plants were being properly operated and maintained, we first inquired into the Region's knowledge of the state O&M programs. In this regard, we found that EPA Regional offices did not have a thorough knowledge of state procedures. While our engineers had accompanied state officials on some O&M inspections, we commonly had no specific knowledge as to what plants were scheduled for inspection or whether the inspections were actually performed. Similarly, unless EPA had specifically requested an inspection be performed, no copies of the inspection reports were normally provided to EPA. This occurred even though state agencies did find, in some instances, significant O&M problems.

In view of the fact that we had identified significant weaknesses in the procedures established to govern the states O&M programs, we were concerned that the lack of emphasis given EPA's O&M program was contributing to lack of adequate operation and maintenance being provided at sewage treatment plants. To illustrate the types of deficiencies which can go uncorrected, we reviewed a few inspection reports related to O&M inspections performed by EPA. In Region VIII, for example, 28 of 52 O&M inspections (54 percent) revealed major design deficiencies in the sewage treatment plants. Some specific examples of the types of problems identified are as follows:

City of Portola (WPC-CAL-401). The EPA final inspection dated February 3, 1970, indicated that the city was not interested in maintenance. In this instance, the accomplishment of an O&M inspection was important to assure proper plant operation and maintenance. We noted that the city has been under a Cease and Desist Order from the State of California for bypassing raw sewage into the Middle Fork of the Feather River. The Federal grant was awarded to the city for improvement of existing treatment facilities "to correct the discharge of inadequately treated sewage into the Middle Fork of the Feather River which is used extensively for irrigation and recreational purposes." However, in view of the fact that the city is still bypassing raw sewage into the river, it is apparent that the objectives of the grant were not fulfilled.

Village of Port Chester (WPC-NY-67). An inspection of the plant in November 1969, disclosed a significant infiltration problem and that plant equipment was not being properly maintained. While these problems were pointed out to the grantee and the state, a subsequent inspection in April 1971, showed that no effective corrective action had been taken. When we reviewed project files in October 1972, we found no indication of the status of action taken to correct the problems in this plant.

City of Show Low (WPC-ARIZ-99). A recent Municipal Waste Treatment Plant Inventory report, prepared by the region's Surveillance and Analysis Division, indicated structural and mechanical problems at this plant. According to the report, the structural problems were due to erosion of banks of ponds and the mechanical problems resulted because the chlorinator line strainer was too small. In addition, this 0.5 mdg plant had one part-time operator for 14 hours a week, although one full-time operator and one half-time laborer were recommended by "The Conference of State Sanitary Engineers - Recommendations for Minimum Personnel, Laboratory Control and Records for Municipal Waste Treatment Works." This has resulted in a violation of the grant condition which required the city to provide efficient operation and maintenance of the approved project in accordance with the above-mentioned conference recommendations.

After evaluating the results of O&M inspections, we were concerned that many treatment plants suffer from significant O&M deficiencies. Unless appropriate action is taken to strengthen the overall O&M program of both EPA and the state, there can be no assurance that the basic objectives of the grant - to prevent unnecessary discharges of pollutants - will be fulfilled.

#### Follow-Up on O&M Inspections

Systematic follow-up procedures were not instituted to assure that necessary actions were taken to correct deficiencies identified during O&M inspections. Instead EPA Regional offices generally just sent a copy of their inspection report to the state agency and grantee. This apparently put the "monkey" on their back and no further action was generally taken on EPA's part until another inspection one to three years later. In many instances, this follow-up inspection would simply show the same deficiencies, and the process would start all over again. For example, a January 30, 1973 inspection report on an O&M inspection at Bay St. Louis, Mississippi Project No. C28-0128 showed the following:

"A visit was made to Bay St. Louis, Mississippi at 1:00 PM on January 23, 1973, for the purpose of performing an O&M inspection on the City's wastewater treatment facilities...

#### "Findings:

- "1. Laboratory analyses are not performed to determine the efficiency of the lagoon.
- "2. The lagoon is equipped with a flow recorder which was not in operation during the inspection. Parts are on order from the manufacturer.
- "3. The lagoon is also equipped with a chlorinator which is placed by the flow recorder. Since the flow recorder was broken, the operator or one of the maintenance men had turned off the chlorine feed so that the effluent was not being disinfected.
- "4. The lagoon is not equipped with a gas mask approved for use with chlorine.
- "5. The operator stated that the lagoon is inhabited by three or four alligators. Due to the season, the alligators are hibernating and were not personally observed by the writer.
- "6. The operator also stated that nutria and muskrat are suspected to inhabit the lagoon.
- "7. The interior face of the dikes have been completely cleared and grubbed of all ground cover. In addition, the dikes are eroding badly at the water line due to wind and wave action.

- "8. The motor on the exhaust fan in the chlorine building was damaged by Hurricane Camille and has not been repaired.
- "9. The polluted water signs need to be repainted.
- "10. The City of Bay St. Louis does not have a certified operator; personnel engaged in the operation and maintenance of the sewage system do not routinely attend training courses. In addition, the Chief Operator plans to retire next month.
- "11. Both the Operator and the Superintendent stated that the lagoon experiences severe odor problems in the warmer months. During the summer, it is necessary to mix the contents of the lagoon as often as three times per day with an outboard motor to lessen the odors...

"Most of the adverse conditions listed in the findings were noted during a previous O&M inspection...on January 21, 1972. The City has not initiated any corrective actions to overcome these operation and maintenance difficulties. It is therefore recommended that the City take immediate steps to remedy the problems and that EPA and the Mississippi Air and Water Pollution Control Commission make a follow-up inspection to determine the City's progress."

In reviewing the procedures established to award construction grants to assist in the financing of sewage treatment plants, we noted that assurances were required to the effect that such treatment plants would be properly operated and maintained. In our opinion, this assurance is basically the same as any other grant terms and condition. Accordingly, when we found that significant O&M problems were occurring in construction grants financed with our money, we were surprised to see no punitive actions taken. Since our grantees were apparently not complying with grant terms, it would seem obvious that action could be initiated to stop payments on any current grants or even to initiate recovery action. While such actions should probably be taken in only the most flagrant cases, grantees must not be allowed to think such terms and conditions are meaningless. If this occurs, grantees will begin to violate the O&M as well as most other grant requirements in increasing numbers.

#### Conclusions and Recommendations

Our review has shown that significant improvements are needed to assure that sewage treatment plants constructed with Federal funds are being properly operated and maintained. In recent years, EPA has concentrated its efforts on providing increased guidelines to be used

by state governments and local grantees in setting up and monitoring O&M programs. In our opinion, these guidelines were essential to provide the basis for a clear understanding as to what was meant by "adequate operation and maintenance." We feel, however, that the time has come to see that such guidelines are properly implemented. Accordingly, we are recommending that appropriate EPA officials:

1. Increase emphasis on working with state program officials to improve those aspects of the water program related to O&M. Of special concern should be those procedures related to certification, training, and the identification of adequate levels of O&M and laboratory equipment in construction grant applications.
2. Require that state agencies implement acceptable O&M monitoring programs. Such programs should necessitate the submission of complete and accurate operating reports. Appropriate penalties should be established to assure that such reports are submitted. State officials should then review operating reports to identify O&M problems. In addition, the states should be required to periodically inspect all treatment plants. Such inspections should include necessary evaluations being made of the plants operation and performance, and adequacy of staffing and operating procedures. Appropriate reports should then be prepared and maintained on file. Wherever corrective actions are needed, appropriate follow-up systems should be established to assure that necessary actions are taken.
3. Appropriately monitor the states' O&M program. This monitoring should be used to assure that necessary inspections are being made by the state, identify plants with serious O&M problems, and verify that such plants have been required to take necessary corrective actions.
4. Expand or contract the Regional O&M programs based on the adequacy of state programs. Where state programs are adequate, EPA's O&M inspection process should be expanded to fill the void. Wherever punitive actions such as withholding of payments on subsequent grants or initiating recovery actions are needed, they should be used.

#### Managements Comments

The Assistant Administrator for Air and Water Programs generally concurred with our findings and recommendations. He did point out, however, that EPA's General Counsel had advised that "the recovery of grant funds from a municipality after a project is complete for failure to meet grant conditions on operation and maintenance would be difficult if not impossible." He did feel, however, that the possibility of withholding current grant funds should be considered.

The Assistant Administrator did point out that the use of the permit program established under Section 402 of the new Act did offer a sound basis for insuring proper O&M of treatment plants. Accordingly, EPA has devised a draft strategy for O&M utilizing the controls available under the permit program. A copy of this draft strategy is included as Appendix B to this report.

In addition, the Assistant Administrator pointed out that efforts were already underway to resolve other weaknesses identified in our finding. These efforts included:

"1. State Programs

The general weaknesses of State O&M programs are recognized. These are generally attributable to low priority given to O&M and/or to inadequate staffing and funding. EPA does have some efforts underway which will serve as a basis for strengthening State programs. A contract will be completed in mid-1973 to provide "Guidelines for a Model State/Federal Program for Monitoring and Upgrading O&M of Municipal Wastewater Treatment Facilities." A parallel study will provide an "Emergency Response Program for Municipal Wastewater Treatment Facilities - State & Local Aspects." A contract is presently being negotiated with the State of South Carolina to develop a "Management System for Identification and Correction of Operation and Maintenance Deficiencies." The evaluation features of the Section 106 program cycle should also correct past weaknesses.

"2. Personnel

The matter of certification is being addressed several ways:

- (a) EPA and the Water Pollution Control Federation (WPCF) jointly drafted a new model state mandatory certification law and were successful in pressing for its adoption by the Council of State Governments as a part of its 1972 package of recommended State legislation.
- (b) EPA sponsored a study by WPCF resulting in development of "A Guide for State Certification of Wastewater Facilities Personnel, March 1973."
- (c) Formation of the Associated Boards of Certification (ABC) is endorsed by EPA as a substantive national effort to establish in all states viable certification programs that will permit nationwide reciprocity.

"3. Test Equipment, Personnel

A study by an outside consultant will produce by mid-1973 "Guidelines for Estimating Needs of Laboratories at Wastewater Treatment Facilities." The document will cover facilities, equipment, personnel, and minimum testing requirements and will be an authoritative reference for State and Regional solution of these problems.

"4. Monitoring O&M

The permit program established by Section 402 of the Act will provide improved capability to monitor O&M. A State desiring approval of the Section 402 permitting authority must meet certain requirements outlined in 40 CFR, Part 124 (published December 22, 1972). Among other requirements, the following are particularly germane:

Section 124.61 requires the owner to report operating results:

Section 124.71 requires the State to provide the capability for "receipt, evaluation and investigatory follow-up" and to notify the Regional Administrator if any condition of the permit is violated.

Section 124.92 requires the State to provide funding, qualified personnel and other resources to support NPDES with inspections, surveillance, and follow-up of evidence of violations; inspections are to be accomplished not less than once every year for every significant discharge.

Section 124.44 requires the State to notify the Regional Administrator quarterly of any owners who fail to comply with permit requirements.

"5. EPA Regional O&M Programs

Although the Regional O&M programs are highly variable among the Regions, the overall emphasis nationwide has increased. The number of inspections on grant-funded projects has steadily increased from 360 in 1968 to about 900 in 1972. It is projected that 1,000 will be conducted in 1973. More follow-ups to correct identified deficiencies are needed. The needed changes in Regional programs are further identified in the O&M draft strategy mentioned previously. An effort is presently underway to improve the quality of the EPA and State inspection effort. An inspector's training course, developed by the Manpower Development Staff, is being conducted at various locations around the country. Attendees include both EPA and State personnel responsible for inspecting municipal wastewater treatment facilities. Seven courses have been conducted as of this date.

After reviewing the bid material to assure that necessary competitive procurement techniques were followed, EPA then revised the grant offer to reflect the actual costs of construction as represented by contract prices. This revision then served to provide EPA authorization for going to contract and thus beginning the construction of a new sewage treatment plant.

#### Reasonableness of Obligation

In reviewing records related to Section 8 construction grants, we noted that the obligation practices being used did not adequately safeguard the interests of the Federal government. This occurred due to the fact that obligations were made based on preliminary estimates which were later found to be vastly over or underestimated. In addition, since such obligations were prematurely made before the grantee was ready to proceed on construction, substantial amounts of EPA funds were tied up on more or less stagnant projects.

Validity of Cost Estimates. In obligating funds on construction grants, EPA has historically relied primarily on the cost data included in the prospective grantee's application. To determine whether such cost figures were reasonably accurate, we compared the original estimated costs with the figures as subsequently revised. In Region II for example, we selected 23 construction projects at random. Analysis of project files showed that for 18 of the 23 projects (78 percent) substantial increases or decreases in the grants were necessary. These changes ranged from an increase of 116.9 percent to a decrease of 13.4 percent. A similar analysis of selected projects in the Region VI revealed a similar situation. We attribute these frequent revisions to two major factors. These include:

1. EPA obligations are based on the figures contained in the grantees application. Commonly, these figures represent simply engineering estimates. Since detailed plans and specifications have normally not been prepared at the time the application is submitted, the grantee's engineer has little concrete information upon which to base his cost estimate.
2. Significant time lapses can occur between the time the engineering report is prepared, the application is made out, and plans and specifications are completed. For example, in the Mississippi project,



we noted that a 1966 grant application was based on a 1962 engineering report. Any delays in the construction project more or less automatically increases construction costs and thereby makes our obligation figures more and more obsolete.

Timing of Obligations. Despite the inaccuracies in estimating costs, the practice of obligating construction grant funds based on preliminary application information can be justified if the construction grant projects move quickly to construction. A review of projects pending construction by the Grants Administration Division as of December 31, 1972, identified 89 projects representing approximately \$35,000,000 of EPA funds which had been classified as pending construction more than two years. (This analysis included only projects awarded with 67-72 funds.) In reviewing the project register for ten states, we noticed that an additional 19 of the 473 active projects (4 percent) classified as pending construction were awarded prior to FY 1967.

To determine the reason such projects were not moving to construction, we selectively analyzed the respective project files. We learned that the selected projects were delayed because (i) the proposed treatment plants need redesigning, (ii) problems in obtaining necessary plant sites and easements, or (iii) inability in obtaining needed funds. For example:

Town of Raleigh, Mississippi - Project 271

Total Cost: \$152,000                      EPA Share: \$42,900

Classified as Pending Construction: 4 1/2 years

Reason: Town decided that they were not able to proceed unless they could obtain other grants. So far have been unable to do so.

Town of Sudlersville, Maryland - Project 134

Total Cost: \$1,293,000                      EPA Share: \$641,600

Classified as Pending Construction: 5 years

Reason: Bids received considered too high and rejected. Plant now under redesign to try to reduce cost.

City of Gentry, Arkansas - Project 249

Total Cost: \$460,000      EPA Share: \$253,000

Classified as Pending Construction: 3 1/2 years

Reason: Financing Difficulties

After analyzing these delays, we believe that EPA was in error in obligating its funds at such a premature date. Unless a grantee knows what plant he is going to build, where it is going to be built, the cost of the plant and actually has available the funds necessary to finance his share of the cost of the project, he is not ready to proceed. Similarly, we should not be ready to obligate our funds until a grantee is ready to go to construction.

Determination of Satisfactory Progress

Even though EPA procedures call for the withdrawal of grant offers when satisfactory progress was not being made, we noted that such procedures were generally not followed.

Paragraph 43 of the Construction Grants Handbook provides that

"A grant offer may be withdrawn at any time that it becomes apparent that satisfactory progress is getting the project underway or completed is not being maintained. In such cases the applicant will be furnished a letter explaining the reasons for the proposed action and will be given 30 days to develop a satisfactory plan for the project."

To facilitate the application of this requirement, each grant offer contains a requirement that plans and specifications be submitted and the project be under construction within specified time frames.

In reviewing project files, we concluded that action taken by EPA with respect to this requirement was indecisive. Although close contact was generally maintained with each grantee and EPA helped provide whatever assistance it could, no definitive actions were normally taken to get the projects moving. This is exemplified by the large number of projects remaining in the pending construction classification for extended periods of time. In reviewing project files, we noted that extensions in required submission dates were more or less automatically given. In only a few instances, did we find any indication that consideration was given to withdrawing a construction grant.

### Impact of Present Practices

The obligation of EPA construction grant funds, based on preliminary application information and the failure to get the grantees moving to construction or take appropriate action to withdraw our grant offer, has impaired EPA's ability to utilize its funds where needed. The millions of dollars tied up on projects, not going to construction, could surely have been utilized elsewhere. The money, for example, could have been used to finance other projects in the state which were ready to proceed or the funds might have been used to reduce the volume of reimbursable projects, thereby relieving state or local agencies of the necessity of pre-financing the Federal share of the costs of sewage treatment plants. In any respect, had the funds not been tied up on such projects, such funds would have been available for reallocation by the Administrator to states, cities, or projects really needing the money.

Since the present obligation procedures do not apparently safeguard the interests of the Federal government, we checked with other agencies to see if an improved system of obligations was being used which might cut down the time between obligation of funds and start of construction. We found that the Department of Health, Education, and Welfare's (DHEW) Hill-Burton Hospital Construction Program had what appeared to be better obligation procedures.

Under that program, application for a grant is a four-part process. Under this process, the first part is a more or less general application similar in content to our application. This part provides an overall view of the project including a narrative description of the project, preliminary cost estimates, and a number of required assurances. Approval of this part by DHEW assures Federal participation in the project, when other requirements are fulfilled.

Part 2 of the application contains information about the applicant's financial resources and serves as a control to see that the grantee actually has the money to proceed. Part 3 of the application establishes the applicant's ownership and rights with respect to the project site, and Part 4 is the final and most significant element of the application. This part provides the basis for grant offer and acceptance and ultimate obligation of funds. Before the Part 4 is approved, the plans and specifications must be reviewed and a determination made that the project is in accordance with Federal standards. In addition, the grantee must have obtained authorization to go to bid and actually completed the bidding process.

DHEW has found this system to be quite beneficial in that it permits great flexibility in using funds only on projects ready to proceed while still providing assurance that the Federal government will participate in the project. Such advantages are provided by

involving the state in the process. Through means of a project construction schedule the state maintains a preliminary control over where the available funds are going. On this schedule, the state shows the projects which have received preliminary approval, are probably going to construction that year, and the estimated funds to be used by such projects. If developments necessitate, the state then has the opportunity to make changes in the schedule as some projects proceed more rapidly than others. Since this system does not provide for obligation of funds until just before projects go to construction, DHEW has had no major problem with obligations tied up on projects not going to construction in a timely manner.

In reviewing the new water pollution control bill, Public Law 92-500, we noticed that Congress does not advocate premature obligation of Federal funds. In fact, Section 203(a) of the law provides that

"...The Administrator shall act upon such plans, specifications, and estimates as soon as practicable after the same have been submitted, and his approval of any such plans, specifications, and estimates shall be deemed a contractual obligation of the United States..."

#### Conclusions and Recommendations

Our review showed that EPA's present obligation practices resulted in the premature obligation of Federal funds. As a result, millions of dollars of EPA funds have been tied up on sewage construction projects which have not moved rapidly to construction. Accordingly, we are recommending that EPA's obligation procedures be changed. In this regard, we believe that obligations should not be made until plans and specifications are reviewed and approved, the prospective grantee has proper legal entitlement to the site or easements and the necessary finances, and until the cost estimates become more realistic through application of appropriate competitive bidding procedures. If these changes cannot be made, we urge that appropriate controls be established to assure that grant offers are withdrawn, whenever grantees do not move forward in a timely manner.

#### Management's Response

Officials representing the Office of Air and Water Programs and the Grants Administration Division generally agreed with our findings and conclusions. These officials pointed out that the implementation of Public Law 92-500 will establish a phasing system which should result in more efficient scheduling of funding and accomplishment of project objectives, whether planning or

construction. This system will require that plans and specifications be completed before obligation of the construction portion of the grant. With respect to those grants already awarded, the officials indicated that they were considering procedures for withdrawing grants from those communities who have not proceeded to construction in a timely manner. These procedures as currently envisioned, would provide a short period of notice to the grantee before deobligation would take place. If construction were to begin during the notice period, the notice would be withdrawn.

## Financing Construction Grants

EPA's procedure for financing wastewater construction projects resulted in (1) severe cash flow problems for local agencies and (2) duplicative administrative reviews by EPA and the state. Our reviews showed that grantees, such as the Metropolitan Sanitary District (MSD) of Greater Chicago, experienced considerable financial hardship under EPA's after-the-fact reimbursement system. In addition, in Region IX, we noted grantees experiencing delays in receiving Federal progress payments under the construction grant program. These delays, which sometimes exceeded two months resulted primarily because the progress payment requests were being subjected to detailed regional reviews which duplicated actions already performed by state personnel. A more efficient system would be to authorize a single state agency to disburse Federal and state funds concurrently upon completion of its review of the grantee's progress payment request. This could be accomplished if EPA provides the state agency with an advance payment or letter-of-credit system and authorizes its use for making payments on Federally sponsored construction grants. In addition to improving the timeliness of payment to grantees, the elimination of duplicative reviews would allow EPA personnel to direct their efforts to correcting other problems.

### Cash Flow Problems

Usually, construction grants are financed on an after-the-fact reimbursement system. This system does prevent grantee institutions from accumulating excess cash, however, the grantees are required to utilize a considerable amount of cash resources.

EPA regional procedures currently provide for four relatively equal grant payments during the period of construction of wastewater treatment facilities. However, current regulations permit the region to make more frequent payments if necessary. Since these facilities often require at least two years to construct, the grantee is required to use its own cash to pay contractor bills, engineering services and other charges during periods between the Federal payments. This can cause grantees to incur short term financing costs or lose interest income which would have accrued if such cash had been invested.

As an example, the treasurer of the MSD of Greater Chicago recently reported that

"if the District did not have its present bonding power, it would be impossible to continue our construction program and pay contractors in accordance with the terms of our contracts."

He calculated that under Federal and state reimbursable methods based upon quarter point (25%, 50%, 75% and 100%) completion, the District's interest expense on one project alone was over \$1,200,000 or 3% of the contract value. MSD projected that at one point in time (36 months from date of award), they may be compelled to disburse \$16,400,000, 41% of the total cost or \$8,400,000 more than MSD's share of the contract value. Based upon an ongoing construction program of \$200 million, the annual, unreimbursable prefinancing costs would range from \$4 to \$6 million per year.

#### Duplicative Administrative Reviews

In Region IX, the Grants Administration Branch, Management Division consists of nine people and is responsible for the administration of approximately 250 active Federal wastewater treatment construction grants. Of this amount, about 200 grants pertain to State of California projects. Additionally, the California State Water Resources Control Board (CSWRCB) Grants Management Division consists of 18 people and is responsible for project evaluation, monitoring of project construction and grant administration functions, which include those functions relating to project payments. The division generally follows the Federal government payment procedures as adapted to the division's needs.

Under state construction grant payment procedures, which are the same as those followed by EPA, the grantee is required to submit a payment request to the state along with the following data: (i) Contractor's Monthly Pay Estimate and (ii) Combined Voucher Register and Expenditure Distribution Journal. These data are then reviewed to determine if conditions for payment have been met and if ineligible items and unacceptable change orders have been eliminated. A review is also made to assure that insurance and labor standards are being complied with. The state then completes a control form entitled "Project Progress and Payment Request" calculating the value of eligible work in place and that portion to be paid by the state. This form and supporting data are then sent to the region for concurrence and application of the Federal share percentage to eligible work in place. Upon receipt at EPA, the Grants Administration Branch essentially repeats the review process prior to calculating the Federal share and authorizing payment.

Our review of 30 grantee requests for progress payments submitted since October 1971 disclosed that the region's Grants Administration Branch required an average of 30 days to complete its review. This represents the period from the date of receipt of the state's computation of eligible work in place until the date of the region's payment approval. Approximately 60 percent

of the payment requests were delayed in excess of 21 days with the longest delay being 67 days for Project WPC-CAL-489. We noted that the region's review of the progress payment requests resulted in only three relatively minor changes to the state's calculation of eligible work in place, while it concurred with the calculations for the other 27 requests. The above delays do not take into account the fact that grantee must wait an additional three or four weeks after the EPA regional review before receipt of a check from the U. S. Treasury. In addition, disbursement of state funds to grantees is delayed because of the state's current practice of not providing payment until the Project Progress and Payment Request form has been approved and returned by EPA.

#### Administrative Priorities

Region IX's review of payment requests from grantees in California is based on the premise that it provides a means of administrative control over grantees by making payment contingent upon compliance with certain requisite actions. However, because this review duplicates the state's reviews, we believe more effective use can be made of the time of these regional personnel. The time currently being spent by grants administration personnel in reviewing individual progress payment requests of California grantees could be redirected to grantees from other states. Their effort could also be redirected towards establishing and maintaining an effective system of initiating and coordinating appropriate regional technical inspections, plans and specifications reviews, and operation and maintenance functions. With this additional administrative assistance, regional technical personnel could direct their efforts toward assuring that treatment plants are properly designed and constructed and effectively operated and maintained so as to meet the objectives of the Act.

Many of the problems described above would be alleviated by a change in EPA's funding method in which a single state agency would be authorized to disburse Federal and state funds concurrently upon completion of its review of the grantee's progress payment request.

#### Funding Methods

In our Report of Analysis of EPA's Method to Funding Grants to State and Local Governments, we discussed the pro's and con's of the various funding methods that can be used for financing EPA projects such as wastewater construction grants. These include (1) Advance Payment System; (2) Reimbursement System Agencies; (3) Letter-of-Credit System and (4) Single Letter of Credit System.



(1) Advance Payment System

This method of withdrawal of cash from the treasury for advances under Federal grant programs is set forth in U. S. Treasury Department Circular No. 1075, revised. In this regard, the circular provides that:

"Advances shall be limited to the minimum possible. Advances shall be timed to be in accord with the actual cash requirements of the recipient organization..."

Although the limitation precludes providing excess cash to grantee institutions, we believe the government, similarly, should not require the grantee to finance the Federal share of a grant. When the Federal government does not provide its share of the cash when required, the grantee is forced to divert his resources from other programs. Since most of our grantees, especially state and local governments have limited resources, the continued use of this funding method could result in financial hardship and even force the discontinuance of needed Federal grant programs.

It should be noted that advance payments without interest are permitted on nonprofit contracts with nonprofit educational, research institutions or in other classes of cases when specifically authorized by agency procedure (see Federal Procurement Regulations Subpart 1-30.4).

(2) Reimbursement System

Most of EPA's construction grants are financed on an after-the-fact reimbursement system. This system does prevent grantee institutions from accumulating excess cash. However, the grantees are required to furnish a considerable amount of cash resources. This can often create a considerable hardship on grantees because very significant sums can be tied up for a long period of time until a subsequent reimbursement voucher can be submitted, reviewed and paid.

(3) Letter-of-Credit System

Probably the most effective funding method currently being used by the Federal agencies, is the letter-of-credit system. This system operates through a cash advance mechanism under which the grantee makes cash draw-downs on his letter-of-credit to pay project costs as they are incurred and billed. From the grantee's point of view, the letter-of-credit is desirable in that it precludes the necessity for incurring borrowing charges or for diverting

assets from other activities. In addition, this system is advantageous to the Federal government in that funds are drawn only a few days before needed thereby preventing the payment of interest on grant funds until required.

#### (4) Single Letter-of-Credit

The operations of the letter-of-credit system are discussed in Part IV, Chapter 1000 of the Treasury Fiscal Requirements Manual. A single letter-of-credit system is simply the replacement of numerous agency letters-of-credit held by state agencies and/or state-supported institutions with one letter-of-credit administered centrally. The system is designed to achieve several major objectives and provide benefits which are important to both the state and the Federal government. The major objectives are:

- o Provide a central point of control outside the state agencies receiving the grant awards, whose function is to draw cash as outlined in the letter-of-credit procedures and monitor the state agencies disbursements so as not to exceed the amount authorized for each grant award.
- o Provide the states with an improved system for reducing the amount of unused Federal cash on hand, without impairing state-Federal programs, thereby reducing interest charges on borrowed funds.
- o Strengthen the communications between the state and Federal governments and establish better financial management of the taxpayers dollars.

In 23 states, all EPA grants go to the same agency. In these states it would be relatively easier to use the single letter-of-credit approach. In the other states, EPA funds go to two or more state agencies. Because of the success of the Department of Health, Education and Welfare's single letter-of-credit system in the involvement of more than one state agency, we concluded that the single letter-of-credit system could be used in all the states by EPA.

During our review of state Water Programs, we noted one example of a single state agency performing virtually all Federal and state disbursements to construction grantees. In 1969, the legislature of the State of Ohio established the Ohio Water Development Authority (OWDA). The OWDA was

established to avoid the need for each individual grantee to float bonds at from 7 1/2 to 9 percent to finance the non-Federal share. OWDA, by floating one huge issue and by having acceptable collateral, was able to borrow money at from six to seven percent. Any eligible applicant on the State's priority list would, when his project was approved, be assured by receiving the 30 percent Federal fund (subject to a final adjustment) and a commitment for a State "loan" for the remainder. As grantees incurred costs, the bills were forwarded to and paid by the OWDA. By written assignment, the grantees authorize EPA to send all payments directly to OWDA which handles the funds on their behalf. The local grantees are required to repay the non-Federal share of project costs to OWDA.

This method of payment is considered advantageous in that, by dealing with one state agency as the central point of control of construction grants disbursements, it results in less administrative burdens for Federal, state and local government representatives.

#### Conclusions and Recommendations

EPA's present system of financing wastewater construction projects results in severe cash flow problems for local agencies, untimely payments to grantees and duplicative reviews by EPA and the states. A re-evaluation of the Agency's method of funding construction grants should be made to preclude the necessity for incurring borrowing charges to pre-finance the Federal share of disbursements. Grantees experience considerable delays in receiving both Federal and state progress payments because of detailed EPA reviews which duplicate actions already performed by state personnel. A more efficient system would be to authorize a single state agency to disburse Federal and state funds concurrently upon completion of its review of the grantee's progress payment request.

In our report of Management Audit at Region IX Administration of Sections 7 and 8 of the Federal Water Pollution Control Act, we recommended the use of a single letter-of-credit to the CSWRCB to cover all Federally-sponsored wastewater treatment construction grants. The CSWRCB indicated its interest in participating in a letter-of-credit system. In addition, in our Report on Analysis of EPA's Method of Funding Grants to State and Local Governments, we also recommended the use of the single letter-of-credit system by EPA.

### Management's Response

Region IX officials generally concurred with our findings and recommendations including the use of the single letter-of-credit to cover all Federally-sponsored wastewater treatment construction grants. Representation of the Grants Management and Contract Management Divisions also concurs with the findings and recommendations contained in our Report on Analysis of EPA's Method of Funding Grants to State and Local Governments. However, the Deputy Assistant Administrator for Resources Management did not believe the Agency should move immediately to the letter-of-credit funding system but that such a system should be preceded by a detailed study of both program and financing arrangements. On June 6, 1972, he requested that the letter-of-credit survey be deferred for six months and then be reconsidered by top EPA management. This approach was agreed to by the Assistant Administrator for Planning and Management.

### Auditor's Comments

A re-evaluation of EPA's method of financing construction grants should be made to resolve the cash flow and duplicative administrative problems resulting from current procedures. Grantees should not be required to finance the Federal share of a grant and therefore more equitable funding arrangements should be employed. Consideration should also be given to the concept of a single state agency making all the necessary disbursements to all construction grantees within its jurisdiction for more effective utilization of Federal, state or local personnel.

### Accelerated Payments

Special procedures established to govern accelerated payments on reimbursable construction grants did not retain aspects of financial control traditionally a part of the payment system. As a result, we found that in Region II (i) payments were made to grantees contrary to grant terms and conditions, and (ii) full payments were made before completion of the construction projects. In some instances, final inspections of such projects identified operational problems which substantially hampered the effectiveness of the sewage treatment plants. By removing these controls, EPA retained no effective means of assuring that required actions would be taken to adhere to grant terms and conditions and to make the changes necessary to provide an effective sewage treatment system.

Traditionally, EPA officials have utilized the construction grant payment system as one of the major controls to assure that the grantees performed as intended. Interim or progress payments were used as a control in that such payments would not be made unless the grantee was complying with grant terms and conditions. Final payments also served as a control in that full payment would not be made until all grant conditions were fulfilled, all work had been accomplished in accordance with approved plans and specifications, and the project had produced an operable treatment system which would treat wastes satisfactorily to meet appropriate standards. Thus, interim payments have normally been limited to 90 percent of the grant amount, and final payments have not been made until final inspection.

At the end of Fiscal Years 1971 and 1972, substantial funds became available for use in funding reimbursable projects. In April 1971, \$150 million dollars became available for use in reimbursable projects. In Fiscal Year 1972, New York State wished to utilize its allotted funds on reimbursable projects. To handle these situations, EPA developed and authorized the use of an accelerated payment system. This system, however, did not incorporate several of the controls normally a part of EPA's payment system.

### Payments Contrary to Grant Terms and Conditions

Our review showed that in making payments, Region II was apparently not considering the special terms and conditions included in its construction grants. In some cases, partial payments were made even though grantees had not fulfilled conditions which were to be met prior to payment. Examples of such instances are shown below.

Parsippany-Troy Hills, WPC-NJ-288. One of the conditions contained in the grant provided that no payment can be made until construction of an expanded treatment plant. Correspondence in the project file indicated that EPA did not receive an application for an expanded treatment plant until September 1971, and that application had to be returned because EPA's continuing resolution did not provide for reimbursable projects. EPA had, however, made a payment contrary to grant provisions in June 1971, three months earlier.

Bergen County Sewer Authority, WPC-NJ-242. One of the conditions of this grant provided that no funds could be released until construction was started on a new treatment plant for Bergen County Sewer Authority. Despite this condition, a payment was made even though an inspection performed a month earlier disclosed the fact that construction had not started.

Ellicottville, WPC-NY-610. This grant contained a condition providing that no payments would be made until the collection system was under construction. In June 1972, EPA made a payment even though construction of the lateral sewer (collection) had not been started.

Since most of the payments contrary to grant terms and conditions had occurred during the last quarter of Fiscal Year 1971, we inquired as to the reason for such payments. We were informed that, in conjunction with establishment of the accelerated payment system, responsible Headquarters officials had verbally instructed the Region to waive such terms and conditions and to make such payments on a one-time basis. In our opinion these payments, contrary to grant terms and conditions, set a bad precedent which might be construed by grantees to indicate that our grant terms and conditions are not really that important and that payments are not necessarily contingent upon compliance with grant terms and conditions.

#### Payments in Full Prior to Satisfactory Completion of Project

Guidelines governing the use of the accelerated payment system did not contain the controls necessary to assure that construction projects would be properly completed and would result in an effective waste treatment system before the full payment of grant funds.

Under the accelerated payment system, the method of computing the amount of payment was changed. Previously, the payment was computed by simply applying the percentage of project completion to the amount of funds authorized. This could be illustrated as follows:

Eligible Project Costs	\$1,000,000
Grantees Entitlement (50%)	500,000
Actual Grant Offer (20%)	200,000

Project 50% complete

$$50\% \times \$200,000 = \underline{\$100,000} \text{ payment}$$

The accelerated payment system changed the basis of computing payments on reimbursable grants. Under this system, payment was to be made on the basis of the grantee's entitlement (maximum grant to which municipality entitled). The instructions relating to this system did not however restrict payments to 90 percent of the grant amount as required by the Construction Grants Handbook. Accordingly, some grantees were paid 100 percent of the authorized grant amount even though construction was not completed. For example:

Northwest Pure Waters District #1  
WPC-NY-496

<u>Eligible Cost</u>	<u>Percentage Entitlement</u>	<u>Federal Share</u>	<u>Percentage Share</u>
\$39,716,200	55%	\$13,106,390	33%

Payment when 65% complete computed as follows:

Eligible Costs	\$39,716,200
Portion of Project Completed	<u>65%</u>
Value of Construction in Place	\$25,818,900
Entitlement	<u>55%</u>
	\$14,200,395*

\*Since this exceeded the amount of grant funds available, payment was limited to \$13,106,390 the full amount of our grant.

Thus, since all authorized funds had been paid to the grantee, EPA had no effective financial control to assure that construction projects were properly built in accordance with plans and specifications and/or that such projects would operate properly.

We reviewed project files related to 23 of Region II construction projects and identified six projects where full payment had been made before final inspection. In three of the six projects, final inspections showed significant operational deficiencies which prevented finalization of the project. Examples of the projects where final inspections revealed deficiencies are shown below.

Lowville, WPC-NY-606. At the time full payment was made, no final inspection had been made to determine whether or not the plant was completed and operated properly. When the final inspection was made in June 1972, EPA inspectors found that the test results gathered by the grantee were insufficient to tell whether the plant was operating properly and achieving the 85 percent BOD removal required under the grant. In addition, the engineers found that the flow of sewerage through the plant was in excess of design capacity and that the system was therefore apparently suffering from an infiltration problem. As a result of the inspection, a memorandum was sent to the grantee asking him to gather the necessary test data and to provide information on the progress of work in reducing the infiltration into the sewerage system. When we reviewed the file in October, we found no indications of the status of corrective action being taken.

Musconetcong, WPC-NY-211. Full payment was made on this project, even though the plant was known to have operating deficiencies. In a final inspection held during November 1971, EPA engineers found that the plant was not achieving the necessary removals of BOD and suspended solids. Accordingly, a memorandum was sent to the grantee asking that EPA be advised of the changes made to improve the plant's operation and to eliminate the problems of solids overflowing the weirs of the secondary clarifiers. At the time of our review in October 1972, the project file contained no information concerning the status of actions taken to correct these deficiencies.

In our opinion, had EPA only paid 90 percent of the grant amount, the Region would have had a real lever to assure that corrective action was taken in a timely manner.

### Conclusions and Recommendations

Our review showed that the establishment of an accelerated payment system without the controls traditionally a part of the construction grant program could seriously impede the Region's management of the Section 8 program. Accordingly, we are recommending that the Grants Administration Division take appropriate action, in establishing any future payment systems, to assure that:



1. Payments are not made contrary to grant terms and conditions.
2. An appropriate amount of funds is withheld to assure that construction projects are properly built in accordance with plans and specifications and that such projects operate properly.

#### Management's Response

Representatives of the Grants Administration Division stated that:

"This Division agrees that adequate financial controls should be maintained to assure satisfactory completion of a project. The EPA general grant regulations (40 CFR Part 30) provide for suspension of work or withholding of payment for noncompliance with grant conditions. In addition, the new construction grant regulations to be published in the Federal Register on February 28, 1973, (as 40 CFR Part 35, Subpart E) explicitly provide for disbursement of the final payment only upon EPA approval of the request and upon compliance by the grantee with all applicable requirements of the regulations and grant agreement. The Grants Administration Manual will provide clear guidance to the staff on handling payments."

## Construction Grants Payment System

Procedures governing EPA's system of making payments on construction grants need revision to prevent regional officials from performing administrative functions properly the responsibility of our grantees. When we reviewed the payment systems in two regions, we noted that EPA technical personnel were reviewing the grantees accounting records and preparing the grantees claim for reimbursement. In another region, administrative personnel were preparing the grantees claim based upon original source documentation furnished them by the grantee. These systems prevent grantee institutions from becoming thoroughly familiar with EPA's financial, accounting, and grant requirements and therefore, from being able to submit their own reimbursement claims.

Chapter 13 of the Construction Grants Handbook sets forth the procedures for making payment under EPA's Construction Grants Program. This Chapter provides that:

- "79. Request for Payment. The applicant may request installment payments on the grant when the construction of the project is 25, 50, 75 and 100 percent completed.
- "80. Processing of Preconstruction Grant Payments. Upon receipt of a request for a partial or final payment in the Regional Office, the Administrative Section will review the project file to determine if all necessary information upon which to base a payment is available. If not, the project reviewer will prepare a letter to the applicant requesting that necessary materials be submitted. These will usually consist of anti-kickback statements, certified payrolls, evidence of contractor's insurance, monthly engineering estimates certified by the contractor, bills for engineering, legal and fiscal services, etc.
- "a. Partial Payment. When it has been determined that all program requirements have been met by the applicant, the project reviewer will compute the amount of the payment...following the principles outlined for preparation of the Project Progress and Payment Request form; however, it is not necessary to use the form for these payments.

"b. Final Payment. When program requirements have been met, the project reviewer will initiate Form FWPCA-10, Project Progress Report and Payment Request, completing it to the extent possible from the project records. The FWPCA-10 will be forwarded to the Engineering Section, for scheduling of the inspection, with a note outlining any special areas to be reviewed by the engineer on his visit to the project. At the time of the inspection, the inspector will complete the Form FWPCA-10 in accordance with instructions."

Our review showed that regional officials were generally operating in accordance with these requirements. After analyzing the impact of such requirements on EPA's ability to manage the construction grants program, we concluded that the costs of these requirements, in terms of use of highly trained technical or administrative personnel to perform functions properly the responsibility of our grantees, simply was not justified.

In Regions V and IX, technical personnel were involved in preparing the grantee's claim. In this regard, we found that during visits to the grantee, EPA engineering personnel were reviewing financial and administrative records. This review provided the basis for these individuals to actually prepare the FWPCA Form 10, "Project Progress Report and Payment Request" for the grantee. In one region, discussion with EPA engineering personnel revealed that at least 50 percent of the engineers time during final inspection was devoted to such administrative functions.

In Region II, the Grants Administration Branch was performing a similar function. For partial payments, grantees were to submit a request for payment accompanied by necessary supporting documents. After checking to see that the necessary documents were submitted and reviewing any vouchers for legal, administrative, fiscal, or engineering services, the Regional Grants Administration Branch would determine the amount of payment due the grantee and initiate payment action. The processing of final payments was handled somewhat similarly. After final inspection of the project and correction of any operating problems, grantees again would be requested to submit documentation supporting the unclaimed costs incurred under the project. Such documentation would normally be comprised of copies of the original vouchers, bills, and checks representing the charges to our construction project. Reviews were then made by the Region's Grants Administration Branch to determine which of these costs represented reasonable, eligible, and allowable charges to our grant. Based on this determination, the final computation of

the amount due our grantee would be made, and action would be taken to initiate final payment.

Since the administration of construction grants represents the major function of the Region II Grants Administration Branch in terms of time and effort, payment processing is one of the Branch's main responsibilities. The review of original source documentation constitutes a major portion of this responsibility in that regional officials estimated that the review of vouchers to support simply legal, fiscal, and administrative costs took 60 percent of the final payment review time and 25 percent of the overall payment review time.

The review of source documentation supporting claims against the Federal government is an audit function delegated to the Office of Audit under EPA Order 1110.16. The involvement of other EPA officials in this process complicates the audit process and creates difficulties with the grantee. For example, one national certified public accounting firm has informed EPA Office of Audit that: (1) grantees generally do not understand EPA record keeping requirements and do not adequately account for eligible costs, (2) grantees resent final audit because they were under the impression that the regional engineer's audit was final, and (3) grantees have not properly documented cost claims because they did not prepare the FWPCA-10 and frequently did not know how the regional engineer computed eligible costs. These problems have resulted in increases of CPA audit costs to the point where Region V audits now cost significantly more than audits in other EPA regions.

Since the performance of a detailed review of such documentation by the regional engineers or administrative personnel was in our opinion, simply a duplication of effort, we inquired into the necessity of such reviews. We were informed that such reviews were necessary in that the Construction Grants Handbook required them. In addition, we were informed that most of our grantee's did not have the expertise to properly account for and submit claims for reimbursement. As support for this position, Region II officials pointed out that many of the bills submitted with the request for payment contained ineligible and/or unallowable costs.

While many of our grantee institutions do have difficulties in administering Federal programs, we can see no reason why this should prevent them from being expected to properly account for grant funds and submit reimbursement claims under our construction grants. Such grantees are expected to perform these functions under all other EPA grant programs. In addition, we feel that unless such grantees are actually required to perform these accounting and reporting functions, they will probably never achieve expertise in regard to EPA's financial, accounting, and grant requirements.

In support of our position, we noticed that Attachments G and H of OMB Circular A-102 which became effective on January 1, 1973, require that grantee institutions have:

1. An acceptable financial system to account for costs incurred under Federal grants. This system must appropriately segregate costs by budget category and separate ineligible and unallowable costs from those to be charged to the grant.
2. The responsibility for submitting reimbursement vouchers claiming those costs allowable under grant terms and conditions.

To make allowance for grantees who do not have the basic expertise to perform these functions, these Attachments provide that the Grantor Agencies, such as EPA, should assist the grantee in improving his system to meet Federal requirements. Basic grant close-out requirements set forth in Attachment L require that close-out be made based on submission of the necessary financial reports by the grantee. Subsequent financial adjustment to the grant may then be made whenever subsequent final audit identifies a claim for unreasonable or unallowable costs.


#### Conclusions and Recommendations

Our review showed that regional officials were spending a considerable portion of their time reviewing grantee accounting documents and preparing the grantees reimbursement claims. Such efforts tend to discourage the grantee from developing the expertise needed to perform such functions himself and result in a duplication of part of the EPA audit effort. Accordingly, we are recommending that the Headquarter's Grants Administration Division revise their policies to return the reporting and voucher preparation functions to the grantee. In addition, we believe that the procedures should be established to shift the role of regional Grants Administration Branch's from the detailed review of supporting documentation to the assistance of grantee institutions in acquiring the financial or accounting system and knowledge of grant terms and conditions needed for proper management of our grants.

#### Management's Response

The submission of individual findings concerning the construction grants payments system to the individual regions resulted in widely varying responses. Region IX concurred with our finding and indicated that technical personnel would no longer be used to review administrative and fiscal data. Region V nonconcurred, however, indicating that such reviews were necessary. Region II generally agreed that grantees

should prepare their own claims; but pointed out that many grantees just do not have the needed expertise. Based on these varying responses, we discussed this situation with responsible officials of the Grants Administration Division. These officials pointed out that the "Regulations" published February 28, 1973, called for payments to be made simply on the basis of requests submitted by the grantee. The overall payment system to be used for construction will be explained in greater detail in the revisions to the Grants Administration Manual now being drafted.

  
John D. Lisle  
Director, Office of Audit

# Memorandum

APPENDIX A

To : Gavin M. Craig  
Chief Counsel

Date : September 27, 1972

From : STATE WATER RESOURCES CONTROL BOARD  
James W. Winchell

Subject: Review of Selected Contract Documents Related to Construction of  
Wastewater Treatment Facilities, Competitive Bidding Problems  
Related Thereto, and Recommendations

This is in response to a request from Mr. Nelson for a review of contract documents of certain consultants doing considerable business in the field of construction of wastewater treatment facilities under the Clean Water Grant Program.

## Scope of Review:

Contract documents of six major consultants in the field of construction of wastewater treatment facilities have been reviewed for purposes of this report. It is believed that these documents present a fair cross section of the standard provisions and approaches used by consultants in this field. This memorandum is primarily limited to the major problem encountered in this review, the problem of assuring that competitive bidding requirements are fulfilled.

## Summary of Legal Requirements and Contract Provisions Related to Competitive Bidding:

All contract documents reviewed to date involve municipal projects which are subject to the provisions of Government Code Sections 37901-37907. A copy of these sections of the Government Code is attached for your reference. Basically, all public projects of a city which require an expenditure of \$3,500, or more, are required to be contracted for and let to the lowest responsible bidder after notice. (Gov. Code Sec. 37902.)

The standard contract for clean water grants contains the following provision:

"5. Municipality shall comply with assurances given to the Environmental Protection Agency which are contained in the document entitled Offer and Acceptance of Federal Grant for Sewage Treatment Works, a copy of which is attached hereto, marked Exhibit A, and made a part hereof, and further the municipality agrees that the State Board shall be entitled to all the rights and privileges of the Environmental Protection Agency pursuant to said assurances."

A copy of Exhibit A is attached hereto. Of particular concern to the present inquiry are the following assurances:

"A. That actual construction work will be performed by the lump sum (fixed price) or unit price contract method, that adequate methods of obtaining competitive bidding will be employed prior to awarding the construction contract, and that the award of the contract will be made to the responsible bidder submitting the lowest acceptable bid;

"B. That the construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of State, territorial and local laws and ordinances."

The demand of competitive bidding thus imposed requires that contract documents for construction of wastewater treatment facilities provide an adequate means for obtaining competitive bidding and provide for award of the contract to the lowest responsible bidder. In the contract documents reviewed, problems associated with both of these requirements are noted.

Methods of Bidding, Bidder Selection, and Change of Contract As Limiting Competitive Bidding:

In the contract documents reviewed, the process of competitive bidding is, in all cases, to a greater or lesser degree, restricted by limitations placed upon the equipment or materials which may be bid. Major items of equipment (and in some contract documents even minor items of materials) are defined by reference to manufacturer or trade name. This is ordinarily accomplished in one of two ways:

1. In the bid proposal form itself, the consultant may include a specific listing of principle items of equipment, followed by one or more manufacturer's name, and appropriate space to bid the item. A sample of the form is as follows:

<u>Item</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Price</u>
1	Comminutor	a. Worthington	\$ _____
		b. Chicago Pump	_____
		c. _____	_____



2. An alternative method of accomplishing the same thing is to include the manufacturer designation in the technical specifications. For example, in that portion of the technical specifications dealing with comminutors, the following language suffices to accomplish the same result: "Comminutor shall be Worthington size 36-6, equivalent model manufactured by Chicago Pump, or equal."

There is a third alternative which would accomplish the same result without actual specification by manufacturer or trade name. The technical specifications may be so drafted that only the equipment of one manufacturer can meet the specification.

Regardless of the method chosen, the overall result of any of the methods is the same. The process of competitive bidding is restricted. The degree of the restriction depends to a large extent on the nature of the contract provisions related to the possibility of bidding alternate equipment, the process of selection of the lowest responsible bidder, and provisions related to modification of the contract after award.

A. Procedures Relative to Bid of Alternate Equipment:

The provisions of the contractual documents reviewed pertaining to bid of alternative equipment vary from consultant to consultant and from project to project. My general observations on the approaches of various contract documents are as follows:

1. Some contract documents specify only one manufacturer's product which may be bid. No alternatives are listed or permitted. This has an obvious tendency to limit the scope of competitive bidding. Competitive bidding on construction projects essentially revolves around two areas, the furnishing of labor and the supplying of materials. When material selection is contractually limited to one particular product, the only portion of the competitive possibility remaining relates to the cost of labor.
2. Most contract documents specify more than one manufacturer's product as being acceptable for the project, as in the illustration given above with respect to comminutors. This process still effectively limits to some degree the scope of competitive bidding on that portion of the project related to supply of materials.
3. Where more than one manufacturer's product is designated, most contract documents give a natural and practical competitive advantage to one of the manufacturers (commonly

referred to as a sub-item (a) manufacturer) by virtue of system design. The contract documents uniformly provide that the cost of any alterations, including design costs, required by alternate equipment or materials shall be included in the cost of the alternate equipment, thus inevitably increasing the cost of alternate equipment. Second, the contractor is ordinarily required to warrant that the alternate equipment will meet specifications and fulfill design purposes. This additional obligation on the part of the contractor makes it much more attractive for the contractor to bid the sub-item (a) equipment where design capability remains a liability of the consultant. These practical considerations limit competitive bidding on equipment and materials.

4. Where more than one product is permitted by the contract documents, some contract documents further allow other alternates to be bid. A full competitive bidding process is limited even in these cases by the competitive advantage given to the specifically designated item or items, and by the fact that the general methods chosen for approval of unspecified alternate equipment are cumbersome, expensive and time consuming on any contractor who wishes to bid alternate equipment.
5. Some contract documents specify equipment, generally with at least two alternate products permitted, provide that all specified equipment is considered as equal, and allow the bidder to bid any specified equipment, or to bid other alternate equipment. This alleviates, to some extent, some of the limitations on competitive bidding noted above.

B. Determination and Selection of Lowest Responsible Bidder, and Modification of Contract After Award

In addition to limitation of the competitive bidding process by virtue of specification of proprietary equipment, certain problem areas are noted with respect to contract provisions related to the manner of selection of the lowest bidder, and the ancillary problem of change of work after award of the contract. Generally speaking, these problems involve possible award of the contract on a cost basis other than the cost of the project which will be actually constructed. In this area also, contract documents varied in a number of ways. As illustrative of the general nature of the problems, the following examples will suffice:

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1. One set of documents provided that award would be made in accordance with what the owner determined to be its best interest. This, of course, is not an appropriate basis for award of a competitive bidding contract.
2. Some contract documents provided that all bidders would be required to bid all sub-item (a) equipment and to include in their ultimate bid the cost of installation of all sub-item (a) equipment. The contract was then to be awarded to the lowest responsible bidder, with the right reserved to the owner to select alternate equipment after award of the contract. This approach creates the possibility that award of the contract is not based on the lowest cost of the actual project to be constructed.
3. One contract document provided for change of equipment after award of the contract, at the option of the owner, with alternate approval of equipment to be provided at the same price as in the contract awarded. This procedure deprived the owner of any possible savings on alternate equipment actually installed.

#### Recommendations:

Specification of major items of equipment by proprietary name to some extent may be both appropriate and necessary. The owner, and hence its consultant, is required by law to provide sufficient plans and specifications to permit competitive bidding, i.e., design cannot be left in the hands of the various bidders to the extent that essentially different systems are bid. This forces the consultants to design a system, and implicit within this approach, the consultants must specify such equipment as will reasonably suit the system.

In addition, the consultant is responsible to design a system, including equipment, which will work. Where certain equipment is known and of proven capacity and durability, it is understandable that a consultant will be under some pressure to specify equipment by proprietary name where he knows that this equipment will do the job required. The basic problem is to assure an adequate system while at the same time fulfilling competitive bidding requirements and assuring that the project will be constructed at the lowest possible cost.

In the light of competitive bid requirements, and in the light of the foregoing considerations, I would recommend the following approach on bidding procedures, determination of low bidder, and modification of contract after award:

1. Bidding Procedures: The objective to be achieved is to provide adequate methods of obtaining competitive bidding prior to award of the contract. To this end, regulations directed to the following matters should be considered:
  - (A) To the extent practical, plans and specifications should be drawn so that materials and equipment are specified relative to quality and function rather than by trade or proprietary name.
  - (B) Major items of equipment may, when necessary to adequate system function, be specified by trade or proprietary name, under the following requirements:
    - (1) To the extent possible, systems should be designed to accommodate, with as few revisions as possible, the equipment of all major manufacturers.
  - (C) Limitation of bidding to the product of one designated manufacturer is not to be favored, and will be permitted only under the following circumstances:
    - (1) Where plant enlargement is involved, and where the existing system is such that only the equipment of one manufacturer will meet the needs of an already existing system.
    - (2) Where there is no known equal for the equipment or materials specified.
    - (3) In cases where only one product is permitted for bid, the consultant shall supply a verified statement justifying the limitation involved.
  - (D) Where equipment is to be specified by trade or proprietary name, the consultant shall include, as an alternate, the equipment of all manufacturers reasonably adequate to function within the system design.
  - (E) Where equipment is specified by trade or proprietary name, and alternate equal equipment is also specified, the alternate equipment should be treated in all respects as equal, subject to the following rules:

- (1) In bidding any alternate equipment, the bidder may be required to include within the cost of alternate equipment the cost of any system revision, including design work, necessary to accommodate the alternate equipment.
    - (2) Since equal equipment is involved, the contractor should not be required to warrant the alternate equipment to any greater extent than the primary equipment.
  - (F) Where alternate equipment is designated by trade or proprietary name, the bidder should also be permitted to bid other alternate equipment which is believed by the bidder to be equal to that specified, under the following rules:
    - (1) In bidding such alternate equipment, the bidder may be required to include in the cost any system revision, including design work, necessary to accommodate the equipment.
    - (2) The bidder may be required to submit such information as is reasonably necessary to permit the consultant to determine whether the proposed alternate is in fact equal, prior to award of the contract.
    - (3) If the proposed alternate equipment is found to be equal, the bidder shall not be required to warrant this equipment to any greater extent than the designated equipment.
  - (G) When any equipment or materials are specified by trade or proprietary name, the consultant shall, by affidavit, affirm that the consultant does not have any interest, direct or indirect, financial or otherwise, in or with the manufacture of such equipment.
2. Determination of Low Bidder: The objective is to assure that the contract is in fact awarded to the lowest bidder on the project to be constructed. To assure this objective, the following procedures should be adopted:
- (A) The contract documents should specifically provide that the contract will be so awarded.
  - (B) The contract documents should provide for procedures to determine whether unspecified alternate equipment is in fact equal prior to award of the contract.

- (C) The contract documents should provide that determination of the low bidder will be based upon the overall low cost determined with reference to the bid cost of any alternate and equal equipment.
- (1) Contract documents which require the bidder to include in his lump-sum bid the cost of so-called primary equipment (sub-item (a) equipment) and which provide for determination of the low bidder solely on this basis are to be disapproved.
  - (2) The bidder may be required to bid all primary items of equipment (sub-item (a) equipment) by unit price for comparison purposes.
  - (3) The bidder should be required to provide a lump-sum bid which includes the lowest cost for construction of the project based upon use of any designated equal equipment, primary or alternate.
  - (4) In addition, the bidder should be permitted to submit a lump-sum bid which includes the cost of any undesignated alternate equipment proposed by the bidder as being equal to that actually designated.
- (D) The contract documents should require the owner and consultant to determine, insofar as possible, prior to award of the contract, what equipment of that which is equal will actually be installed in the project, and to award the contract on this basis.
3. Modification of Contract After Award: It is permissible for contract documents to provide for contract changes after award. The objective is to assure that the power to change or alter does not subvert the entire bid process. Assuming that the foregoing procedures have been properly implemented, there should ordinarily be no reason for major alteration of equipment after award of the contract. Changes or alteration of equipment or material should therefore ordinarily be limited to situations where the alteration is necessary to assure adequate system function. In such event, any savings occasioned by the alteration should go to the benefit of the owner, and the contract should not provide for alternate equipment at the original unit price, regardless of actual cost.

*James W. Winchell*

James W. Winchell  
Associate Attorney

"(2) that such works are in conformity with any applicable State plan under section 303(e) of this Act;

"(3) that such works have been certified by the appropriate State water pollution control agency as entitled to priority over such other works in the State in accordance with any applicable State plan under section 303(e) of this Act;

"(4) that the applicant proposing to construct such works agrees to pay the non-Federal costs of such works and has made adequate provisions satisfactory to the Administrator for assuring proper and efficient operation, including the employment of trained management and operations personnel, and the maintenance of such works in accordance with a plan of operation approved by the State water pollution control agency or, as appropriate, the interstate agency, after construction thereof;

"(5) that the size and capacity of such works relate directly to the needs to be served by such works, including sufficient reserve capacity. The amount of reserve capacity provided shall be approved by the Administrator on the basis of a comparison of the cost of constructing such reserves as a part of the works to be funded and the anticipated cost of providing expanded capacity at a date when such capacity will be required;

"(6) that no specification for bids in connection with such works shall be written in such a manner as to contain proprietary, exclusionary, or discriminatory requirements other than those based upon performance, unless such requirements are necessary to test or demonstrate a specific thing or to provide for necessary interchangeability of parts and equipment, or at least two brand names or trade names of comparable quality or utility are listed and are followed by the words "or equal";

"(b) (1) Notwithstanding any other provision of this title, the Administrator shall not approve any grant for any treatment works under section 201(q) (1) after March 1, 1973, unless he shall first have determined that the applicant (A) has adopted or will adopt a system of charges to assure that each recipient of waste treatment services within the applicant's jurisdiction, as determined by the Administrator, will pay its proportionate share of the costs of operation and maintenance (including replacement) of any waste treatment services provided by the applicant; (B) has made provision for the payment to such applicant by the industrial users of the treatment works, of that portion of the cost of construction of such treatment works (as determined by the Administrator) which is allocable to the treatment of such industrial wastes to the extent attributable to the Federal share of the cost of construction; and (C) has legal, institutional, managerial, and financial capability to insure adequate construction, operation, and maintenance of treatment works throughout the applicant's jurisdiction, as determined by the Administrator.

"(2) The Administrator shall, within one hundred and eighty days after the date of enactment of the Federal Water Pollution Control Act Amendments of 1972, and after consultation with appropriate State, interstate, municipal, and intermunicipal agencies, issue guidelines applicable to payment of waste treatment costs by industrial and nonindustrial recipients of waste treatment services which shall establish (A) classes of users of such services, including categories of industrial users; (B) criteria against which to determine the adequacy of charges imposed on classes and categories of users reflecting all factors that influence the cost of waste treatment, including strength, volume, and delivery flow rate characteristics of waste, and (C) model systems and rates of user charges typical of various treatment

works serving municipal-industrial communities.

"(3) The grantee shall retain an amount of the revenue derived from the payment of costs by industrial users of waste treatment services, to the extent costs are attributable to the Federal share of eligible project costs provided pursuant to this title as determined by the Administrator, equal to (A) the amount of the non-Federal cost of such project paid by the grantee plus (B) the amount determined in accordance with regulations promulgated by the Administrator, necessary for future expansion and reconstruction of the project, except that such retained amount shall not exceed 50 per centum of such revenues from such project. All revenues from such project not retained by the grantee shall be deposited by the Administrator in the Treasury as miscellaneous receipts. That portion of the revenues retained by the grantee attributable to clause (B) of the first sentence of this paragraph, together with any interest thereon shall be used solely for the purposes of future expansion and reconstruction of the project.

"(4) Approval by the Administrator of a grant to an interstate agency established by interstate compact for any treatment works shall satisfy any other requirement that such works be authorized by Act of Congress.

#### "ALLOTMENT

"Sec. 203. (a) Sums authorized to be appropriated pursuant to section 207 for each fiscal year beginning after June 30, 1972, shall be allotted by the Administrator not later than the January 1st immediately preceding the beginning of the fiscal year for which authorized, except that the allotment for fiscal year 1973 shall be made not later than 30 days after the date of enactment of the Federal Water Pollution Control Act Amendments of 1972. Such sums shall be allotted among the States by the Administrator in accordance with regulations promulgated by him, in the ratio that the estimated cost of constructing all needed publicly owned treatment works in each State bears to the estimated cost of construction of all needed publicly owned treatment works in all of the States. For the fiscal years ending June 30, 1973, and June 30, 1974, such ratio shall be determined on the basis of table III of House Public Works Committee Print No. 92-50. Allotments for fiscal years which begin after the fiscal year ending June 30, 1974, shall be made only in accordance with a revised cost estimate made and submitted to Congress in accordance with section 516(b) of this Act and only after such revised cost estimate shall have been approved by law specifically enacted hereafter.

"(b) (1) Any sums allotted to a State under subsection (a) shall be available for obligation under section 203 on and after the date of such allotment. Such sums shall continue available for obligation in such State for a period of one year after the close of the fiscal year for which such sums are authorized. Any amounts so allotted which are not obligated by the end of such one-year period shall be immediately reallocated by the Administrator, in accordance with regulations promulgated by him, generally on the basis of the ratio used in making the last allotment of sums under this section. Such reallocated sum shall be added to the last allotment made to the States. Any sum made available to a State by reallocation under this subsection shall be in addition to any funds otherwise allotted to such State for grants under this title during any fiscal year.

"(2) Any sums which have been obligated under section 203 and which are released by the payment of the final voucher for the project shall be immediately credited to the State to which such sums were last allotted. Such released sums shall be added to the amounts last allotted to such State and shall

be immediately available for obligation in the same manner and to the same extent as such last allotment.

#### "REIMBURSEMENT AND ADVANCED CONSTRUCTION

"Sec. 206 (a) Any publicly owned treatment works in a State on which construction was initiated after June 30, 1966, but before July 1, 1972, which was approved by the appropriate State water pollution control agency and which the Administrator finds meets the requirements of section 8 of this Act in effect at the time of the initiation of construction shall be reimbursed a total amount equal to the difference between the amount of Federal financial assistance, if any, received under such section 8 for such project and 50 per centum of the cost of such project, or 55 per centum of the project cost where the Administrator also determines that such treatment works was constructed in conformity with a comprehensive metropolitan treatment plan as described in section 8(f) of the Federal Water Pollution Control Act as in effect immediately prior to the date of enactment of the Federal Water Pollution Control Act Amendments of 1972. Nothing in this subsection shall result in any such works receiving Federal grants from all sources in excess of 80 per centum of the cost of such project.

"(b) Any publicly owned treatment works constructed with or eligible for Federal financial assistance under this Act in a State between June 30, 1956, and June 30, 1966, which was approved by the State water pollution control agency and which the Administrator finds meets the requirements of section 8 of this Act prior to the date of enactment of the Federal Water Pollution Control Act Amendments of 1972 but which was constructed without assistance under such section 8 or which received such assistance in an amount less than 30 per centum of the cost of such project shall qualify for payments and reimbursement of State or local funds used for such project from sums allocated to such State under this section in an amount which shall not exceed the difference between the amount of such assistance, if any, received for such project and 30 per centum of the cost of such project.

"(c) No publicly owned treatment works shall receive any payment or reimbursement under subsection (a) or (b) of this section unless an application for such assistance is filed with the Administrator within the one year period which begins on the date of enactment of the Federal Water Pollution Control Act Amendments of 1972. Any application filed within such one year period may be revised from time to time, as may be necessary.

"(d) The Administrator shall allocate to each qualified project under subsection (a) of this section each fiscal year for which funds are appropriated under subsection (e) of this section an amount which bears the same ratio to the unpaid balance of the reimbursement due such project as the total of such funds for such year bears to the total unpaid balance of reimbursement due all such approved projects on the date of enactment of such appropriation. The Administrator shall allocate to each qualified project under subsection (b) of this section each fiscal year for which funds are appropriated under subsection (e) of this section an amount which bears the same ratio to the unpaid balance of the reimbursement due such project as the total of such funds for such year bears to the total unpaid balance of reimbursement due all such approved projects on the date of enactment of such appropriation.

"(e) There is authorized to be appropriated to carry out the provisions of this section but not to exceed \$100,000,000 and, to carry out the provisions of this section, not to exceed \$100,000,000. The appropriations contained in this subsection shall be the sole

EPA Strategy for an Operation and Maintenance  
Program for Municipal Wastewater Treatment Facilities

I. Introduction

The Federal Water Pollution Control Act Amendments of 1972 establish specific goals for controlling wastewater discharges to meet certain water quality objectives. These goals require the expenditure of many billions in capital funds for the construction of new facilities. These goals also require that all treatment facilities, both new and existing, be operated efficiently and effectively to maximize our pollution control effort. Correct operation of new and modified facilities and improved operation of existing facilities is absolutely essential if our water quality goals are to be met.

A recent sample survey conducted in accordance with Section 210 of the Act showed that about one-third of all treatment plants constructed with Federal grant assistance were not operating at the designed level at the time the plant was inspected. This illustrates the improvement in plant operation that will be needed if our water quality objectives are to be achieved.

This strategy for EPA's operation and maintenance program for municipal wastewater treatment facilities has been developed to implement EPA's overall water pollution control strategy. It is based on the broadened authority and stated objectives of the Act and EPA's Water Strategy document of February 27, 1973.



## II. Strategy

### A. The Federal Water Pollution Control Act

The amended Act substantially enhances EPA's ability to implement an effective operation and maintenance program. The National Pollutant Discharge Elimination System permit program established under Section 402 now provides the foundation of the operation and maintenance program. This permit program, which will establish specific effluent limitations and performance criteria for municipal treatment facilities, along with the right of entry and inspection and the monitoring requirements of Section 308, insures that the O&M program will be expanded to include all municipal treatment facilities.

Specific performance criteria in the permit will establish the framework against which actual plant operation will be compared. Enforcement for violation of permit conditions will be used to create the initiative to improve plant performance and establish a situation in which cooperative efforts on the part of State and Federal agencies with municipal treatment facilities can productively achieve better O&M.

The law further provides additional emphasis and impetus for the O&M program as follows:

- (1) Section 204(a)(4) requires that a construction grant applicant make adequate provisions for assuring proper and efficient operation and maintenance of such works.

- (2) Section 210 requires a survey of plant operating efficiency as compared to design efficiency.
- (3) Section 106, through the State program grant, provides a means to strengthen State O&M programs, through funding support.

B. The "Water Strategy" - February 27, 1973

The "Water Strategy" document is the key to the development of an effective EPA O&M program to achieve the objectives of the Act. Section VI(C)(1), strategic guidance for municipal construction, states that an objective of the program "...is to operate and maintain efficiently the plants that are now constructed." The section includes further discussion of the O&M program as follows:

"The operation and maintenance program will be used to determine which plants currently operating are not in compliance with the 1977 standards and to ascertain what is required to bring them into compliance. State records, surveillance and analysis data, and permit applications will be relied upon to locate the problem areas. On-site operation and maintenance visits, as well as training programs for plant operators, will be available to municipalities to correct deficiencies. These efforts will focus on priority basins and on plants where the required degree of improvement can be achieved without additional major capital investment. Manpower training will primarily support the operation and maintenance program. Regional training programs should assess training needs, encourage the States to meet those needs, and move to satisfy deficiencies."

This element of the water strategy, utilizing the NPDES permit program as a base, is to be effectively implemented in support of our water quality objectives.

### C. O&M Program Objectives

The overall objective of EPA's national operation and maintenance program is the achievement of efficient, effective and reliable operation and maintenance of municipal wastewater treatment plants to produce improved effluent quality and receiving water quality. The specific objective of the present program is to maximize the impact of municipal wastewater treatment facilities on the achievement of the 1977 water quality goals.

EPA must take the lead in the program to promote awareness of the necessity for improved operation and maintenance of municipal wastewater treatment facilities. Equally important, EPA must work closely with the states to improve capabilities to upgrade O&M programs with emphasis on activities that will produce highly visible results within a short time frame.

### III. Strategy Implementation

Emphasis must be placed on program activities to maximize the desirable impact of better operation and maintenance of municipal wastewater treatment facilities. The desired emphasis of program activities will require changes in the present Regional Office and Headquarters O&M program. These changes are identified below.

#### A. Regional Offices

The following orientation of Regional O&M programs must be made:

1. Integrate grant-related O&M activities into the grant project review process. This includes the following activities:

- a. Emphasize O&M aspects of proposed projects at predesign stage.
  - b. Review of plans and specifications from O&M viewpoint.
  - c. Identification of plant staffing requirements and potential training needs.
  - d. Review of O&M manuals.
2. Realign priorities for inspection efforts to concentrate on intensive initial and follow-up inspections on critical plants in priority areas, for both new and existing treatment facilities.
  3. Establish a technical assistance capability for improving existing plant operations. This encompasses extended analysis of plants to correct major operational problems and achieve improved operational efficiencies. It must also be closely interrelated to training needs to insure continually improved operation.
  4. Guide state agencies in improving their O&M programs. Emphasis must be increased to establish the states in the lead role in improving treatment plant operations within their political jurisdictions.

B. Headquarters and Regional Offices

Headquarters will be responsible for support and program development functions in establishing an aggressive nationwide O&M program. The Headquarters staff will work closely with the Regional Offices in implementing the priority items identified above.

Headquarters will exercise the lead role in developing and implementing (within Regional Offices), the following program activities:

1. A public information program program to promote better operation and maintenance of municipal treatment facilities. This must reach that part of the public that can best influence improved O&M.
2. Improved relation to training efforts of operational needs.
3. Improved capability for data handling and meaningful assessment. This will provide an improved base for program support and direction and satisfy the requirements of Section 210 of the Act.

These Program activities are essential to implement the O&M water strategy. It is expected that within one year adjustments in program activities will reflect the results of program assessments.

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