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TA No. 1775-MAR: Majuro Water Supply

Report of the Financial Analyst

Michael G. Powell & Associates, Ltd.

February 1993

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MAJURO WATER SUPPLY
COMMUNITY DEVELOPMENT
CORPORATION
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**REPUBLIC OF THE MARSHALL ISLANDS - MAJURO WATER SUPPLY PROJECT
REPORT ON ORGANIZATION MANAGEMENT AND FINANCIAL ASPECTS**

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**REPUBLIC OF THE MARSHALL ISLANDS - MAJURO WATER SUPPLY PROJECT
REPORT ON ORGANIZATION MANAGEMENT AND FINANCIAL ASPECTS**

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ASIAN DEVELOPMENT BANK - MAJURO WATER SUPPLY PROJECT

REPORT ON ORGANIZATION MANAGEMENT AND FINANCIAL ASPECTS

ORGANIZATION & MANAGEMENT

General

The Majuro Water and Sewerage Company was established by Order in Cabinet in January 1989. The Articles of Incorporation are attached as Annex 1. Its shares, together with those of the Capital Improvement Projects Corporation, were originally held by the Marshall Islands Development Authority, another State Corporation. The management of the Company was contracted to a private company, Pacific Management Services Corporation. The contract, which expired in September 1991, was not renewed and, in July 1992, the shares of the Company were transferred to the Ministry of Public Works. At the present time, the Government is considering the possibility of a merger with, or joint management by, the Marshall Energy Corporation.

Legislation

Water Rights

Under the prevailing land tenure system of the Marshall Islands, land is allotted by clan chiefs to clan members for life. The land, the rights to which extend over the adjacent lagoon and ocean, can be leased but not sold.

It is unclear whether the rights extend below the surface to include groundwater. Conflicts have already arisen over the ownership and control of groundwater on Laura Island, where wells have been developed to supply the rest of the connected atoll; the terms of leases have not been satisfactorily settled; the local water users feel that their water requirements should be fully met (possibly without charge) before water is supplied to the more populated end of the atoll.

These and other issues, including the right to acquire land for catchment areas, reservoirs and ground water development, and the protection of groundwater sources from uncontrolled exploitation, will have to be resolved in the near future, before land becomes more scarce and the present rights even more valuable.

It is recommended that Government draw up appropriate legislation to regulate and control water resources on the Majuro Atoll or, preferably to govern the whole of the Marshall Islands. Failing such legislation the Government should, as a minimum, establish reserves to protect potential reservoir sites or groundwater areas from development for other uses. Advice to Government on immediate action should be given under the Advisory Technical Assistance (ADTA).

Other Legal Matters

In 1992, the Criminal Code was amended to protect water and sewer lines by making unauthorized use or contamination of the system a criminal offence. Although the Code enables MWSC to prosecute for illegal connections, illegal pumping, and other tampering, there is no comprehensive legislation granting the powers that may be required for adequate regulation and practical enforcement.

It is recommended that the Government enact enabling legislation in which the powers, duties and responsibilities of the MWSC are clearly set out and which, in particular, will give the Board of Directors power to make rules and regulations so as to ensure that MWSC can carry out its functions effectively. A suggested form of Enabling Act is attached as Annex 2.

It is further recommended that, failing the provision of enabling legislation, MWSC should ensure that all existing and future consumers enter into a contract of service which clearly define the conditions of service, and which would authorize MWSC, *inter alia*, to install and maintain connections and allow access to premises to inspect pipes and fittings and to carry out necessary repairs.

A system of communal septic tanks and fields was recently installed for the residents of the Laura community for the protection of the Laura lens water, with sewerage connections and toilet houses provided at no charge.

It is recommended that the liability for their future operation and maintenance, and for the provision of additional services to new houses should be clearly established, possibly by amendment to the building code.

Direction of MWSC

Composition of the Board

The Board is made up of four Government appointed directors, all of whom are Ministers, or members of the President's Secretariat. MWSC would benefit from a broader range of business skills and interests in its Directors, particularly in the fields of finance, administration and public health. This has been cited as one of the important elements of the improvement in performance of the Marshall Electric Company (MEC), another corporation of the Government, whose Board includes Directors from the private sector.

In view of the present problems of water supply, the interests of consumers should also be represented on the Board through public election of Directors. While this may be difficult to accomplish, it would effectively reduce the influence and lack of accountability that is occurring as a result of political appointments.

It is recommended that the total number of Directors be increased from four to seven, on the following two considerations:

- (a) the appointment of two Directors from the private sector, to provide stronger background in the above fields and in business management; and
- (b) the election of two Directors from the general public, to improve responsiveness to the water user's needs, and to provide consumers with a means of participation in the policy development of MWSC.

Conduct of the Board

The Board does not meet on a regular basis and clearly misunderstands its role in several areas, making it ineffective in providing direction to the Company, and resulting, on occasions, in detrimental interference (1).

Both the Board and Senior Management require assistance to strengthen understanding of their roles in the following areas:

- policy formation and development;
- planning and budgeting for future services to meet increasing consumer demand.
- long range planning and capital budgeting;
- differentiation between the responsibilities of the Board and those of Management;
- establishment of clear corporate and management objectives and means for evaluating performance;

It is recommended that ADTA should include a component for Board and Senior Management instruction and discussion of the above topics.

Organization and Staffing

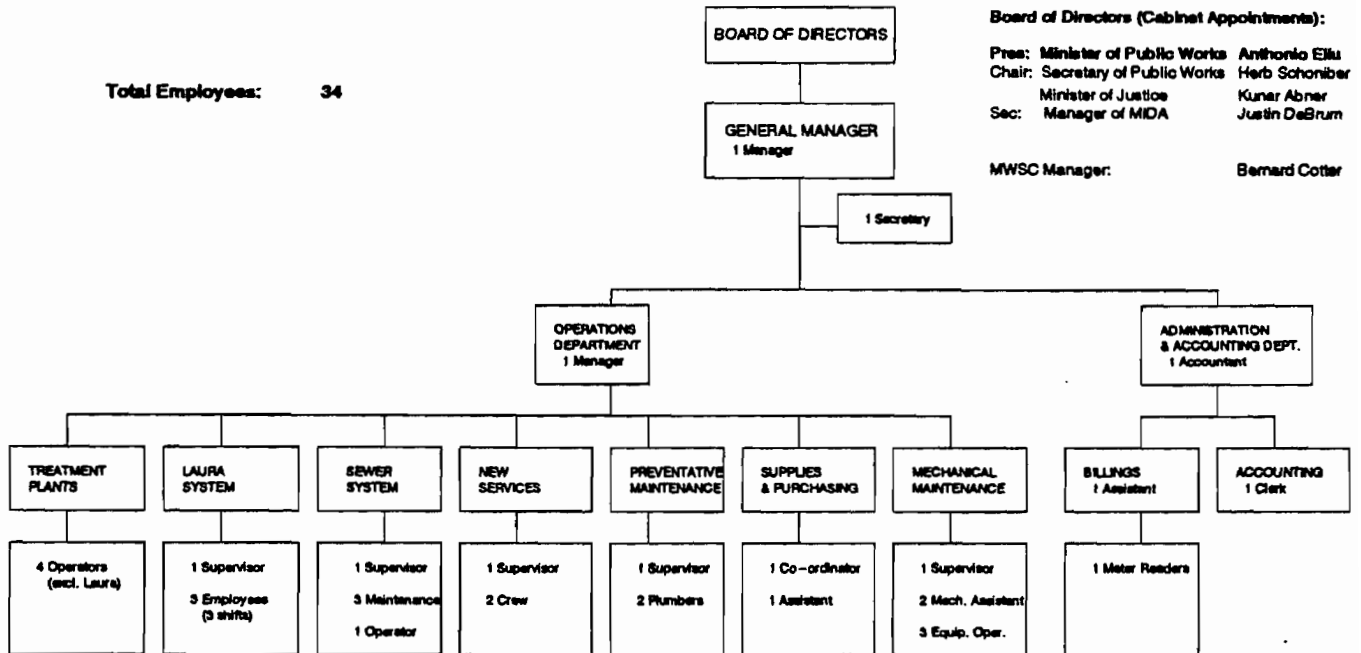
Present situation

A chart describing the current organizational structure, and that proposed by the Consultants, including numbers of employees, can be found on the following page. A schedule of the proposed MWSC staffing and associated costs is set out in Annex 3.

(1) For example, there has been intervention by Directors in hiring employees, and interference in disconnections on overdue accounts.

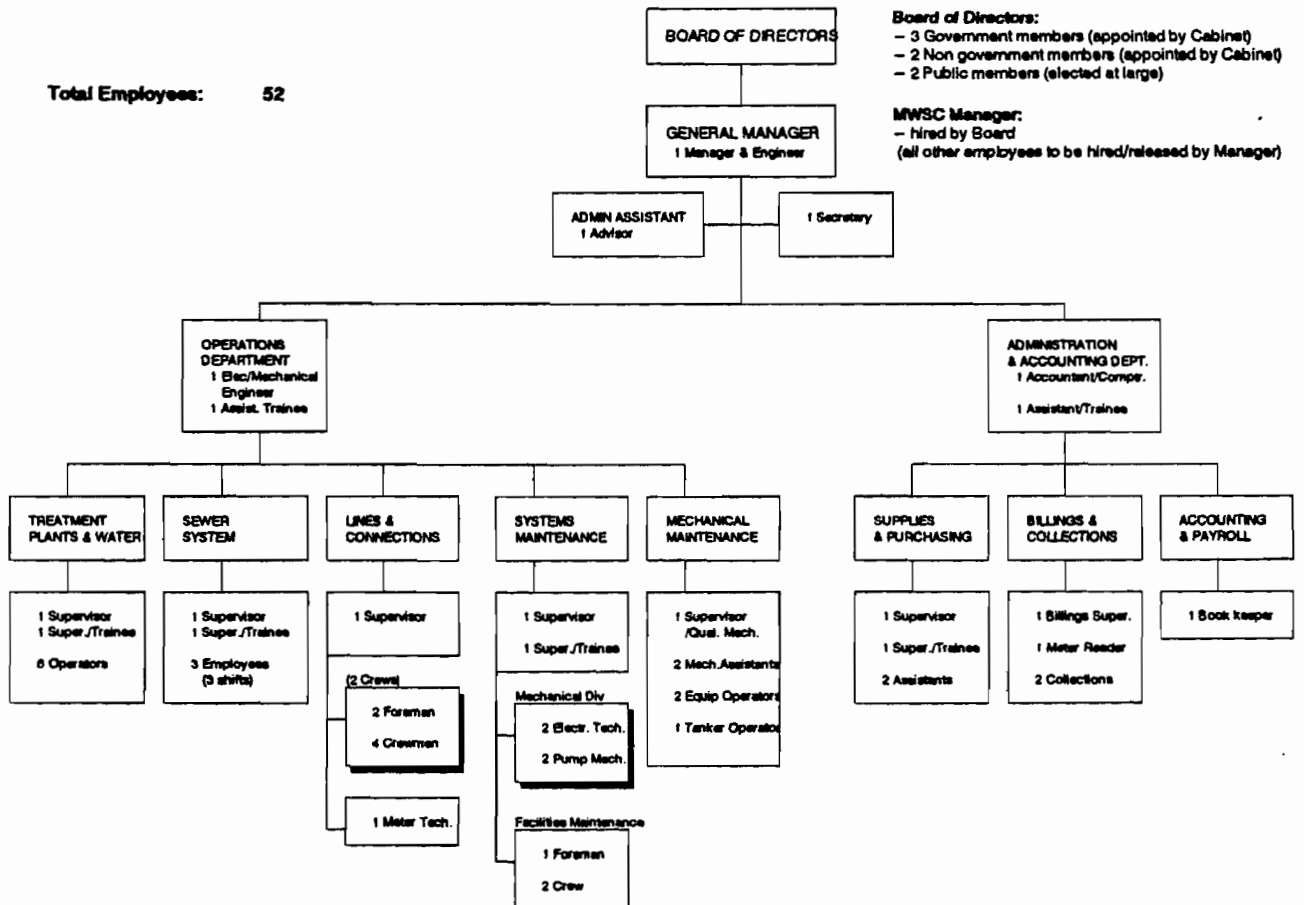
**MAJURO WATER & SEWERAGE COMPANY
ORGANIZATIONAL CHAR- 1992**

Total Employees: 34



**MAJURO WATER & SEWERAGE COMPANY
ORGANIZATIONAL CHART - PROPOSED**

Total Employees: 52



MWSC has been strongly influenced by American expatriate management and influence, as have most Government institutions in the Marshall Islands. Typically, the employment objectives have been to improve the effectiveness of employees and to reduce surplus employment, but it is difficult to retain good, well trained employees with the traditionally low wages. Moreover, the removal of poor employees has been hampered both by the Public Service Commission (PSC) rules and by political influences (1).

The long term objective of MWSC should be to employ Marshalese people in management as well as staff positions, assisted as necessary, by short term expatriates and consultants. To meet this objective, expatriate assistance will be required initially for a number of positions (See Annex 4), in order to provide expertise and training in technical and administrative skills. In general, expatriate contracts of no more than two years should be adequate, subject to extension or renewal according to circumstances.

It is recommended that MWSC seek exclusion from regulation under the PSC, so as to provide the necessary flexibility and independence in their employment practices.

Staffing

MWSC is inadequately staffed in a number of areas, due primarily to cash shortage. As a consequence, it is unable to carry out its functions effectively. A description of the recommended actions is given in Annex 4, together with training requirements. The principal areas in need of additional skills and manpower are as follows:

(a) Technical:

- long range planning and budgeting;
- electrical and mechanical operations and maintenance;
- groundwater development;
- quality control systems for monitoring operations; and
- routine maintenance and repairs.

(b) Financial and Administrative:

- long range planning and capital budgeting.
- general administration including personnel development;
- accounting and reporting;
- billing and collection control; and
- internal controls.

(1). Employees who have little intention of working are periodically forced on MWSC. The Government owned Marshall Electric Company cites its exclusion from regulation by the PSC as an important factor in developing an effective and motivated employee group.

Additional staff are required for system maintenance and repairs, for customer services, and system monitoring.

It is believed that the proposed increases in staff will be adequate to provide the additional expertise and manpower required. This will result in a doubling of the total annual cost for a 60% increase in staffing. This estimate is based on existing MWSC wages and benefits; where new posts are proposed, they are based on those of the Marshall Electric Company, whose payroll costs are generally similar for employees of equivalent status. This differs from the amounts suggested in the MOU.

It is therefore recommended that the number of personnel of the MWSC be increased from the present 34 to 52, at an estimated cost of \$740,000, including temporary additional expatriate management.

It is further recommended that, as an alternative or supplement to the above recommendation, Government consider a twinning arrangement with an overseas water and sewerage authority, to provide some of the expatriate supervision and training requirements.

Accounting

Accounting System

The accounting needs of MWSC are not complex, nor is the volume of transactions large, the total number of fresh water customers being at present approximately 1650. Although the MWSC accountant holds no formal accounting qualification, the basic book keeping has been conscientiously maintained, with accounting adjustments prepared by the auditors, in conjunction with the audits.

Computerization

The accounting and billing for MWSC has, until recently, been prepared by the accountant and two assistants, using elementary accounting software of DacEasy, and an unintegrated, databased billing program. MWSC has recently purchased a more sophisticated US databased accounting program, including a module for utility billing and receivables, and general ledger. The MWSC would benefit from immediate assistance with the installation, set-up, and training in their conversion to this system, the current staff lacking both the time and expertise for the work. Without qualified assistance, there is a high risk of an unsatisfactory result, compounded by the difficulties of transition to metered billings. Unfortunately, the cashflow problems of MWSC indicate that they will not seek such help, and, if included in the ADTA (March 1994), it will be too late.

It is strongly recommended that the Bank arrange for immediate assistance to MWSC through ADTA or other means to advise on the appropriateness of the accounting program selected, its installation and use.

It was not possible, within the scope of the recent Fact Finding Mission, to evaluate the software beyond a cursory review of the features and operations of the program, which appeared adequate. Adoption of inappropriate programs can consume inordinate staff resources, as well as problems of accounting errors and poor customer relations.

It is recommended that a comprehensive review of the accounting program be conducted during the next Mission, or as part of the immediate assistance recommended above.

General Accounting

As noted above, annual accounting entries and adjustments for items such as depreciation, year end accruals, and provision for uncollectible accounts, have been done with the assistance of the auditors. The most recent audit will cover two fiscal years (a cost saving decision). For improved planning and decision making purposes, more timely and accurate accounting is necessary. This could be provided by regular periodic professional assistance being provided by the accounting firm of the auditor, or by the contracting of a qualified accountant once funds are available, as recommended in the Annex 4.

It is recommended that the use of financial data, budgeting, and a basic understanding of financial statements and cash flow projections be included in ADTA institutional strengthening of the Board of Directors, and that additional professional accounting services be engaged to provide advice and review of the accounts on a more timely basis.

It is further recommended that the bank require annual audited statements of MWSC.

Revenue

The chief sources of revenue are potable water sales, which until recently, were charged on a flat monthly fee basis. Charges for sea water and sewerage have been levied as a fixed surcharge on potable water billings.

Neither potable nor fresh water charges have been related to the cost of their provision. These revenues have not been segregated in the accounting, however this will be done as of the 1993 fiscal year. Other revenues come from connection fees, which appear, on average, to have been below the cost of provision, particularly now that meters are also required, and from custom work, and sundry charges.

It is recommended that the adequacy of charges for connections and sundry services be reviewed in further depth during the next bank Mission.

Metering

For many years, customers have been charged a flat monthly fee which entitled them to use as much water as they wanted and was available. This monthly charge has not been increased for many years, and provides enough revenue to meet one third of the operating costs. The Board of Directors and management have recently taken a major step to resolve this problem by installing meters on all connections and adopting a tariff structure to charge for water on the basis of consumption. This will encourage consumers to conserve water, and to pay in accordance with their own usage. The actual effect on consumption will not be known until after February when the first fully metered bill will be issued. The progressive tariff should also be expected to result in an increase in individual connections by households which may previously have shared connections.

Billing and Collection Procedures

Bills are prepared monthly. A notice of their issue is advertised in the newspaper, for those without mailing addresses. No statements of overdue accounts have been prepared in the past, the outstanding balance being carried forward to the following month's bill. As a result of computer problems, regular billing was delayed during the fall of 1992, with a three month back log being billed during January 1993. This delay has further aggravated the severe cashflow and collection problems of MWSC. MWSC should give attention to new methods of payment and collection for the convenience of consumers. Few Marshalese have cars and the consumer population is spread around 33 miles of atoll; arrangements could be made for retail stores or other businesses to receive payments on behalf of MWSC, for a small commission. MWSC could also consider having meter readers deliver overdue notices on their regular rounds, and possibly take payments.

It is recommended that the adequacy of collection procedures be reviewed in further detail on the next bank Mission, and strategies for their improvement included in ADTA.

Delinquent Accounts and Collections

Water revenues are the main source of income, apart from a limited annual government contribution; loss of revenue and cashflow from unpaid bills is therefore very serious. As of January 8, 1993 (subject to audit adjustments for fiscal years 1991 and 1992), \$285,442 or 84% of outstanding accounts have been overdue for over three months, many of those much longer. This represents 70% of the total revenue from water sales for 1992. Attempts to enforce collection have not been successful, primarily due to intervention by Government ministers and the Board of Directors. Furthermore, there are additional problems of disputed billings because MWSC has been unable to provide water on a regular and dependable basis to all parts of the service area.

CAPITAL WORKS**Capital Works - Existing****Ownership of Assets and Recognition of Economic Cost**

The capital assets of MWSC are currently owned by Government. For a period in 1990, the assets were transferred to MWSC at a nominal valuation, as a Government contribution, but were subsequently transferred back to the Government. Assets are leased to the MWSC, the original lease providing for a nominal fee of \$12,000 per annum, but the fee is waived as long as the ownership of MWSC remains with Government. In the event that such fee be charged, the sum is inadequate to be considered as fair economic rent of the assets concerned.

Asset Valuation

Valuation of the capital assets of MWSC is required so that provision can be made in the water charges to recover their cost. As noted as a qualification to the Auditor's opinion on the 1991 Financial Statements, it is not possible to determine the current book value of the capital assets because no inventory has been maintained. Consequently a complete list of the assets of the water and sewerage system is not available.

A preliminary schedule of fixed assets was compiled in consultation with the Mission's Water Supply Expert, the Manager and Accountant of MWSC/CIP, and the Administrator of the CIP. From discussion and review of records, the year of purchase, historic cost, and estimated current replacement costs were obtained. For each asset, or asset group, the current condition was reviewed by MWSC and CIP, who estimated the residual life.

The schedule is presented in Annex 5, together with a description of the methodologies used by the Consultant in determining the valuation adopted for the financial projections. The total value amounts to a little over \$15,000,000.

A more detailed study, including an inventory of assets and method for appropriate accounting in the future, will be carried out as part of ADTA.

It is recommended that the existing capital assets of the water supply and sewerage system be transferred, after revaluation at their current value, to the accounts of the MWSC, to ensure that tariffs are adequate to recover their cost and provide for their future replacement. To account for the transfer, Government may make an equity contribution of equal amount or, alternatively, MWSC may issue additional shares, which could form the basis for later dividend payments.

Insurance

In accordance with the lease agreement with Government, MWSC is required to insure the water supply and sewerage system assets, but the policy has not been renewed for fiscal 1993 because of cash shortage. Failure to adequately insure MWSC's capital works could result in serious losses and possible financial failure, considering risks such as the recent typhoon damage that required significant repairs to the airport catchment system.

It is recommended that all the capital assets of the water and sewerage system which, if damaged, would cause major interruption to or failure of the water supply, or other serious financial risk, be appropriately insured at all times by MWSC.

Capital Works - Future

Project Planning and Implementation

The proposed project is one of rehabilitation, and does not provide significant additional supply of water.

It is recommended that the Board initiate long term planning for the development of new sources as a matter of urgency, and in view of the current cash shortage of MWSC, Government should provide the necessary funds for the purpose.

Under the arrangements proposed in the Memorandum of Understanding, the design and supervision of construction of the proposed project will be undertaken by Consultants under the general guidance of the Project Management Office (PMO) established in the Ministry of Public Works (MPW).

Two individual Consultants will be attached to the PMO on an as needed basis to advise on project design and construction.

Capital works have previously been undertaken by the Capital Improvements Projects Office (CIP) of the MPW who have been responsible for design, contract preparation and construction supervision. The CIP has facilities which MWSC should continue to make use of, rather than setting up their own.

Project Accounting

At present, disbursements for all projects undertaken by the CIP have been accounted for by the CIP. From the files and records reviewed, accounts appear to have been systematically kept, although some improvements could be made if the accountant (shared with MWSC) had more time to devote to the work. This should improve if additional accounting staff is hired by MWSC. CIP is, however, accountable only for project disbursements; Government has failed to adequately reconcile and record additions to the system, or maintain an inventory

of the assets [1]. Under the proposed ADTA, MWSC will receive advice on appropriate accounting for assets and the maintenance of an asset register.

FINANCE

Current Situation

As MWSC has only been incorporated since 1989, and was operated for the first three years under a management contract, there is very little data recorded on a consistent basis with which to determine any meaningful trends or conclusions. Further, at the time of writing, audited statements for fiscal 1991 and 1992 are still not complete. However, the following observations summarize the present situation:

- revenues from sales were sufficient only to cover approximately one third of operating expenses, the balance of income coming from government subsidy;
- even with the maximum government subsidy of \$400,000 per year it has been impossible to perform adequate system repairs and maintenance;
- cashflow shortages have crippled operations, resulting in crisis control rather than planned spending;
- the sea water system has been constructed or installed using materials which have suffered severe corrosion, resulting in premature need for expenditure on major capital replacements.
- the Company is unable to provide a regular supply of potable water to all parts of the service area, resulting in EPA health warnings, abuse of the system, and deteriorating customer relations.

The Economic Cost of Water and Services

In the past, the amount that was charged for water was not related to the costs of obtaining and delivering the water, for example:

- MWSC was not charged for electric power by the government, a cost exceeding \$100,000 per annum;
- no charges were recorded to account for the construction and use of over \$25 million dollars that has been spent to build the system;

(1). Special audits of the disbursements and internal controls of federal financial assistance programs are conducted annually by independent auditors, as required under the 'Single Audit' program (US Act) of the government, the U.S. Department of the Interior designated as the cognizant agency. As terms of this audit may be adequate for Asian Development Bank purposes, it may be economical for the Bank to pursue the inclusion of this project in the engagement terms of the Single Audit, with any special amendments to the scope which the Bank may require.

- insufficient provision has been made for regular system maintenance; extensive replacement of major components will be required soon.

These factors have been incorporated in the financial projections to determine the required revenues, the results of which are discussed below.

Tariffs

In December 1992, effective February 1993, the Board of the MWSC published new tariffs to cover the costs of its services. The structure and application of the tariffs is given in Annex 6 and is summarized as follows:

- (a) for sales of fresh water: a minimum monthly charge plus a progressive quantity charge; separate tariffs apply to residential and business customers;
- (b) for sales of salt water: a minimum monthly charge plus a percentage of the fresh water charge;
- (c) truck deliveries (including deliveries to ships): a minimum delivery charge plus a quantity charge;

Charges and fees are also set out for fresh and salt water service connections and for connection to the main sewer.

At the same time, the Board adopted and published its Rules and Regulations, to apply to all customers, covering application of the tariffs, availability of services, obligations of customers, ownership of facilities, maintenance and repairs, misuse of services and other matters.

The tariff structure is comprehensive, clear and well presented. The rules and regulations appear to cover adequately the principal issues of MWSC and customer rights, obligations and remedies, although minor corrections and improvements should be made.

The legal authority for introducing and enforcing the tariffs and the associated rules and regulations was discussed with the Attorney General who confirmed that the Board had acted within its legal rights; it was also confirmed that the Board has complied with all requirements in regard to notification.

The Attorney General recommended that the Board file the adopted tariff and regulations with the Registrar of Companies.

Financial Projections

Effects of the New Tariff and the Project

The results of the financial projections are presented in Annex 7 for the period 1993 through 2005. The underlying assumptions for the projections are set out in Annex 8 (Notes and Assumptions), Annex 9 (Schedule of Project Capital Costs).

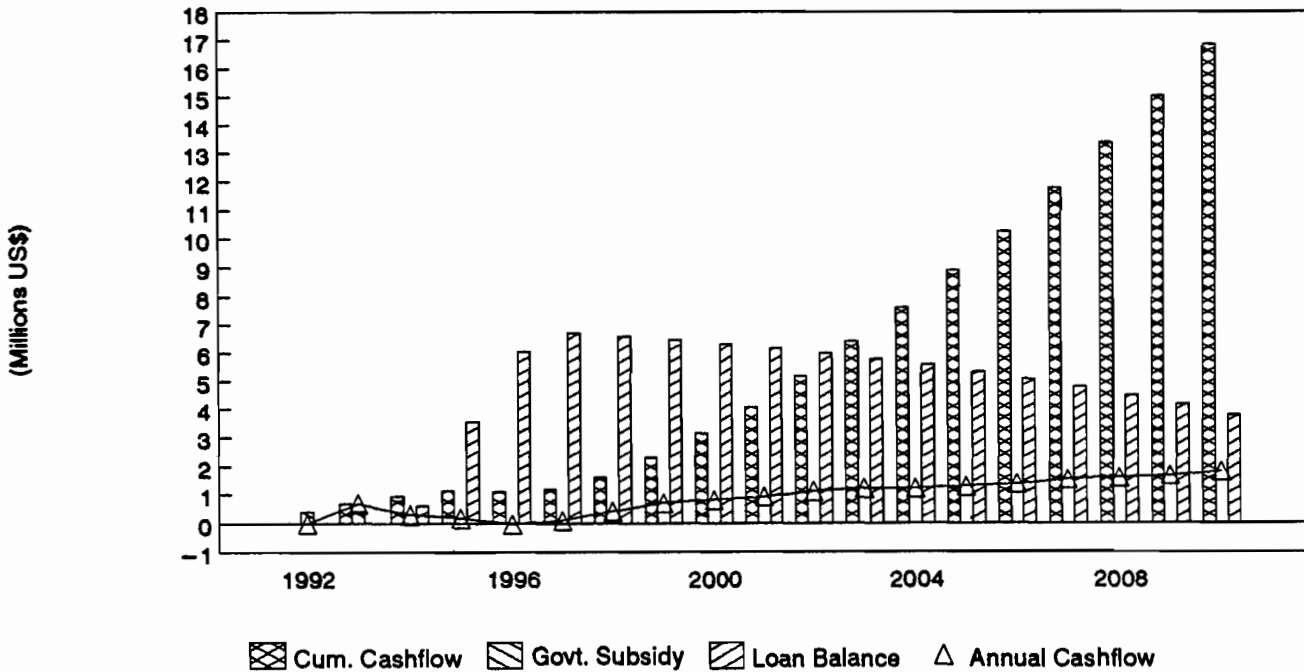
A summary of the financial results is shown in the graph on the following page which shows outstanding debt, annual cash flow and accumulated cash surpluses. The average tariff required and balances of key elements of the financial covenants are summarized in the table below the graph.

The projections indicate that, given satisfactory financial management and strategy, improved financial performance by MWSC will result, with decreasing dependence on government subsidy. The conclusions from the preliminary financial analysis are as follows:

- (i) From fiscal 1994, a government subsidy for MWSC should not be required, given the expected improvement in financial performance and the effectiveness of the new tariffs, discussed below. Nevertheless, a contingency plan for covering any shortfall in cash from revenues should be in place until MWSC's operations have stabilized;
- (ii) The tariffs recently introduced should be adequate to maintain revenues at levels sufficient to meet the Bank's financial covenants until fiscal 1997/98, when increases will probably be necessary. This assumes that the new tariffs will not result in a significant fall in demand; consumer response to the tariff may, however, not be apparent for some time. The tariffs will require review when new works for providing additional supplies of water are developed.
- (iii) Substantial cash surpluses should accumulate since part or all of the cost of the existing assets of the MWSC will, from now on, be recovered through an annual depreciation charge. The amount of the accumulation will depend on the level of the charge; several scenarios are possible. This cash surplus is available and should be retained by MWSC solely for financing future extensions to, and replacement of, the existing works.

The amount and timing of the costs of the future works cannot be determined until a long term capital budget has been prepared, incorporating the results of a long range plan for the provision of water and sewerage to the area. As noted earlier, long range planning is essential for the future stability of MWSC operations and should be given high priority by the Board of Directors.

**MAJURO WATER & SEWER CO.
IMPROVEMENT PROJECT FINANCING**



All figures in US\$ Millions, unless stated otherwise:

FISCAL YEAR ENDING SEPT:	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
AVG. TARIFF REQ'D. (\$/'000g)	1.25	4.27	4.27	4.27	4.27	5.00	5.50	6.75	7.25	7.75	8.50	9.00	9.25	9.75
Tariff in constant dollars	1.25	4.11	3.95	3.80	3.65	4.11	4.35	5.13	5.30	5.45	5.74	5.85	5.76	5.86
AVG. TARIFF REQ'D. (\$/m3)	0.33	1.13	1.13	1.13	1.13	1.32	1.45	1.78	1.92	2.05	2.25	2.38	2.44	2.58
Tariff in constant dollars	0.33	1.09	1.04	1.00	0.98	1.09	1.15	1.36	1.40	1.44	1.52	1.54	1.53	1.55
LOAN BALANCE	0.00	0.00	0.60	3.54	6.01	6.70	6.57	6.44	6.29	6.13	5.95	5.76	5.54	5.31
ANNUAL CASHFLOW	-0.01	0.67	0.29	0.17	-0.03	0.10	0.41	0.71	0.82	0.92	1.12	1.21	1.21	1.29
CUMULATIVE CASHFLOW	-0.01	0.66	0.94	1.12	1.09	1.19	1.60	2.31	3.13	4.05	5.16	6.38	7.58	8.88
NET OPERATING INCOME	-0.34	0.30	0.34	0.41	0.48	0.77	1.08	1.50	1.61	1.71	1.91	2.00	2.00	2.08
DEPRECIATION	0.01	0.00	0.71	0.77	0.84	0.91	0.99	1.36	1.46	1.56	1.16	1.27	1.35	1.45
INTEREST	0.00	0.00	0.03	0.21	0.48	0.64	0.64	0.64	0.62	0.61	0.60	0.58	0.57	0.55
DEBT SERVICING	0.00	0.00	0.03	0.21	0.48	0.64	0.76	0.77	0.77	0.77	0.78	0.78	0.78	0.78
NET INCOME (ACCOUNTING)	0.05	0.70	-0.40	-0.57	-0.84	-0.78	-0.55	-0.50	-0.47	-0.46	0.13	0.16	0.08	0.09
GOVERNMENT SUBSIDY	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

As indicated by the outlined numbers, the objectives in determining the tariff is to generate revenues adequate to:

Year 2 – provide a positive income from operations;

Year 4 – provide a positive income from operations and recover depreciation charges, or debt servicing, whichever is greater; and

Year 8 – fully recover expenses, interest, and depreciation charges, ie. positive net accounting income.

In this analysis, the tariff is determined as remaining at current average rate until an increase is required in 1997.

Thereafter, the tariff is calculated by determining what average rate is required to meet the above conditions.

In actual practice, the tariff is not expected to be adjusted each year.

Financial Rate of Return

The proposed project has a financial rate of return of -6.83% in current terms, (2.72% in constant terms), taken over a period of 50 years. The full calculation is shown in Annex 10.

Average charge for the services

The average charge in the fiscal year 1992 for MWSC services was \$1.25 per 1000 gallons, based on the total quantity of fresh water sold and the revenue received.

On the assumption that 85% of the water consumption in the MWSC supply area will be provided by MWSC, and the balance from roof collection systems or bottled water, it is calculated that the average charge for water under the new tariffs will rise to \$4.27 per 1000 gallons, approximately three and one half times the previous average charge.

The derivation of this figure is based on the following assumptions:

- (a) the quantity of water sold is independent of the price charged;
- (b) the quantities of fresh and salt water sold will be as set out on in the assumptions to the financial statements given in Annex 11.
- (c) the quantities sold to each consumer group will be 80% residential, 20% business and institutional.

Given these assumptions, the average charge for fresh water each year in the period 1993 through 2005 is set out in Annex 12. At the foot of the Annex is given the average charge which will be required to enable MWSC to meet its financial commitments, based on the assumed loan covenants and on-lending terms (See Notes to the Financial Projections, Annex 8).

It will be noted that the present tariff is adequate to meet commitments until 1998, after which an increase will be necessary.

Sensitivity of Revenue to Changes in Charges and Demand.

The demand for water from MWSC, given full supply at the present tariffs, is not known and cannot be established with present data.

The sensitivity analysis has been made at two levels of possible demand, that given by the Mission's Water Supply Consultant figure of 52.5 gallons per head per day (gphd) or 200 lcd. This

This includes a sea water component of 12.5 gpd for toilet flushing purposes supplied to 77% of the population. [1]

The analysis has also been carried out at a lower figure of 40 gpd and the results compared.

A initial fall in consumption per connection and revenue as a result of the increased charges is probable, although it may not result in a reduction in overall sales. Changes in consumption and revenue from the implementation of metering and progressive tariffs may result from several causes:

- (a) individual consumption may decline and conservation measures improve, due to the rates and progressive structure of the tariff;
- (b) the number of consumers sharing connections may decline, resulting in more residential connections and therefore reduced consumption per connection; revenue will then decline since the consumption in the lower end of the tariff will increase;
- (c) water consumed from alternative sources, principally roof catchments and storage, may increase;
- (d) where services are inadequate, there may be a drop in the willingness to pay.

The combined effect of the these and other factors cannot be assessed until some time after the introduction of the new tariff. In all probability, the full effect will not be known for at least a year, although preliminary indications should be evident by the time of the next Mission in April.

In the financial projections it has been assumed that the amount of water consumed from sources other than MWSC -principally roof catchments -is 10% of the total demand. In the analysis, sensitivity to changes in this assumption in the range 10% - 35% is calculated, and the effect on net operating revenue and on financial performance is examined.

[1] There are 820 connections to the salt water system. If the figure of 77% (or 20,000 people) is correct, it implies that there are 24 persons per sea water connection, which seems improbable. Reconciliation is required.]

This effect is measured as the change in the time taken to meet the assumed financial covenants, namely, that net operating revenue must be adequate to meet the following conditions by, and following, the date given:

1. be positive in 1996;
2. equal the greater of depreciation or debt service by 1998;
3. equal depreciation plus interest by 2001.

The results are set out in Annex 13 and are summarized in the following table, results for the 40 gpd level of demand shown in italics:

FINANCIAL CONDITION	Supply from non MWSC sources - %					
	10%	15%	20%	25%	30%	35%
	Condition met by end of fiscal					
Net Operating Income Positive	1994 <i>1994</i>	1994 <i>1994</i>	1994 <i>1994</i>	1994 <i>1994</i>	1995 <i>1995</i>	1995 <i>1996</i>
Cashflow Positive	1997 <i>1994</i>	1997 <i>1997</i>	1998 <i>1998</i>	1998 <i>1998</i>	1998 <i>1999</i>	1998 <i>1999</i>
Net Operating Income less Depreciation >0	1998 <i>2000</i>	1998 <i>2000</i>	1998 <i>2000</i>	1998 <i>2001</i>	1999 <i>2002</i>	2000 <i>2002</i>
Net Operating Income less Debt Service >0	1997 <i>1996</i>	1997 <i>1997</i>	1997 <i>1998</i>	1998 <i>1999</i>	1998 <i>1999</i>	1999 <i>1999</i>
Net Operating Income less Dep'n and Int >0	2002 <i>2002</i>	2002 <i>2002</i>	2002 <i>2002</i>	2002 <i>2002</i>	2002 <i>2002</i>	2002 <i>2002</i>

The above results indicate that an increase in consumption from sources other than MWSC from 10% to 35% of total demand would delay compliance with the assumed financial covenants by one to two years depending on the demand level assumed.

Up to the point at which total sources are greater than demand, MWSC revenues will fall as the percentage taken from other sources is increased; during this period MWSC will have spare capacity. Once the sources are insufficient to meet demand the balance will be met from MWSC sources and revenues will again increase. Without the development of additional sources, full use of MWSC sources would be achieved.

If demand is at the higher level of 52.5 gpd, the available total supply is never adequate, so that all MWSC water would have to be

demand level of 40 gpd, total supply exceeds demand for some years, so that alternative sources are available; in this case MWSC revenues would fall initially and recover as soon as the total sources become inadequate to meet demand.

The two conditions are shown in the graphs and tables on the following page.

An implicit assumption in the analysis is that storage of run-off from roof catchments would be adequate to maintain the supply at the assumed level throughout the year. This may not be correct at present, but it may be possible (and practicable) to develop this source in future, and a study of its potential should form part of the future long term planning for the supply area.

SOCIO-ECONOMIC FACTORS

Population Served

The population estimate and projections, as used in the financial and demand projections, are as provided by the Department of Statistics and Planning. Whether, in fact, Majuro Atoll continues to face a high rate of growth will depend on improved economic activity on other islands which may slow the immigration of people from other atolls to Majuro. Being a large centre with airport, port, schools, and other features, it is expected that the high growth will continue, despite a birth rate of Majuro being lower than the average for the Marshall Islands.

For Majuro atoll, the service area of MWSC is limited to the linked islands, representing 97% of the population. This is distributed over 33 miles (55k), the most densely populated area being Rita island on the southeastern tip, the least densely populated area being the rural community on Laura (the major groundwater source).

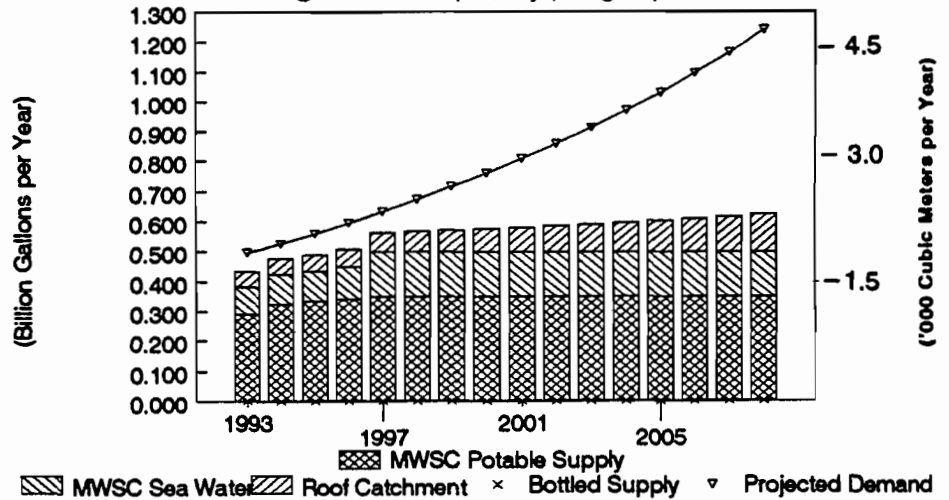
Ability and Willingness to Pay

The average income and number of members per household varies significantly, from extended families of over 20 members sharing a water connection, often without indoor plumbing, to very small households (often expatriate), with full plumbing and conveniences. The average family size is 8.8 people.

Similarly, there are variations in the incidence, size, and quality of roof catchment systems and storage, and of houses with sea water and/or sewerage services.

Consequently, without sufficiently detailed data, it is not possible to analyze demand and predict the effect that the new progressive tariff may have on future behavior and consumption, however, a general assessment of ability to pay was carried out, with the following results.

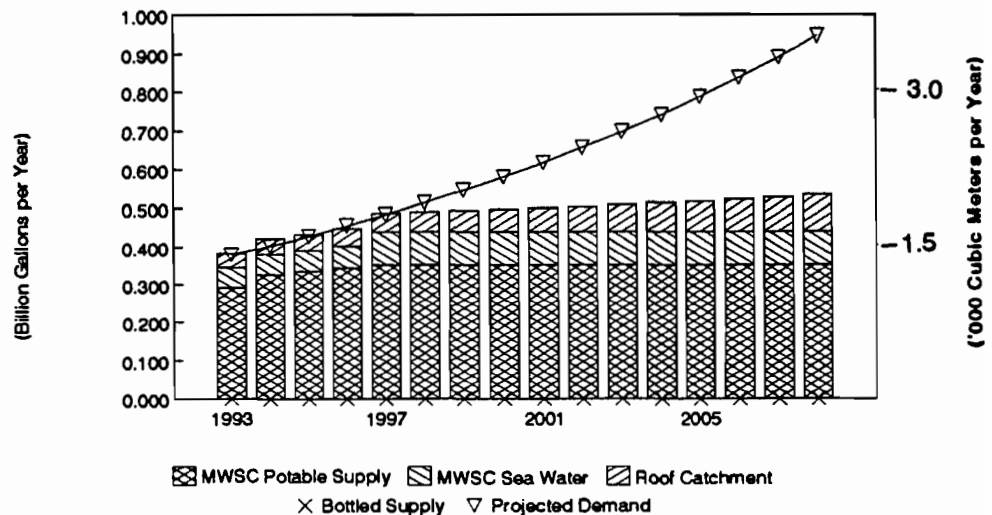
MAJURO WATER DEMAND & SUPPLY
@ 199 Litres/Capita/Day (52.5g/c/d)



ASSUMPTIONS IN METRIC MEASUREMENT
3,7850 Litres = 1 US Gallon

For Fiscal Years Ending Sept 30,		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
DEMAND (Annual)														
Water Demand @ 199	(M m ³ /y)	1.878	1.966	2.122	2.255	2.366	2.549	2.709	2.860	3.061	3.254	3.459	3.677	3.909
- met by bottled purchases	(M m ³ /y)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
- met by roof catchment	(M m ³ /y)	0.188	0.200	0.212	0.226	0.240	0.255	0.271	0.288	0.306	0.325	0.346	0.368	0.391
- met by MWSC seawater system	(M m ³ /y)	0.349	0.371	0.379	0.407	0.565	0.565	0.565	0.565	0.565	0.565	0.565	0.565	0.565
- met by MWSC potable water system	(M m ³ /y)	1.101	1.235	1.266	1.297	1.330	1.330	1.330	1.330	1.330	1.330	1.330	1.330	1.330
NET UNMET DEMAND	(M m ³ /y)	0.238	0.188	0.262	0.324	0.260	0.368	0.541	0.694	0.658	1.031	1.216	1.412	1.620
AVERAGE PER CAPITA CONSUMPTION														
TOTAL	(l/c/d)	174	180	174	170	177	168	159	151	143	136	129	122	116

MAJURO WATER DEMAND & SUPPLY
@ 151 Litres/Capita/Day (40g/c/d)



For Fiscal Years Ending Sept 30,		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
DEMAND (Annual)														
Water Demand @ 151	(M m ³ /y)	1.431	1.521	1.617	1.718	1.827	1.942	2.064	2.194	2.332	2.479	2.636	2.802	2.978
- met by bottled purchases	(M m ³ /y)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
- met by roof catchment	(M m ³ /y)	0.143	0.152	0.162	0.172	0.183	0.194	0.206	0.219	0.233	0.248	0.264	0.280	0.296
- met by MWSC seawater system	(M m ³ /y)	0.208	0.209	0.212	0.226	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331
- met by MWSC potable water system	(M m ³ /y)	1.101	1.235	1.266	1.297	1.330	1.330	1.330	1.330	1.330	1.330	1.330	1.330	1.330
NET UNMET DEMAND	(M m ³ /y)	-0.021	-0.078	-0.025	0.022	-0.019	0.065	0.195	0.312	0.436	0.568	0.709	0.858	1.017
AVERAGE PER CAPITA CONSUMPTION														
TOTAL	(l/c/d)	154	159	154	149	153	145	137	130	123	117	111	105	100

The new tariffs should allow substantially all households, including those with low income to meet the cost of MWSC services. The results of the analysis show that the cost of these services for such households would probably not exceed about \$25 per month, based on average consumption of 7,500 gallons per month at the new tariffs. The most recent data on household income (1991) indicates that the monthly income of the lowest 10% of households, adjusted for inflation, is about \$485; about 5% of income would therefore be spent on the services. This figure is generally regarded as acceptable.

In this regard, it may be noted that residents of the Laura lens area appear to be less willing to pay for water than residents of the highly populated D.U.D. area. Laura residents consider that the ground water in their area traditionally belongs to them and may consider that they should not have to pay for it. Residents of Rita, at the opposite end of the atoll service area, who have not been receiving a regular supply of potable water, appear highly willing to pay, despite generally lower income levels.

Elasticity of Demand and Alternative Sources

Due to the improved information that will shortly be available with the commencement of metered billings and progressive tariffs, the determination of the elasticity of demand was postponed to a later Mission. Two points can be determined by observing the costs of alternative sources, examined below.

1. Bottled Purified Water

During the Mission, water was unavailable to residents of southeast extremes of the atoll (Rita Island), and EPA tests were warning that water was unsafe to drink in several areas. Water was being purchased by the bottle for meet basic drinking requirements.

A small private desalination and purification plant produces and sells bottled water in Majuro. In the dry season, in January, the plant was producing at its full capacity of 1,500 gallons per day, and selling all of its production, which retails at approximately \$1.75 per gallon. At this rate, if current health problems in the drinking water of Rita and the D.U.D. area continue, or MWSC is unable to meet basic consumption requirements, it is estimated that .5 million gallons may be purchased annually, at a cost of almost \$1 million. This converts to an average monthly household expenditure of almost \$6 per MWSC connection.

2. Roof Water Catchment and Private Storage

The cost of roof catchment can be used as a proxy for the maximum price consumers will pay. Tank storage costs about \$1.00 per gallon and new systems were being installed during the Mission.

Other factors which will influence the installation of private systems

are:

- (i) size and suitability of roof
- (ii) size of household and resultant cost of MWSC water
- (iii) income level and ability to finance the capital cost.

The financial projections assume 10% of water needs are currently met by roof catchment, based on the estimate, as provided by the Mission's Water Supply Consultant, of an annual supply of 45 Mg/y. Further research is required to establish a reliable figure on the amount of roof catchment in use, the annual yield, health considerations, and the economics of this source of supply. [1]

It is recommended that further work be undertaken during the next Mission to estimate elasticity of demand once preliminary data from metered billings is available.

Further Information: Pending EPA Survey

The Environmental Protection Agency, under the Ministry of Health, is currently organizing an extensive UNDP funded survey to determine the water usage and facilities of all Marshall Island residents. The survey will include description of roof catchment and storage systems, and evaluation and measurement of the building to determine potential for such systems. The survey will also include inspection of facilities and has been expanded, in co-operation with needs of MWSC, to include physical inspection to determine the condition of plumbing (for sea water corrosion and malfunction) and to note the nature of the connection (metered vs. illegal), and incidence of pumping to boost pressure.

The results of the survey are not expected to be available before August of 1993 at the earliest.

It is recommended that information being collected in the EPA survey be included in future economic and tariff studies of the Bank, and that related work be scheduled accordingly. If further information is required that might be incorporated in the survey, the co-operation of the EPA should be sought immediately for its inclusion.

FACTORS AFFECTING FUTURE PERFORMANCE

The Memorandum of Understanding at paragraph 28 sets out guidelines for financial management and strategy, including accounts receivable and treatment of delinquent accounts. The guidelines are endorsed.

[1. Interest rates for consumer loans are about 18% vs commercial prime rate of 6.5%. If roof catchment and private storage is found to be economic, consideration should be given to MWSC acting as a financing agent, the repayment of loans recovered through monthly billings.]

It was apparent to the Mission, from observations and discussions with management, that the management of MWSC is taking whatever action it can, within its capacity, to improve matters. Notable examples of this are found in:

- (i) the procurement and expedited installation of meters since the last Mission in August 1992, the program being over 95% complete in January; and
- (ii) a comprehensive policy of regulations and tariffs has been prepared and adopted by the Board, effective February 1993.

It should be noted, however, that without assistance in some areas, the MOU guidelines may be unattainable, or unrealistic in their timing, unless the following can be provided:

- (i) immediate ADTA (as described in the attached Terms of Reference 'Phase I');
- (ii) additional interim funds, or loan, from government for additional staff and maintenance materials, until such time as cashflow improves; and
- (iii) solid policy support from the Board and Government for enforcing regulations.

REQUIREMENTS FOR FURTHER WORK ON THE NEXT MISSION

Work to be undertaken by ADTA is detailed in the attached Terms of Reference, Annex 14. It should be noted that immediate consideration should be given to urgent items which may be critical in MWSC meeting the conditions precedent to loan negotiations. These might normally come under ADTA and are included in the Terms of Reference in 'Phase I', but could, in the interests of time, be substantially accomplished by the Financial Consultants during the next Mission, scheduled for April 1993. These items are identified with an asterisk, below. Currently, ADTA is not scheduled before April 1994.

Some areas of work undertaken require follow up, or completion, where work was postponed pending availability of more reliable data. Also, new issues requiring further work were identified during the Mission. These are include:

Legal/Institutional

- * Conduct detailed review on legislative requirements, including Water Rights Act and Enabling legislation, or individual contracts, if required.

Organization/Management

- * Review appropriateness of new computer accounting program for the needs and abilities of MWSC.

Obtain further detail on employment and training requirements, particularly for personnel for the Operations Department.

Financial

Examine adequacy of charges for connections and other services, and consult with MWSC on minor discrepancies and improvements to be made in Tariff Schedule and Regulations as adopted.

Update financial projections with:

- adjustments to 1991 and 1992 resulting from completion of audit and receipt of statements by the Bank; and
- incorporate changes in the capital costs of the project which have occurred since those provided for the purposes of the projection;
- any revisions of basic assumptions and estimates to be used, or changes in the financing or covenants to be met.

Socio-Economic

Estimate elasticity of demand once required consumption data from metered billings is available; conduct further survey work, as necessary.

Determine initial response of consumers to the increase in tariff and reassess the implications for future revenue as projected.
