

**REPORT OF SURVEY
ON
NEW/INNOVATIVE TECHNOLOGY STUDIES
SUPPORTED BY U.S. EPA
STEP-1 WASTEWATER TREATMENT FACILITIES
PLANNING GRANTS IN THE 10 REGIONS**



**OFFICE OF MONITORING AND TECHNICAL SUPPORT
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY**

REPORT OF SURVEY
ON
NEW/INNOVATIVE TECHNOLOGY STUDIES
SUPPORTED BY U. S. EPA
STEP-1 WASTEWATER TREATMENT FACILITIES PLANNING GRANTS
IN THE 10 REGIONS

Regional Services Staff
Office of Monitoring and Technical Support
Office of Research and Development.
U. S. Environmental Protection Agency

March 25, 1977

Revised September 26, 1977

Prepared by:
George R. Shultz
Regional Liaison Officer, RSS

Approved by:
Michael L. Mastracci
Director, RSS



FOREWORD

The Office of Air, Land, and Water Use (OALWU), Office of Research and Development (ORD), is concerned with the development of new and/or innovative municipal wastewater treatment technology for use in the Regional Construction Grant Programs.

In this connection, the Waste Management Division, OALWU, requested the Regional Services Staff, Office of Monitoring and Support, ORD, to assist in collecting information from the ten Regions to determine: (1) the extent to which Step-1 facilities planning grants are utilized to support pilot studies of new and/or innovative treatment technology; and, (2) how to maintain communications between the Regions and ORD with regard to such future pilot studies.

The purpose of this report is to present the findings of the survey, and to place the findings in perspective with the Regional construction grant process.

CONTENTS

<u>TITLE</u>	<u>PAGE NUMBER</u>
INTRODUCTION	
The Construction Grant Process in Brief.....	1
Historical Perspective.....	1
Congressional Concern.....	2
REGIONAL SERVICES STAFF SURVEY OF REGIONS	
Objectives.....	4
Assumptions.....	4
Type of Information Collected.....	5
Other Related EPA Activities and Surveys.....	6
FINDINGS	
Regional Cooperation.....	8
Step-1 Pilot Studies.....	8
Candidate Mechanisms for Signaling Proposed.....	12
New/Innovative Studies in Step-1 Planning Grants	
RECOMMENDATIONS	
Candidate Mechanisms for Signaling Proposed.....	17
New/Innovative Studies in Step-1 Planning	

INTRODUCTION

The Construction Grant Process in Brief

A brief outline of the construction grant process is presented for the reader at the outset of this report, since the report focuses on new and innovative municipal wastewater treatment technology studies which are supported by the Regional Construction Grant Programs.

The construction grant process is divided into five phases: (1) Pre-application; (2) Step-1 planning grant; (3) Step-2 design grant; (4) Step-3 construction grant; and (5) post-construction inspections of operations and maintenance activities. The grant process provides for evaluation of new and innovative technology in the preapplication and Step-1 planning grant phases, in order to investigate the most cost-effective alternatives. This does not, however, preclude further detailed evaluation during the Step-2 design grant phase.

Appendix A contains a more complete overview of the construction grant process.

Historical Perspective

The 1972 Amendments to the Federal Water Pollution Control Act, PL 92-500, included authority to develop new and innovative municipal wastewater treatment technology. The Amendments also encouraged and expanded construction effort on the part of the communities, through various types of Federal aid including:

- (1) Grants for planning activities
- (2) Technical assistance, primarily for design and construction of facilities
- (3) Technical information from EPA research, demonstration, and monitoring

At the same time, however, the 1972 Amendments led to a combination of time constraints and heavy workloads for the EPA Regional Construction Grant Programs, which were not conducive to developing, testing, and demonstrating new and innovative techno-

logies. It has been recognized for five years now that the EPA Regional Construction Grant Programs, State governments, municipal governments, and consulting engineers are prone to apply proven technology, rather than take the time and risk to develop new and improved technology.

Congressional Concern

In January 1974, the General Accounting Office indicated that one of EPA's primary goals should be to find ways to minimize the cost of treating municipal sewage.⁽¹⁾ Subsequently, Congressional concern has been expressed as to what EPA is doing to develop and utilize new and improved municipal wastewater treatment technology.

In response to this concern, Andrew W. Breidenbach, Assistant Administrator for the Office of Water and Hazardous Materials (OWHM), appeared in October 1976 before the House of Representatives Subcommittee on the Environment and the Atmosphere, of the Committee on Science and Technology. He stated that the EPA acknowledges the need for developing and utilizing new and improved wastewater treatment technologies, and assured the Committee that EPA looks to its Office of Research and Development (ORD) for technical support in this regard. This was an indication that the OWHM desires to work with ORD to establish a closer working relationship to carry out the intent of the 1972 Amendments, especially with respect to development and utilization of new and improved technology.

Joe G. Moore, Jr., Head, Graduate Program in Environmental Sciences, University of Texas at Dallas, also appeared in October 1976 before the same House of Representatives Subcommittee, as a private citizen. He stated in effect that even though new technology and/or innovative approaches may prove to be more cost effective, the procedural requirements, coupled with the time pressure to obligate grant funds, appear to present competing goals.

The Office of Air, Land, and Water Use (OALWU) in the Office of Research and Development (ORD), is addressing itself to the overall issue of application of new/innovative technology in the Regional Construction Grant Programs. In this connection, discussions were held in early 1976 between William Rosenkranz, Chief, Waste Management Division, OALWU, ORD, and William Whittington, Chief, Municipal Technology Branch, Municipal Construction Division, Office of Water Program Operations (OWPO), OWHM, with Michael Mastracci, Director, Regional Services Staff (RSS), Office of

(1) GAO Report, entitled "Research and Development Programs to Achieve Water Quality Goals: What the Federal Government Needs to Do", B166506, January 16, 1974.

Monitoring and Technical Support (OMTS), ORD, attending. As a direct result of this meeting, RSS was asked by OALWU to conduct a preliminary review of the Regional construction grant records to:

- (1) Help OALWU determine the extent to which new and/or innovative processes occur within the Regional Construction Grant Programs.
- (2) Help evolve a mechanism that could highlight new and/or innovative processes or studies that occur within the Step-1 facility planning phase of the construction grant process.
- (3) Recommend to OALWU a tracking system that can collect design and operating data from plants that employ new technology.

(Fulfillment of this request was in accordance with the RSS Functional Statement, in which the RSS is charged with "Coordination and arrangements for obtaining Regional Assistance to ORD activities".)

In further response to Congressional concern, Donald Ehreth of the Waste Management Division, OALWU, modified the request in October 1976 by asking that the RSS assist in collecting specific information from the ten Regions on those Step-1 planning grants that support on-going pilot projects, pilot studies, treatability studies, and/or other related data collecting activities. This information was transmitted to Mr. Ehreth on February 10, 1977, and is attached in Appendix B of this report.

The RSS approach to fulfilling the OALWU requests is discussed in the following Section.

REGIONAL SERVICES STAFF SURVEY OF REGIONS

Objectives

George Shultz of the RSS, OMTS, ORD, visited and interviewed Regional Construction Grant Program personnel during the period November 1976 through January 1977. The objectives of these Regional visits were to:

- (1) Collect specific information on new/innovative municipal wastewater treatment technology pilot studies that are supported by Step-1 facilities planning grants within the Regional Construction Grant Programs.
- (2) Identify to OALWU a mechanism(s) that could signal new/innovative technology pilot studies proposed within the Step-1 facilities planning grants.
- (3) Recommend a communication system between the Regional Construction Grant Programs and ORD for relaying Step-1 pilot study information.

Assumptions

In order to set up an informal set of guidelines for discussion with Regional personnel, a number of assumptions were made at the outset of the RSS Regional Survey. They were:

- (1) The survey would be conducted on a part-time basis over a 2-3 month period by 1 member of the RSS staff.
- (2) The focus would be on Step-1 facilities planning grant pilot studies and related data collecting activities, and may even cover the preapplication phase. (It should be noted that pilot studies are also conducted under Step-2 grants.)
- (3) A rigorous definition of new and/or innovative technology was not necessary, since it was presumed that the focus would be on those on-going pilot studies which were being conducted primarily to determine cost effective alternatives. As the survey progressed, it became more and more apparent that such a definition was not essential to attain the survey objectives, and that a definition is better left as a Regional prerogative.

- (4) OALWU's specific request was for the collection of all available information relating to pilot studies, pilot projects, etc. The RSS detected that a low-key approach would enhance Regional cooperation and would yield better though fewer data and would not add work load to an already overworked Regional Staff. The Regional Construction Grant Projects Engineers were asked to provide only enough information on those projects which came easily to mind. There was no extensive review of the files by the RSS, nor were the Regional personnel asked to do this.
- (5) The survey would be conducted in such a way as to create the least workload possible for the Regional personnel and, in general, deadlines for submittal of information were the prerogative of Regional Construction Grant Program personnel.
- (6) The current EPA Grants Information and Control System (GICS) was not geared to provide such information.
- (7) This survey could lead to a system of communication between ORD and the Regional Construction Grant Programs. In order to be considered acceptable, however, the communication system would necessarily have to have minimal impact on the Regional resources. At the same time, in order to be effective, the mechanism should be capable of highlighting or signaling upcoming pilot studies, in order to provide enough lead time for Regional and ORD personnel to discuss possible cooperative studies.
- (8) The findings of this survey would be made available to all Regions.
- (9) The report of this survey would provide a basis for cross-pollination between Regional Construction Grant Programs in the 10 Regions.
- (10) This RSS effort would initiate a direct long-term dialogue between specific responsible principals in both the ORD and the Regions who are concerned with wastewater management and practices.

Type of Information Collected

In response to Objective 1 of the RSS Regional Survey, information was collected on new/innovative technology studies, which ranged from wastewater collection, to on-site municipal wastewater treatment, to sludge disposal, to land application of effluent. The information requested for each pilot study was:

- (1) Geographical location of the pilot plant or related study.

- (2) Identification number assigned to the Step-1 planning grant.
- (3) A brief narrative description of the technology involved, including design criteria, or other related information as needed for a better understanding of the study.

The information, as submitted by the Regions in response to the above, is attached in Appendix B. A list of Regional Construction Grant Program personnel contacted during the Regional visits is attached in Appendix C.

In response to Objectives 2 and 3 of the RSS Regional Survey, numerous discussions were held with Regional Construction Grant Program personnel with regard to alternative mechanisms for signaling new/innovative studies in Step-1 grants and for follow-up communication between the Regions and ORD. The discussions primarily revolved around the merits of such alternative mechanisms as: (1) person-to-person contact; and (2) the new EPA Grants Information and Control System (GICS-II) (see Appendix D).

Other Related EPA Activities and Surveys

Following is a brief notation of six other related EPA program activities and surveys which were prompted by the January 1974 GAO Report, and the recent Congressional concern about what EPA is doing to develop and utilize new and improved municipal wastewater treatment technology in the Regional Construction Grant Programs.

Appendix E contains more detailed information on each of the activities and surveys.

.Municipal Environmental Research Laboratory, OALWU, ORD

The MERL is serving as the coordinator for the OALWU to explore, on a trial basis with Regions I and V, the feasibility of long-range planning for cooperative technology studies between ORD and the Regions, on new and innovative wastewater treatment processes and methods.

.Office of Air, Land, and Water Use, ORD

The OALWU contracted Booz-Allen and Hamilton, Inc., to conduct a survey at local, State and EPA Regional levels. The purpose of the survey was to determine whether or not innovative technologies are being used in municipal wastewater treatment projects funded under the Regional Construction Grant Programs, and to identify the reasons why such technologies are or are not being used.

.Technical Information Division, OMTS, ORD

The TID awarded a one-year research grant, "Introducing New Technology to Municipal Waste Treatment: A Decision-Making Study", to the Syracuse Research Corporation. The grantee proposes to delineate the roles of decision-makers and how coalitions form at the local level that serve to promote or impede the introduction of new technology to municipal waste treatment.

.Office of Water Program Operations, OWHM

The OWPO visited the Regions to collect information on Step-2 and Step-3 construction grant projects, to determine the number of projects utilizing new technologies, the types of technology currently under design or construction, and the factors which impact the implementation of new and alternative technology.

.Office of Planning and Evaluation, Office of Planning and Management

The OPE visited the Regions to evaluate the impact of the EPA municipal water pollution control research and development program, on the development and application of innovative municipal water pollution control technology.

.Environmental Protection Agency

The EPA recently issued a request for proposals to conduct a special study, which will evaluate the current Step-1 facilities planning grant process, and recommend ways in which the process might be improved to ensure that the rate of facility planning is sufficient to ensure obligations at the rate of \$5-6 billion per year.

FINDINGS

Regional Cooperation

The Regional Services Staff met with excellent Regional cooperation. All Regional Construction Grant Program personnel contacted showed a desire to work with the ORD's OALWU in order to provide the information requested. There was general agreement that the type of information requested should provide a basis for determining the feasibility of cooperative Regional/ORD studies, the ultimate goal being the utilization of better cost-effective wastewater treatment approaches by the municipalities.

Step-1 Pilot Studies

Based on the information received from the 10 Regions, there are well over 50 Step-1 planning grants identified which have one or more associated pilot studies, or need performance data. There is little doubt that there are additional pilot studies, but RSS did not attempt to pinpoint the number, since some Regions indicated that there were "several" or "numerous" target sites available for study. These target sites may best be determined by the Regions, and appropriate OALWU Headquarters and Laboratory personnel. RSS highlights some of these target sites in the overview of specific findings annotated by Regions.

The following is an overview of the specific findings of this survey, Region by Region (see Appendix B):

Region I

A meeting was held in the Regional Office between Regional and ORD personnel to discuss short- and long-range cooperation between the Construction Grant Program and ORD's Municipal Environmental Research Laboratory. The Regional personnel expressed interest in developing cooperative pilot studies with emphasis on low operating and maintenance expense, and high reliability of treatment for communities with 1.0 mgd or less. Of particular interest were: controlled discharge multi-cell oxidation ponds; phase-isolation oxidation ponds; oxidation ditch-carrousel technology; land application; sludge treatment land disposal technology; and septage treatment.

This approach was decided upon since Region does not have Step-1 pilot studies which could serve as indicators of Region

I wastewater treatment technology needs. It should be noted that this longer-range approach may serve as an indicator of how the ORD and the Regions may proceed in the future to co-operate with the States and municipalities.

At the time of this report, the MERL and Region I Construction Grant Program personnel have held a telephone conference to discuss an approach, which will include cooperation of the State agencies in identifying candidate municipalities that are 12-18 months from receiving a Step-1 planning grant.

Region II

The Regional Construction Grant Program personnel in Region II indicated that there are three target sites for pilot studies in New Jersey, and several possibilities in Puerto Rican municipalities which come under the preview of Region II. The New Jersey studies include: composting of primary sludge; treatability studies (undefined); and development of design parameters for a denitrification system. The Region considers that there are several Step-1 awards in Puerto Rico which may require associated studies in sludge composting under conditions unique to Puerto Rico, as well as the need for R&D assistance in recommending operational and monitoring methods in connection with land disposal and treatment.

Region III

Region III Construction Grant Program personnel indicate that there are two discrete pilot study projects, one in Maryland and one in Virginia. The Region indicates that the Maryland project involves construction of a composting pad and building, and that the Virginia project is a proposed study for recycling of digested sludge to agricultural land.

Region IV

The Construction Grant Program personnel in Region IV identified five target sites in Florida where performance data is needed, four in Tennessee, and numerous on-going projects in sewer rehabilitation throughout the Region which are available for study.

The Florida projects involve deep well disposal studies at four sites, and a unique sludge disposal project which has just been put in operation and which consists of drying, pelletizing, and bagging, where the end product is sold as fertilizer. The Region believes that a performance evaluation of the operation could be beneficial to the Agency.

The Tennessee projects include: studies of a 40 mgd

activated sludge plant using pure oxygen for BOD reduction followed by air for nitrification; study of an attached growth media tower for BOD reduction; and two cost-savings studies of vacuum collection systems in lieu of deep cutting through rock that would be required by gravity systems.

The numerous sewer rehabilitation projects available for studies throughout the Region would involve the evaluation of the performance and life of different joint compounds and the overall effectiveness of rehabilitation effort in terms of flow reduction.

Region V

The Regional Construction Grant Program personnel in Region V report that there are a comprehensive series of wastewater treatment studies which may be available in Michigan at one municipality (Kalamazoo), two pilot studies in Ohio, and three in Wisconsin.

The Kalamazoo studies include:

Primary - Coagulation, for SS removal without harming secondary.

Secondary - Pure oxygen, bio-disc, variations in conventional activated sludge.

Advanced - Activated carbon, two-stage aeration, bio-disc, trickling filter, filtration.

Recycle Streams - Trickling filter, bio-disc, pure oxygen.

Miscellaneous - Plant automation, scrubber water, equipment replacement, odor control, and sludge treatment and disposal.

The two Ohio projects involve a study of different alum strengths in final settling tanks, and a performance study on a commercial rotating disc unit.

The Wisconsin projects include: testing of rotating bio-disc systems for secondary treatment; a pilot plant study of an activated biofiltration system; and a treatability study associated with high BOD treatment problems.

In addition to the above near-time potential studies, the Regional Construction Grant Program is cooperatively exploring on a trial basis with the MERL, the feasibility of long-range cooperative technology studies on new and innovative wastewater treatment processes and methods. This approach

is described in Appendix E, "Other EPA Program Contacts with Regional Construction Grant Programs".

Region VI

Further communication may be indicated between ORD and the Regional Construction Grant Program, regarding possible grant mechanisms for mutually beneficial cooperative cost-effective technology studies.

Region VII

Region VII Construction Grant Program personnel report that there is one pilot study at Topeka, Kansas, and that there is a broad Regional need for study of methods and criteria to evaluate State pollution control agency management and municipal management programs for controlling discharge from lagoons as a treatment alternative. In addition, the following have been reported as needing performance data: four municipalities in Iowa; one in Nebraska; one in Kansas; and eight in Missouri.

The Topeka project involves pilot work to study compactability of undigested activated sludge using Permutit "DCG" and "MRP" units.

The Iowa projects involve performance evaluation of: an ABF system; traveling brush aerator modification or oxidation ditch; heat treatment of sludge; and rotating biological filter.

The Nebraska project involves performance evaluation of a two-stage trickling filter followed by a rotating biological filter designed for nitrification using pilot plant.

The Kansas project involves performance evaluation of an aerated lagoon followed by large lagoon cells.

The Missouri projects involve performance evaluation of land application of effluent; granular rock filter following 3-cell lagoon (2 sites); rapid sand filters following aerated lagoon; deep ditch oxidation; full-scale ozone disinfection; and rapid sand filters following extended aeration.

Region VIII

The Regional Construction Grant Program personnel in Region VIII indicated that it has not been the Regional policy to support pilot studies of a research nature through Step-1 grant funds. Rather, it is the Region's feeling that such research studies may be supported by the ORD grant mechanism. In fact, the Region believes there are opportunities for ORD

participation in cooperative studies through the research grant mechanism which may be mutually beneficial to the municipalities, the Regional office, and ORD.

Further communication will be needed between ORD and the Region to determine the nature of the studies, and whether they are related to new and innovative technological processes and methods, or whether peripherally related.

Region IX

The Regional Construction Grant Program in Region IX indicates that there are 8 Step-1 planning grants with comprehensive pilot studies throughout the State of California. The projects include studies on: virus removal; regional wastewater solids management program; conversion of existing incinerator to a pyrolysis mode; pyrolysis of mixture of sludge and air-classified refuse; energy recovery; activated carbon treatment system; pure oxygen aeration; and effluent irrigation.

Region IX has delegated all aspects of the construction grant program in California to the State of California that can legally be delegated. Consequently, the California State Water Resources Control Board submitted a list of 42 current 201 grant-supported pilot and special studies, funded by 27 Step-1 grants. Fifteen of the 42 studies are related to bay outfall, ocean outfall, and oceanographic studies.

Region X

Based on RSS notes taken during the visit to the Region X Construction Grant Program, the following are studies associated with Step-1 planning grants: a sewer sealing study in Idaho which may be near completion; two studies on phased isolation lagoons in Oregon; process evaluation of a problem caused by student population fluctuation in Washington; and several pilot studies involving biological and physical-chemical treatment systems as options to comply with secondary treatment requirements of the law in the Seattle Metropolitan area. OALWU notes that ORD is funding a similar lagoon project in California and that Region X and IX should coordinate their lagoon work.

Candidate Mechanisms for Signaling Proposed New/Innovative Studies in Step-1 Planning Grants

The information on pilot studies and other data collecting activities associated with Step-1 facilities planning grants (Appendix A) is the product of ten Regional visits and numerous interviews with Regional Construction Grant Program personnel. It is the most complete collection of such information to be available

to ORD at the present time, and represents a base to which updated information should be added.

The question is, what mechanisms and/or communication channels between Regional and ORD personnel are feasible to update this data base, for the purpose of identifying potentially cooperative pilot studies.

Based on discussions with Regional Construction Grant Program and Headquarters personnel, there appear to be several basic candidate mechanisms: (1) person-to-person communication; (2) utilize the new GICS-II system; and (3) modify Regional Step-1 planning grant procedures. These mechanisms, together with certain options, are presented as follows:

I. Person-To-Person Communication

...OPTION 1

Direct person-to-person communication between the cognizant Regional Construction Grant Program person and the OALWU's designated coordinating laboratory, MERL, when a pilot study is proposed in a Step-1 grant application.

Pro

- (1) The communication would be direct and simple.
- (2) The communication would be effective time-wise, since the procedure is simple.

Con

- (1) Communication may become unreliable during periods of peak workloads in the Region, laboratory and/or Headquarters.
- (2) The system places a responsibility on the Regional person to initiate an additional action item.

Policy Implications-None

...OPTION 2

Utilize a cooperative Regional/MERL approach to identify potential pilot studies in municipalities, 12-18 months in advance of the Step-1 grant awards. (See Appendix E, pages 1 and 2, for a description of this trial approach).

Pro

- (1) Pre-selection of treatment process and methods by municipalities and their consulting engineers would be minimized.
- (2) The preapplication and Step-1 grant phases would be facilitated and expedited.

Con

- (1) There would be a certain amount of guesswork involved.
- (2) A significant amount of time and effort would be required by the Region and MERL.
- (3) The approach is currently a "trial balloon".

Policy Implications-None

...OPTION 3

Designate a Regional person, such as the R&D Representative or Technology Transfer Representative, to relay the information on proposed pilot studies to the OALWU's designated coordinating laboratory (MERL).

Pro

- (1) This could save time and effort for the Regional Construction Grant Program personnel.
- (2) The Regional R&D Representative or Technology Transfer Representative would be kept up to date on R&D needs and developments within the Region.

Con

- (1) The system would involve a "middleman" who might not always be made available by the Region.
- (2) Questions of a detailed nature would still have to be referred back to the Regional Construction Grant Program person.

Policy Implications-None

II. Utilize the New GICS-II System

...OPTION 1

The Regional Construction Grant Programs could utilize the data elements entitled "Special Study Received" and "Special Study Reviewed", to signal Step-1 pilot studies.

Pro

- (1) The data element is already available for special studies and, therefore, pilot studies and related data collection activities could be included.
- (2) ORD could access the information easily and at any time.

Con

- (1) The data elements would be extended beyond their intended use, and the information could be confusing for

ORD personnel since special, non-pilot, studies would represent extraneous information.

- (2) The data elements are currently optional and, therefore, there would be no assurance that all of the Regions would utilize the elements for pilot study information.
- (3) From the Regional viewpoint, entry of pilot study information into the data elements could confuse the Regional tracking and management of Step-1 grants.
- (4) Only limited detail would be available.

Policy Implications-None

...OPTION 2

Add new data elements entitled "Pilot Study Received" and "Pilot Study Reviewed", to signal upcoming or proposed pilot studies received in Step-1 grant applications.

Pro

- (1) The data element would contain Step-1 pilot study information only.
- (2) The information would be easy to access on a ten-Region basis.
- (3) There would be short lag time, since ORD could access the information at any time.

Con

- (1) An extra entry would be required from Regional personnel.
- (2) Useful feedback information from ORD could be lacking or sketchy.

Policy Implications-Headquarters and Regional Construction Grant Program concurrence would be required.

III. Modify Regional Step-1 Planning Grant Application Procedures

...OPTION 1

Require grantee to provide a separate synopsis of proposed pilot studies, as an integral part of the Step-1 application, with a copy provided for transmittal by the Region to the designated OALWU laboratory (MERL) for review and comment.

Pro

- (1) No significant extra Regional workload would be required.

- (2) The Region would have the benefit of extra expert review by ORD staff.
- (3) The written synopsis would enhance clarification of the applicant's proposed study.

Con

- (1) The synopsis would require extra work and possibly a time delay for the applicant.
- (2) The applicant might be discouraged from looking for cost-effective alternatives.

Policy Implications-Headquarters and Regional Construction
Grant Program concurrence required.

RECOMMENDATIONS

Candidate Mechanisms for Signaling Proposed New/Innovative Studies in Step-1 Planning Grants

Recommendation No. 1

The first recommendation that RSS offers to OALWU for consideration is to "Modify Regional Step-1 Planning Grant Application Procedures" as outlined in Option 1, i.e., require the grantee to provide a separate synopsis of the Step-1 Grant application, with a copy provided for transmittal by the Region to the designated OALWU laboratory (MERL) for review and comment.

..Discussion of Recommendation No. 1 - This procedure would permit the most dependable signaling of new/innovative studies in Step-1 planning grants. It would also facilitate follow-up communication between ORD and the Regional Construction Grant Programs because the proposed pilot studies would be described in writing at the outset. It is recognized, however, that it would be necessary to obtain OWPO and Regional Construction Grant Program concurrence, and would be time consuming for the modified procedure to be cleared and implemented. Nevertheless, it is believed that this procedure is the most reliable one of those which have been investigated.

In this procedure, it is visualized that:

- (1) The Regional Construction Grant Project Engineer would "pull" a hard copy of the grantee's separate synopsis of proposed pilot study, and mail the synopsis to the Director of the Municipal Environmental Research Laboratory at Cincinnati.
- (2) MERL would respond by selecting an individual from the Wastewater Research Division to review and comment on the proposed pilot study, or refer it to the Environmental Research Laboratory at Ada.
- (3) The comments would be transmitted to the cognizant Regional Construction Grant Project Engineer by telephone and/or memorandum. The response may range from "this looks good, MERL should 'piggyback' the proposed pilot study by an expansion as follows...., which would require X-dollars of ORD funds to supplement the study," to "data is already available from previous studies."

The important thing to recognize is that this procedure

would require a feedback response from the MERL, whether negative or positive, so the Regions can have the benefit of ORD's comments. It should also be recognized that, based on data obtained from the OWPO survey of the Regions for new/innovative technology used in Step 2 and Step 3 Grants, it is conceivable that there could be as many as 20 proposed studies per month from the ten Regions.

- (4) When the Regions receive the ORD comments, they could use the information in deciding whether or not to fund the proposed pilot study, and/or whether ORD involvement is appropriate, the Regional Construction Grant Project Engineer would communicate by telephone and/or memorandum with the MERL to firm up arrangements for ORD participation in the proposed pilot study.

Recommendation No. 2

A second, interim, recommendation which the RSS offers for OALWU consideration is "Utilize the New GICS-II System," as outlined in Option 2, i.e., add new data elements entitled "Pilot Study Received" and "Pilot Study Reviewed," to signal upcoming or proposed pilot studies received in Step-1 grant applications.

..Discussion of Recommendation No. 2 - Again, as with Recommendation No. 1, this would require Headquarters and Regional Construction Grant Program concurrence, but would take much less time to implement than changing the grant procedural requirements.

If the new GICS-II system is to be utilized, it would be on an interim basis, until Recommendation No. 1 was implemented, and operational in the Regions. At that time, the procedure could be continued for cross-check purposes.

In the meantime, the procedure would be as follows:

- (1) MERL would utilize the Cincinnati-based computer facility to access Step-1 pilot study information from the GICS-II, on a routine basis.
- (2) When MERL receives the printout information, the appropriate Regional personnel would be contacted for further details about the proposed pilot study. This contact normally would be by telephone, with a request for followup written information on the study when appropriate.
- (3) MERL would then review the proposed pilot study, or refer it to ERL at Ada for review and comment.
- (4) The comments would be transmitted to the cognizant Regional Construction Grant Project Engineer by telephone and/or

memorandum.

- (5) When the Region receives the ORD comments, they could be used as information in deciding whether or not to fund the proposed pilot study, and/or whether ORD involvement would be mutually beneficial. Assuming ORD's involvement is appropriate, the Regional Construction Grant Project Engineer would communicate by telephone and/or memorandum with the MERL to firm up arrangements for ORD participation in the proposed pilot study.

Appendix A

Overview of the Construction Grant Process

OVERVIEW OF THE CONSTRUCTION GRANT PROCESS⁽¹⁾

General

The construction grant process is divided into 5 phases: (1) Pre-application; (2) Step-1 planning grant; (3) Step-2 design grant; (4) Step-3 construction grant; and (5) Post-construction inspections of operations and maintenance activities.

Preapplication Requirements

A municipality must be entered on a State priority list before the official Construction Grants process is initiated. Following inclusion on the State priority list and approval of its plan of action, the community selects a qualified architectural/engineering consultant, who usually prepares the Step-1 grant application.

At this point there is usually a preapplication conference, jointly conducted by EPA and the State, to give the community a comprehensive overview of the program procedures, with particular attention to meeting the requirements of a Step-1 grant application.

Once a community has prepared and submitted this grant application for State and EPA review, and it is approved, a Step-1 grant is awarded upon such approval.

Step-1 Planning Grant

The grant provides funds for the preparation of a facilities plan, which must address itself to issues required by PL 92-500, ensuing

(1) The publication, "The Federal Wastewater Treatment Facilities Construction Grant Process from A(bilene) to Z(anesville)", prepared in March 1975 by John T. Rhett, Deputy Assistant Administrator for Water Program Operations, Office of Water and Hazardous Materials, provides the basis for the overview.

regulations, and by other Federal laws. These include design related issues such as: cost effectiveness data, where pilot studies for new or improved technologies may be indicated; wastewater discharge permit status; infiltration/inflow into the collection system; land disposal; reclaiming or recycling of water; replacement or rehabilitation of existing sewer systems; disposal of sludge; and provisions for the effective operation and maintenance of the treatment works.

Once the Step-1 facilities plan has been approved by EPA and the State, the State can then certify the project as eligible for a Step-2 grant for preparation of construction plans and specifications. The project now enters the formal design stage. (In certain cases where no facilities plan has been prepared, the prospective grantee or his consultant may prepare an application for a Step-2 grant directly.)

Step-2 Design Grant

In the Step-2 process, the grantee's consultant prepares engineering plans and specifications that will translate decisions, made during the facilities planning stage, into efficient and effective treatment facilities.

Design planning conferences are held by the EPA Regional Offices and States to facilitate the Step-2 grants process, and to assure that new requirements under the 1972 Amendments are met. If so indicated at this time, special or pilot studies may be initiated/expanded to evaluate cost effective alternatives, which may involve new/innovative technologies.

Once the plans and specifications have been submitted, the State and/or EPA must review them to insure that the proposed project will meet effluent limitations and water quality standards, and that it is not designed with excessive capacity.

Step-3 Construction Grant

If the plans and specifications are acceptable, the project is again entered on the State list of priority projects, and the municipality prepares a Step-3 grant application (or an earlier agreement is again amended) and it is reviewed. If approved EPA transmits to the applicant a Step-3 grant agreement for signature and return to EPA.

EPA then sends copies of the plans and specifications to the municipality's engineering firm through the State agency, so the community can advertise for sealed bids. Upon selection of the lowest responsible bidder, the community submits to EPA the bid information as a tabulation, and requests approval for a contract award. Upon approval a letter of approval of the contract award is mailed to the grantee, who secures the contractor's signature so that construction operations can begin.

During construction, EPA is involved in various activities: partial payments to the applicant from the Federal share of the grant; interim field inspection by the staff engineers; processing change orders; and assure preparation of an O&M manual which is approvable by the State and EPA.

When a final inspection is made of the completed project and a final payment is made, plant operation may begin.

Post-Construction Inspections

Once the plant begins to treat wastes, EPA and the State conduct inspections to insure that the facility operation complies with its discharge permit, and to determine whether the O&M practices are adequate.

It should be noted that in the interest of improving the cost effectiveness of the entire construction grant program, EPA has increased the pressure for improved integration of O&M objectives with the construction planning process.

Appendix B

Regional Pilot Plant Step-1 Studies

REGION I

PILOT PLANT STEP-1 STUDIES

Region I does not have Step-1 pilot studies, but expressed interest in developing such studies with emphasis on low operating and maintenance expense, and high reliability of treatment for communities with 1.0 mgd or less. Also of interest were: controlled discharge multi-cell oxidation ponds; phase-isolation oxidation ponds; oxidation ditch-carrousel technology; land application; sludge treatment land disposal technology; and septage treatment.

Mr. Mayo, Director, MERL-CI, is to coordinate short- and long-range cooperation between the Regional Construction Grant Program and the OALWU Waste Management Division's program in wastewater technology.

REGION II

PILOT PLANT STEP-1 STUDIES

- o City of Camden - Project Number C-34-678, located in Camden County, New Jersey. This project (Step 1 application presently under review by EPA) is for a full scale, on site pilot study for the composting of primary sludge.
- o Camden County Municipal Utilities Authority - Project Number C-34-524, located in Camden County, New Jersey. A portion of this project (currently not certified by the State) is for the performance of treatability studies in conjunction with the Facilities Plan, now nearing completion in the Delaware Basin of Camden County.
- o Township of Wayne - Project Number C-34-393, located in Passaic County, New Jersey. A portion of this project will be to conduct pilot plant studies to develop design parameters for their proposed denitrification system.
- o Puerto Rico Municipalities (Submitted by William J. Muszynski)

Background

The Puerto Rico Aqueduct & Sewer Authority (PRASA) is the Commonwealth of Puerto Rico agency that plans, constructs and operates its municipal wastewater treatment plants. It is also the agency that applies to EPA for all of the grants to construct municipal wastewater treatment works. The Environmental Quality Board (EQB) is the Commonwealth Agency that certifies the applications to EPA.

A. Sludge Composting

Several Step 1 awards have been made to PRASA to do facility planning for various regions on the island. These Step 1 grants are currently

in the process of being completed and submitted to the EQB and EPA for review, approval and Step 2 award. It has come to our attention that one of the problems faced by the island is the treatment and disposal of the sludge from the municipal wastewater treatment facilities. Based upon the facility plans currently under review, it appears that the larger facilities will use incineration and landfill disposal, while the smaller, more rural facilities will use anaerobic digestion, sludge drying beds and landfill disposal. Landfill disposal creates several problems for the rural areas because in most cases a new landfill site may have to be opened, an old one may not be operated in accordance with acceptable sanitary landfill practices, municipalities control their landfills and may not accept the sludge, and some landfills may be a considerable distance from the wastewater treatment facility.

As a result of reading the literature on the Beltsville, Maryland project, I recommended to PRASA and EQB that consideration be given to establishing a composting operation at one of their small, existing facilities. It was our feeling that because of the size of the Beltsville project, the relative unavailability of wood chips on the island and possible localized operational problems it would be necessary to establish this working model to investigate its adaptability to the Commonwealth facilities. PRASA has indicated that it is interested and that it has a small plant which has a vacuum filter and sufficient land to run a full scale pilot facility. Because we are still at the discussion stage, no analysis has been

done as to what the cost of providing additional equipment, testing, etc. would be.

It is my impression that the stumbling blocks in making the decision to proceed with this study are: the lack of local funds, the anticipated turnover in PRASA and EQB because of the recent elections, and the lack of detailed information as to the scope of the study. The first step must be to sit down with PRASA, & EQB and ourselves to detail the scope of the study. Once this is completed, we can then develop the cost. It is anticipated that the personnel situation in both PRASA and EQB will be stabilized in January 1977. Once we know the costs, we can then proceed to develop how much funds we can provide and how much will be the Commonwealth's share.

The study must have as its goals; the identification of costs of operation, the possible utilization of island available materials such as Bagasse (sugar cane stalks), other materials in lieu of wood chips, including the synthetic materials, identification of operational techniques and possible problems, the possible uses or needs for the residue material and a cost comparison to other sludge treatment and disposal techniques. It is quite possible that a successful demonstration of the compositing operation may show that it is an acceptable technique for larger facilities planned for the island. PRASA has always been a most cooperative agency and I believe, will be most receptive to this proposed study.

As discussed with Mr. Shultz, whether or not R&D has the available

funds to supplement our grant funds for this project, I do feel that we could use their expertise in developing the scope and cost of such a study. Your assistance in coordinating this request with other R&D staff would be appreciated.

B. Land Disposal and Treatment

Our discussions with the Corps of Engineers, PRASA, its consultants, EQB and experience gained through our grant program has indicated that certain regions of the island have or may have future water supply problems. As a result, several of the facility plans have recommended the land disposal of the conventional secondary treatment effluent. The general disposal areas selected would be sugar cane fields. While I am aware of the work being done in Hawaii on this subject, I feel that there is a hesitation on the part of PRASA and EQB to accept responsibility of large scale acceptance for such an operation without the benefit of assistance in the operation and monitoring of a trial facility.

It is my opinion that if we were to establish the monitoring program and assist in the evaluation of the results, PRASA would be more receptive to this treatment and disposal process. R&D assistance would be helpful in recommending any step 2 considerations, as well as, establishing the monitoring program.

If there are any questions concerning the above please contact me (William J. Muszynski) at 212/264-4750.

REGION III

PILOT PLANT STEP-1 STUDIES

- o Beltsville, Maryland (USDA) C-240580-01 Construction of a Composting Pad and Building

Grant Period: December 1975 to September 1977

Project Manager: Maryland Environmental Services
Annapolis, Maryland

EPA Share: \$1,067,250

Total: \$1,423,000

- o Hampton Roads, Virginia C-51545-01 Proposed Study for Recycling of
(Hampton Roads Sanitation District for the Atlantic Digested Sludge to Agricultural
Wastewater Treatment Land
Facility)

Grant Period: April 1977 to April 1980

EPA Share: \$147,750 (Step-1 share)
(\$ 50,000 - Study)
(\$147,000 - Land acquisition)

Total: \$510,000

REGION IV

PILOT PLANT STEP-1 STUDIES

- o Largo, Florida C120493 Step-3

We have a unique sludge disposal project just put in operation in Largo consisting of a drying, pelletizing and bagging process. The end product is sold as a fertilizer. A study to evaluate the performance of the operation could be of great benefit to the agency.

- o Deep Well Disposal

Several deep well disposal projects in Florida are available for study. Test wells have been drilled or are being drilled now. These are in Step-3 stage but final effluent disposal have not been approved yet. Performance data needed.

Dade County	C120377 (Step-3)
W. Palm Beach	C120489 (Step-3)
St. Petersburg	C120523 (Step-3)
Orlando	C120399 (Step-2)

- o Knoxville, Tennessee C470385-02 Step-2

40 MGD activated sludge plant. Pure oxygen for BOD reduction followed by air for nitrification.

- o Covington, Tennessee C470362-01 Step-1

Attached growth media tower for BOD reduction.

- o Vacuum Collection System

Cost savings may be possible by avoiding deep cuts through rock that would be required by gravity system.

Westmoreland, Tennessee	C470451-02 (Step-2)
Tracy City, Tennessee	C470410-01 (Step-1)

- o Sewer Rehabilitation

A study is urgently needed to evaluate the effectiveness of rehabilitation work on sewer systems. In regard to the millions of dollars being spent, we need to evaluate the performance and life of the different joint compounds and the overall effectiveness of the rehabilitation effort in terms of flow reduction. Numerous ongoing projects are available for such a study.

REGION V

PILOT PLANT STEP-1 STUDIES

- o Kalamazoo, Mich. C262583-01 Wastewater Treatment Study
- Costs: Total Estimated Project Cost: \$669,500
- Estimated Wastewater Treatment
Study cost approved in Grant
Application: \$215,400
- Costs incurred thus far: \$330,375
- Items investigated (see attached summary)
- PRIMARY: Coagulation - for SS removal without harming secondary
- SECONDARY: Pure oxygen, bio-disc, variations in conventional
activated sludge.
- ADVANCED: Activated carbon, two-stage aeration, bio-disc,
trickling filter, filtration
- RECYCLE STREAMS: Trickling filter, bio-disc, pure oxygen.
- MISC.: Plant automation, scrubber water, equipment replacement,
odor control, and sludge treatment and disposal.
- o Mansfield, Ohio C391129-01 (Completed)
- Pilot Study - Uses of different alum strengths in final settling
tanks.
- o Oxford, Ohio C390932-01 Rotating Discs Pilot Study*
- (BIO SURF PROCESS)
- *Quoted 5/7/75 letter from Oxford Community to Ohio EPA:
- "One potential means of adding tertiary treatment to our
existing plant is through a process of rotating media covered
discs or drums through the effluent. Prior to incorporating
this process into our plant, however, we wish to be convinced
of its ability to perform adequately. One commercial unit is

available for PILOT STUDY and test at a monthly cost of \$600 -
A six month test would cost \$3600. By performing a PILOT STUDY
in advance of final design, we can be more assured of achieving
the best possible final product."

- o EauClaire, Wisconsin C550628-01 Rotating bio-disc systems
testing for secondary
treatment
- o EauClaire, Wisconsin C550628-01 Pilot plant study of an
activated biofiltration
system
- o Whitewater, Wisconsin C550752-01 Treatability study - high
BOD treatment problem

WASTEWATER TREATMENT STUDY

The City of Kalamazoo treats a most unusual combination of industrial and municipal wastes. A substantial portion of the total waste stream is comprised of paper mill effluents. Nearly half the total BOD load to the plant is the result of pharmaceutical waste discharges. The pharmaceutical wastes are subject to wide variations in characteristics.

The Plan of Study area designated by the Water Resources Commission of the State of Michigan greatly expands the potential Service Area of the Kalamazoo wastewater system. The increased connected population will result in an increase in volume of domestic waste and will change the ratio of industrial to domestic wastewaters.

The treatment concept at Kalamazoo uses the nutrient-rich municipal and pharmaceutical wastes to balance the nutrient-deficient paper wastes and thus provides secondary treatment without adding nutrient chemicals.

The present facilities do not produce an effluent that consistently meets secondary treatment standards. In addition, the water quality for the Kalamazoo River proposed by the State of Michigan and the Federal requirements for the best practicable waste treatment technology make it necessary to improve the present facilities. The degree of treatment that must be achieved to meet water quality goals under present loading conditions will require BOD and suspended solids removals in excess of 95%, together with substantial ammonia oxidation. The combination of complex wastes and high degree of treatment requires that pilot studies be conducted to establish operation and design parameters for maximum utilization of existing facilities for future improvements. Pilot studies also must be conducted to determine the possibility of producing a plant effluent that can be used for recycle or land disposal. If the wastes are to be discharged to the River, it will be necessary to use the best practicable waste treatment technology.

The pilot plant approach to be used at Kalamazoo recognizes that a high quality primary effluent must be provided if secondary treatment is to function well. Preliminary investigations have shown that the paper mill effluents can be chemically coagulated as a unit or in combination with municipal wastes and produce a low suspended solids primary effluent that is essentially free of clays and paper fibers. High clay and paper fiber concentrations presently cause upsets in the activated sludge as well as solids overloads in the final clarifiers. The success of chemical coagulation must be studied over a substantial period of time due to the need to maintain a nutrient balance for secondary treatment. Chemical dosage, detention time, and overflow rate must be established before large capital outlays are made in the construction of chemical additions and primary treatment facilities.

Secondary treatment pilot studies must be conducted also: The possibility of developing a reliable nitrification system in the presence of pharmaceutical wastes must be established. The success of nitrification with very warm wastes over the winter months must be determined. Substantial capital savings could be achieved in design if the available heat is adequate to maintain a high level of nitrification using short detention times.

The presence of fine clays and paper fibers makes it necessary to investigate the effectiveness of effluent filtration. The fibers and clays may tend to coat the filters and result in very short filter runs.

There are two in-plant recycle streams at the Kalamazoo plant that require attention because of their flow and/or loading significance. The separate treatment of oxidized sludge liquors and incinerator scrubber water should be investigated before an overall treatment scheme is devised.

Methods to conserve energy will be investigated as part of this task. Effective utilization of energy will be considered in relation to cost of operation and conservation of a natural resource.

PRELIMINARY ANALYSIS AND INVESTIGATIONS

The major waste streams contributing to the treatment plant were analyzed in detail. Several treatment schemes including coagulation-sedimentation, chemical addition-coagulation-sedimentation, centrifuging, carbon adsorption, and ozonation were conducted using bench scale equipment. The results of the preliminary analyses and investigations were used to design the pilot facilities.

THE PILOT PLANT

The City had two unused chemical flocculation tanks, aerators, several pumps, valves, meters, and miscellaneous pipe. The two flocculation tanks were modified to provide a flocculation tank, primary and secondary settling tanks, and two aeration tanks. The other available equipment was assembled and used for the pilot plant. The cost of modifying the existing tanks, installing electrical power lines, pipelines, and miscellaneous supporting equipment was approximately \$70,000. The pilot plant has a great deal of flexibility and capacity. The plant can treat an average flow of nearly 1 mgd through primary treatment and 0.5 mgd (approximately 1% of the anticipated future flow) through secondary treatment.

As an alternative to modifying existing tankage and other equipment, the City could have rented small pilot plants to conduct the studies. The cost of renting primary/secondary pilot equipment was estimated at \$1,500 per month, or about \$27,000 for the projected 18-month duration of the study. Added to this cost would be the cost of installation of electric service, pipelines, pumps, and other supporting equipment similar

to that required for the present pilot plant. Rented pilot facility would be of much smaller size and require the purchase of more supporting equipment. The cost of this supporting equipment, including power supply, was estimated at \$35,000, or a total cost of \$62,000. The greater flexibility of the larger pilot unit coupled with the increased reliability in the data and the reduced errors of scale-up more than offset the small additional cost.

REQUIRED IMPROVEMENTS TO PRIMARY TREATMENT

The present high clay and fiber content of the paper mill wastes causes a buildup of inert solids in the secondary treatment system. The high percent of inert solids in the mixed liquor requires operation at very high mixed liquor solids. This high concentration of MLSS overloads the final settling tanks and causes the discharge of an effluent with high solids and BOD.

The present pilot studies will optimize primary treatment in the plant. Primary treatment studies will be as follows:

1. Investigate primary treatment of paper mill wastes
 - a. Coagulation-sedimentation
 - b. Chemical addition-coagulation-sedimentation
2. Investigate primary treatment of combined paper mill wastes and municipal wastes
 - a. Coagulation-sedimentation
 - b. Chemical addition-coagulation-sedimentation

The above pilot studies are required to:

- a. Determine whether primary treatment of the combined wastes is feasible and practicable
- b. Determine whether the primary treatment effluent will have a sufficiently high phosphorus content to support biological activity in secondary treatment
- c. Establish design criteria for primary treatment

REQUIRED IMPROVEMENTS TO SECONDARY TREATMENT

Improvements to secondary treatment are required to:

1. Increase BOD removal
2. Increase SS removal
3. Increase TOD removal
4. Provide a consistent effluent quality

The stringent effluent quality requirements that the Kalamazoo facilities will have to meet, and the changed nature of the future

secondary treatment influent require best practicable waste treatment technology and that investigations be conducted to determine optimum aeration periods and secondary settling rates. The pilot investigations will:

1. Study the effects of various aeration times on effluent quality using conventional activated sludge flow diagrams
2. Study the effects of various aeration times on effluent quality using sludge reaeration flow diagrams
3. Study the effectiveness of pure oxygen systems
4. Investigate various settling rates
5. Investigate chemical addition to remove phosphorus and improve solids and BOD removals
6. Study the effectiveness of the above approaches in controlling and reducing the $\text{NH}_3\text{-N}$ concentration in the pilot effluent

The most cost-effective method will be recommended for implementation.

NEED FOR ADVANCED WASTE TREATMENT

Advanced waste treatment facilities will be needed to produce an effluent with the required quality. Best practicable waste treatment technology will be required to produce an effluent for discharge to the River or for recycle and reuse. At present the following advanced waste treatment processes are contemplated for pilot studies:

1. Subject to the findings of Item 6 above, the study will include the investigation of $\text{NH}_3\text{-N}$ oxidation by:
 - a. Activated carbon addition to aeration tank
 - b. Two-stage aeration
 - c. Fixed-film processes
 1. Plastic media trickling filter
 2. Rotating disk
2. Effluent filtration
3. Chemical treatment-filtration
 - a. Activated carbon addition
 - b. Metal salts addition
4. Post aeration

The most cost-effective method of achieving this goal will be recommended for implementation.

TREATMENT OF IN-PLANT RECYCLE STREAMS

The sludge disposal process results in the return of very substantial COD loads to the treatment systems. The pilot studies will investigate the feasibility of pretreatment of said return streams before they are incorporated into the total waste volume. The following studies are presently scheduled:

1. Plastic media trickling filter
2. Rotating disk
3. Biological treatment using pure oxygen may also be investigated

The most cost-effective method will be recommended for implementation.

MISCELLANEOUS WASTE TREATMENT NEEDS

Under this portion of the project we propose to undertake four major tasks:

1. Plant automation
2. Scrubber water disposal
3. Improvement and/or replacement of antiquated equipment
4. Odor control
5. Sludge treatment and disposal

Plant Automation

The need for more sophisticated process control as well as the necessity of lowering labor costs dictate that the City begin to consider and plan for some degree of automation in the operation of the treatment plant. The use of a computer in the compilation of operating data as well as the preparation of monthly operating reports allows for the release of personnel to perform other tasks.

The study proposed herein provides for the development of a logical program to implement automation. The need for computerized operation of some portions of the treatment facility will receive careful study.

Items receiving specific consideration for automatic operation include:

1. Feeding of phosphorus removal chemicals
2. Control of dissolved oxygen in the aeration tanks
3. Waste sampling and analysis

The most cost-effective method of plant automation will be recommended for implementation.

Scrubber Water Disposal

The incinerator scrubber water is discharged to primary treatment

after cooling and this water imposes an additional hydraulic and solids load on the system. Laboratory work will be undertaken to determine the effectiveness of this method of treatment for the scrubber water. After cooling, and with improved quality of the effluent water used for scrubbing, this recycle stream may be of adequate quality for discharge to the Kalamazoo River without further treatment.

The most cost-effective system will be recommended for implementation.

Improvement and/or Replacement of Antiquated Equipment

The primary portion of the plant has been in service for 20 years and some items of equipment are unsuitable for the present loading and should be replaced. As part of the program proposed herein, an inventory of such items will be prepared in cooperation with the plant personnel. This portion of the project is planned for early completion to allow for implementation of improvements at the earliest possible time.

Odor Control

Investigations on methods of controlling odors from the treatment facilities are being and will continue to be conducted as part of the study. The use of ozone to control odors from sludge processing and thickening tanks has been investigated. Scrubbing and carbon adsorption of foul air streams is scheduled for testing at the treatment plant in the near future.

The most cost-effective system will be recommended for implementation.

Sludge Treatment and Disposal

The present sludge treatment and disposal system will be reviewed. Sludge disposal on land will be investigated. Estimates will be prepared to determine the cost-effectiveness of alternative sludge disposal systems.

The most cost-effective system will be recommended for implementation.

REGION VI

PILOT PLANT STEP-1 STUDIES

At time of report, information not received on pilot studies associated with Step-1 Facility Planning Grants.

Further communication may be indicated between ORD and the Regional Construction Grant Program, regarding possible grant mechanisms for cooperative cost-effective technology studies.

REGION VII

PILOT PLANT STEP-1 STUDIES R&D POTENTIAL ASSISTANCE

Step 1 Projects with Pilot Plants

Topeka, Kansas C200746	Pilot work to study compactability of undigested activated sludge using Permutit "DCG" and "MRP" units.
---------------------------	---

Other Projects with Potential R&D Involvement

- ° A contract study to develop methods and criteria to evaluate the state pollution control agency management and municipal management of controlled discharge lagoons (i.e., when to discharge, why, for how long, what analytical tests are required or can be accepted). A review of current state management programs successfully optimizing this treatment alternative would also be useful.
- ° Ft. Dodge, Iowa-C190551 - ABF system almost on line, needs performance data.
- ° Reinbeck, Iowa -C190557 - Traveling brush aerator modification of oxidation ditch, construction complete, needs performance data.
- ° Muscatine, Iowa -C190592 - Heat treatment of sludge, almost on line, needs performance data.
- ° Emmettsburg, Iowa-C190604-Rotating biological filter, construction complete, needs performance data.
- ° York, Nebraska -C310433-2-stage trickling filter followed by rotating biological filter unit designed for nitrification using pilot plant data. Construction complete. Needs performance data and scale up comparison data.
- ° Iola, Kansas -C200407-Aerated lagoon followed by large lagoon cells, now under construction, needs performance data.
- ° Frankford, Mo. -C290720-Submerged sand filter following aerated lagoon. Plans and specifications are under review, needs performance data.
- ° Alton, Missouri- C290849-Testing of land application effluent. Plans and specs will be initiated shortly; needs performance data.
- ° Delta, Missouri- C290644-Granular rock filter following 3-cell lagoon, construction complete, needs performance data.
- ° California, MO - C290608-Granular rock filter following 3-cell lagoon, construction complete, needs performance data.
- ° Branson, MO - C290592-Rapid sand filters following aerated lagoon, construction complete, needs performance data.

- o Warrensburg, Missouri -C290655-Deep ditch oxidation system, under construction, needs performance data.
- o Springfield, Missouri -C290564-Full scale ozone disinfection, under construction, needs performance data.
- o Little Blue Valley S.D., MO -C290630-Rapid sand filters following extended aeration, construction nearing completion, needs performance data.

REGION VIII

PILOT PLANT STEP-1 STUDIES

The Regional Construction Grant Program personnel in Region VIII indicated that it has not been the Regional policy to support pilot studies of a research nature through Step-1 grant funds. Rather it is the Region's feeling that such research studies may be supported by the ORD grant mechanism. In fact, the Region believes there are opportunities for ORD participation in cooperative studies through the research grant mechanism which may be mutually beneficial to the municipalities, the Regional Office, and ORD.

REGION IX

PILOT PLANT STEP-1 STUDIES

- o Pomona Virus Study I.D. 061051

Grantee: L. A. County Sanitation Districts

Location: Pomona, California - Statewide applicability

Goal: To compare virus removal efficiencies of four different tertiary treatment processes:

1. Coagulation + sedimentation + filtration + disinfection using Cl_2 or O_3 , aiming for 5 mg/l Cl_2 residual.
2. Low-dose chemical addition + filtration + Cl_2 (or O_3).
3. Two-stage carbon adsorption + filtration (20 minute empty bed detention time) + Cl_2 (or O_3) between stages.
4. Same as 2 but with nitrified secondary in addition.

Results: Process No. 1 was found to be best; the other three processes were found to be roughly equivalent in virus removal efficiency. All four processes were effective and acceptable for practical application.

Criterion Developed: Two-hour Cl_2 detention time providing 10 mg/l total Cl_2 residual.

Other Results: Trace organics were characterized and classified. Virus sampling and concentration procedures were developed.

The study is complete or near completion.

- o LA/OMA Project = Los Angeles/Orange County I.D. C061042
Metropolitan Area Regional Wastewater Solids
Management Program

Grantee: L. A. County Sanitation Districts

Location: L. A. County and Orange County

Goal: To develop a regional sludge management plan for the L. A.-Orange County Metropolitan area. Completion date expected by 1979.

Sludge Management Alternatives Chosen as Candidate Systems:

1. Incineration

2. Pyrolysis
3. Separate WAS (waste activated sludge) treatment
4. Co-pyrolysis with refuse
5. Jet propulsion laboratory (JPL) pyrolysis system
6. B.E.S.T. (basic extractive sludge treatment) dehydration process
7. Carver-Greenfield multiple-effect evaporation process
8. Dewatering for landfill or agriculture
9. Sludge recycle center
10. Evaporation ponds
11. Remote dewatering for landfill or agriculture
12. Liquid sludge for agriculture
13. Soil reclamation on San Clemente Island
14. Thermal conditioning - anaerobic digestion
15. Ocean disposal - Not EPA Grant Eligible (in conflict with law)
16. Exportation
17. Wet air oxidation

Studies Underway:

1. Pyrolysis
2. Heat treatment (400°F) followed by digestion
3. Leachate analysis
4. High-rate composting
5. Sludge marketing

Results: No design criteria yet developed. A Phase I report (August 76) is available.

- o San Francisco Bay Region Wastewater I.D. C061225
Solids Study

Grantee: East Bay Municipal Utility District (EBMUD)

Location: Nine-county San Francisco Bay Area

Goals:

1. To develop regional policy and plan for long-term municipal wastewater solids management needs.
2. Develop staged facilities plans for the four major wastewater treatment agencies: San Francisco, San Jose, EBMUD, and Central Contra Costa County Sanitary District. Final project report/EIR/EIS expected December 1978.

Testing and Demonstration Program Includes:

1. Solano County soil enrichment study - reports available
2. Microbiological testing and evaluation - reports available
3. Heavy metal study - due for completion July 1977
4. Veale tract soil enrichment demonstration program - due completion July 1977.

Other Testing Carried out by Participating Agencies:

1. Air drying lagoons
2. Low speed/high speed contrifuges
3. Composting and co-composting with solid wastes
4. Incineration
5. Pyrolysis
6. Coordination with testing done by LA/OMA Project

Results: Numerous, and can best be found in the various reports available.

- o Central Contra Costa County Sanitary District I.D. C061269
Sludge and Refuse Study

Grantee: Central Contra Costa County Sanitary District

Location: Contra Costa County

Goals:

1. To convert an existing incinerator to a pyrolysis mode.

2. To investigate pyrolysis feasibility for a mixture of sludge and air-classified refuse.
3. To investigate energy recovery aspects.

Results: Only interim; no design criteria yet.

- o Jet Propulsion Laboratory Activated Carbon Treatment System (JPL-Acts) I.D. C061073

1 MGD Pilot Plant

Grantee: County Sanitation Districts of Orange County

Location: Huntington Beach, California

Goal: To evaluate an activated carbon treatment system for sewage that was conceived and developed by JPL supported by NASA. Completion date June 1977.

Results: With domestic sewage, the metals and PCB removals were good, but pilot plant operations are too preliminary to draw useful conclusions regarding process parameters for domestic sewage.

- o City of Los Angeles Aeration Study I.D. C061036

Grantee: City of Los Angeles

Location: Hyperion S.T.P.

Goal: To compare three different types of pure oxygen aeration; City will choose one:

1. Unox
2. Deep torbine
3. Diffused bubble

Results: The work on the Unox System is completed; work on the other two is proceeding. Any results available are not on hand at present.

- o Chino Basin Municipal Water District Virus Study I.D. 060858

Grantee: Chino Basin Municipal Water District

Location: Ontario, California; Chino, California (full-scale plant); Uplands, California

Goal: To investigate the use of ozone in combinations with chlorine in various treatment train configurations with the goal of virus removals.

Results: The work is completed. The most effective virus removal required O_3 plus chemical treatment plus Cl_2 , in that order, on a secondary settled effluent. A final report is available.

- o Santa Rosa Effluent Irrigation Study I.D. C060790

Grantee: City of Santa Rosa

Location: Laguna de Santa Rosa

Purpose: To investigate the feasibility of agricultural cropping so as to design a large-scale wastewater reuse system (parameter development). Four different crops used*, irrigated with reclaimed water, with groundwater, and with combinations thereof - and with and without fertilizers.

*Barley, corn sudan grass, hay crops

Results: Soils were tested for pathogen and metals contamination.

Finding: Wastewater (reclaimed) produced better crops than groundwater.

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY

CURRENT 201 GRANT SUPPORTED PILOT AND SPECIAL STUDIES

January 1977

PROJECT NO. C-06-0868

Grantee: East Bay Dischargers Authority

Location of Study: Oakland, California

Objective:

For proposed bay outfall determine feasibility, best location, design data, potential environment impact.

Description:

Conduct estuarine study within study area including fish and macroinvertebrate assessment, benthic assessment and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-0870

Grantee: Humboldt Bay Wastewater Authority

Location of Study: Offshore Samoa Spit, North Humboldt Bay,
California

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-0914

Grantee: City of Morro Bay

Location of Study: Morro Bay, California

PROJECT NO. C-06-0914 (contd.)

Objective:

For an ocean outfall disposal alternative determine the feasibility, best location, design data, and potential environmental impact.

Description:

Conduct an oceanographic study within the study area including current measurement, marine geophysical investigation, fish and macro-invertebrate assessment, benthic assessment, and chemical, physical, and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-0914

Grantee: City of Morro Bay

Location of Study: Morro Bay, San Luis Obispo County, California

Objective:

For a wastewater reclamation alternative determine the feasibility of using treated wastewater on the soils characteristic to the area.

Description:

Conduct a soils study within the study area, including an assessment of the geology and soil types in the area with respect to percolative capacity, testing of soil irrigated with treated wastewater for sodium buildup and physical behavior under use.

PROJECT NO. C-06-0938

Grantee: Sacramento Regional County Sanitation District

Location of Study: Sacramento, California

Objective:

Evaluate digested sludge processing and disposal system utilizing long-term solids storage basins and high rate application of sludge to land dedicated to sludge disposal. Determine odor emissions and travel from solids storage basins and test odor control processes. Monitor environmental impact of system.

PROJECT NO. C-06-0938 (contd.)

Description:

Full scale solids storage basins (SSBs) were constructed to store anaerobically digested sludge during wet weather and longer periods. Basins are loaded at a controlled rate to operate in facultative mode with algal covering to control odors. Sludge is withdrawn from the basins for disposal, but the basins are never emptied. The SSBs are being studied as a unit process rather than as storage basins. Sludge harvested from SSBs is applied on land dedicated to sludge disposal. Because no agricultural use is planned, sludge is applied at a high rate, experimenting with different application methods. Odor emissions from SSBs are measured. Techniques are evaluated to strip odors from digested sludge, to scrub fouled air, and to operate SSBs to prevent odors. Extensive monitoring of processes and environment and varied operational schemes are conducted to determine effects on virus and other pathogenic organisms, heavy metals, organics, salts, and other chemical and sludge characteristics.

PROJECT NO. C-06-0938

Grantee: Sacramento Regional County Sanitation District

Location of Study: Sacramento River, Southwest of Sacramento,
California

Objective:

Evaluate the critical factors which regulate the slime growths occurring in the Sacramento River in late summer and fall.

Description:

A limnological study was performed to evaluate what the critical water quality and physical factors were in limiting the slime growths. Community analysis was performed on the periphyton at various locations in the river to locate density differences in growth. Possible operating alternatives were evaluated in the municipal treatment plants, as well as monitoring for seasonal changes in the waste constituency.

PROJECT NO. C-06-0988

Grantee: City of Benecia

PROJECT NO. C-06-0988 (contd.)

Location of Study: Benecia, California

Objective:

Determine feasibility of biological oxidation for treatment of combined industrial and domestic wastewater.

Description:

Combined wastewater is treated in three bench scale activated sludge pilot systems having different operational criteria. The effect of shock industrial loadings on the biomass and the stability of the processes are to be evaluated.

PROJECT NO. C-06-1002

Grantee: East/Central Contra Costa County Wastewater Management Agency

Location of Study: New York Slough, Pittsburg, California

Objective:

For proposed bay outfall determine feasibility, best location, design data, potential environmental impact.

Description:

Conduct estuarine study within study area, fish and macroinvertebrate assessment, benthic assessment and chemical, physical, and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1022

Grantee: San Mateo County Mid-Coastside Service Agency

Location of Study: Half Moon Bay, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data and potential environmental impact.

PROJECT NO. C-06-1022 (contd.)

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1042

Task: Field Demonstration of the DECO Pyrolysis Process

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Southgate Refuse Transfer Station, Los Angeles
County, California

Objective:

Obtain operational data, energy and mass balances, and air emission data for a full scale pyrolytic process.

Description:

A 50 ton/day DECO pyrolysis reactor is being field tested at the South Gate Transfer Station. The unit is being operated under various ratios of sludge and refuse, varying from 100 percent refuse to 100 percent dewatered sludge. For each operating condition, complete energy and mass balances are performed by LA/OMA Project or LACSD staff. Fuel gases, oil and char are being analyzed to determine component fractions, heat value, and quantities produced. Quantities of refuse and sludge added are being closely monitored as well as all other energy and mass inputs to the system. All air pollution aspects of the process will be reviewed by the Southern California Air Pollution Control Board. Actual field testing by the latter agency will probably be required.

PROJECT NO. C-06-1042

Task: Demonstration Project for Optimization of Sludge
Dewaterability and Energy Production

PROJECT NO. C-06-1042 (contd.)

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Los Angeles County Sanitation Districts
Joint Water Pollution Control Plant,
Los Angeles County, California

Objective:

Demonstrate on a continuous flow, pilot scale basis potential for increased methane production and enhancement of solids dewaterability.

Description:

A continuous flow, pilot scale demonstration is being conducted at the research facility of the Joint Water Pollution Control Plant (JWPCP). The entire treatment train of thermal conditioning, anaerobic digestion, and subsequent dewatering will be evaluated for primary, waste activated sludges, and mixtures of the two. Effects of thermal conditioning on energy production, sludge biodegradability, and dewaterability will be evaluated. Energy balances for the complete system and cost factors will be developed. It is anticipated that the study will require nine months to one year for completion.

PROJECT NO. C-06-1042

Task: Carver-Greenfield Demonstration Project

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: City of Los Angeles Hyperion Treatment Plant,
Playa del Rey, California

Objective:

Demonstrate the Carver-Greenfield evaporation process on a continuous flow, pilot scale basis

Description:

The Carver-Greenfield process offers considerable potential for decreasing energy requirements in subsequent pyrolysis processes. The heat of vaporization in a combustion process is over 1,000 Btu/lb of water whereas in a multiple effect evaporator only about

PROJECT NO. C-06-1042 (contd.)

300-400 Btu/lb are required. Thus, the Carver-Greenfield pyrolysis process offers the potential for obtaining energy self-sufficiency. The Carver-Greenfield process following dewatering will be tested for improvement of the overall thermal efficiency of the process.

PROJECT NO. C-06-1042

Task: B.E.S.T. Demonstration Project

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Orange County Sanitation Districts (OCSD)
Plant No. 2, Orange County, California

Objective:

Obtain operational data on the Basic Extractive Sludge Treatment (B.E.S.T.) system of sludge dehydration by solvent extraction.

Description:

The B.E.S.T. process is relatively new to the field of municipal sludge treatment, although the principles of solvent extraction are well developed. The process attempts to evaporate water with less thermal input than conventional drying processes. The B.E.S.T. system offers potential for decreasing energy requirement in subsequent pyrolysis processes.

It is proposed that the mobile, trailer-mounted B.E.S.T. system be demonstrated at an existing pyrolysis pilot facility. The unit is capable of processing about one ton/day (dry) solids and would be operated on a 24-hour basis to assure that representative mass and energy balances were obtained. Dried sludge will be stored until sufficient quantity is available to operate the OCSD pyrolysis reactor. Total duration of the study is estimated to be about two or three months including set-up and dismantling of equipment.

PROJECT NO. C-06-1042

Task: Field Demonstrations of Deep Pile Composting

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Los Angeles County Sanitation Districts Joint
Water Pollution Control Plant (JWPCP), Los
Angeles County, California.

PROJECT NO. C-06-1042 (contd.)

Objective:

Perform field demonstrations of deep pile composting to determine the feasibility and practicality of the process on a large scale.

Description:

Of all possible methods for deep pile composting, mechanization of the process in deep concrete bins appears to offer the most advantages. A concrete bin structure will be constructed at one of the regional treatment facilities. JWPCP is the probable site for such a demonstration, since both dewatered and composted sludge is available. The bin structure itself will be 10 feet high, 16 feet wide, and 200 feet long. Initially, a mechanical rotor or turning device will be used to aerate and turn the compost. The device will be mounted on rails (or similar structure) at the top of each wall and will travel the length of the bin turning the sludge as often as required to maximize the drying and composting process. The capability of testing a diffused air system will also be provided in the bin design. Following construction, the bin will be operated for at least one year to observe operation under all weather conditions. Sludge will be loaded and unloaded from the bin using skiploaders. Various methods of operation will be examined during the study period to determine the optimum mode of operation.

PROJECT NO. C-06-1042

Task: Sludge Evaporation Ponds Demonstration

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/CMA Project)

Location of Study: Los Angeles County, California

Objective:

Obtain field data on the performance of evaporation ponds for sludge dewatering.

Description:

Field evaporation pond studies will be performed to gather detailed design and operation information. At least a one-year study is envisioned to gather data during both summer and winter conditions. The studies should address, but not be limited to, the following items. First, modes of operation for the evaporation ponds should be investigated, including installation of pond

PROJECT NO. C-06-1042 (contd.)

linings or underdrain systems, decanting of ponds, and separate and combined treatment of digested primary sludge and waste activated sludge. Second, potential odor problems should be studied and mitigation measures identified. Third, the potential for breeding of insects, rodents, or other pests should be thoroughly studied and mitigation measures identified.

PROJECT NO. C-06-1042

Task: Field Demonstration of Mechanical Sludge Dewatering

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Los Angeles County Sanitation District,
Los Angeles County, California.

Objective:

Obtain operational and performance data on mechanical dewatering of sludges generated in the Los Angeles-Orange County Metropolitan area.

Description:

Dewatering characteristics of sewage sludges are known to vary considerably depending on the type of sludge, previous processing, and general characteristics of the sewerage system. Because of this variability and because of advancements in equipment design, those pieces of mechanical dewatering equipment which offer potential for achieving greater solids capture or greater cake solids will be piloted scale field tested. Pilot units would be tested on sludges from each of three major treatment plants in the planning area. This will provide operational and performance data relative to each sludge at each plant.

PROJECT NO. C-06-1042

Task: University of California, Riverside, Agricultural Project

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: University Farm, University of California,
Riverside, California

PROJECT NO. C-06-1042 (contd.)

Objective:

Develop guidelines and criteria for recycling and disposing sewage sludge from the regional wastewater solids study area on cropland. More specifically,

1. Determine the effect of soil properties on the capacity and limitation of cropland in receiving liquid and composted sludge and the change in soil physical and chemical properties due to sludge application.
2. Determine crop responses (yield, nutrient utilization, uptake of potentially hazardous trace metal elements, and trace organic components, etc.) to various levels of sewage application on cropland.
3. Determine potential routes and mechanisms whereby surface and groundwater and soils may be contaminated by the application of sewage sludge to croplands.

Description:

Many parameters that may limit the land application of sewage sludge require further evaluation under local climatic, hydrologic and soil conditions. Direct extrapolation from investigations completed elsewhere may not apply locally. Therefore, a comprehensive study of sewage sludge recycling onto land has been developed so that the beneficial value and limitations of cropland application of municipal sludge from the coastal region of Southern California can be evaluated.

Effects of sludge application which will be evaluated in this study can be divided into two distinct categories. Effects on soil and groundwater which will be monitored include the following: (1) characterization of surface runoff; (2) transformation and movement of plant nutrient constituents in the soil profile; (3) trace metal buildup in soils; (4) analysis for trace organic chemicals in sludge; and (5) changes in soil salinity. Analysis of crop responses to sludge application will include crop yield, trace metal uptake by plants, and trace organic uptake by plants.

Feed crops, truck crops, and non-food crops such as cotton will be grown during the project. Sludge types to be applied will include liquid digested sludge from two treatment plants and digested-dewatered-composted sludge. The crop selection and sludge types will cover the range of reasonable agricultural use alternatives.

PROJECT NO. C-06-1042

Task: Sludge Disposal to Sanitary Landfill Demonstration
Project

Grantee: Los Angeles County Sanitation Districts (Lead Agency),
Regional Wastewater Solids Management Program
(LA/OMA Project)

Location of Study: Los Angeles County and City of Los Angeles
Sanitary Landfills, Los Angeles County,
California.

Objective:

Demonstrate effects of sewage sludge additions to sanitary landfills. Determine the feasibility and problems associated with sludge addition to existing sanitary landfills in the region.

Description:

- a. Phase I - This will consist of testing mixtures of sludge cake and refuse in different ratios to determine at what ratio leachate will be generated. Small test cells (4 ft. in dia., 45 in. high) will be used for this investigation. Hydraulic pressure will be applied to simulate the actual pressure of overlying strata at different fill depths. These experiments will also determine the quantities of leachate expected at different fill depths. These experiments can be completed in 2 to 3 months.
- b. Phase II - In this phase several lysimeter cells will be set up at various operating conditions. Such operational parameters will be determined from the results of Phase I experiments. Some lysimeter cells may be started during Phase I.
- c. Phase III - During this phase one or more large size test cells (approximately 70' x 100' x 15' deep) may be operated to verify and correlate the data obtained from the lysimeter study. However, the need for this phase of the investigation will be established after reviewing the data obtained from the Phase I study.

PROJECT NO. C-06-1051

Grantee: Los Angeles County Sanitation District No. 2

Location of Study: Los Angeles, California

Objective:

Compare four alternative tertiary treatment systems to determine

PROJECT NO. C-06-1051 (contd.)

most cost-effective method of virus inactivation. Also characterize residual organics.

Description:

The California State Department of Health requires a certain treatment scheme where wastewater is discharged to non-restricted recreational impoundments. The virus study assessed less costly treatment schemes in terms of virus removal compared to the Department of Health standard, using both chlorine and ozone as disinfectants in a 50 gpm pilot plant. Seeded poliovirus and naturally-occurring virus were examined for removal through the processes. The residual organics study attempted to characterize organic compounds in secondary and tertiary effluents as well as the effects of treatment on formation and removal of organic substances.

PROJECT NO. C-06-1058

Grantee: Marin County Sanitary District No. 6

Location of Study: San Pablo and San Rafael Bays, California

Objective:

For proposed bay outfall determine feasibility, best location, design data, potential environmental impact.

Description:

Conduct estuarine study within study area including current measurement, fish and macroinvertebrate assessment, benthic assessment and chemical, physical, and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1063

Grantee: City of Modesto

Location of Study: Modesto, California

Objective:

Examine effectiveness and establish design criteria for intermittent sand filtration system for use in polishing oxidation pond effluent to meet federal secondary treatment standards.

Description:

PROJECT NO. C-06-1063 (contd.)

Collect data from three pilot filtration systems of different grain sizes utilizing varying hydraulic loading rates on each.

PROJECT NO. C-06-1066

Grantee: Monterey Peninsula Water Pollution Control Agency

Location of Study: Monterey, California

Objective:

For the proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct an oceanographic study within the study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1066

Grantee: Monterey Peninsula Water Pollution Control Agency

Location of Study: Monterey County, California

Objective:

For a potential wastewater reclamation alternative determine the feasibility of using treated wastewater for the irrigation of directly consumed food crops.

Description:

Conduct an agricultural reuse demonstration study consisting of irrigation of various vegetable crops with wastewater treated to different levels. Measurement of the microbiological quality of effluents from various levels of treatment, and of agricultural, soil and plant materials. Assessment of long-term impact of irrigation with reclaimed wastewater on the productivity of the area.

PROJECT NO. C-06-1073

Grantee: County Sanitation Districts of Orange County

PROJECT NO. C-06-1073 (contd.)

Location of Study: Huntington Beach, California

Objective:

Evaluate the feasibility of substituting a physio-chemical treatment process, the Jet Propulsion Laboratory - Activated Carbon Treatment System (JPL-ACTS), for a biological treatment process. Establish design criteria for the JPL-ACTS.

Description:

The JPL-ACTS utilizes activated carbon to remove raw wastewater pollutants. Activated carbon is produced by a pyrolysis process utilizing sewage solids removed from the raw wastewater stream. A 1 mgd JPL-ACTS pilot study will be conducted.

PROJECT NO. C-06-1102

Grantee: City and County of San Francisco

Location of Study: San Francisco, California

Objective:

Develop a system to control and manage wet weather flows in the combined sewer system of the City.

Description:

The City used rainfall data (68 year record) for determining historical flow patterns. A correlation is then made between this data and more recent data collected citywide. Computer programs and other analytical methods are used to determine flow management for the proposed storage/transport sewers.

PROJECT NO. C-06-1106

Grantee: City of Santa Cruz

Location of Study: Santa Cruz, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct oceanographic study within study area including current

PROJECT NO. C-06-1106 (contd.)

measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1118

Grantee: South San Luis Obispo County Sanitation District

Location of Study: Oceano, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data and potential environmental impact.

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1128

Grantee: City of Watsonville

Location of Study: Watsonville, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1135

Grantee: South Bay Dischargers Authority

Location of Study: South San Francisco Bay, California

PROJECT NO. C-06-1135 (contd.)

Objective:

For proposed bay outfall determine feasibility, best location, design data, potential environmental impact.

Description:

Conduct estuarine study within study area including fish and macroinvertebrate assessment, benthic assessment and chemical, physical, and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1135

Grantee: South Bay Dischargers Authority

Location of Study: South San Francisco Bay, California

Objective:

Evaluate the significance of marsh and benthic loading rates and their influence on the oxygen budget in South San Francisco Bay.

Description:

A field monitoring program was performed to monitor the changes in nutrients and oxygen demanding substances in sloughs with and without significant marsh influences. These measurements were also made in flow through respirometers on the different sediment types found in the Bay.

PROJECT NO. C-06-1154

Grantee: West Contra Costa County Wastewater Management Agency

Location of Study: Richmond, California

Objective:

For proposed bay outfall determine feasibility, best location, design data, potential environmental impact.

Description:

Conduct estuarine study within study area including current measurement, fish and macroinvertebrate assessment, benthic assessment and chemical, physical, and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1183

Grantee: City of Woodland

Location of Study: Woodland, California

Objective:

Investigate the effectiveness and applicability of the pond isolation process in waste oxidation ponding systems.

Description:

The critical factors in algal settling are verified and optimum operating schedules are determined using pilot ponds operated to simulate physiochemical and biological conditions existing in field ponds. Laboratory bioassays are used to identify specific nutrient limitations.

PROJECT NO. C-06-1202

Grantee: The City of Los Angeles

Location of Study: Los Angeles Outer Harbor, Los Angeles,
California

Objective:

Investigate the effects of the Terminal Island Treatment Plant's wastewater discharge on the marine environment of the Los Angeles Harbor.

Description:

A series of studies designed to show that the secondary effluent discharged by the Terminal Island Treatment Plant is "enhancing" the waters of the Los Angeles outer harbor. Investigations include: analysis of existing data, assessment of oxygen budget, assessment of food chain/web, assessment of chemical constituents, and toxicity/bioassay studies.

PROJECT NO. C-06-1225

Task: Solano County Soil Enrichment Study

Grantee: East Bay Municipal Utility District (EBMUD)
(Lead Agency), San Francisco Bay Region
Wastewater Solids Study

Location of Study: Solano County, California

PROJECT NO. C-06-1225 (contd.)

Objective:

Evaluate the use of digested and dewatered sewage sludge on marginal agricultural land under controlled field conditions to determine the agricultural benefits, environmental effects, health-related effects, and public acceptance of such practices.

Description:

A series of field test plots and a comprehensive environmental monitoring program are being used to determine liquid sludge application rates; crop yields; soil, plant, and water quality; heavy metal effects; and pathogenic micro-organism survival and effects. Public acceptance is evaluated through a public participation program involving local farmers and ranchers, farm advisors, prominent citizens, and decision-makers.

PROJECT NO. C-06-1225

Task: Microbiological Testing and Evaluation of
Sludge Application to Agricultural Land

Grantee: East Bay Municipal Utility District (EBMUD)
(Lead Agency), San Francisco Bay Region
Wastewater Solids Study

Location of Study: Solano County, California

Objective:

Evaluate the health related effects of pathogenic microorganisms associated with land application of sewage sludge, and determine the relative health risk of such practice.

Description:

Samples of sewage sludge, soil, soil-sludge medium, and irrigation water are collected. Quantitative analyses are made for total mesophilic aerobic forms of Salmonella, Shigella, Fecal Coliform, and Fecal Streptococci. Helminths are quantified using the MacMaster's slide technique and viability tests made by hamster inoculation. An assessment of health risk will be made upon completion of the monitoring program through a cooperative effort with the California State Department of Health. Microbiological testing will be conducted at other test sites as applicable.

PROJECT NO. C-06-1225

Task: Heavy Metal Study

PROJECT NO. C-06-1225 (contd.)

Grantee: East Bay Municipal Utility District (EBMUD)
(Lead Agency), San Francisco Bay Region
Wastewater Solids Study

Location of Study: University of California, Riverside, California

Objective:

Determine the phytotoxic effects of selected heavy metals on selected plants, "safe" sludge loading rates, and the "useful" life of an agricultural land application project assuming heavy metals are the long-term limiting factor.

Description:

The pot test program is being conducted at U. C. Riverside by Drs. Al Page and Frank Bingham, under the auspices of the U. C. Kearney Foundation. Three soils, three air-dried sludges, four sludge application rates and a control, three plant systems, and four replications, for a total of 540 pots are being utilized. The heavy metals of interest are Cd, Cu, Cr, Ni, Pb, and Zn. The total metals and their availability will be measured in the sludge, soil and plants, to observe heavy metal uptake and accumulation and resultant yield relationships. This information will provide a firm basis for developing diagnostic soil and plant tissue criteria for assessing the phytotoxic hazard from heavy metals accumulation in soils. These criteria will facilitate the development of "safe" sludge application rates, and the "useful" life of such projects.

PROJECT NO. C-06-1225

Task: Veale Tract Soil Enrichment Demonstration Program

Grantee: East Bay Municipal Utility District (EBMUD)
(Lead Agency), San Francisco Bay Region
Wastewater Solids Study

Location of Study: East Contra Costa County, California

Objective:

Demonstrate the beneficial effects of dewatered sewage sludge, composted sewage sludge, and fibreboard waste on marginal agricultural land in East Contra Costa County. The test program would evaluate sludge composting methods, application methods, and public acceptance of this practice in this area. There are approximately 12,000 areas of such marginal agricultural land in the immediate surrounding area that is accessible to barge transportation.

PROJECT NO. C-06-1225 (contd.)

Description:

The program will be conducted by the Study staff in cooperation with EBMUD laboratory personnel, and Veale Tract, Inc. A series of field test plots and a monitoring program will be utilized. Dewatered sludge cake will be hauled to the test site. The sludge will be incorporated into the test plots and will be composted with fibreboard waste product. The test plots will consist of sludge only, a mixture of sludge and fibreboard waste, chemical fertilizer, and a control replicated three times. Selected crops will be grown and harvested. EBMUD will provide laboratory services to monitor the site operations in accordance with regulatory agency requirements. Various sludge application methods will be tested to determine feasibility for fullscale operation.

PROJECT NO. C-06-1252

Grantee: City and County of San Francisco

Location of Study: Offshore San Francisco, California,
south of the Gulf of Farallon

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macro-invertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1269

Grantee: Central Contra Costa Sanitary District

Location of Study: Concord, California

Objective:

Determine and optimize the operating characteristics of a full scale model sewage sludge-solid waste coincineration and pyrolysis process with respect to feed techniques, waste heat recovery, fossil fuel input, and exhaust air emissions.

Description:

An unused sludge incinerator was modified and instrumented to accept a mixture of dewatered raw sludge and the light fraction of solid waste. Different mixtures of sludge and solid waste were used and total feed rates were varied. The operation of the unit was optimized for minimum startup input of fossil fuel, maximum waste heat recovery, and minimum exhaust gas contaminants. The data obtained will be used to develop design criteria for modification of two existing sludge incinerators now designed to be fired with natural gas.

PROJECT NO. C-06-1286

Grantee: Carmel Sanitary District

Location of Study: Carmel Bay, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

PROJECT NO. C-06-1289

Grantee: City and County of San Francisco

Location of Study: San Francisco, California

Objective:

Determine the best treatment process that can be adapted to the wide range of flow conditions that occur in the combined sewer system. Determine level of treatment for wet weather flows.

Description:

Test treatment systems on transitional flows that range from dry to wet weather and then back to dry weather. Pilot advanced primary systems to check treatment ability and resulting sludge volume.

PROJECT NO. C-06-1327

Grantee: City of Pismo Beach

Location of Study: Pismo Beach, California

Objective:

For proposed ocean outfall determine feasibility, best location, design data, and potential environmental impact.

PROJECT NO. C-06-1327 (Contd.)

Description:

Conduct oceanographic study within study area including current measurement, marine geophysical investigation, fish and macroinvertebrate assessment, benthic assessment, and chemical, physical and bacteriological analysis of water column and sediments.

REGION X

PILOT PLANT STEP-1 STUDIES*

- o Nampa, Idaho

Sewer sealing study (completed?)

- o Dayton, Oregon

Phased isolation lagoon tests. (Has a Step-1 grant, but no EPA funds for tests.)

- o Ontario, Oregon

Phased isolation lagoon tests. (Does not have a Step-1 grant yet.)

- o Pullman, Washington

Process evaluation - problem of Washington State University student population fluctuation.

- o Seattle Metro

Several pilot studies involving biological and physical-chemical treatment systems as options to comply with secondary treatment requirements of law.

*Based on notes taken during Regional visit.

Appendix C

Regional Construction Grant Program Personnel Contacted

LIST OF REGIONAL CONTACTS.

REGION I Kenneth Johnson, Deputy Regional Administrator

Richard Kotelly, Deputy Director, Water Programs

Richard Keppler, R&D Representative

REGION II William J. Muszynski, Chief
Construction Grants Branch (Puerto Rico & Virgin Islands)

James DeLaura, Project Engineer (New Jersey)

Andy Warren, Chief
Central New York Section Construction Grants

Robert Mason, R&D Representative

REGION III Al Montague, R&D Representative

REGION IV Kirk Lucius, Deputy Director, Water Division

REGION V Eugene Chaiken, Deputy Chief
Construction Grants Branch, Water Division

Kent Fuller, Deputy Chief, Planning Branch, Water Division

Individual State Project Engineers

Clifford Risley, R&D Representative

REGION VI Ned Burleson, Municipal Facilities Branch, Water Division

REGION VII Robert Steiert

Arlein Wicks, Director, Office of Intermedia Programs

Aleck Alexander, R&D Representative, OIP

James Mandia, R&D Representative, OIP

REGION VIII Samuel Berman, Chief, Engineering Operations Branch
Water Division

Wayland Britt, Engineering Operations Branch

George Hartman, Engineering Operations Branch
Water Division

Alfred Vigil, Chief, Grants Administration Branch
Water Division

Jon Herrmann, R&D Representative

REGION IX Sheila Prindiville, Director, Water Division

Allan Abramson, Chief, Planning and Standards Branch
Water Division

William Bishop, R&D Representative

REGION X Norman Sievertson, Grants Operations Section
Water Operations Branch, Water Division

Tom Dennington, Grants Administration Branch
Water Division

Dave McClelland, Grants Administration Branch
Water Division

John Osborn, R&D Representative

Appendix D

Description of Grants Information and Control System-II (GICS-II)
and Sample Printout of a Step-1 Grant from Region IV

Grants Information and Control System (GICS)

The original GICS system was modified recently to standardize on a national basis certain information concerning the Regional Construction Grant Programs in the ten Regions. The system allows additional data elements for Regional use for tracking and management purposes.

It is understood that the new GICS-II system will essentially be operational in all Regions by March or April 1977. The following is a brief description of the system, as presented in the Grants Information and Control System Users Manual, which is available from the Grants Information Branch, Grants Administration Division:

The Grants Information and Control System (GICS) is a computer based management system that gathers information on EPA grant programs, whether administered at Headquarters or in the Regional Offices. The system provides computer programs to collect application, award, and status data from Regional and Headquarters offices, edit the data, maintain a grant data base, and disburse error data to the submitting office. Finally, the system maintains current query files for on-line retrieval for some grant programs.

Specifically, the objectives of the system are:

1. Provide monthly grant activity information to management
2. Provide real-time or on-line response to special information requests from grants applicants, Congress, and top management of EPA.
3. Provide real-time or on-line response to daily operational problems to program review staff and grants clerks

4. Eliminate unnecessary manual record keeping and reporting procedures, both in the Regions and Washington
5. Provide a standard system design module that can supply standard management information and still be modified to meet special local operational requirements

GRANT NO. 130403-01-0 P.P. CH (021) C PARENT NUMBER (021) - - - - - DES. DEF. (E) PROJ. NO. (001)
 TYPE (041) A FACILITY INVOL. (021) - - - - - DET. BUDGETABLE (071) PROJ. FUND (051) OR. DESAL
 → STEP (071) 1 PERMIT STATUS (731) (74) 0 HISTORY FILE 4 GRANTS ASST (001)

DESCRIPTION: 201 FACILITIES PLAN
 (21)

CONSULTANT (031) 9920 PRUSE

APPLICANT	PLANNING	WORKS	DESIGN DATE
(12) CITY OF	LEGIS AUTH (061) 30	TYPE (56)	POP SERVED (05)
(13) CITY HALL	P.L. FY (571) 75	INTERCEPTION (761)	FLOW CAP. (091)
(14) CITY	P.L. NUMBER (591) 1180	COLLECTION (771)	INVEST FLOW (001)
REP (111) PERKINS, HARRY JR. CITY MGR	RIVER BASIN (251) 0321	SEWER INFIL (001)	100 INFLUENT (051)
STATE (111) 14	3031(E) AREA (001)	SEP COAR SWR (011)	100 EFFLUENT (051)
ZIP (121) 31745		SOURCE MATH (791)	SS INFLUENT (021)
REGION (171) 14		PUMP STATION (791)	SS EFFLUENT (021)
CENSUS (501) 4		TREAT PLANT (111)	PERS. ON TOTAL (001)
PHONE (101) - -		OUTFALL (751)	PERS. ON CERT (001)
COUNTY (111) 1101		OTHER (081)	PERS. ON TOTAL (001)
CG DIST (111) 02		SEWER REMAIN (001)	PERS. ON CERT (001)

FINANCE	SCHEDULE	PCT/TASK	DATE	AMOUNT	PAY FMT
TOT COST ALL PROJ (201)	(00)				CUM PAYMENTS REQ (001)
ELIGIBLE 2000 COST (291)	(01)			295,300	PAYMENT INFO RECPT (001)
OTHER FUNDS AND (051)	(02)			0	PCT COST CO (001)
OTHER FUNDS DATE (001)	(03)				DATE (001)
OTHER FUNDS SOURCE (051)	(04)				CUM EPA PAYMENTS (001)
P.L. AMOUNT (001)	(05)			0	LAST EPA PAYMENT (001)
CUM EPA FUNDS AND (191)	(06)			215,100	DATE (001)
EPA FUNDS AND (011)	(07)			79,150	OTHER FUNDS PAID (001)
	(08)				PCT PAID (001/001)
	(09)				PCT CR LYST INSR (001)

MILESTONES	STATUS	DATE	REGIONAL DATES
ACTION CODE (231) EP (241)	74-12-20	PRE-APP CONF (001)	0-0-0
P.L. STATUS (001)	0-0-0	EAS RECPT (001)	0-0-0
DRG CERT (001)	0-0-0	EAS REVIEW (001)	0-0-0
CORRECT CERT (051)	0-0-0	I/I RECPT (001)	0-0-0
APPL RECPT (001) A	74-10-24	I/I REVIEW (001)	0-0-0
ADMIN REVIEW (001)	0-0-0	SE RECPT (001)	0-0-0
ENR REVIEW (001)	0-0-0	SE REVIEW (001)	0-0-0
PLAN REVIEW (001)	0-0-0	SP STUDY REC (001)	0-0-0
GRANT AVAL P (001)	0-0-0	SP STUDY REV (001)	0-0-0
GRANT AVAL P (001) OF	74-12-20	FAC PLAN REC (001)	0-0-0
GRANT ACCEP (001)	0-0-0	FAC PLAN REV (001)	0-0-0
ANL RECPT (001)	0-0-0		
ANL REVIEW (001)	0-0-0		

CHECKLIST

(001) (011) (021) (031) (041) (051) (061) (071) (081) (091) (101) (111) (121) (131) (141)

Appendix E

Other Related EPA Activities and Surveys

OTHER RELATED EPA ACTIVITIES AND SURVEYS

There were six other related EPA program activities and surveys prompted by the January 1974 GAO Report, and the recent Congressional concern about what EPA is doing to develop and utilize new and improved wastewater treatment technology in the Regional Construction Grant Program. A brief description of these activities and surveys follows.

Municipal Environmental Research Laboratory

The MERL is serving as the coordinator for the Office of Air, Land, and Water Use to explore, on a trial basis with Regions I and V, the feasibility of long-range cooperative technology studies between ORD and the Regions, on new and innovative wastewater treatment processes and methods.

As a first step, Mr. Mayo, Director, MERL, held telephone conferences with Regional Construction Grant Program people in Regions I and V to indicate MERL's interest in developing new and innovative technology studies for specific municipal projects, in cooperation with the Region. He acknowledged to Regions I and V that the opportunity to impact the current 18 billion dollar program is minimal; however, he felt that now is the time to start laying the ground work for the next Congressional appropriations.

MERL proposed that, initially, State and Regional Construction Grant Program personnel meet with individuals from the MERL to review and compare both the MERL list of Innovative Technologies (Appendix F) and State priority lists, for candidate municipalities (projects) that will probably not be ready for a Step-1 grant award for 12-18 months. This long-range

approach is considered desirable because of ORD planning and budgeting requirements.

The Regions agreed to contact the State agencies to determine their reactions on the proposal to incorporate cooperative technology studies in the Step-1 grant process. It was also agreed that for this trial basis there should be a limit on the number of projects in a Region to no more than six.

This cooperative State/Regional/ORD approach may serve as an indication of how the Office of Air, Land, and Water Use, ORD, may wish to proceed, following the initial examination of current on-going pilot studies that are being supported by Step-1 planning grants, as covered in this report.

Office of Air, Land, and Water Use, ORD

The OALWU contracted Booz-Allen and Hamilton, Inc., to conduct a survey at local, State and EPA Regional levels. The purpose of the survey was to determine whether or not innovative technologies are being used in municipal wastewater treatment projects funded under the Regional Construction Grant Programs, and to identify the reasons why such technologies are or are not being used.

In its February 1976 report^(*) to the OALWU, Booz-Allen and Hamilton, Inc.:

- (1) summarized the survey findings and conclusions
- (2) identified emerging problems in municipal wastewater treatment
- (3) examined barriers to the implementation of innovative technology
- (4) made a broad recommendation on data collection and dissemination
- (5) presented alternatives for encouraging the introduction of

innovative technologies in municipal wastewater treatment

(*) "A Survey of the Use of Innovative Technology in Wastewater Treatment" -

Report by Booz-Allen and Hamilton, Inc., Management Consultants,

February 1976, Report No. 9075-044-001, under contract with Office of

Air, Land, and Water Use, Office of Research and Development, EPA

Technical Information Division, OMTS, ORD

The TID awarded a one-year research grant (R804782 01) in November 1976 to the Science and Technology Policy Center, Syracuse Research Corporation, entitled "Introducing New Technology to Municipal Waste Treatment: A Decision-Making Study".

The following is taken directly from the Summary of Proposed Work section of the EPA Notice of Research Project.

"Through the Environmental Protection Agency, the federal government is encouraging the adoption and use of new technology in municipal waste treatment. To effectuate realistic technology transfer policies, EPA must better understand the dynamics of local decision-making as they impact on decisions to innovate. Some municipalities have made decisions to incorporate new technology, whereas others have not. Why? To investigate the factors that impinge on technological choice by municipal users, the proposed research would study the process of decision in four cities that have made contrasting technological determinations. It would prepare in-depth case studies using an organizational problem-solving approach. This would involve structuring the analysis around key decision points found to be critical in previous studies in the adoption of new technology: (1) awareness of problem/opportunity; (2) search for alternative solutions; (3) advocacy of options; (4) adoption of specific solution; (5) initial implementation; (6) incorporation or termination. Cross-case comparisons would be made to delineate the roles played by various participants in the process and how coalitions form at the local level that serve to promote or impede the introduction of new technology to municipal waste treatment."

Office of Water Program Operations, OWHM

Another related activity was the Regional survey conducted by the Office of Water Program Operations, Office of Water and Hazardous Materials.

The purpose was to collect information on Step-2 and -3 construction grant projects to determine the number of projects utilizing new technologies and the types of new technology currently under design or construction.

In this approach, Gary Otakie, OWPO, conducted personal interviews with Regional Construction Program Project Engineers/State Coordinators, and reviewed construction grant files as necessary.

Appendix G contains a copy of the memorandum from John Rhett, DAA, OWPO, OWHM, to the Regional Administrators requesting their cooperation and assistance, and attached questionnaire entitled "Construction Grant Projects Utilizing New and Innovative Technologies".

Office of Planning and Evaluation, Office of Planning and Management

Through a series of Regional visits, Larry Reed of the Program Evaluation Division, Office of Planning and Evaluation, OPM, headed up a study to evaluate the impact of municipal water pollution control research and development program on the development and application of innovative municipal water pollution control technology.

The final product of this study will be a report of the findings to the Assistant Administrators for Research and Development, and Planning and Management. It is expected the report will contain recommendations for improving the overall process of developing and utilizing new/innovative and improved wastewater treatment methods and technologies, which involves the ORD, OWHM, and the Regional Construction Grant Programs.

Environmental Protection Agency

The EPA recently issued a request for proposals to conduct a special study on the current Step-1 facilities planning grant process.

Following is the background information provided in the Statement of Work of the request for proposal.

Public Law 92-500 requires that municipal wastewater treatment facilities achieve best practicable waste treatment technology or some more stringent level of treatment necessary to meet water quality standards. A total of \$18 billion was authorized and allotted in 1972 to help municipalities meet these requirements. As of July 31, 1976, \$11 billion of the total had been obligated, leaving \$7 billion to be obligated of the initially authorized funds. The Agency anticipates additional authorizations will be forthcoming, and is planning for an obligation level of \$5-6 billion per year in the future.

The rate of future obligations depends on the current level of facility planning or Step 1 activity. Step 1 grants are given to help determine the most cost-effective and environmentally sound facilities necessary to solve municipal pollution problems. If there are not enough applications for Step 1 grants, or if plans are prepared too slowly after the Step 1 grants are made, or if the plans that are prepared are poorly conceived and need major revisions, the Agency will have difficulty in the long run maintaining a level of grants approval for Step 2 (design) and Step 3 (construction) sufficient to achieve the overall goals of the program in an orderly manner. This potential difficulty will be referred to in this rationale as "shortfall."

The problem of preventing a "shortfall" is complicated because funds are allotted to the individual states. Some states have a shortfall in the facility planning process compared with their available allotment. The available allotment is, therefore, utilized slowly, and the overall national rate of obligations is reduced accordingly.

EPA regional offices and states play an essential role in developing, reviewing and approving applications for Step 1 grants. They must review and approve the Plan of Study (a requirement for a Step 1 grant) and the Facility Plan (the major product from the Step 1 grant). They also provide preapplication assistance to potential grantees and are immediately responsible for assuring that the overall grants process moves at a rate commensurate with national obligation goals.

The Grants Information Control System contains much information on pending and approved Step 1 grants and facility plans. This system falls short, however, of providing a complete picture of facility planning in the pipeline or about to enter the pipeline. Prospective grantees who initiated their feasibility and planning work on their own prior to October 1974, may apply directly for a Step 2 or 3 grant. Several states (e.g., New York) still have many such projects, while in other states most have already passed through the grants pipeline. Some states also set aside funds for Step 1 grants to communities which are not explicitly mentioned by name on the state priority list as in line for such a grant.

Another consideration which must be kept in mind when assessing the shortfall is that the rate at which facility plans are completed and approved varies greatly. The assessment must be based on an analysis of the time necessary to complete facility plans as well as the number of facility plans underway or likely to get underway each year.

These considerations have led the Agency to conclude that a special study is needed to evaluate the current Step 1 process and recommend ways in which it might be improved to ensure that the rate of facility planning is sufficient to ensure obligations at the rate of \$5-6 billion per year.

Appendix F

List of Innovative Technologies
Wastewater Research Division
Municipal Environmental Research Laboratory-Cincinnati

INNOVATIVE TECHNOLOGIES

<u>CATEGORY & TITLE</u>	<u>CLASSIFICATION</u>		
	<u>PROVEN BUT NOT USED EXTENSIVELY</u>	<u>TESTED BUT NEEDS FIELD VERIFICATION</u>	<u>GOOD IDEA THAT NEEDS TESTING</u>
A. Secondary Treatment Alternatives			
1. Intermittent Sand Filtration to Upgrade Lagoons	X		
2. Open Tank Oxygen Aeration		X	
3. Automation of Secondary Treatment Plants		X	
4. Fluidized Bed-O ₂ Biological Treatment			X
5. Carrousel (deep oxidation ditch with mechanical aeration)	X		
6. Deep Shaft Aeration		X	
7. Airco Fall Reactor (clip-on upgrading technique)			X
8. Orbital (Raceway brush aeration & flow equalization)	X		
9. Activated Bio-Filter (sludge return in a trickling filter)		X	
10. Weighing Agent Upgrading		X	
11. Rotating Biological Contactors	X		
B. Disinfection Alternatives			
1. Ultraviolet Radiation		X	
2. Sulphur Dioxide Dechlorination	X		
3. Ozone			
Air		X	
O ₂		X	
Electron Acceleration			X
4. Chlorine Dioxide			X
Nutrient Removal			
1. Single-stage Nitrification-Denitrification in an Extended Aeration Plant	X		
2. Fixed Film Nitrification and Denitrification		X	

C. Nutrient & Toxics Removal
(continued)

- | | |
|---|---|
| 5. Biological Phosphorus Removal (Phostrip) | X |
| 4. Digester Supernatant Ammonia Recovery | X |
| 5. AARP - Ammonia Removal & Recovery | X |

D. Toxics Removal (organics & heavy metals)

- | | | |
|--|---|---|
| 1. Powdered Carbon Upgrading to Activated Sludge Plants with Regeneration | X | |
| 2. Powdered Carbon Upgrading to Activated Sludge Plants without Regeneration | X | |
| 3. Sodium sulfide or Ferrite Upgrading for Heavy Metal Removal | | X |
| 4. Independent Physical-Chemical Treatment with Nitrate Addition (no regeneration) | X | |

E. Preliminary & Primary Treatment Alternatives

- | | | |
|---|---|---|
| 1. Flow Equalization Dry & or dry/wet weather storage | X | |
| 2. SWIRL Primary | | X |
| 3. Stationary Screens (Bauer Eng.) | X | |
| Discostrainer | | X |

F. Special Applications

- | | | |
|---|---|---|
| 1. Chemical Flocculation & Flotation for Ocean Discharge | | X |
| 2. Renovation & Reuse through Groundwater Recharge | X | |
| 3. Direct Municipal/Industrial Reuse | | X |
| 4. Aluminum sulphur Impregnated concrete pipe Trenchless sewers | | X |

Special Applications (continued)

- | | | | |
|----|---|--|---|
| 5. | Integrated Municipal Utility Services | | X |
| | Solid refuse | | |
| | Sludge | | |
| | Wastewater renovation | | |
| | Power production | | |
| 6. | Solar Energy for Digester Heating; Remote Facility Pumping Stations | | X |

g. Small Flow Applications

- | | | |
|----|--|---|
| 1. | Centralized Management of Remote Treatment Facilities | X |
| 2. | Septage Treatment | X |
| 3. | Individual Home Water Conservation Treatment & Reuse Systems | X |
| 4. | Alternating Soil Absorption Fields and Chemical Rejuvenation | X |
| 5. | Recreational Vehicle Waste Disposal Systems | X |

Sludge Disposal Applications

- | | | | |
|-----|--|---|---|
| 1. | Sludge-Refuse Coincineration | X | |
| | Co-pyrolysis | X | |
| 2. | Digester Supernatant Treatment with Anaerobic Trickling Filter | X | |
| 3. | Coal Sludge Incineration | X | |
| 4. | Sludge Pressure Dewatering & Autothermal Incineration | X | |
| 5. | Thermophilic Digestion | | |
| | Aerobic | | X |
| | Anaerobic | X | |
| 6. | Multiple Hearth Pyrolysis | X | |
| 7. | Composting (Alternate Schemes) | X | |
| 8. | Compost Sterilization w/Heat | | X |
| 9. | Lime Stabilization | X | |
| 10. | Sludge Trenching | X | |
| 11. | Heat Treatment of Sludges Prior to Digestion to Improve Biodegradation | | X |
| 12. | Sludge Disinfection by High Energy Electron Irradiation | X | |

I. Wet Weather Flow Treatment

- | | | |
|---------------------------|---|---|
| 1. Vacuum Street Cleaning | | X |
| 2. Sewer Flushing | X | |
| 3. Porous Pavement | | X |
| 4. Helical Flow Regulator | | X |
-

Appendix G

November 29, 1976 Memorandum from John Rhett, Deputy Assistant Administrator for Water Program Operations, to Regional Administrators, Subject: "Utilization of New and Innovative Technologies in the Construction Grants Program"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Utilization of New and Innovative Technologies
in the Construction Grants Program

DATE: NOV 29 1976

FROM: John T. Rhett, Deputy Assistant Administrator
Water Program Operations (WH-546)



TO: Regional Administrators, Region I - X

Recent Congressional committee hearings have raised questions concerning the utilization of new technologies in the Construction Grants Program. Some outside observers of the program feel these technologies are not being implemented. The reasons cited include conservative design practices and lack of confidence in new technologies caused in part by a shortage of full scale operating data.

✓ A review of Step 2 and 3 Construction Grant Projects will determine the number of projects utilizing new technologies and the types of new technology currently under design or construction. This data will provide a basis for decisions concerning the need for special programs related to implementation of new technology.

Members of the Office of Planning and Evaluation and my staff will be scheduling visits to discuss the use of new technology in grant projects in your Region and to scan the project files to gather information. Gary Otakie (426-8976) of this Office and Larry Reed (755-0306) of OPE will be the principal contacts on these matters. We are sending the attached form so that your construction grants staff can familiarize themselves with the type of information we are seeking.

I appreciate your cooperation and assistance.

Attachment

cc: Water Division Directors

Project No: _____ EPA Regions: _____
 Grant Applicant: _____ Name of Preparer: _____
 Location: _____ Telephone No: _____
 *Check One: PL - 92-500 Project Step 2 Grant Awarded ☒
 PL - 92-500 Project Step 3 Grant Awarded ☒
 Old law Project ☐ Step 1 Study Completed ☐

*Date of award (bid) _____
 *Design average flow (MGD) _____

WASTEWATER: _____ WASTEWATER: _____
 OXYGEN ACTIVATED SLUDGE ☐ UTILIZATION OF SOLAR ENERGY
 SPECIFY PROCESS _____ (COLLECTORS OR CELLS) ☐
 OTHER OXYGEN SYSTEM ☐ (specify) _____ NEW DISINFECTION TECHNOLOGY ☐
 ROTATING BIOLOGICAL CONTACTOR (Disc) ☐ OZONE ☐
 for BOD REMOVAL ☐ ULTRA VIOLET LIGHT ☐
 for NITRIFICATION ☐ BROMINE CHLORIDE ☐
 OXIDATION DITCH ☐ OTHER ☐
 ACTIVATED BIO FILTER ☐ SPECIFY _____
 PLASTIC MEDIA TRICKLING FILTER ☐ DECHLORINATION ☐
 LAGOON (POND) UPGRADING ☐ SULFUR DIOXIDE ☐
 WITH ROCK FILTERS ☐ OTHER ☐
 INTERMITTENT SAND FILTER ☐ SPECIFY _____
 SUBMERGED SAND FILTER ☐ STORM AND COMBINED SEWER ☐
 OTHER ☐ (SPECIFY) _____ OVERFLOW TREATMENT ☐
 LAND APPLICATION (TREATMENT) ☐ SPECIFY TYPE _____
 CROP IRRIGATION _____ NON-SEWERED TREATMENT ☐
 (or slow rate systems) ☐ SPECIFY TYPE _____
 RAPID INFILTRATION ☐ OTHER INNOVATIVE PROCESSES ☐
 OVERLAND FLOW ☐ SPECIFY _____
 CARBON ADSORPTION ☐
 GRANULAR ☐
 POWDERED ☐
 NEW FILTRATION TECHNIQUES ☐
 (NOT RAPID SAND FILTERS)
 MULTI OR DUAL MEDIA ☐
 SPECIFY _____

CARBON REGENERATION ☐
 LIME TREATMENT ☐
 WITH BIOLOGICAL TREATMENT ☐
 AFTER BIOLOGICAL TREATMENT (tertiary) ☐
 BEFORE NITRIFICATION ☐
 PHYSICAL - CHEMICAL
 (no biological treatment) ☐
 RECARBONATION ☐
 ION EXCHANGE ☐
 REVERSE OSMOSIS ☐
 AMMONIA STRIPPING ☐
 TUBE SETTLERS ☐
 MICRO SCREENS ☐
 NITRIFICATION ☐
 SUSPENDED GROWTH (TANKS) ☐
 ATTACHED GROWTH (FILTERS) ☐
 WITH AIR ☐ WITH OXYGEN ☐
 FLUIDIZED BEDS ☐
 DENITRIFICATION ☐
 SUSPENDED GROWTH (TANKS) ☐
 ATTACHED GROWTH (FILTERS) ☐
 COMBINED NITRIFICATION-
 DENITRIFICATION ☐
 WASTEWATER REUSE ☐
 GROUND WATER RECHARGE ☐
 RECREATIONAL REUSE ☐
 INDUSTRIAL REUSE ☐
 OTHER (SPECIFY) _____

SLUDGE: _____
 CO - INCINERATION ☐
 CO - PYROLYSIS ☐ PYROLYSIS ☐
 REGIONAL TREATMENT OF SEPTAGE
 TANK PUMPINGS ☐
 SLUDGE COMPOSTING ☐
 LIME CONDITIONING ☐
 UTILIZATION OF INCINERATOR ASH FOR
 SLUDGE CONDITIONING ☐
 CHEMICAL FIXATION (STABILIZATION)
 OF SLUDGE ☐
 SPECIFY PROCESS _____
 COMMERCIAL SOIL CONDITIONER/
 FERTILIZER PRODUCTS ☐
 DIGESTOR GAS DRIVEN INTERNAL
 COMBUSTION ENGINES ☐
 NEW SLUDGE Dewatering TECHNIQUE ☐
 HEAT TREATMENT ☐
 FILTER PRESS ☐
 BELT FILTER ☐
 UTILIZATION OF WASTE HEAT ☐
 SPECIFY _____
 OTHER INNOVATIVE PROCESSES ☐
 SPECIFY _____

DISCUSSION

OTHER INFORMATION AVAILABLE ON THE TECHNOLOGIES (PROCESSES) CHECKED ABOVE (VARIATIONS, PECULIAR CIRCUMSTANCES, ETC.)