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# Audit of Sustainability of USAID/Egypt's Infrastructure Projects

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Report No. 6-263-95-009  
August 13, 1995





**UNITED STATES OF AMERICA  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
OFFICE OF THE REGIONAL INSPECTOR GENERAL/AUDIT**

CAIRO, EGYPT

August 10, 1995

**MEMORANDUM FOR DIRECTOR USAID/Egypt, John R. Westley**

FROM : RIG/A/C, Lou Mundy

SUBJECT: Memorandum Report on the Audit of Sustainability of USAID/Egypt's Infrastructure Projects, Report No. 6-263-95-009

This memorandum is our report on the subject audit. Overall, for the projects reviewed, the audit found that the intended benefits of USAID/Egypt's infrastructure projects are being sustained after USAID funding ceased or, for those projects not yet completed, were moving toward sustainability. Further, USAID/Egypt was designing projects at both the project and sector level to address continuing concerns about sustainability.

I appreciate the cooperation and assistance provided to the auditors on this assignment.

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## Background

This audit is one of several on project sustainability being conducted by the Office of the Inspector General. The Regional Inspector General for Audit/Singapore is leading the Agency-wide audit and will issue a report summarizing the results of these audits.

USAID/Egypt's current portfolio of active and closed projects amounts to \$5.8 billion in obligations of which \$3.6 billion is for infrastructure projects in the water, power, telecommunications, and local development sectors. Of the balance, \$843 million is for projects in the agriculture sector, \$420 million is for the health and population sector, and \$901 million is for various sectors.

We reviewed 13 infrastructure projects or almost two-thirds of the dollar value of USAID/Egypt's active and completed infrastructure projects. According to USAID/Egypt's records, \$2.2 billion was obligated and \$1.9 billion spent on these 13 projects through December 31, 1994.

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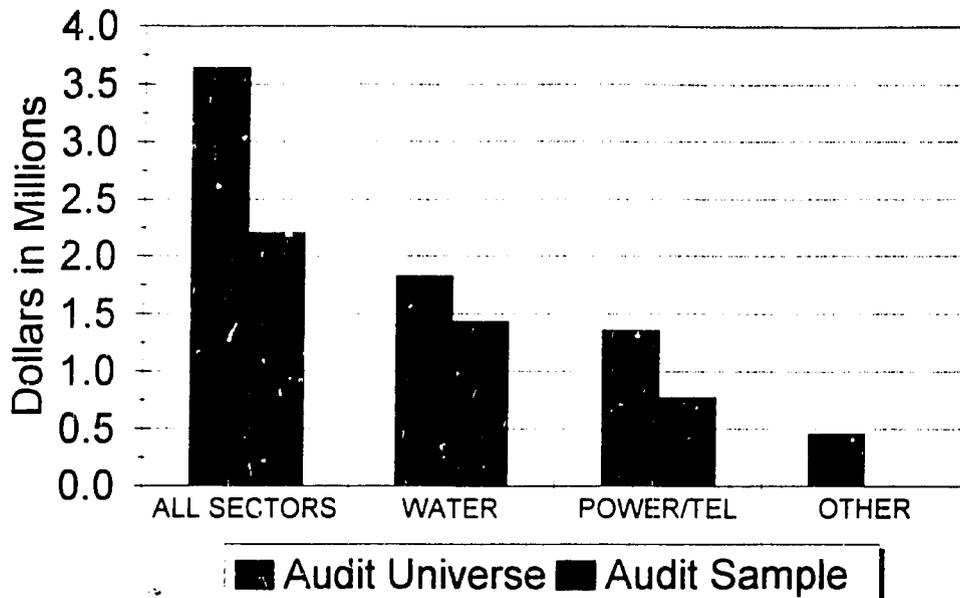
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Summary financial information for the 13 projects covered by this audit is provided in Appendix III. Audit coverage, by sector, is illustrated below.

## Audit Coverage By Sector

### Infrastructure Project Obligations



### Audit Objective

In accordance with our Fiscal Year 1995 Audit Plan, the Office of the Regional Inspector General for Audit, Cairo audited 13 infrastructure projects to answer the following audit objective:

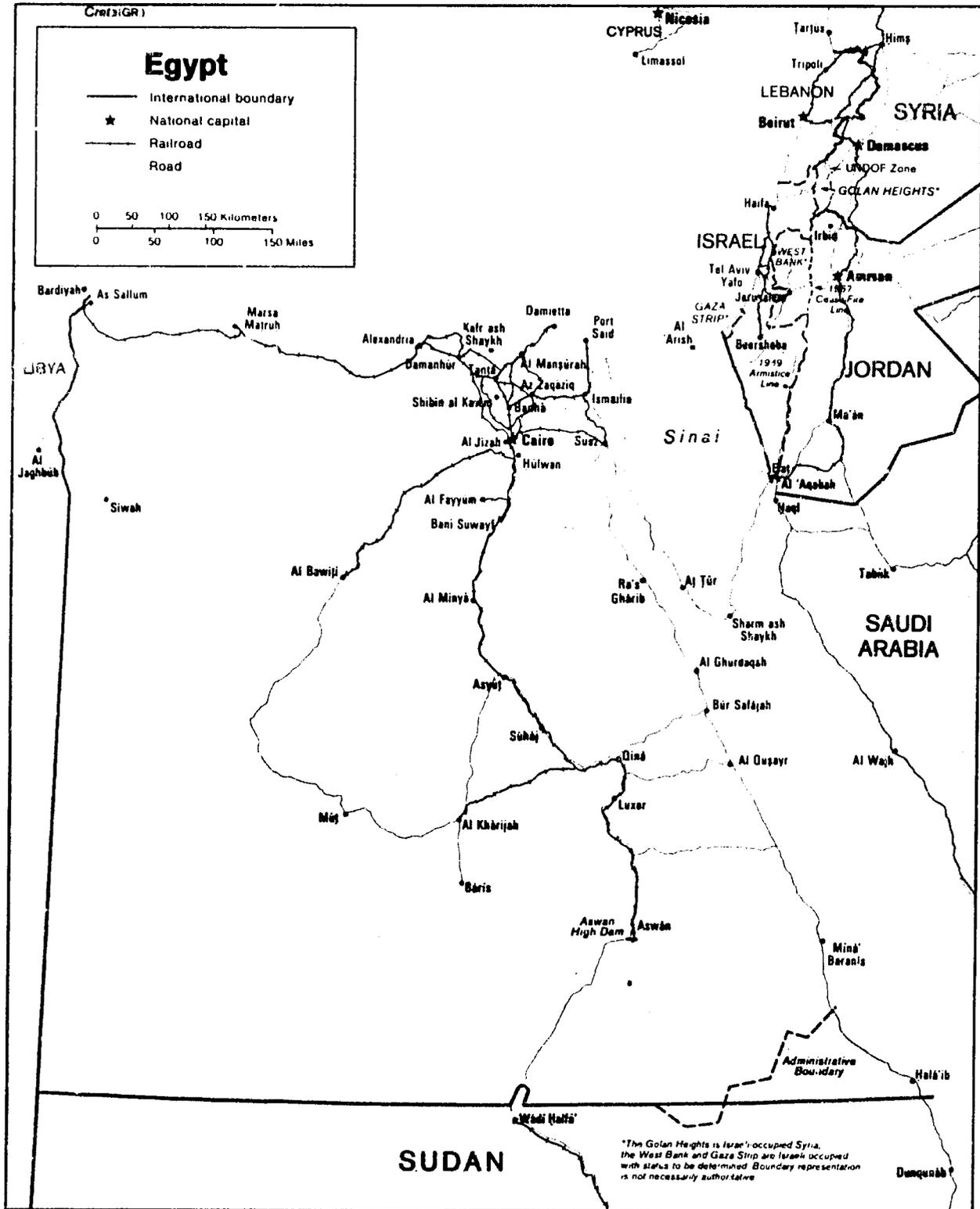
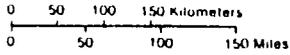
**Did the intended benefits of USAID-financed activities continue after funding ceased?**

Appendix I contains a description of the scope and methodology for this audit.

Cross(GR)

# Egypt

- International boundary
- ★ National capital
- Railroad
- Road



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## **Audit Findings**

### **Did the intended benefits of USAID-financed activities continue after funding ceased?**

For the projects reviewed, completed projects were being sustained by benefits being generated and projects not yet completed were moving toward sustainability. Specifically, water sector projects were operating at or near capacity and were meeting water and effluent quality standards and the power-sector projects were providing a reliable source of power. Further, USAID/Egypt was designing projects at both the project and sector level to address continuing concerns about sustainability.

Examples of benefits being derived from completed USAID/Egypt projects follow:

- The Shoubrah El Kheina Thermal Power Plant, constructed with USAID financing of \$261 million, has produced outstanding benefits since its completion in 1988. USAID/Egypt intended that this project, which involved the construction of four steam-generating units capable of producing 1260 megawatts of power, would increase the Egyptian Electricity Authority's generating capacity to meet power requirements of consumers throughout Egypt. We found that the plant has consistently operated to full capacity with minimal forced outages since 1988, when the last of four units was installed. In 1994, outages accounted for less than 1 percent of the time that units were expected to be available. The plant has trained over 800 engineers, technicians, and chemists during the last eight years, and preventive maintenance appears to be reducing the need for corrective maintenance.
- Constructed with USAID financing of \$70 million, the Safaga Grain Silos Complex and its supporting 9-megawatt power station, has generated the benefits intended by this project to eliminate port storage losses and reduce demurrage charges and ocean transportation costs. A 1993 project completion report stated that the project has reduced losses from waste and spoilage by about 10,000 metric tons annually and generated annual savings of about \$5 million in demurrage and freight rates as well as about \$2 million in labor costs through automation of port handling processes. The audit confirmed these benefits and showed that the power station is producing the electricity needed to operate the grain silos complex.

We also visited projects nearing completion and found that they were already producing benefits. To illustrate:

- Rehabilitation of the Hydroelectric Power Station at the Aswan High Dam has already begun to provide significant improvements. The major feature of this project (\$140 million of USAID funding) is the replacement of the original Russian-built "runners" for each of the 12 hydro-turbines that generate electrical power.<sup>1</sup> The USAID-financed runners provided an additional 60 megawatts of generating capacity and a 3 percent increase in efficiency. With the project now being completed, improvements in efficiency and reliability are being realized.
  - A test performed by a contractor comparing the original runners with the newly installed ones showed that the new runners have generated about 5 percent more power than the old ones. The Egyptian Electricity Authority estimates this increased efficiency will generate savings of about \$5.9 million annually.
  - According to a USAID official, inspections performed over the last few years show no cracks in the runners. The current maintenance schedule calls for each unit to be removed from service for one month a year. Previously, two turbines would normally be out of service for as long as six to seven months so that cracks could be welded. While such units were being repaired, other units remaining in operation were liable to cracking as scheduled preventive maintenance could not be done on time.
- To expand and develop sustainable wastewater collection, treatment and disposal facilities, USAID/Egypt financed the \$750 million Cairo Sewerage II Project. This project involved the (1) rehabilitation of a major treatment plant and construction of another, (2) construction of eight pump stations, and (3) an extensive system of sewer lines and household connections on Cairo's West Bank. Previously, extensive flooding from sewage previously occurred in over 200 areas of Cairo. Now since completion of two treatment plants and extension of sewers into many areas of Cairo, flooding is now uncommon. Also, both treatment plants are operating at a performance level above designed levels.

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<sup>1</sup> Electrical power is generated when water passes through a "runner" on each of the dam's 12 hydro-turbines.

- The normal design parameter for a primary treatment plant, such as at Abu Ruwash, is the removal of 45 percent of Biochemical Oxygen Demand (BOD)<sup>2</sup> and 60 percent of total suspended solids. A November 1994 report from the construction manager shows that during the two preceding years the plant removed 53 percent of BOD and 73 percent of total suspended solids.
- The Zenein secondary treatment plant is designed to remove 80 percent of BOD and 80 percent of total suspended solids. An August 1994 report from the construction manager responsible for monitoring plant operation shows that the Zenein plant removed 94 percent of BOD and 96 percent of total suspended solids.

To ensure that facilities financed by the Cairo Sewerage II Project are maintained, USAID/Egypt reports it has conducted more than 3,000 hours of classroom training and has financed the installation of an automated maintenance management program. Also, the Egyptian implementing agency has a USAID-approved plan to raise and retain revenue needed to maintain and operate the facility.

- The Cairo South Project (\$118 million financed by USAID) involved the installation and start-up of a 150-megawatt unit to generate electricity. With installation now complete and current efforts focused on unit start-up, the unit has already produced a peak output exceeding 150 megawatts. Egyptian Electricity Authority personnel, scheduled to soon assume responsibility for operation and maintenance, reportedly cannot start up and shut down the unit without contractor assistance. USAID management, however, advised us that three engineers would provide technical assistance during the two-year contract warranty period and bring the Authority's personnel up to the desired proficiency. Also, increases in tariff pricing are being generated, but not at the level expected. Pricing levels set in 1992 were met but 1993 and 1994 increases were not fully realized.
- USAID/Egypt financed the first of a three-phased Alexandria Wastewater System Expansion to improve public health in the city of Alexandria. During the first phase, USAID/Egypt provided \$405 million to improve collection in the east and west districts of the city, extend services into unsewered areas, and provide primary treatment before discharge of treated water into a lake. According to a contractor's draft report, those areas of the city served by the USAID-financed project are no longer considered public health hazards. Previously, raw sewerage was present on a large percentage of the

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<sup>2</sup> "Biochemical Oxygen Demand" is a measure of the amount of organic material in water based on oxygen depletion.

city's streets and was being discharged into a lake or the Mediterranean Sea. Street and beach pollution was considered a public health danger to most of the city's inhabitants and beach users. The city's pollution problem has, however, not been totally resolved as areas of the city not covered by USAID financed projects are still contaminated with sewerage.

As discussed below, the Mission has made a concerted effort over the years to help assure sustainability.

### **How USAID/Egypt Helps Ensure Sustainability**

Over the past several years, USAID/Egypt recognized that financial, institutional and logistical constraints existed that could limit benefits achievable in both the water and power sectors. In the water sector, the Government of Egypt had not raised tariffs to a level that would ensure a reliable source of funding for maintenance and other operating costs, and had not made appropriate arrangement to retain revenue collected or ensure that sufficient revenues would be collected. These constraints raised questions about the availability of funds to provide adequate maintenance for USAID-funded facilities. In the power sector, most facilities lacked preventive maintenance programs, and the Egyptian Electric Authority lacked the financial and institutional autonomy needed to raise and retain sufficient revenues for future expansion.

In the early years of USAID/Egypt's program, the Mission handled project sustainability through covenants in grant agreements and a Memorandum of Understanding. But these methods were not effective in addressing sustainability concerns. To illustrate:

Covenants in nine projects, we reviewed in our audit of the Maintenance of Water and Wastewater Projects, were not effective in promoting sustainability. For example:

- Action critical to satisfactory operation and maintenance over the long term were not included in covenants. None of projects required the Government of Egypt to establish autonomous organizations with authority to set tariffs locally, and only one required the Government of Egypt to allow local organizations to retain tariff revenues to finance their operations.
- Other covenants were not precisely worded, making them difficult to enforce or to determine if they had been met. Several intended to require partial or full recovery of costs did not define what cost should be recovered.
- Other covenants were not met for long periods of time. A covenant in the Alexandria Wastewater System Expansion Project, requiring the Government of Egypt to exercise its best efforts to increase wastewater

tariffs over time, had not been fully met six years after the covenant was agreed upon. Similarly, a covenant on the Provincial Cities Project, requiring the Government to exercise its best efforts to develop a system for retaining water tariffs, had not been met after 11 years.

- To strengthen water and wastewater organizations, the Mission and the Government of Egypt signed a Memorandum of Understanding in 1984 specifying the policy reforms that USAID/Egypt wanted implemented by 1989. These reforms included (1) increasing tariffs to cover the costs of operation and maintenance, debt service, and routine improvements; and (2) establishing autonomous water and wastewater organizations with the authority to raise and retain revenues to finance their own operations. The reforms were never completely implemented.

Beginning in the early 1990s, the Mission began strengthening project sustainability through project-related actions as well as sector-related actions. Project-related actions included:

- Setting targets to hold the host government accountable for policy reforms needed to overcome obstacles to sustainability, and
- Including design strategies in project papers specifying how sustainability can be achieved.

We reviewed three recently initiated projects and found that each had a sustainability strategy or plan built into project design that focused on sustainability for the project or for the sector as a whole. To illustrate, the Secondary Cities Project, approved in September 1994, is to expand and develop sustainable, replicable water/wastewater facilities in selected urban population centers of Egypt. The project's strategy calls for the completion of certain reforms by the end of the project that include removing legal impediments that inhibit institutional autonomy; establishing a decentralized authority to determine tariff rates; and restructuring the administrative, financial, and personnel systems of water/wastewater entities.

To ensure that sustainability is built in before construction is initiated on the Secondary Cities Project, the Mission is developing agendas of required reforms and tariff increases for each of the cities. Also, it will assess the counterpart organizations for each of the governorates involved, identify specific steps needed toward reform, and develop local government action plans. These plans will include benchmarks to track when the Government of Egypt implements reforms and tariff increases. Most importantly, the Mission will provide funds for construction on this project only if the host government performance meets the benchmarks.

Sector-related actions taken by the Mission included:

- creation of a staff unit to focus on sustainability issues,

- design of sector-wide projects addressing sustainability, and
- use of financial leverage to ensure that policy related actions are implemented by the host government.

In 1991, the Mission established an Institutional Support Branch within its Urban Administration and Development Office. Staffed by eight professionals, this unit has focused on the long-term institutional strengthening of Egyptian water and wastewater organizations. Also, beginning with a 1988 contract award on the Wastewater Institutional Support Project, the Mission started using sector-wide institutional support projects to help overcome major obstacles to sustainability in the water, power, and telecommunications sectors. To illustrate:

- In July of 1993, USAID approved the \$200 million Telecommunications Sector Support Project, consisting of both policy and institutional reforms and infrastructure components to accelerate the development of Egypt's National Telecommunications Organization into a fully autonomous utility. This organization, in conjunction with USAID, identified reforms to address streamlining of management, pricing, recovery of services, and fiscal autonomy. Release of project funds was conditional upon adoption of a two-year reform program and meeting milestones relating to each of the reform objectives set forth in this program.
- In July of 1994, USAID/Egypt approved financing of the \$200 million Power Sector Support II Project to transform the Egyptian Electricity Authority into an utility capable of operating on a self-sustaining basis. Much of this financing was to go toward equipment, technical assistance and training. Pricing reforms are expected to provide the Authority with sufficient revenue to cover a larger portion of its funding requirements. USAID and the Government of Egypt have agreed on reforms needed to overcome constraints to efficiency, and have set benchmarks to be met annually as a condition to obligating project funds. For example, the Authority has agreed to submit a sector-wide maintenance plan by June 1995 and have it implemented in 50 percent of plants by June 1996 and in 75 percent by June 1997.

To obtain actions needed for sustainability the Mission has recently begun to withhold or delay the release of funds when needed actions are not completed. To illustrate:

- In 1994, the Mission withheld \$35 million in funding on the Alexandria Wastewater Systems Expansion Project until a presidential decree was signed giving the wastewater organization in Alexandria substantial autonomy from the central government. After the decree was signed, USAID/Egypt withheld funding for construction until the reforms described in the decree had actually been implemented.
- The Mission withdrew \$30 million in funding planned for the Government of Egypt in 1993 and delayed \$24 million in funding due in 1994 because the Egyptian Electric

Authority fell short of meeting electricity pricing targets of 80 and 90 percent respectively.

- The Mission set a condition in September 1994 that it would not provide future funding for construction of wastewater facilities in Cairo unless the implementing agency for wastewater facilities in Cairo increased tariff revenues to a level sufficient to meet needed operation and maintenance costs. In response, the Cairo governorate approved a tariff rate increase of 50 percent.

In conclusion, the Mission's efforts toward sustainability started several years ago and have progressed to a point where (1) constraints to sustainability have been identified, (2) solutions have been sought and implemented, and (3) further funding of infrastructure is conditional upon the Egyptian government adopting policy reforms and tariff increases. As result of these efforts we believe that the intended benefits will continue in USAID-funded infrastructure projects once funding ceases.

USAID/Egypt had no comments to offer on our draft report. USAID/Egypt's response to the draft report is attached as Appendix II.

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## SCOPE AND METHODOLOGY

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### Scope

We conducted our audit in accordance with government auditing standards. We performed the audit from February 5, 1995 through May 30, 1995 at the offices of USAID/Egypt and at various project sites in the Egyptian cities of Cairo, Hurghada, Safaga, and Talkka. Our audit covered 13 of 34 active and completed infrastructure projects identified in the Missions's latest USAID Status Report. A complete list of the 13 projects is contained in Appendix III. They include 3 completed projects, 7 projects nearing completion, and 3 recently initiated projects. The 13 projects were managed by the USAID/Egypt's Office of Power and Telecommunications and Office of Urban Administration and Development.

Our conclusions concerning the sustainability of infrastructure projects were based on:

- the results of two Office of the Regional Inspector for Audit/Cairo (RIG/A/Cairo) audits concerning five projects in the water/wastewater and power sectors--the Audit of the Operation and Maintenance of USAID/Egypt Water and Wastewater Projects, (Report No. 6-263-94-008, August 30, 1994); and the Audit of USAID/Egypt Commodities Procured for Power Projects, (Report No. 6-263-95-003, January 31, 1995);
- observations during visits to five selected projects;
- review of various Mission documents including project papers, project completion reports, evaluation reports, and portfolio review documentation; and
- interviews and information obtained from project officials showing benefits generated to date.

USAID/Egypt provided us with a written representation letter confirming to the best of their knowledge and belief that (a) all pertinent information was provided, (b) all known instances of

irregularities or material violations of U.S. laws and regulations were reported, and (c) the Mission has complied with all contractual agreements.

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## Methodology

To answer the audit objective, we determined benefits being achieved on 10 completed or nearly completed projects, and identified USAID actions that had been taken to achieve sustainability on these 10 projects as well as on 3 recently initiated projects. The 13 projects covered by the audit are shown at Appendix III.

For three completed and nearly completed projects we reviewed work performed on two recent RIG/A/Cairo audits covering water and power projects to obtain information concerning intended project benefits, benefits achieved, barriers to sustainability, and actions being taken to achieve sustainability. We also reviewed the three projects to confirm that the intended benefits were being achieved and reviewed the project design of completed projects to determine if they were designed to promote sustainable results.

To determine intended benefits and actual benefits being achieved on the seven nearly completed projects, we:

- relied on work performed on two recent RIG/A/Cairo audits that covered the seven projects;
- visited two project sites and reviewed operations at the two sites; and
- reviewed project completion reports and evaluation reports where available, queried project officials about benefits being achieved, and obtained documentation substantiating benefits being achieved.

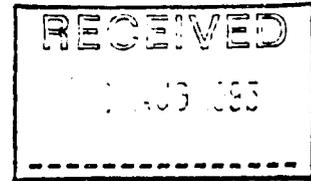
For the three recently initiated projects, we reviewed internal controls to determine whether or not procedures would ensure that project benefits would continue after USAID funding ceased. More specifically, we reviewed project papers to identify intended benefits as well as a strategy or plan for ensuring that benefits continue after USAID funding ceases and requested and reviewed the Mission's portfolio review documentation and project evaluations to determine whether they addressed sustainability.

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CAIRO, EGYPT

**MEMORANDUM**

DATE : August 3, 1995

TO : Louis Mundy, RIG/A/C

FROM : *Mohamed Tanamly*  
Mohamed Tanamly, DC/PM

SUBJECT : Draft Audit Memorandum Report on the Audit of  
Sustainability of USAID/Egypt's Infrastructure Projects

Mission has no comments on subject draft report. Please issue the final report.

cc: F. Guymont, AD/DR

**Projects Included in Audit of Sustainability  
of USAID/Egypt's Infrastructure Projects**

Project Number		Project Name	Amount Obligated	Amount Expended	Project Status
263-0100	2	Alexandria Wastewater	\$ 404,924,045	\$ 386,593,815	NC
263-0161	2	Provincial Cities Dev.	104,139,686	91,040,643	NC
263-0165	1	Safaga Grain Silos Complex	70,208,110	70,208,110	C
263-0173	2	Cairo Sewerage II	747,999,812	670,987,762	NC
263-0193	2	Cairo Water II	145,000,000	102,168,611	NC
263-0236		Secondary Cities Dev.	30,000,000	0	N
263-0030	1	Shoubra Thermal Power	261,503,013	263,503,013	C
263-0160	2	Aswan High Dam Rehab.	140,000,000	130,745,532	NC
263-0196	1	Talkha Combined Cycle	64,674,280	64,674,280	C
263-0215.1	1	Cairo South	118,100,000	104,388,271	NC
263-0215.3	1	Hurghada Installation	11,810,000	8,645,503	NC
263-0223		Telecom Sector Support	80,000,000	1,017,958	N
263-0224		Power Sector Support II	26,000,000	0	N
Totals			\$2,204,358,946	\$1,891,973,498	

## Legend:

1 = Site visit during current audit

2 = Visited during previous audit

NC = Nearly Complete

C = Complete

N = New