

PD-ABI-409
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EVALUATION REPORT
OF THE
OPERATION AND MAINTENANCE ELEMENT
OF THE
WATER AND WASTEWATER CONSULTING GROUP
PROJECT FOR THE
ALEXANDRIA
GENERAL ORGANIZATION FOR SANITARY DRAINAGE

APRIL 1992

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EVALUATION REPORT
OPERATION AND MAINTENANCE ELEMENT
OF THE WCG PROJECT FOR THE
ALEXANDRIA GENERAL ORGANIZATION FOR SANITARY DRAINAGE

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EVALUATION REPORT
OPERATION AND MAINTENANCE ELEMENT
OF THE WWCG PROJECT FOR THE
ALEXANDRIA GENERAL ORGANIZATION FOR SANITARY DRAINAGE

During the week of March 16th, at the request of the Alexandria Sewerage I Project Officer, a comprehensive evaluation was made of the O&M and training element of the Water and Wastewater Consulting Group (WWCG) program provided for the Alexandria General Organization for Sanitary Drainage (AGOSD). Specifically, the evaluation concerned the Scope of Work provided in Modification 5 of the USAID direct contract, 263-0100 with WWCG with an effective date of 10 July 1990. The evaluation was conducted regarding project performance and effectiveness and measured project accomplishments in comparison with project objectives and projections. The evaluation took place over a period of four days and included, site visits, interviews, document and deliverables review, and extensive discussions with WWCG and AGOSD personnel.

I. Executive Summary

The WWCG O&M activity in support of AGOSD is achieving most of its objectives to date in spite of some serious delays in construction schedules, and some lack of support on the part of the client agency. During this initial period of the Mod 5 activity, work has been delayed primarily on the Tasks that relate to the Wastewater Treatment Plants, the mechanical dewatering facility and the landfill/composting facility. The WWCG staff that was mobilized to accomplish the pump station activities and then to continue with these programs, has been efficiently utilized in other Scope responsibilities, particularly related to the production of training materials, Standard Procedures and training programs. This staff use was approved in advance by the Project Officer. Consequently, a major portion of the staff time has now been used but a significant amount of work related to the delayed facilities, still remains to be done. The PACD has been extended to December 31, 1994 and measures have been taken to extend the O&M contract accordingly. This will allow the continuation of the training for one full year after the physical completion of the facilities, at an additional cost of \$1.6 million.

The success of the project to date seems to be primarily the result of dedicated efforts on the part of the O&M team and an overall enthusiastic and positive attitude. The O&M Director's professionalism and his diligent efforts have kept the program on

track in spite of serious delays and problems. All of the WWCG staff was very cooperative during the evaluation and all requests for data and references and documents were fulfilled quickly and completely with openness and candor. One of the primary advantages of the project evaluation was that WWCG took the opportunity to review the effectiveness of each of the activities through the eyes of the USAID review team and the AGOSD personnel interviewed.

Nevertheless, all of the Scope of Work items have not been fully achieved. The following is a summary of the activities for each of the Tasks in the Scope of Work:

o Task 4.01, Training at USAID Funded Pump Stations.

This task has been essentially completed, although some training is still taking place regarding these pump stations. The AGOSD personnel assigned to the stations can be considered fully effective, although the two older pump stations need improved maintenance procedures. Preventive maintenance programs have been established at all six stations. Some AGOSD staff expressed concern regarding the level of demonstration training provided in the OJT portion of the program.

o Task 4.02, Treatment Plants

This task has not been accomplished because the construction of the treatment plants has not yet been completed and the AGOSD staff has not yet been identified. WWCG is fully prepared to undertake the training for this task at the appropriate time. The preparation of the O&M manuals and Standard Procedures is on schedule. It was noted that the treatment plants have not been provided with administration buildings, laboratories and workshops, which will cause major difficulties during commissioning and routine operation.

o 4.03, Mechanical Dewatering Facility (MDF)

This task has not been completed because the construction of the MDF has just begun. The AGOSD staff has not yet been identified, but will be assigned sufficiently in advance for adequate training. The WWCG work program has been developed and an appropriate schedule established.

o 4.04, Landfill/Composting Facility (LCF)

This task has not been completed because the construction of the LCF has not yet begun. The AGOSD staff has not yet been identified, but will be assigned sufficiently in advance for adequate training. The WWCG work program has been developed and an appropriate schedule established.

o 4.05. Twinning Program

WWCG has subcontracted this task to ISTI. Twinning partners have been identified and the program is scheduled to begin this year. Given the delays in the construction program, this schedule is appropriate. The Twinning Plan Report has not yet been completed, but it is scheduled for completion in April, 1992.

o 4.06. AGOSD Central Management and Training Unit (CMTU)

The CMTU has not been established, but a training management facility known as the Training Resources and Technical Information Center (TRATIC) has been organized and approved by AGOSD. TRATIC is not yet functional or fully staffed. WWCG has provided reference materials, documents and training equipment for TRATIC. TRATIC only partially meets the role envisioned for the CMTU. The task deliverables are on schedule.

o 4.07. Operation and Maintenance Data Management Systems

WWCG has installed a computerized maintenance program called TUMMS in the USAID funded AGOSD pump stations. The preventive maintenance portion of the program is fully functional, but the inventory control program has not yet been implemented, even though it was intended to be on-line by December 1991. Other elements of the task are on schedule and will be on-line within three months after completion of construction. WWCG has interpreted this task to apply only to the USAID funded facilities and not the existing collection system. While the scope of work is not specific on this point, the Project Officer reports that it was intended that the program emphasis should be on the USAID facilities. The Management Information System Concept Report has not yet been prepared.

o 4.08. O&M Budget and Procurement Assistance

WWCG has completed the O&M budget development task and has instituted an annual update program. Progress is being made regarding the linking of the inventory control program with the AGOSD procurement of spare parts.

o 4.09. Existing AGOSD Collection System and Pump Stations

Limited training and direct management assistance have been provided by WWCG for the existing system. There is much less interest in training on the part of the AGOSD personnel assigned to the existing pump stations. Three to four days of on-site training have been provided at each of the 17 existing pump stations and WWCG technical assistance is available upon request. This level of training effort was approved by the USAID Project Officer. Requested information on the existing collection and pumping system has not been provided by AGOSD, and the required

collection system O&M program has not been developed. There are indications that the reluctance on the part of AGOSD to provide requested information has now changed with the recent change in agency management. The Consolidated Pump Station Report has been completed and is well done.

o 4.10. Supplies and Studies

All of the required equipment and supplies have been procured with the exception of the Maintenance vehicles which are on order.

o 4.11. Monitoring and Evaluation

The Briley Wild Report was prepared and submitted in final form in partial completion of this task, but no further work is anticipated. The primary concerns expressed in the Briley Wild Report regarding system sustainability have subsequently been aggressively addressed by WWCG and the recommendations implemented.

o Project Staffing

During the course of Mod 5, there have been a number of changes in the staffing outlined in the Scope of Work. The changes were required to meet the conditions of the project as they were refined through experience and changed circumstances. The staffing changes were discussed and agreed in advance by the Project Officer, but have not been fully documented. Nevertheless, the total personmonth allocation and salary related costs as specified in the contract have not been exceeded. The Staffing Tables on pages 24 and 25 provide details concerning person-month utilization.

II. Introduction/Background

USAID financial assistance to the Alexandria Wastewater Program began in September 1977 when a loan agreement was signed to finance preparation of a Master Plan, Immediate technical assistance and to identify necessary construction and rehabilitation projects. After a number of amendments, the final maximum authorization for the project is \$318,458,045. The Egyptian Government contribution will be approximately 299 million Egyptian Pounds when the project is concluded. Water and Wastewater Consultants Group (WWCG) was hired through the Loan Agreement to provide Design Review, construction management and technical assistance services.

In July 1990, Modification 5 (Mod 5) to the contract was approved, which modified the WWCG Scope of Work and added a comprehensive Operation and Maintenance Program. Mod 5 contained a budget of \$9,448,251 and provided 326 person-months of

expatriate staff in Egypt, 14 person-months of Home Office Support, 370 person-months of Egyptian Associate staff, 40 person-months of Egyptian subcontractor personnel and 240 person-months of U.S. subcontractor personnel. In addition, a provision of the Modification required that 40 percent of the activities (and budget) be subcontracted to firms other than those making up the WWCG joint venture.

The mod 5 Scope of Work is contained in 11 tasks, 4.01 through 4.11, and lists action items, accomplishments and deliverables for each task. The Scope contains 49 specific written deliverables to be completed and requires monthly progress reports, procurement actions and extensive training.

The period of Mod 5 was defined as being from January 1, 1986 through December 31, 1992. Provision was made for a six month extension of the contract, contingent on the PACD being extended to June 30, 1993. The level of effort of O&M services was estimated based on forecasted dates of completion of the major construction projects. However, substantial delays in the construction schedules have caused the PACD to be extended to December 31, 1994 for the O&M element, for one full year beyond the completion of construction. An amendment to Mod 5 is currently being considered that will add approximately \$1.6 million to the cost of the program without changing the Scope of Work.

III. Project Approach

During the course of the evaluation, site visits were made to the following sites:

- o New Smouha Pump Station
- o East Zone Pump Station
- o Ras El Soda Pump Station
- o Sporting Pump Station
- o Sidi Bishr Pump Station
- o Maamoura Pump Station
- o East Wastewater Treatment Plant
- o West Wastewater Treatment Plant
- o Mechanical Dewatering Facility
- o AGOSD TRATIC Training Center

During the course of the evaluation, interviews were conducted with the following persons:

- o Engineer Bhaggat, AGOSD O&M Manager
- o Engineer Reda, AGOSD Central Maintenance Manager
- o Bill Durham, WWCG Project Manager
- o George Kineas, WWCG O&M Director
- o Mahmoud Fahmy, WWCG Deputy O&M Manager
- o Bill Rappold, WWCG Training Manager

- o Ted Schuurmans, WWCG Technical Assistance Manager
- o Debbie Horton, WWCG Technical Documents Manager
- o Jack Kules, WWCG Instructional Techniques Manager
- o Approximately 20 AGOSD P.S. Operators and Technicians

During the course of the evaluation, the following reports, publications and documents were reviewed:

- o WWCG Monthly Progress Reports, November, December 1992 and January 1992
- o WWCG Progress Report to USAID, March 15, 1992
- o WWCG Documentation Quality Assurance/Quality Control Plan, January 8, 1992
- o WWCG Consolidated Pump Station Condition Report, January 1992
- o Briley, Wild and Associates, Interim Evaluation of the Alexandria Wastewater System Expansion Project, Volume 1 and 2, December 1991
- o Samples of Standard Operating Procedures, Standard Maintenance Procedures, Safety Procedures, Task Analyses and Job Analyses

IV. Findings

In order to facilitate a comparison of the project Scope of Work and deliverables with the work actually accomplished to date, this section includes a description of the tasks followed by a detailed position report. General comments regarding program effectiveness and special conditions are provided at the end of each Task discussion.

4.01 Pump Stations

1. Train and provide direct management to AGOSD staff in the new (6) pump stations in process control, mechanical maintenance, electrical repair, instrumentation, maintenance, spare parts, record keeping and reporting.

This task pertains to the six new pump stations provided through USAID funding. They are New Smouha Pump Station, East Zone Pump Station, Ras El Soda Pump Station, Sporting Pump Station, Sidi Bishr Pump Station, and Maamqura Pump Station. While the term direct management is not clearly defined, extensive OJT and classroom training for the pump station operators has taken place, and the technical assistance team has made frequent visits to the pump stations for advice and consultation. The subject matter of the training includes the requirements shown above and many more. However, the intent of the task regarding the preparation and submittal of technical reports for management purposes has not been implemented. A complete listing of the training courses provided has been submitted to USAID.

2. Train approximately 15 engineers and supervisors at each station and provide additional training for support staff and clerical and housekeeping staff.

The number of AGOSD staff assigned to each Pump Station varies depending on the type of pumps, the capacity of the station and the extent to which the station is in full operation. Training has been provided for nearly all the staff assigned to each of the six stations at the site and specific to the station requirements. training has also been provided in clerical and housekeeping procedures. Additional staff and training will be required at the time that the stations become fully operational. This sub-task has been fully accomplished.

3. AGOSD O&M Unit to be fully effective by June 1991. Limited Technical assistance to be provided after June 1991.

The effectiveness of the O&M Unit is a subjective analysis, but can best be judged by the work being performed at the pump stations. In all of these pump stations, effective preventive maintenance was being carried out. Housekeeping and landscaping varied from very good at New Smouha, East Zone and Mamoura to poor at the older Ras El Soda and Sporting stations. Additional staff and training will be required at the time that the stations become fully operational. This sub-task has been fully accomplished.

4. Deliverables:

Job Analysis and Responsibility Assignment

The Job Analyses and O&M Task Analyses were combined in one volume and were completed in 1991. A sample review of certain of the products showed them to be complete, understandable and directly applicable to the work and training requirements of each station.

Operation and Maintenance Task Analysis

Combined with Job Analyses. See Job Analysis deliverable above.

Standard Operating Procedures

The Standard Operating Procedures, Standard Maintenance Procedures and Standard Safety Procedures, were combined into one volume, called Standard Procedures, for each process and topic identified as being necessary for the proper O&M of the stations. Forty five SP's have been prepared for such processes as screening, seal water, sump pump operation, etc. A review of several of the SP's showed them to be complete, comprehensive, understandable and directly applicable to the training programs.

Standard Maintenance procedures

See Standard Operating Procedures above.

Standard Safety Procedures

See Standard Operating Procedures above.

Pump Station Training Program Assessment

This deliverable has not yet been completed. WWCG has scheduled a short term Specialist from M&E Parent company AWT, to make this analysis and prepare the report, in May of this year.

5. Comments Regarding Task 4.01

o WWCG has gone beyond the original Scope of Work for this task and has provided definition for work to meet the intent of each sub-task even when it was not clearly specified. This effort has been made because of the delays in the construction schedule, and the need to keep their staff fully and effectively occupied. This work was approved by the Project Officer.

o All of the pump stations visited had computer print-outs of the preventive maintenance schedules for the week and the maintenance procedures were being carried in accordance with the schedules. This represents a significant improvement in the AOGSD O&M program and satisfies one of the primary recommendations of the Briley, Wild and Associates Evaluation Report of December 1991, regarding sustainability of the AGOSD pump stations.

o WWCG, in the implementation of the computerized preventive maintenance program has collected data previously maintained in written form at the pump stations. In some cases, this has resulted in a loss of record keeping on site. On an interim basis, while waiting for the products of the PM program, such as equipment repair history, some accountability is being lost. It would be advisable to maintain hand written records at all sites until the computerized system is fully functional.

o There was some confusion at the pump stations regarding the location of the Standard Procedures and O&M manuals, particularly the Arabic translations. In some cases, the operational personnel reported that they had no copies available at the site for their review. The SP's in Arabic should be available for reference when needed.

o There were some indications that there may have been more emphasis in training toward the newer pump stations that were designed by WWCG rather than the older CDM designed facilities. The status of housekeeping, the skill level of the AGOSD

employees and employee morale were clearly lower at the two older stations.

o Operators at several of the pump stations reported that they felt the "hands on" training had not been sufficiently detailed or specific. There were comments that the WWCG trainers had lectured and described procedures and equipment, but had not actually demonstrated repair and inspection procedures that they were required to perform. Task 4.01 does not specify hands on training as a required activity, but if WWCG chooses to use this technique, they should consider the AGOSD staff stated needs.

o WWCG has recommended that the Sporting and Ras El Soda pump stations be rehabilitated to include some features that were not included in the original design, such as surge control valves at Sporting to prevent flooding. This would seem to be a good suggestion.

4.02 Treatment Plants

1. Train and provide direct management and O&M assistance to AGOSD staff in the East and West WWTPs in process control, mechanical maintenance, electrical repair, instrumentation, maintenance, spare parts, record keeping and reporting.

The construction of the wastewater treatment plants has not yet been completed and the AGOSD staff has not yet been identified. This task has not yet been completed for reasons beyond the control of WWCG. The plants are nearing completion, and when they are, the training and technical assistance should be provided as described in the Scope.

2. Train 40 engineers and supervisors at each plant and provide additional training for support staff and clerical and housekeeping staff.

The training has not yet been provided because the O&M staff has not yet been identified. Efforts are underway to prepare for the O&M staff training at the appropriate time.

3. AGOSD to be fully effective by December 1992. Limited Technical assistance to be provided after 12/91.

The timing for this sub-task was changed, with USAID concurrence, for AGOSD staff to be fully effective by December 1993. The contractor appears to be on schedule to satisfy this sub-task.

4. Deliverables:

East WWTP O&M Manual

The East WWTP O&M manual is approximately 52 percent complete and

is scheduled to be ready for submittal by September 1992. Since the plant will not be fully operational until August 1993, the WCG schedule is appropriate.

West WWTP O&M Manual

The West WWTP O&M manual is approximately 17 percent complete and is scheduled to be ready for submittal by September 1992. Since the plant will not be fully operational until August 1993, the WCG schedule is appropriate.

Job Analysis and Responsibility Assignment

The Job Analysis and O&M Task Analysis will be combined into one volume for each of the treatment plants, as was done for the pump stations. Work is in progress on these sub-tasks and completion is scheduled for April 12, 1992. Since these documents will be needed for the training program, it is important that they be completed on schedule.

Operation and Maintenance Task Analysis

See previous item.

Standard Operating Procedures

The Standard Operating, Maintenance and Safety Procedures (SP's), will be combined into one volume for each of the two treatment plants as was done for the pump stations. The subjects for the SP's have been identified (approximately 50), but work has not yet started on their production. The SP's are scheduled for completion in September 1992. This schedule is appropriate.

Standard Maintenance procedures

See Standard Operating Procedures above.

Standard Safety Procedures

See Standard Operating Procedures above.

Lesson Plans and Participant Materials

Work has not yet started on this deliverable, but is scheduled to begin in May 1992.

Treatment Plant Training Program Assessment

The assessment cannot be made until the training program is completed.

5. Comments Regarding Task 4.02

o AGOSD was considering a temporary start-up of the East Treatment Plant for ceremonial purposes during April 1992. However, this concept was quickly eliminated from consideration by the Chairman of AGOSD, because start-up, before all equipment has been fully checked out and inspected could cause significant damage to the facilities. Also, since the sludge disposal have not yet been constructed, safe and controlled disposal of the sludge produced during temporary operation could be a serious problem.

o Both treatment plants will provide primary treatment only with no disinfection prior to discharge. The East plant has a design capacity of 410,000 cubic meters per day (CMD) and the West plant has a capacity of 170,000 CMD. Sludge produced in the East Plant will be piped (and mixed with raw sewage along the route) to the West plant for mechanical dewatering and disposal. The combined raw sewage/settled sludge will enter the West plant at the headworks. The dewatered sludge from both plants will then be transported 30 kilometers to the disposal area over very poor and congested roads.

o It was noted that neither of the two treatment plants have been provided with administration buildings, laboratories or workshops. These facilities will be very important to the sustainability of the treatment plants after they are in operation. It is strongly recommended that the construction contract be amended to include these facilities prior to plant commissioning.

o Major delays in the construction of the West treatment plant and an extra construction cost of approximately \$12 million resulted from claims by residents in the area that the construction activity was causing structural problems in their homes.

4.03 Mechanical Dewatering Facility (MDF)

1. Train and provide direct management to AGOSD staff in the MDF in process control, mechanical maintenance, electrical repair, instrumentation, maintenance, spare parts, record keeping and reporting.

Construction of the MDF has just begun with completion scheduled for approximately October of 1993. The AGOSD staff has not yet been identified, and training has not taken place. Training of AGOSD staff will commence in 1993, after they have been assigned, but prior to August 1993.

2. Train 40 engineers and supervisors at the MDF and provide additional training for support staff and clerical and

housekeeping staff.

See comment in item 1. above.

3. AGOSD to be fully effective by December 1992. Limited Technical assistance to be provided after 12/91.

The fully effective date has been revised with USAID approval to October 1993. WWCG is planning to meet that date.

4. Deliverables:

MDF O&M Manual

Job Analysis and Responsibility Assignment

Operation and Maintenance Task Analysis

Standard Operating Procedures

Standard Maintenance procedures

Standard Safety Procedures

Lesson Plans and Participant materials

MDF Training Program Assessment

None of the Task 4.03 deliverables have yet been started, but all are scheduled by WWCG to be completed by May 1993.

4.04 Landfill/Composting Facility (LCF)

1. Train and provide direct management to AGOSD staff in the LCF in process control, mechanical maintenance, electrical repair, instrumentation, maintenance, spare parts, record keeping and reporting, and trucking.

Construction of the LCF has not yet begun. The present schedule is for the facility to be completed by December 1993. AGOSD staff has not been identified and training has not yet taken place. Training will be scheduled when the staff has been identified at the appropriate time.

2. Train 20 engineers and supervisors at the LCF and provide additional training for support staff and clerical and housekeeping staff.

See comment in item 1. above.

3. AGOSD to be fully effective by December 1992. Limited Technical assistance to be provided after 12/91.

This effective date has been revised with USAID concurrence to December 1993. WWCG plans to meet this schedule.

5. Deliverables:

LCF O&M Manual

Job Analysis and Responsibility Assignment

Operation and Maintenance Task Analysis

Standard Operating Procedures

Standard Maintenance procedures

Standard Safety Procedures

Lesson Plans and Participant materials

LCF Training Program Assessment

None of the Task 4.04 deliverables have yet been started, but all are scheduled by WWCG to be completed prior to December 1993.

4.05 Twinning Program

1. Provide for training of 20 AGOSD engineers from the pump stations, the treatment plants and solids handling units in the U.S. at a cooperating municipal wastewater facility.

The twinning program was slow in getting started because of the delays experienced in selecting a subcontractor for this program, using Federal Acquisition Regulations (FAR) procedures. However, the subcontractor has now been selected and the first travel to the U.S.A. by AGOSD personnel is scheduled for the spring of this year. The subcontractor is ISTI, who will handle all logistics support, travel costs and arrangements. A Scope and Schedule of Services has been signed between WWCG and ISTI that provides for the first group of six AGOSD personnel to attend a three week program in mid April, 1992. WWCG has developed selection criteria for the AGOSD staff for participation in this program. Present plans are for two groups to participate in 1992, two in 1993 and two more in 1994. This sub-task has not yet been fully accomplished, but plans are underway and the preparations appear satisfactory. The cities of Orlando Florida and Los Angeles, California have agreed to actively participate in this program.

2. Train additional personnel as shown in "F" and "G".

This sub-task refers to Twinning program training in the U.S. for five staff from the Central Management and Training Unit and for four staff from the O&M Data Management System program.

Provision has been made for training of these personnel through the twinning program at the appropriate time.

3. Provide for four U.S. based WW O&M professionals to make training visits to AGOSD.

Arrangements have been made for four U.S. based wastewater management and O&M professionals to travel to Alexandria through the ISTI subcontract, at the appropriate time. However, the scope of the training and technical advice for these people has not yet been clearly defined. This definition is required of the subcontractor prior to the finalization of their trip to Egypt.

4. Deliverables:

U.S. Based Twinning Plan Report

This report is under preparation and is scheduled for completion during April 1992. The report should have been finished and reviewed well before the implementation of the twinning exchange program.

Twinning Program evaluation

The Twinning Program evaluation will be completed at the conclusion of the program, and is scheduled by WWCG for that time.

5. Comments Regarding Task 4.05

o The logistics and technical support of this program was subcontracted to ISTI because of the 40 percent subcontracting requirement placed upon WWCG for the Mod 5 effort. However, the home offices of the CH2M Hill and Metcalf and Eddy could certainly have provided this support, and probably in a more efficient manner. USAID approved the WWCG Subcontractor Management Plan.

o The U.S. cities involved in the proposed twinning program were very interested in working with the City of Alexandria, to the extent that they will not charge for their staff time. They will seek actual costs for travel and per diem only.

o WWCG has indicated that travel by a limited number of AGOSD staff to the annual Water Environment Federation conference in September of this year will be part of the Twinning exchange program.

o The period of performance with ISTI is 13 months only through May 31, 1993, but the program is intended to go on through the PACD.

o WWCG has nominated eight AGOSD candidates for the first twinning trip based on their training programs, but has not yet received AGOSD approval. USAID should reserve the right to concur with the selection of participants.

4.06 AGOSD Central Management and Training Unit (CMTU)

1. CMTU to be established by April 1991

An AGOSD organization called the Central Management and Training Unit has not been established. However, WWCG was instrumental in reorganizing the O&M Department of AGOSD and also in the formation of the Training Resources and Technical Information Center (TRATIC). While the original intent of the task is not clear, it seems that the CMTU was intended to be a management and training unit rather than simply a training management unit. WWCG efforts would seem to meet the intent regarding training but not regarding management. TRATIC has been approved by AGOSD, and an organizational structure developed, but it has not yet been staffed and is not yet functional, one year after the Task schedule. However, training is going on at the TRATIC Center, with the bulk of the training being provided by AGOSD staff previously trained by WWCG and with WWCG supervision. The organization has not yet received CAO A approval.

2. CMTU personnel to be trained in:

Overall Management Coordination and Planning

This training has not been provided.

Assessment of Training Needs

Some training has been provided in training needs assessment to AGOSD staff who may be assigned to TRATIC. WWCG and USAID should encourage the assignment of previously trained AGOSD staff to the Center.

Job and Task Analysis

Some training has been provided in job and task analysis to AGOSD staff who may be assigned to TRATIC. WWCG and USAID should encourage the assignment of previously trained AGOSD staff to the Center.

Lesson Planning and Training Delivery

Some training has been provided in lesson planning and lesson delivery to AGOSD staff who may be assigned to TRATIC. WWCG and USAID should encourage the assignment of previously trained AGOSD staff to the Center.

Training Evaluation

Some training has been provided in training evaluation to AGOSD staff who may be assigned to TRATIC. WWCG and USAID should encourage the assignment of previously trained AGOSD staff to the Center.

3. Provide reference documents, equipment and materials facilitating training self sufficiency.

WWCG has provided an extensive selection of reference materials, documents and equipment for use at the TRATIC. However, this sub-task is not completed because additional references and equipment will be purchased when the needs are determined.

4. Assist AGOSD in the preparation of an O&M program budget by January 1990 with periodic revisions and refinement. Provide overview support through December 1992.

The scheduled dates shown in this sub-task were modified with USAID concurrence to January 1991, and December 1993, respectively. The first iteration of the O&M budget was completed and submitted by WWCG in May 1990. The first periodic revision and refinement has been completed in draft form and is now being edited. This sub-task is being satisfactorily performed.

5. Provide training for five AGOSD staff in the U.S. through the twinning program, by June 1992. Facilitate travel in the U.S. for training and project related activities.

The scheduled date shown in this sub-task was modified with USAID concurrence to June 1993. The AGOSD staff for TRATIC have not yet been identified, but plans are in place to include this staff in the twinning program training when they are in place.

6. Deliverables:

Program start-up Workshop Plan and Materials

The program start-up Workshop was not held. WWCG advertised for a consultant to provide the Workshop, as required by the FAR requirements, but no responses were received. By the time the process was completed, it was felt that the program was too far along to warrant and start-up workshop, so it was deleted with USAID concurrence.

Training Strategy Report

The Training Strategy Report, the Institutional Strengthening Strategy Report and the Training Center Concept and Implementation Report were combined into one report and completed

in June 1991.

Institutional Strengthening Strategy Report

See Training Strategy Report above.

Training Center Concept and Implementation Report

See Training Strategy Report above.

Interactive Video Training Feasibility Report

Completed in September 1991.

Instructional Technology Workshop Materials

Completed in preparation for the Training for Trainers program.

Facility Manager-In-Training Lesson Plans

Not completed. WWCG to review and determine status of this deliverable.

Program Start-up Workshop Evaluation

Since the Start-up Workshop was not held, there could be no evaluation report.

Annual O&M Program and Budget Report

This report was completed and is being updated annually. The next annual report is due in April 1992 consistent with the fiscal year.

Spare Parts Recommendations Report

Not yet completed, but is in preparation now. It is scheduled for completion in May 1992.

Procurement System Recommendation Report

This report is in progress and will be combined with the O&M Budget Report.

7. Comments regarding Task 4.06

o There has been a major problem getting AGOSD to provide staff for the TRATIC program. AGOSD promises, WWCG pushes, but little happens. Three people have now been identified for the TRATIC management positions, but final selection and appointment has not been made. The Manager of the Center is of critical importance and should be a person who has participated in the

Training for Trainer courses.

o It seems that under previous circumstances, the TRATIC program, when fully implemented, was probably as close as possible to the concept of a Central Management and Training Unit. With recent changes in AGOSD management, it may now be possible to reconsider the management component of the CMTU as originally intended.

4.07 Operation and Maintenance Data Management Systems

1. Design an Operation and Maintenance information and data management system to be completed by December 1990, and to be on-line by December 1991.

The data management programs being utilized for this task is called TUMMS, a proprietary program that was developed by CH2M Hill. The system design was completed in December 1991 for maintenance management and inventory control. The maintenance management program is on line, but the inventory control program is not yet fully implemented. The maintenance management program is currently being modified to resolve a few difficulties that have been noted during the initial operation. The maintenance management program is not currently being used for compiling equipment repair histories, but the program is capable of this function. The entire program under this task has been oriented toward the new USAID funded pump stations, and no work has been done or is planned for the existing (non USAID funded) pump stations and collection system. While the wording of the task is not specific, it seems, based on item 2 below, that the intent was to include the entire AGOSD system, new and old.

2. Add facilities under construction to the data management system at construction completion. To be on-line within three months after construction completion.

Work on this sub-task for the new facilities under construction, has not yet begun. The new facilities will include the East and West Treatment plants, the mechanical dewatering facility and the landfill/composting facility. However, the Technical Assistance Manager reported that there would be no problem with completing this sub-task within three months after construction completion.

3. Train four AGOSD engineers in the U.S. through the twinning program in O&M data gathering, compiling, sorting, interpreting and reporting. To be completed by December 1991.

The scheduled date shown in this sub-task was modified with USAID concurrence to June 1993. The identification of AGOSD staff for this program has been limited, but one person has been nominated by WWCG for participation in the first phase of the twinning program. Additional data management personnel will participate

in future twinning efforts.

4. Deliverables

Maintenance Management System (hardware and software) to include preventive maintenance procedures, preventive maintenance reports, work order system and inventory control system.

The hardware and software systems are in place, but the Data Worker program has not yet been fully implemented.

Operations Data Management System to include plant data definition, calculation codes, input forms and report formats

The hardware and software systems are in place, but the Data Worker program has not yet been fully implemented. Plant data will be entered into the system within three months after the completion of construction.

Collection System to include Computerized Maintenance Scheduling System, Manhole numbering system and system inventory

This sub-task has been completed for the USAID funded facilities only, but not for the existing AGOSD collection system. The manhole numbering system that has been entered, relates only to drawings and plans, but not to street locations or descriptions. WWCG reports that they have requested data on the existing collection system from AGOSD, but have not received it.

Management Information System Concept Report

Work has not yet begun of this sub-task, but a TDY person from the Home Office support staff has been requested to prepare this report.

5. Comments on Task 4.07

o While the Scope of Work is not specific, WWCG has interpreted this task to apply only to the USAID funded facilities and not to the existing pump stations and collection system. The USAID Project Officer has concurred with this interpretation. However, the system is in place and could be implemented for the existing system with minimal additional expense.

o WWCG reported that one of the problems delaying the full implementation of the maintenance management and inventory control system is the fact that there is no provision in the TUMMS software for multiple locations for specific types and models of equipment and parts. It could be interpreted that the development and improvement of the TUMMS proprietary program is being undertaken at project expense.

o It would seem that the Management Information System Concept Report should have been prepared for AGOSD approval in advance of system implementation.

4.08 O&M Budget and Procurement Assistance

1. **Develop individual O&M budgets for each pump station, treatment plants MDF and LCP to include electrical, manpower, chemicals, repairs and operation supplies.**

This task has been accomplished in its entirety and annual updates of the budgets are planned. The first update of the budgets will be completed based on operating experience where possible, in April 1992 for FY 1992/93.

2. **Assist GCSD to develop an inventory control system linked to the procurement of spare parts and develop a system for monitoring the acquisition and delivery of ordered materials.**

The inventory control system has been designed and completed, but has not yet been fully implemented. See Task 4.07 also. When the inventory control system is fully implemented, WWCG reports that it will be linked to the procurement of spare parts.

4.09 Existing AGOSD Collection System and Pump Stations

1. **Train and provide direct management to AGOSD staff in the 17 existing AGOSD pump stations in process control, mechanical maintenance, electrical repair, instrumentation, operations evaluations, maintenance planning and scheduling, spare parts and consumables management, record keeping and reporting.**

Although the wording in this sub-task is identical to sub-task 1 of Task 4.01 for the new pump stations, the intent of the task was that the majority of the pump station training should be provided for the new, USAID funded stations. The staffing provided for this task is substantially less than that provided for task 4.01. Limited training and direct management have been provided for the existing pump stations. Although the AGOSD existing pump station personnel are invited to attend training programs, very few actually attend. Three to four days of on-site training have been provided at each of the 17 existing pump stations and WWCG technical assistance personnel are available on request for the stations, but the degree of WWCG attention is significantly less than that for the USAID funded stations.

2. **Collection System O&M program to be developed based on current AGOSD archived data.**

AGOSD archived information on the collection system has been requested on several occasions, but has not been provided. WWCG indicates that they will continue to press for the information.

3. Train 12 engineers and supervisors at each pump station and provide additional training for support staff and clerical and housekeeping staff.

A team of WWCG specialists is currently undertaking a program to provide 30 hours of training at each of the pump stations in the existing system. In most of the stations, it is not possible to find 12 engineers and supervisors assigned or present at the stations.

4. AGOSD to be fully effective by June 1991. Limited Technical assistance to be provided after June 1991.

This sub-task schedule was not met, and the AGOSD personnel assigned to these stations are not yet fully effective. The level of maintenance and housekeeping at these stations indicates a low level of interest and capability.

5. Deliverables:

Consolidated Pump Station Condition Report

The Consolidated Pump Station Report has been completed and it is very well done (although full of typographical errors), including pictures taken at each station to illustrate the written condition report. This deliverable has been fully completed.

Spare Parts and Materials Requirements Report

This deliverable is presently being developed. Although it was previously reported in the WWCG Progress Reports that this Report was not needed and would be deleted from the scope, a later decision was made to complete it.

6. Comments on Task 4.09

o The AGOSD personnel from the existing pump stations are encouraged to attend training programs, but very few have actually participated. The WWCG O&M Director feels that one of the major reasons for this is that generally, the best and brightest of the AGOSD staff are assigned to the new stations. The less qualified or less motivated employees from the other stations may feel intimidated or simply may not have the interest in learning. The net effect of this, however, is that the poorest pump stations, the ones that need the most help, are being operated and maintained by the least qualified staff.

o In an institutional project such as this one, simply requesting data from the client agency is not sufficient. A persistent and concentrated effort may be required to obtain the requested information, but the effort must be made if the project is to succeed. WWCG fully supports this position and I'm

convinced the required effort will be made.

o Tools and equipment have been provided for all 23 of the AGOSD pump stations, including the existing stations. The provision of tools and equipment to the existing collection system and pump stations was beyond the scope of work but was undertaken, with USAID approval, because the need was critical. These tools have allowed improved maintenance of the stations.

4.10 Supplies and Studies

1. Supply training materials and supplies for the O&M training program to include training materials, computer hardware and software, repair parts as required and vehicles. Also to include TUMMS, Dataworker, and inventory control programs produced by CH2M Hill.

All the required equipment and supplies were purchased and delivered to the project site, with the exception of two maintenance vehicles which have been specified and are now in the process of procurement. Some additional reference materials will be purchased during the remainder of the project as the need is determined.

2. Provide instruments and supplies to include Fisher and Porter Mag X calibrator, Electronic frequency counter, Digital volt meter, precision resistor 500 ohm +/-0.1%, signal generator, transistor tester, instrument technicians tool set and AC voltage amperage recorder.

The instruments and supplies specified were purchased and provided to the project during 1991.

3. Provide safety equipment to include Hydrogen Sulphide digital/audible alarm system, emergency egress breathing unit, Miller wincher plus storage bag, Miller tripod plus storage bag, Miller carabiner, Miller full body harness, safety helmets and industrial first aid kits.

The safety equipment listed in this sub-task has not yet been procured. WCG is currently conducting an inventory of AGOSD safety equipment that has been previously purchased through USAID funding to be sure that the equipment is needed and that unnecessary duplication is avoided.

4. Provide computer supplies to include 3-Compac Deskpro 3868 system unit, 4.0 mb memory upgrade, 5.25 and 5.5 inch floppy drives, with minimum 40 mg hard disk.

The computer hardware and software and supplies list was revised within the available funding and with USAID concurrence to more closely satisfy the requirements of the project. The computer

purchase is complete and the equipment has been received at the project site.

4.11 Monitoring and Evaluation

1. Prepare Scope of Work and subcontract for subconsultant to monitor and evaluate WWCG. Problems identified to be brought up during Steering Committee meetings. Subconsultant to prepare monthly progress reports comparing implementation progress with program schedules.

Through Mod 5, a project evaluation was conducted by Briley Wild Associates. It was reported that Mod 5 was used as a convenient vehicle to provide for the evaluation, but that it was intended for all of WWCG and not just the O&M activity. There is one Section, Section 4 of the final report that pertains to sustainability and includes an evaluation of the pump stations and a preliminary and rather cursory review of the O&M program. The Briley Wild Subcontract ended with the publication of the final report and no further activity is planned. Monthly progress reports were not prepared as specified in this sub-task.

2. Appoint technical reviewers to monitor quality and accuracy of training materials.

The Briley Wild Report included a comprehensive section on the WWCG training program that included discussions regarding course design, general knowledge training, instructional technology training, direct technical assistance and English language training. The preparation of the training materials by WWCG was in an early stage when the Briley Wild evaluation was made, but an examination of Standard Procedures as the basis for the training was conducted and the comment made that "this method of presentation is very effective for operations personnel". Technical reviewers were not appointed.

3. Subconsultant to determine operational effectiveness of O&M for pump stations, WWTPs, MDF, LCF and existing collection system.

The Briley Wild evaluation of the pump stations was conducted early in the WWCG O&M activity and was primarily based on a review of the documentation and a physical examination of several pump station facilities. The primary concerns were related to the lack of a sound preventive maintenance program and operation of the facilities in the manual mode rather than the automatic mode for which the stations were designed. These concerns have been aggressively addressed by WWCG since that time, and the problems have been substantially corrected. The Briley Wild Report did not consider the operational effectiveness of the treatment plants, the MDF, the LCF (they were not yet in operation) or the existing collection system.

4. Comments regarding Task 4.11

o The Briley Wild evaluation, even though it was included in Mod 5, was intended to be a project evaluation and not only an evaluation of the O&M activity. It included a Social Environmental Element, a Physical Progress Element as well as the Sustainability of Project Element.

o The review of the O&M activities of WWCG were necessarily cursory, since the activity was just underway for a short period of time. The analysis was as solid as it could be under the circumstances.

o It appears that the intent of this Task was that it be an on-going program, but this has not occurred. All of the funding provided for this Task has been utilized and there is no plan to conduct further evaluations. However, this USAID review of the project status would seem to satisfy the intent of the Task and it is not recommended that further evaluations by subcontractors be conducted at this time.

V. Project Staffing

During the course of Mod 5, there have been a number of changes in the staffing outlined in the Scope of Work. The changes were required to meet the conditions of the project as they were refined through experience and changed circumstances. The staffing changes were discussed and agreed in advance by the Project Officer, but have not been fully documented. Nevertheless, the total personmonth allocation and salary related costs as specified in the contract have not been exceeded. The following tables summarizes and compares the staffing approved in the contract with that actually used to date:

Table 1

Foreign Personnel in Egypt
Person Months

Position	Total MM Auth	Actual MM 7/92	Proposed thru 7/94
O&M Director	35	30	23
Training Manager (ITL)	28	25	0
Technical Asst Mgr	18	30	22
WWTP Manager (WWTTL)	15	24	21
Training Coordinator	21	0	0
Senior Tech Reviewer	18	0	0
O&M Writer	18	0	0
O&M Writer	10	0	0
Sr O&M Mech (MS)	15	28	18
Sr O&M Procurement	15	0	0
O&M Mechanic	12	0	0
O&M Electrician (ES)	6	30	18
Computer Spec	9	0	0
Process Spec Dew	8	0	0
Tech Review/Eval (PTM)	11	23	0
Coll System Mgr (PSCSL)	12	23	0
Sr O&M Mech (FMS)	18	15	9
Sr O&M Elec	24	0	0
O&M Mechanic	24	0	0
Landfill Mgr	6	0	0
Fin Expert/ Audit	3	0	0
Home Office Support	14	12	13
Sludge Disp Team Ldr*	0	0	15
Inst/Dewater Spec*	0	0	20
Info/Doc Mgt Sys Spec*	0	10	2
O&M Prog Coord*	<u>0</u>	<u>4</u>	<u>2</u>
Total	340	254	163

Table 2

Egyptian Personnel Person Months

Position	Grade	Total MM Auth	Actual MM 7/92	Proposed thru 7/94
Mech Eng	PPR	36	0	0
Mech Spec	PS	30	30	18
Elec Spec (EIS)	PS	28	27	18
Elec Spec	PS	6	0	0
Storekeeper	T(D)	36	16	11
Monitoring & Evl	PBX	27	3	3
Translator	PBX	36	29	12
Wordprocessor	C	12	29	23
Wordprocessor	C	16	18	12
Training Spec (IT)	PS	32	22	12
Computer Spec	PS	12	28	12
Mech Spec	PS	14	0	0
Elect Spec	PS	22	0	0
Facil Maint Spec	PS	33	0	0
OMS Elec	T(D)	30	0	0
Assoc Div Mgr*		0	30	23
Tech Trans (II)*		0	18	12
Operations Spec*		0	20	18
Finan & IMS Spec*		0	13	3
Graphics Spec*		0	24	12
Graphics Spec (II)*		0	11	3
Laboratory Spec*		0	3	18
Safety Spec*		<u>0</u>	<u>18</u>	<u>0</u>
Total		370	321	240

Table 3

Egyptian Subcontractors Person Months

Position	Grade	Total MM Authorized	Actual MM thru 7/92
Egyptian Subs (EST)		34	NA
Egyptian Subs (EVAL)		6	NA

Table 4

U.S. Subcontractors Person Months

Position	Total MM Auth	Actual MM thru 7/92	Proposed thru 7/94
Twinning	131	C	
U. Mgt Conslt	23	O	O
Monitoring & Eval	30	M	M
Collection System Spec	<u>56</u>	<u>B</u>	<u>B</u>
Total	240	149	102

* Position not included in Mod 5 Staffing Schedule

For the foreign personnel in Egypt, it can be seen from the table above that the proposed person months and actual person months will exceed the MOD 5 authorization by 77. These 77 person months are incorporated into the Amendment presently being considered. For the Egyptian Subcontractor personnel, the actual and proposed person months will exceed those provided in Mod 5 by 191. These 191 person months will be incorporated into the Amendment to MOD 5 now under consideration.

VI. Conclusions and Recommendations

Conclusions

1. The WWCG Mod 5 O&M activity is accomplishing the objectives of the project in spite of substantial delays in construction schedules.
2. The training materials being produced, including lesson plans, reference materials, and Standard Procedures are clear, well done and are specifically directed to AGOSD needs. They should serve as important references for AGOSD now and in the future.
3. The six USAID funded pump stations are being operated and maintained in a manner that will assure their sustainability, although the quality of the O&M services varies from station to station.
4. The AGOSD staff being trained through WWCG programs are generally responsive, capable and highly motivated.
5. The two older USAID funded pump stations, Ras El Soda and Sporting, are not being operated or maintained as well as the four newer WWCG designed stations.
6. The WWCG Mod 5 O&M team as a group, are dedicated professionals aggressively pursuing the needs of AGOSD in

operation and maintenance capability. They accepted this evaluation as an opportunity to review their efforts from a fresh perspective.

7. The MOD 5 tasks that have not yet been fully addressed, those regarding the WWTPs, the MDF, the LCF, and the twinning program, must be pursued diligently during the next two years of the program.

8. The staffing schedules that were included in Mod 5 have not been strictly adhered to. However, the staffing that has been provided is consistent with project needs and indicates flexibility and responsiveness on the part of WCG. A formal staffing report indicating all changes and the reasons for the changes and the associated costs should be prepared by WCG as documentation for future reference.

9. The list of deliverables is extensive and WCG has developed a comprehensive quality control and scheduling program to assure that timing requirements are coordinated and that the documents produced are in line with project needs.

10. The existing collection system and non USAID funded pump stations are in poor condition and are badly in need of rehabilitation and replacement. A failure in the existing system will directly effect the newer USAID facilities.

11. While the AGOSD O&M capability has improved significantly as a result of the WCG MOD 5 program, the institutional needs of AGOSD are not being addressed. Future efforts should concentrate on management capability, data management processes, personnel policies and procedures, financial autonomy and accountability.

Recommendations

1. The inventory control portion of the TUMMS program should be implemented as soon as possible and it should be integrated with the ordering and procurement procedure within AGOSD. Also, plans should be made to expand the TUMMS program into other vitally needed areas of computer accountability for AGOSD, such as payroll and personnel record keeping, budgeting and planning.

2. The Management Information Systems Concept Report, required as a deliverable in task 4.07 will be very important to the future data management programs for AGOSD and should be completed. The Scope of the Report is not clearly defined, but it is hoped that it will include a thorough consideration of the MIS needs of AGOSD and will provide an action plan for development of the program.

3. The Twinning Plan Report, required as a deliverable in task

4.05, should be completed before the program is implemented. Establishment of the twinning program and content should have been based on this Report. This Report should be completed as soon as possible.

4. The East and West WWTPs should be provided with adequate laboratories, workshops and administrative facilities prior to start up of the plants.

5. The existing (non USAID funded) collection system and pump stations should be considered for rehabilitation or replacement with USAID support as a high priority matter. This program should not wait for a future institutional support project.

6. Until the TUMMS program is fully functional, equipment repair records and spare parts utilization records should be maintained at each pump station and equipment repair histories developed.

7. The Sporting and Ras El Soda Pump Stations need rehabilitation and modification based on the evaluation prepared by WWCG, even though these stations have not been utilized at full capacity since their completion. The rehabilitation should be provided and intensive instruction provided for the O&M staff in maintenance and housekeeping.

8. The O&M manuals for the East and West Treatment plants should be completed no later than September 1992, so they can be used for training efforts.

9. Consideration should be given to alternative methods of sludge transport from the treatment plants to the landfill/composting facility, to avoid the heavy traffic areas.

10. Training for the AGOSD staff assigned to the MDF and LCF should be initiated no less than three months prior to the startup of those facilities.

11. TRATIC should be made fully functional under AGOSD control as soon as possible. The organization of the facility should be presented to CAO as a permanent operation within AGOSD.

12. A priority listing of critical needs within AGOSD that can and should be addressed quickly to avoid major problems to the collection and treatment programs should be developed for consideration of USAID funding as an amendment to the WWCG contract.

13. An institutional strengthening project should be designed for consideration as a major component of an Alexandria Sewerage II project. The institutional program should include organizational autonomy, financial viability and accountability,

personnel policies and procedures, public sector and private sector cooperation and other elements.

VII. The Way Forward

While the WWCG Mod 5 program is addressing many of the O&M problems being faced by WWCG, and especially related to the USAID funded pump stations and treatment plants, there are many critical institutional needs that are not being adequately addressed. Some of these issues are directly related to the on-going activities of WWCG and could be added to their scope of work through an amendment to the Contract. Others are more institutional in nature, but are critical to the sustainability of the AGOSD O&M program and could be provided through a new TOR and RFP as part of an Alexandria Sewerage II Contract if there is one.

Examples of services and needs that are directly related to the on-going WWCG O&M activities are the following:

- o Modification of the two older USAID funded pump stations to upgrade them as recommended by WWCG, but not including the addition of comminutors
- o Extension of the computerized maintenance management system to the existing pump stations and collection system facilities, particularly regarding preventive maintenance schedules and inventory management
- o Management training for middle management level AGOSD management staff particularly related to continuation of the financial and data management programs provided by WWCG
- o Provision of centralized workshops for pump and motor repair and major mechanical overhauls
- o Provision of a USAID project funded Personal Services Contractor to work with the Chairman of AGOSD as a technical and management advisor and liaison person

Examples of institutional AOGSD needs and services that could be provided for improved project sustainability through a separate project or sub project include the following:

- o Computerized personnel data files and payroll records and financial accountability systems for the entire organization and a program of management reports for the Chairman
- o Development of an Organizational Plan for the agency to increase independence and autonomy and financial viability through a program of enhanced revenue generation and retention of revenues and budgeting for proper O&M

- o Development of policies and procedures in such areas as safety, security, training, public relations, staff communications and reporting procedures
- o Staff development and training management for all AGOSD staff and development of an Operator Certification program consistent with the programs being developed for Cairo GOSD and NOPWASD
- o Rehabilitation and replacement of the existing pump stations and collection system not previously the subject of USAID programs, including a program for proper abandonment of the facilities that are no longer required
- o Development of an industrial waste monitoring and fee assessment program for AGOSD as a source of additional revenue and to evaluate the impact of the high strength wastes on the treatment processes and receiving water quality