REVIEW OF THE OPERATIONS
OF THE
WATER RESOURCES GROUP

JANUARY 1988
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CHAPTER I
EXECUTIVE SUMMARY

INTRODUCTION

Following self-government in 1978 the water resource investigation and management function became part of the Water Division of the Department of Transport and Works.

In December 1984 the function was transferred to the Department of Mines and Energy where it was known as the Water Resources Division.

On 19 March 1987, Water Resources staff were transferred to the NT Water Authority (NTWA) as part of the Government’s revised Administrative Arrangements. Finally on 1 July 1987 NTWA and the NT Electricity Commission merged to become the NT Power and Water Authority (PAWA); Water Resources Division was retitled Water Resources Group (WRG).

An objective set by the PAWA Board was for WRG to operate on a commercial basis, and some internal studies were initiated within the Water Directorate to achieve this end.

In August 1987, the Managing Director Water Directorate appointed an external consultant to head a Review team to conduct an independent review of the operations of the Water Resources Group based on the following Terms of Reference:

Having regard to the policies of the Northern Territory Government and the objectives of the Power and Water Authority including the requirement to operate on a commercial basis:

a. review all projects and activities performed by the Water Resources Group, and in each case identify the client, the purpose, the full cost, and the current source of funds;

b. undertake discussions with external clients concerning their continuing sponsorship, and projected programmes of work in the context of meeting full costs;

c. investigate scope for Group functions to be carried out by the private sector, or to be wound down or discontinued should there be a withdrawal/reduction of client funding or government subsidisation;

d. investigate scope for increased use of alternative resources to perform Group functions;

e. identify any Group activities which are critical to the future development of the Northern Territory, and the extent of Government subsidy necessary to support the activity;

f. identify any economies and efficiencies that may be able to be achieved within the Group.
The team is to provide a report with recommendations on the results of the Review. The recommendations should include an assessment of the impact on staff, budget and revenue levels, together with a strategy for implementation.

CONDUCT OF REVIEW

The Terms of Reference of the Review in drawing attention to the requirement of PAWA to operate on a commercial basis place strong emphasis on two matters:

- identification of the full cost of WRG programmes, the clients generating the requirement, and the impact of full cost recovery on each client.
- the scope for increased use of private sector or other resources to carry out WRG functions and the extent to which these functions could be scaled down.

A major part of the review process has been directed to these matters.

The Review Team devoted considerable attention to the identification of the full costs of operation of the Water Resources Group. WRG management has been disadvantaged in that there were no systems in place to provide this information. The team has extracted information from a number of sources to enable indicative costings to be estimated.

An extensive programme of discussions both within the organisation and with external clients of WRG was undertaken. External clients included NT Government Departments and industry representatives. Non client industry representatives, such as drilling contractors and engineering consultants were also interviewed.

CURRENT WATER RESOURCES GROUP FUNCTIONS

Water Resources Group is responsible for the assessment, promotion, orderly development and regulation of the water resources of the Northern Territory for the optimum long term community benefit. Functional activities can be broadly described as follows:

- to formulate and implement policy and legislation related to the management of water resources;
- to provide input to the formulation of forward strategies for the management of water resources and operations;
- in close consultation with the Planning and Development Group of the Water Directorate and external clients, to identify and implement annual programmes of work;
- to provide assistance to industry and the public through the Rural Advisory Service;
- to collect, store, process, assess and disseminate data related to both surface and groundwater resources of the Northern Territory;
- to develop and undertake environmental protection, monitoring and regulatory programmes;
The Director of Water Resources has statutory responsibilities as Controller of Waters under the Control of Waters Act and as Commissioner of Water Development under the Water Supplies Development Act.

CURRENT STAFF AND EXPENDITURE LEVELS

There have been significant variations in WRG establishment since 1980 when the total establishment was 316.

The present establishment of the staff employed on water resources activities (excluding Trainees) and the actual staff numbers are:

<table>
<thead>
<tr>
<th>Location</th>
<th>Current Establishment (1987)</th>
<th>Actual staff 30 September 1987 (At Commencement of Review)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin</td>
<td>131</td>
<td>129</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>36</td>
<td>31</td>
</tr>
<tr>
<td>Katherine</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>172</td>
<td>165</td>
</tr>
</tbody>
</table>

The current staff establishment of 172 is made up of 46 Professionals/Executives and 126 Technical and Field staff.

The total budgetted expenditure to be incurred by WRG in carrying out its programmes for the current financial year is $11.494M. The largest item in this expenditure is manpower at $5.722M which represents 50% of total expenditure.

Organisation overheads and corporate expenditure which are attributable to WRG activities are estimated at an additional $1.96M.

WATER RESOURCES GROUP PROGRAMMES

The Water Resources Group 1987/88 programme of activities consists of 57 technical projects which for the purpose of internal project management and control are grouped under programmes of:

- Water Supply
- Flood Protection
- Waste Disposal (Waste Water Management)
- Baseline Inventory
Water Supply Programme

Consists of all projects which are associated with the provision of water supply services, and includes investigations and assessment of surface and groundwater for existing and proposed supplies and water quality monitoring of existing supplies. In the case of groundwater includes construction of production bores.

Rural Advisory Services are also provided as required under the Water Supplies Development Act, and control and regulatory activities (issue of licences for extractions and works) are undertaken under the Control of Waters Act.

Waste Disposal Programme

Under this programme WRG monitors the effects of waste discharge on surface and groundwater systems, and monitors mining discharges to ensure protection of the environment. Investigations and studies to assist the operation and augmentation of sewerage systems are also undertaken.

Flood Protection

Flood protection activities undertaken by Water Resources Group are flood plain mapping, estimating flood heights and discharge, developing flood warning systems and providing an advisory service on flood plain management matters.

The work undertaken by the Water Resources Group is in accord with a programme determined by the Flood Plain Management Committee which was established in 1980 by direction of Cabinet.

Baseline Inventory

The Water Resources Group Baseline Inventory Programme is aimed at collecting surface water and groundwater information for short, medium and long term development.

The particular objective of the Baseline Inventory Programme is to cover gaps in knowledge about NT water resources in prospective areas of development where no "primary" client exists, and therefore no information would be collected without Water Resources intervention.

PROJECT ANALYSIS

All WRG projects have been analysed to identify the purpose of the activity, the legislative authority for PAWA to undertake the activity, the project cost and present cost recovery. Each project was classified as "Business", "Client" or "General Community" by the Review team as a basis for determining responsibilities for cost in a full cost recovery situation.

The major outcome of this part of the Review was to ascertain present cost recovery and potential for full cost recovery.

Considering the Water Resources Group as a service unit to both internal (PAWA) and external clients on the basis of 1987/88 expenditures and recoveries only 30% of the total WRG cost (including overheads) is being recovered.
Using the classification of Business, Client and General Community the appropriate source of 
funding for WRG activities on a full cost recovery basis would be broadly:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>% of WRG ANNUAL COSTS</th>
<th>SOURCE OF FUNDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>50%</td>
<td>PAWA town water supply and sewerage systems (15%) and AES water supplies (35%)</td>
</tr>
<tr>
<td>Client</td>
<td>27%</td>
<td>Mostly NT Government Departments. Some non Government activities</td>
</tr>
<tr>
<td>General Community</td>
<td>23%</td>
<td>NT Government for Territory water resources assessment and control and statutory requirements and provision of some advisory services.</td>
</tr>
</tbody>
</table>

The source and amount of funding for full cost recovery of WRG services as compared with present cost recovery is:

<table>
<thead>
<tr>
<th></th>
<th>Present Cost Recovery $M</th>
<th>Full Cost Recovery $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA Town Water Supply</td>
<td>.730</td>
<td>1.918</td>
</tr>
<tr>
<td>and sewerage operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA Aboriginal Essential Services</td>
<td>1.460</td>
<td>4.638</td>
</tr>
<tr>
<td>NT Government direct appropriation to WRG</td>
<td>7.885</td>
<td>2.912</td>
</tr>
<tr>
<td>External</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NT Government Departments</td>
<td>.827</td>
<td>2.541</td>
</tr>
<tr>
<td>NT Local Government</td>
<td>.035</td>
<td>2.06</td>
</tr>
<tr>
<td>Commonwealth Government</td>
<td>542</td>
<td>.758</td>
</tr>
<tr>
<td>Non Government</td>
<td>.015 (1)</td>
<td>.018 (1)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11.494 (2)</td>
<td>13.001 (1)</td>
</tr>
</tbody>
</table>

(1) excludes previous years’ recoveries against 1987/88 expenditure.
(2) excludes overheads
ACTIVITY ANALYSIS

There are a number of discrete activities which are carried out as part of or provide input into Water Resource Group Projects. The Review carried out an analysis of the following:

- Drilling
- Bore Testing
- Water Resource Data Collection
- Data Base Management
- Flood Plain Studies
- Laboratories
- Depot Centred Activities
- Advisory Services

GENERAL CONCLUSIONS

- The Water Resources Group is highly regarded as a professional and competent organisation by other government departments and private industry groups who have had working associations with WRG over a number of years. The information and service provided by WRG are valued throughout the NT.

- The identification of "full costs" and classification of various projects carried out by WRG to "Business" "Clients" and "General Community" if followed through and so recovered will:
  - Increase costs attributed to operation of PAWA - town water supply and sewerage system
  - Increase costs attributed to AES Community Supply
  - Transfer NT Government funding from PAWA/WRG to other NT Government Departments who have lead agency responsibilities and should be determining priorities
  - Fully identify the cost of "General Community" programmes such as water resource assessment which are funded by NT Government
  - Increase cost recovery from external clients.

- The surface water resource assessment which is funded by NT Government has been realistically established - i.e. it covers those areas of the Territory where information is most likely to be required in future and the programme should be retained at current levels of activity.

- The ground water monitoring programme covers a substantial area of the Territory with about 1000 bores being monitored. WRG recognises the need to re-assess this programme with a view to rationalizing the number of bores being monitored.
• Integration of hydrographic and ground water monitoring crews is possible and is to be implemented. Some further economic gains may be achieved by use of agency arrangements for data gathering and by making it a requirement that the large remote Communities monitor their supplies.

• On the basis of cost comparison estimates prepared by the Review team there is scope for cost reductions by letting all Government drilling activities to contract.

• On the basis of cost comparison estimates prepared by the Review team there is scope for cost reductions by transferring laboratory water analysis functions to the private sector.

• The development and utilization of water resources in the Northern Territory has now reached a stage where the role of Government and therefore the activities of WRG should be changing to resources management rather than undertaking detailed studies for water utilisation which could be undertaken by developers.

COST SAVINGS AND STAFF REDUCTIONS

(i) Staff Reductions

Implementation of the Review Recommendations is likely to require a period of a minimum of two years and should eventually result in the following staff reductions.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Initial</th>
<th>Final</th>
</tr>
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<tbody>
<tr>
<td>Drilling Activity</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>Laboratory Activity</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>WR Data Gathering Activity</td>
<td>6</td>
<td>6 (immediately 1 &amp; 6 after 2 years)</td>
</tr>
<tr>
<td>Maintenance and Depot</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Range</strong></td>
<td><strong>44</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

(ii) Potential Savings Based on Current Programmes and Expenditure Levels

<table>
<thead>
<tr>
<th>Type of Change</th>
<th>Savings</th>
</tr>
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<tbody>
<tr>
<td>Change to Contract Drilling</td>
<td>$1.00M to $1.4 M</td>
</tr>
<tr>
<td>Change to use of Private Laboratories</td>
<td>$0.15M to $0.20M</td>
</tr>
<tr>
<td>Integration of Field Staff etc</td>
<td>$0.18M to $0.3 M</td>
</tr>
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(iii) Full Cost Recovery

The strong view of the Team is that full cost recovery should be implemented from 1988/89 and should include an appropriate component for corporate overheads. Activities such as those associated with the General Community classification should be recovered by direct appropriation on the basis that the NT Government is the client group.
RECOMMENDATIONS

(i) Role of Water Resource Group

It is recommended that:-

(1) Endorsement be given to an ongoing role of Water Resources Group within the Water Directorate of PAWA spanning provision of professional and technical services to the Planning/Development and Operations arms of the Water Directorate, assessment and control of the Territory’s water resources and provision of advisory and professional services to other government agencies, industry and public.

(ii) Cost Recovery

It is recommended that:-

(2a) PAWA move to full cost identification and recovery of WRG programmes and discussion be held with Treasury to ensure commitment of funds to enable an agreed stable level of service to be provided by WRG to other NT Government agencies.

(2b) As some cost recoveries will be "in house" WRG should be set up as a "service unit" within PAWA and appropriate charge out rates determined for all its activities.

(iii) Water Resource Assessment, Data Collection and Processing

It is recommended that:-

(3a) The existing programme of surface water assessment comprising 64 resource inventory river gauging stations should be retained and continue to be funded by government.

(3b) The existing programme of surface water assessment comprising 61 project river gauging stations be retained as long as client departments, including PAWA, require the site specific data and are prepared to meet the full cost.

(4) Strategy proposals be prepared to ensure ongoing assessment of NT groundwater resources which maximises the involvement of private drillers and private enterprise developers and sets out on a priority basis a programme of broad regional investigation to infill data obtained from detailed development investigations using modem geophysical techniques associated with limited investigatory drilling.

(5a) Technical Services Division of WRG be restructured to include all field monitoring staff (surface water, ground water and water quality) reporting to one Principal Technical Officer, and the field staff employed on the combined activity reduced by 6. Only 5 of these positions are currently filled.
(5b) Agency arrangements (for towns and remote communities) for collecting data from river gauging stations and ground water monitoring bores be explored and action be taken to implement, where suitable arrangements have already been identified.

(6a) Five technical staff made excess as a result of privatisation or rationalisation of functions be used as a resource to catch up on backlog of surface water data entry.

(6b) Programme of accelerated catch up in excess of that provided in recommendation 6(a) should be subject to rigid cost/benefit analysis before any further resources are made available.

(iv) **Flood Plain Management**

It is recommended that:

(7a) Use of consultants to carry out detailed flood studies be maximised.

(7b) The role of the Commonwealth Bureau of Meteorology in the issue of flood warnings throughout the Northern Territory be established with a view to transferring some of this responsibility from PAWA.

(v) **Advisory Services**

It is recommended that:

(8a) The government subsidy in the form of the "Dud Bore" Scheme be phased out over a period of 5 years.

(8b) Provision of "advice" for location of bore sites be charged to landholders and costs gradually increased to full cost recovery over a period of 5 years.

(8c) Rural Advisory Services section be restructured and provided with administrative support from existing PAWA resources to enable greater use of technical staff time in providing on farm advisory services.

(vi) **Drilling**

It is recommended that:

(9) The use of contract drilling for the full government drilling programme be actively explored with the objective of transferring to full contract drilling over a two year period.

(vii) **Bore Testing**

It is recommended that:

(10) Current bore testing capacity should be retained by PAWA but continue to be reviewed as work load reduces and future capacity of contractors to provide some of the requirements is demonstrated.
(viii) **Depot Centered Activities**

It is recommended that:-

(11) The store and workshop depot activity of the Technical Services Division be included in an overall review of PAWA depot functions with a view to maximum integration.

(ix) **Laboratories**

It is recommended that:-

(12) The Expressions of Interest received from industry be examined on the basis that all water analysis functions performed by the East Point, Parap and Nightcliff laboratories be transferred to the private sector over a two year period.
CHAPTER 2
INTRODUCTION

2.1 BACKGROUND

Water Resources Group (WRG) became part of the Water Directorate of the Power and Water Authority (PAWA) when the Authority was established on 1 July 1987.

The Water Resources activity has been operating within government on a non-commercial basis for some years, although a number of projects were paid for by external clients on a partial cost basis.

A major objective set by the PAWA Board was for WRG to operate on a commercial basis, and some internal studies were initiated within the Water Directorate to achieve this end.

In August 1987, the Managing Director (Water) appointed an external consultant, Mr Arthur Clegg (former Director Operations of the Victoria Rural Water Commission), to conduct the Review with Terms of Reference as shown in Appendix I.

Mr Clegg was assisted in the Review by Sue Ross (Executive Officer Corporate Policy PAWA) and Glenn Hill, (Director of Administration, Department of Mines and Energy). The Review commenced on 21 September 1987.

2.2 CONSULTATION PROCESS

During the course of the review the team conducted an extensive series of meetings and interviews with staff of WRG, senior staff within the Power and Water Authority, client groups in government agencies and in industry, as well as discussions with industry representatives and persons with relevant knowledge and expertise in the Northern Territory and interstate. A record of all those interviewed and a summary of their comments is attached at Appendices 2 and 3.

The following unions were advised in writing of the review:

- Federation of Miscellaneous Workers Association
- Association of Professional Engineers Australia
- Association of Drafting, Supervising and Technical Employees
- Australian Public Service Association
- Administrative and Clerical Officers Association
- Amalgamated Metal Workers Union

A presentation of the Review findings and likely recommendations was given to the PAWA Board on 4 December 1987.
2.3 REVIEW CRITERIA

The criteria adopted as guiding principles for the Review were:

1. That the activity properly belongs to the business of WRG involving the orderly development and protection of the water resources of the NT.

2. That the maintenance or establishment of in-house resources be cost effective and in accord with NT Government policies.

3. That due regard be given to implementation or utilisation of technological advances where this can improve services or make them more cost effective.

4. That due attention be attributed to the establishment and maintenance of suitably qualified, trained and motivated human resources.

2.4 SUBMISSIONS

A number of submissions were received and these are summarised at Appendix "4".

The Review team is appreciative of the submissions which were useful to the Review process. All comments and suggestions have been considered and the Review team has been mindful of the concerns etc expressed in completing the Review and framing its recommendations.

2.5 ACKNOWLEDGEMENTS

The team wishes to thank all those interviewed and those who made submissions. Particular thanks are extended to the staff of the Water Resources Group for the co-operation extended during the course of the Review.

Thanks are also extended to word processing staff within the Administration Division of the Department of Mines and Energy for the assistance given in typing records of conversation, various papers and reports, and the final report.
CHAPTER 3
WATER RESOURCES GROUP OVERVIEW

3.1 HISTORY
Following self-government in 1978 the water resource investigation and management function became part of the Water Division of the Department of Transport and Works.

In December 1984 the function was transferred to the Department of Mines and Energy where it was known as the Water Resources Division.

Finally on 1 July 1987, Water Resources became part of the Water Directorate of the Power and Water Authority as part of the NT Government's new Administrative Arrangements.

3.2 REVIEWS
During the period 1978 to 1987 the water resources function has been the subject of a number of reviews. The most significant of these was a Water Management Study by Binnie and Partners in 1980, and a review by Mr P F Temple in 1985 "Report on the Establishment of a Water Authority in the Northern Territory".

3.3 ORGANISATION
Over the years the Water Resources organisation structure has changed with various administrative and support functions being transferred in and out of the Group. The current organisation is shown at Appendix 5; the current WRG Functional Statement is at Appendix 6.

3.4 STAFFING
The present establishment of staff employed on water resources activities (excluding trainees) and actual staff numbers are:

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<tr>
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<th></th>
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<tbody>
<tr>
<td>Darwin</td>
<td>131</td>
<td>133</td>
<td>129</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>36</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Katherine</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>172</strong></td>
<td><strong>168</strong></td>
<td><strong>165</strong></td>
</tr>
</tbody>
</table>

There have been significant variations in WRG establishment since 1980 when total establishment was 316. These changes are set out in Appendix 7.
3.5 BUDGET

For the purposes of this Review two Operations and Maintenance budgets for the Water Resources Group may be considered:

(i) (a) the PAWA budget which provides for Water Resources Group activities in Darwin and is titled "Water Resources Group" budget.

(b) the PAWA budgets titled "Operations Group Alice Springs" and "Operations Group Katherine" each of which cover all Water Directorate (except administration) activities in those centres as a single unit.

(ii) a budget prepared for this Review to assess full costs.

Both budgets are at Appendix 8.

A. PAWA OPERATIONS AND MAINTENANCE BUDGET

The 1987/88 Water Resources Operations and Maintenance (O & M) Budget was essentially prepared under NT Government accounting guidelines and not by zero base budgetting as normally used within PAWA. This has meant that certain accounts (O & M categories) values have been taken at face value and others have had to be recalculated for the purposes of this Review.

The Water Resources Project estimates (1987/88 expenditure estimates for all projects programmed for the Water Resources Group) differed from the assessed total O & M budget estimates by approximately $0.387M. This is due to the Project estimates for all accounts other than manpower being refined with the benefit of time (and therefore improved information) whereas the O & M estimates were "as budgetted" (due lack of any better information available).

In reading the PAWA/WRG budget the following should be noted:-

(i) manpower figures recalculated on a zero base budgetting process were discounted by approximately $0.1M to suit budget appropriations, this may be appropriate given delays in filling vacancies etc.

(ii) staff carrying out water resources functions in areas other than Darwin are budgetted under the Operations Group and reliable estimates of costs (other than manpower) have not been available for these groups.

(iii) revenue from Trust Accounts, the Commonwealth and Laboratory clients has not been included in the WRG/PAWA budget.

(iv) a significant portion, approximately $3.3M, of Water Resources Group expenditure (other than manpower) is funded through Trust Accounts (Sundry Debtors, client funding). These funds are project based and are mainly managed by professional staff groups in Darwin (and to a much lesser extent in Alice Springs). Accordingly these funds have not been processed as an
expenditure attributable to any particular section. Under PAWA accounting procedures any expenditure incurred by any cost centre should be charged to a project account which itself forms a subset of the O & M expenditure; such expenditure is thus accounted for in both the project and in the cost centre.

B. THE ASSESSED OPERATIONS AND MAINTENANCE BUDGET

This Budget was based on the PAWA budget with the following amendments:

(i) manpower estimates were reassessed on zero based budgetting guidelines
(ii) provision was made for 1987/88 estimated expenditure against trust accounts
(iii) overheads were calculated for input by other Groups and Management areas in PAWA and for corporate overheads (depreciation, interest and insurance).

Due to time constraints and lack of accessible data the budget prepared for the purpose of this assessment should be regarded as reasonably accurate only.

C. CAPITAL ITEMS BUDGET

2. The approved capital items budget was accepted at face value, partly because of its relatively small value ($720,000) and because its 1987/88 impact is mainly restricted to the interest payable on such borrowed monies. A recent Board decision to defer any action to purchase heavy duty trucks (estimated at $489,000 total including trade in) is likely to result in this money not being expended in 1987/88. Whilst this is noted it does not have any significant impact on the results of the Review.

3.6 NT DEVELOPMENT SCENARIO

The following extracts from Budget Paper No 6 of 1987-88 delivered by the Treasurer describe the development scenario for the Northern Territory.

"Overview of the Northern Territory Economy"

The Northern Territory has a rapidly growing population ... is rich in natural resources, and has strong mining and tourism industries ....

The economy is constrained, at present, by its narrow industry base, deficiencies in its physical infrastructure especially its transport links, and its isolation from major centres of population and economic activity.

Although in many respects the Territory's economic development constraints appear formidable, the economic development potential and prospects are great.

POPULATION

The Northern Territory has the smallest population of any state in Australia and the lowest population density of one person per ten square kilometres." (Current population is approximately 150,000)
"TRADE

The Northern Territory’s substantial natural resources have given it a comparative advantage in production for export both overseas and interstate, of primary and transformed mineral, fishing and agricultural products and services.

Industry Performance and Outlook

MINERALS OIL AND GAS

The production of minerals, oil and gas is the single most important private industry in the Northern Territory.

Rural Industries and Fishing

Rural industries are an increasingly important sector of the Northern Territory Economy. These contribute to regional development, to the wider diversification of an otherwise narrowly based local economy, and provide a source of employment, particularly in the more remote areas of the Territory.

The opportunity to further develop a strong rural industry sector arises with an abundant supply of land relative to population size.

The principal primary industries are pastoral production (cattle and buffalo), agriculture and horticulture, and commercial fishing.

PASTORAL

The BTEC program presently underway is fundamentally altering the nature of the pastoral industry in the Territory. The program requires the establishment of additional fencing and watering facilities on properties.

AGRICULTURE AND HORTICULTURE

The Northern Territory has a small, but expanding, agricultural and horticultural sector.

Although relatively small at present the horticultural industry in particular has potential.”

Review Comments

Interviews for this Review with clients of the Water Resources Group and other interested parties have reinforced the above statements. The Northern Territory Government is widely perceived to be promoting a variety of growth sectors in the Territory, all of which will have, to a greater or lesser extent, an impact on the Territory’s water resources.

There is therefore an ongoing need for a group within government, such as WRG, to be adequately resourced with professional and technical expertise on water resource matters to ensure that the NT Government policies and priorities are met.
3.7 GOVERNMENT POLICIES

The NT Government has stated from time to time various policies and arrangements which have a direct or indirect impact on Water Resources Group activities. These policies are summarised as follows.

(i) In the Power and Water Authority Act Second Reading Speech the Government announced its intentions that:

- the establishment of the PAWA will bring together the Northern Territory Electricity Commission and the Northern Territory Water Authority and will thus establish the water area on a sound commercial footing
- the Authority is to be guided by commercial principles
- all personnel will work towards a commercial environment
- it will be necessary for the Authority to be aware of recent advances in technology and to assist with training at all levels
- there will be a need to ensure the development of management skills. In particular we will need to identify the capability amongst our management for marketing, commercial and entrepreneurial techniques as well as skills in customer education, economic, financial and legal areas
- this points to a comprehensive approach for the identification, assessment, distribution and management techniques for Territory water and natural gas resources as a whole
- at the workface there will be a need for the training of technical and operational staff to keep up with both technological change and new management techniques
- it is important to commence examination of pricing, borrowing and financing policies
- it will be important to work towards more appropriate accounting procedures and costing methods which will enable the government to identify areas of cross-subsidation
- in moving towards the user pays principle it will be necessary ..... to establish that cross subsidies within and between consumer groups are minimised

(ii) **Cabinet**

Cabinet Decision 3061 approved on 26/27 July 1983 the development of a new Act (the Water Act) and that a strategy be developed in the immediate future leading to negotiations with the adjoining states to develop suitable water sharing arrangements for shared surface water and groundwater resources. For various reasons this Act is only now being finalised for re-presentation to Cabinet early in 1988.
(iii) **Regulations**

A Regulatory Review Committee has been established by Government to ensure that the least intrusive means of regulation have been chosen in all areas of legislation. The establishment of this Committee was prompted by claims from private enterprise that development was being stifled by red tape and bureaucracy.

(iv) **Changes To Administrative Arrangements 14 July 1986**

The Incentive for change to administrative arrangements was brought about by "the most difficult budgetary period in (the NT's) history".

The objectives of the changes are to:

- provide the same or similar levels of service more efficiently
- make lasting savings in the costs of Government
- refocus emphasis on the promotion of industry development and the marketing of NT products and services

To achieve these objectives the Government restructured departments and froze maximum staffing allocations.

In addition:

- A new emphasis will be placed on industry development and the marketing of Territory products and services
- departments (will have the responsibility) to build and promote their industry sectors... This will be their first and foremost objective
- the measures ... will result in a more co-ordinated, more efficient approach to the development of the NT combined with a leaner and more efficient Public Service.

(v) **Chief Minister’s Media Release 19 March 1987**

In this media release the Chief Minister advised that: "... administrative arrangements (had been drawn up) to rationalise and co-ordinate the activities of Government, improve delivery of services to the community and reduce administrative costs. This had been achieved by grouping "like functions". NTEC and NTWA will operate under a common board ... This will achieve better co-ordination in the delivery of services, allow more efficient performance of common functions ... and help in establishing both areas of Government on a sound commercial footing".

(vi) **Ministerial Media Release 4 August 1987**

In this media release the Minister responsible for the Power and Water Authority ... confirmed that residential bores in the Darwin rural area will not be licensed or metered.
(vii) **Chief Minister's Statement of 7 January 1987.**

In this statement the Chief Minister determined that a series of basic principles are established which are to be applied in the general decision-making processes of Government and to underpin the further work which is proceeding to develop a comprehensive document outlining the Government's overall goals and objectives and policies. These basic principles are:

1. **A Commitment to Small Government**
   
   Where it can be demonstrated that services can be provided as well or better and at less cost by non-Government organisations including private enterprise then it is the Government's preferred position that the work be done by such private enterprise/non-government organisation.

2. **Private Enterprise Approach to Growth**
   
   Government should not seek to undertake a role which can adequately be carried out by private enterprise...the role of private enterprise will be maximised through contracts to local industry and other relevant means.

3. **Developing an Environment to Allow Territory Industry to Develop its Full Potential**
   
   The Government is committed to minimum commercial regulation of Territory enterprises... Government will adopt a streamlined, non-bureaucratic approach to economic activity.

4. **Promoting Expansion and Diversification of the Private Sector Base**
   
   Government support for industry will focus on those industries which can contribute to this growth without an on-going need for assistance or subsidy.

5. **A Commitment to Decentralised Decisionmaking**
   
   The Government will seek to have decisions which affect local communities made within those communities wherever this can be done in an efficient way.

(viii) **Essential Services to Remote Communities**

(Statement Resulting from discussions with Chief Minister on 21 September 1987).

This clarifies NT Government agency responsibility for the programming, funding and provision of essential services in remote communities.

- The Department of Community Development's focal point role in essential services has not been preserved in the 19 March 1987 Administrative Arrangements Order

- Services will be provided by the Departments and Authorities that have expertise in the particular service field
"We are spreading and deepening the Government's concentration on the specific needs of Aboriginal communities in the Departments that have expertise in those particular fields."

Specialist Departments and Authorities must now provide their particular service on two bases:

(i) the service is provided on the same basis to all people in the Territory and recovery of charges for service provision is similarly on the same basis for all recipients of the service;

(ii) the service includes identification of need, assessment of need, prioritisation, Budget provision, programming, implementation of program; and aspects of cost recovery including metering, billing and recovery on an individual consumer basis

Co-ordinators of Government services would be appointed in regional centres to ensure the effective delivery of services in those areas

Subject to the directions of Cabinet and relevant Ministers, the Power and Water Authority will be responsible for provision of electricity, water and sewerage services

The Office of Local Government can provide advice and support to communities and Government agencies across a range of issues

In general terms the NT Government has developed policies and arrangements supporting the following statements:

- the government is strongly developmental
- it is desirous of diversifying its economic base
- it is supportive of commercialisation of as many public services as possible, and development of a private sector
- it is anxious to minimise its direct capital investment in industry favouring other incentives rather than direct subsidy
- it is committed to minimisation of bureaucracy and streamlining of government procedures - particularly one stop facilities
- it is a government of consultation, co-ordination and consensus
- it is supportive of agricultural and horticultural development
- tourism development is a primary focus
- there is a stated commitment to foster an aquaculture industry
- government has a strong commitment to mining in the Territory.
CHAPTER 4

WATER RESOURCES PROGRAMMING AND MANAGEMENT

4.1 PAWA Objectives

The Board of the Authority is currently determining the aims and objectives of the Authority, however, in general terms in respect of the Water Directorate, the following interim objectives have been proposed:

• In order to provide safe reliable and efficient services to the community, PAWA will secure and manage power and water resources, water and wastewater systems.

• To promote the efficient operation of power, water and wastewater systems, and water resources management, providing and sustaining reliable and economic services.

• To promote public understanding of PAWA’s objectives and policies, and to consult with the NT community on issues of mutual interest.

• To develop pricing and charging policies which are equitable and, as far as possible, recover the cost of all services provided.

• To work closely with other organisations in planning and co-ordinating the management of water resources.

• To develop and implement sound management practices and systems, to enable PAWA to maintain an acceptable service to the community.

• To ensure that PAWA’s human resources requirements are met, while considering individuals needs, development and career aspirations.

• To promote the investigation, development and implementation of new technology, new ideas and improvements where appropriate.

The Terms of Reference required review of all WRG projects and activities in the light of PAWA objectives.

4.2 WATER RESOURCES PROGRAMME

The Water Resources Group 1987/88 programme consists of 57 technical jobs or projects which, for the purpose of job management and control are grouped under programmes of

• Water Supply
• Flood Protection
• Waste Water Management
• Baseline Inventory
22

This reflects the broad priority of WRG programmes. Projects are listed in order of priority within each of these programmes.

Further details relating to these programmes are included in Section 4.4 "Programme Descriptions".

4.3 JOB MANAGEMENT

The Water Resources Group (WRG) has been operating a job management system since 1977.

The 1987/88 programme consists of 57 technical jobs or projects which for the purpose of job management and control are grouped under the programmes described in Section 4.4.

A Job Management Committee exists to ensure the orderly introduction of new jobs, and the development and evaluation of work briefs, as well as the review of all jobs from initiation to completion.

The Committee comprises senior professional staff from Hydrology and Laboratory Divisions. There is also an officer from the Water Directorate Planning and Development Group who attends as an observer.

This approach has the benefit of providing flexibility and enables different disciplines to provide input to each task.

WRG liaises closely with external clients as part of the process of developing project briefs and incorporation of projects within work programmes. A detailed listing of all projects, by programme and showing clients and cost estimates is provided at Appendix 9.

4.4 PROGRAMME DESCRIPTIONS

Water Supply Programme - Consists of all projects associated with provision of water supply services to towns and communities, primary production, mining, tourism and recreation.

In the case of town and community supply, the programme of investigation and assessment works is to assist the Planning and Development Group of the Water Directorate in planning the augmentation of existing supplies and developing new supplies. Some technical projects and programmes of water quality testing are designed to assist the Operations Group in the operation and management of these systems.

Several surface and ground water sources are currently undergoing detailed examination, examples being re-examination of safe yield of Darwin River Dam, investigation of alternative ground water resources and detailed examination of Alice Springs ground water supplies.

Establishment of water supplies for large aboriginal communities, small communities and outstations are included in the programme.
The Government production bores drilling programme which involves the drilling and construction of production bores, associated site selection and testing work are also part of the Water Supply programme with work being carried out not only for PAWA and community supplies but also on behalf of other government departments including Transport and Works, Conservation Commission and Australian National Parks and Wildlife Services.

Water resources investigations and development of supplies for existing and potential primary production enterprises are also undertaken in conjunction with the Department of Industries and Development.

Rural Advisory Services as required under the Water Supplies Development Act and control and regulatory activities (issue of licences for extractions and works) under the Control of Waters Act are also provided.

**Waste Water Management Programme** - Projects included in this programme are for monitoring the effects of waste discharges on surface and ground water systems.

Waters leaving developments including mines, primary industries and towns are monitored by sampling and testing of surface streams and ground water systems or, in the case of mining companies, assessments are made of data provided with some limited field-monitoring being carried out.

Environmental studies and environmental monitoring of rehabilitation works such as Rum Jungle Mine Rehabilitation (undertaken on behalf of Commonwealth Government) are included in the Waste Water Management Programme.

Monitoring of PAWA sewerage effluent outfalls and studies of the performance of sewerage disposal systems are also an important part of the Waste Water Management Programme.

**Flood Protection** - Flood Protection activities undertaken by Water Resources Group are:

a. Flood warning systems  
b. Flood estimates (height and discharge)  
c. Flood plain mapping  
d. Flood protection advisory service

The work undertaken by the Water Resources Group is in accord with a programme determined by the Flood Plain Management Committee. This Committee was established in 1980 by direction of Cabinet and current membership is:

- Department of Lands and Housing (Provides Chairman)  
- Northern Territory Police  
- Northern Territory Emergency Services  
- Water Resources Group (PAWA)
Cabinet directed that the Committee oversee and implement a detailed flood plain management policy having regard to:

- further investigations and detailed development of guidelines, administrative arrangements and any necessary legislative changes;
- further development of flood forecasting and warning systems;
- acceleration of flood plains mapping programme (to include coastal surge zones);
- implementation of a programme of public awareness and education;
- review and refinement of emergency preparedness and post-flood planning;
- development of relevant land use strategies in consultation with local authorities.

**Baseline Inventory** - The Water Resources Group Baseline Inventory Programme is aimed at collecting surface water and groundwater information for short, medium and long term development.

The Water Resources Baseline Inventory Programme is driven by the prospects for development. Research into the availability and use of NT water resources, and the protection and improvement of quality and quantity is undertaken for development purposes, and the long term community benefit.

The particular objective of the Baseline Inventory Programme is to cover gaps in knowledge about NT water resources in prospective areas of development where no "primary" client exists, and therefore no information would be collected without Water Resources intervention.

### 4.5 WATER RESOURCES PROJECTS

The projects carried out under the Water Supply, Flood Protection and Waste Water Management Programmes are investigation, assessment and development activities which are project specific. Baseline inventory projects are concerned with collecting surface and ground water information for short, medium and long term development. Further details of the 57 projects on which expenditure will be incurred in 1987/88 are included in Chapter 5 "Project Analyses".

### 4.6 WATER RESOURCES ACTIVITIES

There are a number of discrete activities undertaken by various sections of the Water Resources Group; these activities were individually reviewed and include:

- Drilling
- Bore Testing
- Data Collection and Management
- Flood Plain Studies
- Laboratories
- Plant and Vehicle Maintenance
- Instrument Workshop
- Construction Maintenance
- Advisory Services
Further details relating to these activities are included in Chapter 6 "Activity Analysis".

4.7 CLIENTS AND OTHER INTERESTED PARTIES

During the course of the review the Review team interviewed in excess of 37 employees of PAWA, 28 individuals representing client departments, authorities and businesses and 22 "interested parties" such as other Water authorities, industry association and consultant representatives. The list of individuals and groups interviewed is at Appendix "2".

Clients were classified as:

- NT Government Departments, Authorities etc
- Commonwealth Departments, Authorities etc.
- Local Government
- PAWA Groups
- Private Enterprise
- NT Government (direct appropriation to WRG)

4.8 COST RECOVERY POLICY

The terms of reference of the review required the review team to "review all projects and activities performed by the Water Resources Group, and in each case to identify the client, the purpose and full cost of the project, and the current source of funds" and to "undertake discussions with external clients concerning their continuing sponsorship and projected programmes of work in the context of meeting full cost recovery".

The Review Team also assessed "internal client" implications in the context of meeting full cost recovery.

The Review Team approached the cost recovery aspect in light of the following criteria:

- a determination of full cost recovery including all overheads
- a comparison of full versus actual (1987/88) cost recovery
- financial implications of full cost recovery to external and internal clients (including NT Government)

Determination of Full Cost Recovery

In order to determine the full cost of projects the following components were assessed:

- all relevant direct operating costs as defined in the PAWA chart of accounts
- capital items programmed for purchase in 1987/88
- overheads - an assessment of the input by other Groups, Top Management etc into the Water Resources Group

The application of overheads is described at Appendix 8.

Due to the different accounting requirements of NT Government Departments (to which Water Resources belonged prior to 19 March 1987) and PAWA, most expenditure estimates are not as accurate as might have been wished. Accordingly most, if not all, figures should be read as indicative only; much more detailed assessment than time permitted is necessary to produce accurate estimates.
Nevertheless, it is considered that any refinement of the estimates would not be such as to affect the conclusions of the review process.

The purpose of assessing all projects to determine full costs was to clearly indicate the real costs of carrying out such projects and therefore to:

- bring this real cost to the attention of all clients, PAWA employees and the NT Government
- assist all clients to determine real needs and priorities in light of knowing full costs
- eventually have the Water Resources Group carrying out only those projects which have cost effective benefit to the client (including NT Government).

(b) **Comparison of Full Versus Actual Cost Recovery**

After assessing full cost recovery amounts for each project in the 1987/88 programme, these figures were compared against the anticipated actual cost recovery which varied from nil to the highest recovery against an individual project of 57%, in dollar terms the difference ranged from $1,997 to $2,099,837.

Specific details on a programme and project basis are at Appendices 13 and 14.

(c) **Financial Implications of Full Cost Recovery to External and Internal Clients.**

There are significant financial implications to the adoption of full cost recovery:

(i) clients will reassess their needs resulting in:

- some clients maintaining their current and projected requirements and using Water Resources Group to carry out their projects.
- some clients maintaining their current and projected requirements but looking to other means (mainly consultants and contractors) to carry out their projects.
- other clients will reduce, to a greater or lesser extent, their current and projected requirements.

The extent of affect of this implication is not yet known.

(ii) The NT Government (via Treasury) will become more fully aware of the extent of General Community activities carried out by Water Resources and will therefore be in a better position to determine the extent of funding necessary to support the Government’s aims and objectives in respect of water resources activities.

(iii) In the short term the NT Government will need to be aware of the extent of “interim funding” where certain activities are ceased, deployed to private or other public enterprises or merely reduced but where it is not possible to immediately reduce the Water Resources liabilities and overheads.
The financial impact on clients based on the 1987/88 programme is scheduled at Appendix 14.

4.9 WATER RESOURCES GROUP MANAGEMENT

For the purpose of this review the Water Resources Group has been considered to be the total professional and technical staff within the Water Directorate involved in the water resource function. Projects and activities undertaken by the Alice Springs and Katherine regional staff have been included and reviewed as part of the total Water Resources Programme.

The arrangements for managing the total Water Resources Programme as set out in current organisation charts and functional statements are as follows:

Darwin based Water Resources Group staff (131 positions). The group is organised into 3 Divisions of Hydrology, Technical Services and Laboratories which cover the full range of water resources functions.

The Darwin based staff are directly responsible to the Group Manager Water Resources. The Group Manager through his Divisional Managers also has a responsibility to co-ordinate and supervise those activities performed by personnel in "other branches" in relation to investigation and reporting on projects of water resources assessment development and management in the NT.

Personnel in other branches are:

Alice Springs - 36 positions
Katherine - 5 positions

Alice Springs staff comprises 9 professional positions (including Regional Engineer Water Resources) and 27 technical and field staff. This group undertakes the full range of water resources activities.

Katherine staff are technical field staff engaged in surface water data collection.

The Alice Springs and Katherine staff are shown on organisation charts as being part of the total regional staff at each centre and are therefore responsible to the Regional Manager who in turn is responsible to the Darwin based Group Manager Operations.

The actual working arrangements as observed by the Review Team are as follows:

Alice Springs: At the time of the Review the Water Resources Branch and Operations Branch of this Regional Centre were set up as separate and independent groups bound only by a service unit/client relationship. Appointment of a Regional Manager to assume responsibility of all regional activities was imminent. The water resources functions of Alice Springs centre were being technically managed from Darwin WRG with substantial backup support from professional staff.
Katherine: The technical oversight and programming of the 2 hydrographic field teams is provided from Darwin by the Principal Technical Officer - Surface Water Section, Technical Services Division. Some local oversight, and provision of support services as necessary was being provided by the Regional Manager.

The Review team considers that the current Regional arrangements are basically sound. These arrangements are that local management responsibility is vested in a Regional Manager, with professional/technical oversight and programme co-ordination being the responsibility of the Water Resources Group Darwin.

The Review team notes that professional staff resources for the Southern Region (Alice Springs) are limited but depending on overall programmes and priorities support as required from professional staff based in Darwin is the most economic use of limited resources: this support, coupled with staff interchanges, maximises professional experience opportunities.

The Review Team considers that there is scope for integrating the Water Resources and Operations Branches in Alice Springs to maximise use of staff resources and local facilities and would anticipate that this matter would be given high priority for consideration by the newly appointed Regional Manager.

There is also a need for the joint management responsibility of the Water Resources Group Darwin (for technical oversight, programme co-ordination and professional back up) and the Operations Group Darwin (for overall management responsibility of Alice Springs and Katherine Regional Centres) to be clearly set out in organisation charts and functional statements.
CHAPTER 5
PROJECT ANALYSIS

5.1 INTRODUCTION

The technical projects carried out under the Water Supply, Flood Protection and Waste Disposal programmes are investigation, assessment and development activities which are project specific. Baseline Inventory projects are concerned with collecting surface and ground water information for short, medium and long term development.

5.2 ANALYSIS CRITERIA

All WRG projects have been analysed to identify the purpose of the activity, the legislative authority for PAWA to undertake the activity, the project cost and present cost recovery. Each project was classified as "Business" "Client" or "General Community" by the Review team as a basis for determining responsibilities for cost in a full cost recovery situation.

The methodology of this analysis including definition of "Business" "Client" and "General Community" and the detailed analysis of each project is set out in Appendix 9.0 and appendices 9.1 to 9.48.

5.3 EXPENDITURE AND COSTS

The total expenditure and actual costs recovered for 1987/88 are shown in the following table. Also shown is the amount that would be required to offset WRG expenditure on a full cost recovery basis.

<table>
<thead>
<tr>
<th>Present $M</th>
<th>Proposed $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Expenditure</td>
<td>11.494 (1)</td>
</tr>
<tr>
<td>Total Cost Recovery</td>
<td>3.888 (3)</td>
</tr>
<tr>
<td>Shortfall</td>
<td>7.606</td>
</tr>
</tbody>
</table>

(1) Excludes Overheads
(2) Includes Overheads
(3) Excludes previous years' recovery against 1987/88 expenditure
(4) Includes adjustment for previous years' recovery against 1987/88 expenditure
The following table summarises the apportionment of costs to Business, Client and General Community.

<table>
<thead>
<tr>
<th>Programme</th>
<th>1987/88 Budget (Incl. all overheads)</th>
<th>Business</th>
<th>Client</th>
<th>General</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M</td>
<td>$M</td>
<td>$M</td>
<td>$M</td>
<td>$M</td>
</tr>
<tr>
<td>Flood Protection</td>
<td>0.513</td>
<td>0.513</td>
<td></td>
<td></td>
<td>0.513</td>
</tr>
<tr>
<td>Wastewater Management</td>
<td>1.201</td>
<td>0.090</td>
<td>1.100</td>
<td>0.011</td>
<td>1.201</td>
</tr>
<tr>
<td>Baseline Inventory</td>
<td>1.682</td>
<td>0.033</td>
<td>1.649</td>
<td></td>
<td>1.682</td>
</tr>
<tr>
<td>Other</td>
<td>0.247</td>
<td>0.045</td>
<td>0.202</td>
<td></td>
<td>0.247</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>13.050</strong></td>
<td><strong>6.556</strong></td>
<td><strong>3.533</strong></td>
<td><strong>2.912</strong></td>
<td><strong>13.001</strong></td>
</tr>
</tbody>
</table>

* excludes adjustment for previous years’ recovery against 1987/88 expenditure.

## 5.4 FULL COST RECOVERY

In making the assessment of the source and amount of funding required to support Water Resources Group activities in a full cost recovery arrangement, both internal and external cost recovery has been considered. That is, WRG is considered to be a service unit whose activities must ultimately be funded by those initiating the service requirement.

The above table showing Water Resource Group costs to Business, Client and General Community activities is restated below showing the spread of these costs expressed as a percentage of the total.

- **Business 50%**
  - PAWA town water supply and sewerage (15%).
  - AES water supplies (35%).

- **Client 27%**
  - mostly NT Government Departments and some local Government and non-Government activities.

- **General Community 23%**
  - Territory wide water resources assessment, regulatory, control and statutory requirements and provision of advisory services.
The source and amount of funding for full cost recovery of WRG services is set out in the following table which also compares present and full cost recovery.

<table>
<thead>
<tr>
<th>Internal</th>
<th>Present Cost Recovery $M</th>
<th>Full Cost Recovery $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAWA Town Water Supply and sewerage operations</td>
<td>.730</td>
<td>1.918</td>
</tr>
<tr>
<td>PAWA AES</td>
<td>1.460</td>
<td>4.638</td>
</tr>
<tr>
<td>NT Government</td>
<td>7.497(2)</td>
<td>2.912</td>
</tr>
<tr>
<td>External</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NT Government Departments</td>
<td>.627</td>
<td>2.541 (1)</td>
</tr>
<tr>
<td>NT Local Government</td>
<td>.035</td>
<td>.206</td>
</tr>
<tr>
<td>Commonwealth Government</td>
<td>.542</td>
<td>.768</td>
</tr>
<tr>
<td>Non-Government</td>
<td>.015</td>
<td>.018 (1)</td>
</tr>
</tbody>
</table>

11.106(2) 13.001 (1)

(1) excludes previous years’ recoveries against 1987/88 expenditure.
(2) excludes overheads.

The application of overheads is described at Appendix 8.

The major change implied in a full cost recovery process with WRG operating as a service unit to both internal and external clients is that direct NT Government appropriation to Water Resources Group would be considerably reduced. This reduction would be offset by increased requirements of other Government Departments (including other arms of PAWA/Water Directorate) which presently receive WRG services at considerably less than full cost.

The total funding requirement from NT Government appropriation for water resource programmes should be reduced as cost recovery from other NT Government activities is increased. Also, identification of full WRG cost to PAWA water supply and sewerage systems will give the opportunity in the longer term to recover those costs from consumers.

Increased costs of WRG services may lead to review by Government agencies and other clients of their requirements. This may lead to a reduced call on NT Government funds for water resource activities.
5.5 OTHER CONCLUSIONS FROM PROJECT ANALYSIS

The project analysis showed that WRG is not engaged in any activity specifically precluded by legislation although there are some activities which are not mandatory.

Water Resources Group activities are directly bound by the following legislation:

- Power and Water Authority Act
- Water Supplies Development Act
- Control of Waters Act
- Water Supply and Sewerage Act

A draft Bill for a Water Act has been prepared amalgamating the Water Supply and Sewerage Act, Control of Waters Act and Water Supplies Development Act to provide a single piece of legislation for the operation of the water sector. In terms of philosophy the resource management parts of the draft Act differ little from current legislation.

In assessing the existing legislative authority for Water Resources Group to carry out each project in its 1987/88 programme it was intended that specific sections of the above Acts could be quoted. However it was found that the legislation tends to cover only very broad activities, and some activities really have no legislative authority under these Acts; however they do not appear to conflict with existing legislation.

The legislative cover for Water Resources activities is much less precise than for other Groups and Directorates in the Power and Water Authority.

Apart from the financial management of Rural Advisory Services "Dud Bore Scheme" (refer Chapter 7) there are no activities which lead to the conclusion that they should be abandoned or transferred to another agency.

The implications however of a full cost recovery process in which certain NT Government Departments would be identified as being the "lead agency" would remove responsibility for priority setting by the Water Resources Group.

There were also some project activities identified which could be undertaken by consultants. These are mostly specific purpose projects such as detailed ground water investigations and flood plain "management" studies.

5.6 SUB PROGRAMMES

Surface water resource assessment, groundwater monitoring and assessment and rural advisory services which span all four major programmes are considered as sub-programmes and further discussed as follows:
Surface Water Resource Inventory

The total project activity forms part of all four programmes.

It consists of collection and processing of surface water flows and rainfall data, from 125 stream gauging stations.

64 of the stations are "Resource Inventory" (RI) and provide water quantity and basic quality data for general water resource assessment (and are the surface water part of the Baseline inventory programme).

The other 61 stations are project stations and are for specific purposes.

The Budgetted expenditure for this activity for 1987/88 $2.280M, of which the Baseline inventory programme is $1.110M.

The conventional argument presented for collection of water resources information on a regular basis over a period of years is that the greater the period of time, the greater the reliability that can be attached to advice about availability and the effect of usage.

In other words, the less time and the less information, the lower the confidence limits are. This may prejudice the viability of a development proposal, or lead to over-design or under-design of works. There is a cost penalty in such cases.

Theoretically there is a strong case for the Baseline Inventory Programme being maintained over a maximum area and the maximum time frame. However, given the speculative nature of the Programme, there needs to be a close analysis of whether or not the stations maintained can reasonably be expected to result in the collection of information that will ultimately save the Government money, or lead to development being able to proceed.

The period of basic surface water data collection in the Northern Territory spans only a very short period of time. Most surface water gauging stations have existed for less than 20 years (20 to 30 years is the minimum period required to provide reliable records on which to make projections for the future). The Northern Territory surface water data base lags well behind other States (Refer Appendix 11).

The Review team has considered the location and need for the RI stations which are mainly concentrated in the north end on major river systems and considers this a fairly modest programme which should continue and be funded as a "General Community" programme by the NT Government.

The 61 project stations (for which 1987/88 budgetted expenditure is $1.17M) are required to obtain data for specific water supply projects, for managing extractions from rivers and streams, for flood studies, roads and other developmental works and waste water management. As well as being project specific the information gained from these stations also adds to the NT surface water inventory data bank.
The need for project stations has been carefully assessed by WRG in consultation with other Government Departments who require the information. The programme should continue under a full cost recovery basis as long as client departments including PAWA require the site specific data and continue to meet the full cost.

The existing programme is modest when compared with States adjoining the Northern Territory (Refer schedule Appendix 12 which also includes Victoria which has a highly developed surface water assessment programme).

**Ground Water Supply Monitoring**

Ground water data collection also forms part of three programmes - water supply, waste water management and baseline inventory.

The Budgetted expenditure for the total activity for 1987/88 is $855 000.

This expenditure is made up of:

(a) $365 000 - Processing Statutory Supplied Data

This is the processing and storage of water bores data collected from private drillers and PAWA/WRG drilling crews for every water bore and is supplied to PAWA as a requirement under the Control of Waters Act. There are approximately 19 000 registered water bores in the Northern Territory. The information is maintained for all users and is the basis of the groundwater resource knowledge of the Northern Territory.

(b) $490 000 - Monitoring of Bores

This is the monitoring of bores for 42 existing supply systems and selected bores in the nine regions identified as having development potential.

There are 1005 bores being monitored (including both systems and regional bores). The network of bores is sparse in the nine regions being monitored and the total coverage of bore monitoring does not include all the NT underground water resources. WRG considers that the Northern Territory lags well behind other States in regional monitoring. There is some information of the ground water resource on a Territory wide spread but this is mostly basic data derived from registered water bores. (comparison with other States appears to confirm this - refer Appendix 12).

No investigatory drilling is being carried out that is not specific to a proposed water supply development or augmentation need. The advent of full cost being clearly identified and recovery sought in the case of client identified groundwater investigations, is likely to make future drilling programmes very selective.

In contrast to the well developed (if modest) surface water assessment programme which has prioritised and tailored surface water resource investigation to limited funds no similar strategy for ground water investigation exists.
In view of the reliance on groundwater supply to the development of the Northern Territory a long term strategy for acquiring groundwater resource data on an ongoing basis should be developed. Such a strategy could include:

- Requirement of all developers to prove "groundwater resource" in the area needed to support their proposals.
- Arrangements designed to improve the reliability and value of groundwater bore data supplied under Statutory requirements by drillers.
- Use of modern geophysical methods in conjunction with limited drilling, to "infill" groundwater knowledge on a broad regional basis.

**Rural Advisory Services**

This comprises both regulatory and full range of advisory services on provision of water supply to rural enterprises and includes professional opinions and assessment and provision of data.

It also includes the issue of permits and licences for extractions and works, technical administration of the "dud bore" scheme and advice to land managers (Department of Lands and Housing) on availability of water, flooding, and the impact on water resources of land use changes.

The provision of Rural Advisory Services (RAS) is by a small section of three Technical Officers; however inputs are made from a number of areas of WRG (hydrology, drilling, bore testing, water quality analysis etc).

The Budget estimate for RAS for 1987/88 is $1.026m (excluding overheads); of this about $300 000 is underwriting the "dud bore" scheme.

A comprehensive review of RAS (Milne Report) which has a number of recommendations is currently under consideration by WRG.

This Review has not attempted to go over the ground covered by the Milne report. However, the Review team agrees with one of its principal recommendations - that is financial management aspects of the dud bore scheme should be transferred to the Department of Industries and Development.

During the course of the Review discussions were held with the NT Cattlemen's Association. Its reaction to phasing out the "dud bore" scheme and to meeting the costs of advice and siting of bore locations was that it was not against a "user pays principle" but the dud bore scheme should be phased out gradually and meeting the costs of RAS should be phased in gradually.
CHAPTER 6

ACTIVITY ANALYSIS

6.1 INTRODUCTION

There are a number of discrete activities which provide input into Water Resources Group projects and which stand alone for detailed analysis. For the purpose of this Review the major discrete activities which have been identified for analysis are:

- Drilling
- Bore Testing
- Data Collection
- Data Base Management
- Flood Plain Studies
- Laboratories
- Plant and Vehicle Maintenance
- Instrument Workshop
- Construction Maintenance
- Advisory Services

6.2 ASSESSMENT CRITERIA

The purpose of the activity analysis was to identify areas of potential cost savings. The approach taken was firstly to determine whether the activity was a built in or "fixed cost" to PAWA regardless of the level of activity, and if so, to what extent the fixed cost could be changed wholly or in part to a variable cost, that is a cost which changes with the level of activity.

The potential for shifting or reducing the fixed cost component to a variable cost was examined and an assessment made in respect to use of external services such as contractors, consultants, or other agencies.

In making the assessment account was taken of the following factors:

- availability of appropriately skilled external services,
- practicability of using external services,
- specialised nature of the activity.

If the assessment showed that there was scope for using external services or making other changes to reduce fixed costs then a more detailed analysis was carried out to determine the practical feasibility and cost saving potential. A recommendation was then made to implement the change, or in some cases that a more detailed appraisal be carried out.

The methodology used in the review while summarised in the above paragraphs is set out in Appendix 10.

The detailed analysis of each activity is included in appendices 10.1 to 10.10.
The following discussion of the ten activities considered summarises the analysis and conclusions reached.

6.3 SUMMARY OF ACTIVITIES ANALYSES

Drilling

The activity of drilling covers the installation of bore holes for investigation and assessment of ground water and construction of production bores for extraction of water.

The budgetted expenditure for drilling in 1987/88 is $4.985 million excluding overheads (40% of WRG total budgetted expenditure).

Four large drilling rigs are operated on a full time basis and additional drilling is carried out by a drilling contractor under a 3 year period contract which expires on 1 June 1988.

The current replacement value of the drill rigs, support equipment, vehicles and materials held in store to support the drilling programme is in the order of $5.2M.

There are 24 staff involved full time on field drilling activities: 4 drill crews, supporting depot based staff and supervisory technical staff.

The Government drill rigs are used on all investigation drilling and all large size production bores, complex production bores, bores in "sensitive areas" (i.e. Arnhemland) and bores in areas where access is difficult (i.e. islands and coastal regions). This leaves "straightforward" small to medium size production bores to drilling contractors.

During the last financial year 13 803 metres of drilling was carried out in the WRG programme. Of this 8068 metres was by Government drill rigs and 5735 metres by the contract driller. This would indicate that a large part of the drilling programme (41% in 87/88) is being carried out by contract. However, because of the nature of the work contract payments amounted to $504 000 (about 11%) of the total annual expenditure on drilling.

There are two avenues for potential saving in the cost of government programmes. These are:

(1) productivity gains in activities associated with the use of government drill rigs,
(2) greater use of contract drilling.

Productivity gains in the use of government drill rigs has not been investigated during the course of this Review but previous consideration and actions already taken have been noted. Reduction of 4 man drill crews to 3 was the subject of a detailed study in 1986 when WRG was part of the Department of Mines and Energy, but no changes resulted from this study.

Existing drill crews are experienced and well trained, are keenly interested in their work and are highly motivated. The crews are well supervised by competent technical staff. Existing plant is generally modern and well maintained.

It is concluded that there is little scope for any significant productivity gains in drilling activity as currently carried out in house.
The total amount of drilling carried out during 1986/87 (approximately 14000 metres) is significantly less than previous years (about 22 000 metres per annum). The total cost of drilling in 1986/87 was $4.758M the same level of annual expenditure as previous years, and as budgeted in 1987/88. Although the total metres drilled is not in itself a complete measure of drilling and bore construction achievement, it indicates that under the present arrangements the drilling activity is largely a fixed cost - with little flexibility to reduce costs with reduced levels of activity.

Using the 1986/87 programme of drilling and bore hole construction actually achieved, a detailed analysis has been carried out of the cost of the Government programme if totally carried out by contract.

The comparison of costs between the existing joint Government/Contract drilling arrangements compared with total contract drilling is summarised below.

<table>
<thead>
<tr>
<th>Contract estimate of work carried out by Government drill rigs</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling carried out by Period Contract (actual)</td>
<td>2174 000</td>
</tr>
<tr>
<td></td>
<td>504 000</td>
</tr>
<tr>
<td></td>
<td>2678 000</td>
</tr>
</tbody>
</table>

**Government Cost**
- Manpower and support costs of WRG for contract management and supervision: 480 000
- 3 158 000

**Actual Drilling Expenditure 1986/87**
- 4 758 000

Less other work included in Drilling Programme (Croker Island Bore Rehabilitation and Drilling School): 150 000
- 4 608 000

Based on the above estimates, savings by introduction of contract drilling would be $1.45M (31% of total Drilling cost).

It is the strongly held view of WRG professional and technical staff responsible for the planning, design and execution of the Government Drilling programme that with few exceptions NT contract water drillers have not the expertise to handle the total government drilling programme and that there are no NT contractors presently equipped with plant of a capacity to carry out the full range of drilling required.
To some extent this was confirmed by lack of response from local contractors to calling of
tenders (early 1985) for the Period Contract. Only 2 NT contractors submitted tender bids;
both were awarded a share of the Period Contract (one subsequently proved unsatisfactory
and his contract was cancelled).

The availability of drilling contractors was explored during the latter part of 1986 when
expressions of interest for the total government drilling programme was sought by
advertisement on an Australia wide basis. This attracted responses from 12 interstate and 3
NT Contractors. An overall assessment of these tenders taking into account their drilling
rigs, equipment, support vehicles, experience, qualifications, and proposed base of operations
concluded that 2 were suitable for operation in all areas of the NT, 2 for most areas, and one
for drilling in the north end only.

This would indicate that on an Australia wide basis there are water well drillers with the
appropriate skills to carry out the NT Government drilling programme.

During the course of this review, discussions were held with officers at the Sydney
Headquarters of the Australian Drilling Industry Association (ADIA). Detailed information
covering the location, range of equipment and specialised services offered is currently not
available. However, ADIA advised that it is currently employing consultants to carry out
surveys on a state by state basis to establish details of the water drilling industry to assist
those requiring services of water drilling contractors.

Discussions were also held with NT drilling contractors acknowledged by WRG as skilled
and competent drillers, and with consultants specialising in groundwater assessment. The
view was expressed that private Contractors could carry out the range of work contained in
the NT Government drilling programme with the following provisions.

• 12 months lead time would be required by some contractors to "gear up" for full range
  of government work.

• The work would need to be let on contract rates that were realistic and under contract
  conditions that minimized the risk to contractors.

Several other reasons have been put forward against the practicality of using contract drillers
in favour of Government drill rigs on other than straightforward works. The most important
of these are:

(1) the difficulty in determining beforehand the precise nature and quantum of work
    involved in an investigatory drilling programme.

(2) the difficulty in specifying requirements and writing a contract which is fair to the
    contractor but not open ended and uncontrollable in total end cost.

(3) the difficulty in arranging a programme of work which is attractive to private
    contractors in that continuity of work would be available over a reasonable period of
time and say 3 months minimum.

(4) the non availability when required, and inability of the private drilling industry to
    respond to emergency requirements.
(5) the complex and sensitive issues associated with working in remote Aboriginal
communities (especially Arnhemland) when conditions imposed by traditional owners
make it absolutely essential to control the behaviour of employees and require a
special understanding and approach difficult to obtain on other than directly controlled
work teams.

While reasons (1) to (3) mitigating against greater use of contract drillers are real, the
differences are not insurmountable and could largely be overcome by forward planning,
precise contract specification, and by inclusion in the schedule of rates provision for all types
of working conditions and standby.

Reasons (4) and (5) that is, the need to respond to emergency situations, and the
requirement to work in a restricted and sensitive environment, may require the Government
to retain some in house drilling capacity during a phasing in period of changing to use of
contractors for the full government drilling programme.

Bore Testing

The activity of bore testing is largely pumping tests for determining yields of groundwater
supplies.

The Bore testing section of WRG consists of 4 test crews of 3 men each under the control of
a Supervising Technical Officer and two other technical officers, making a total staff of 15.

As well as testing bores for capacity and water quality, other ancillary functions include
rehabilitation of production bores, spear pointing to establish shallow depth supplies mainly
in coastal areas, and equipping bores.

A large amount of pumping equipment is required to carry out the full range of testing
requirements. The current value of equipment is approximately $1.9M.

Total budgeted expenditure on Bore testing and the ancillary functions is $1.71M (excluding
overheads). This is largely a fixed cost.

The work of bore testing could be carried out by private contract although there are no
Territory contractors available with the full range of equipment at the present time.

Drilling contractors and groundwater consultants have suggested that there is insufficient
work available to justify them equipping to carry out bore testing.

Data Collection

This activity is the physical collection and information handling of data from surface and
ground water.

The total staff involved in this activity is equivalent to 45 1/2 positions. Total budgetted
expenditure of water resources data collection and handling is currently $3.065M (excluding
overheads) which has been reduced substantially since 1986 (the total cost was then
$4.96M).
The activity of field data collection and handling is a substantive part of these costs, and employs 33 staff on a full time basis.

The nature of the activity is a fixed cost - with little potential to change to a variable cost.

There is potential for cost savings which have been identified in a comprehensive review by WRG "NT Water Resources Assessment (September 1987)", the major recommendation being the integration of field staff.

Combining the field activities of hydrographic and groundwater and water quality monitoring crews will reduce field staff numbers by 6.

The WRG Review also proposes an ongoing appraisal of the use of appropriate new technology for collecting and communicating data. The Review team supports this approach but points out that it would need to be demonstrated that new systems are suitable in Northern Territory conditions and are cost effective having regard to initial capital cost and future maintenance costs and reliability.

Data Base Management

The storage and retrieval of information and data base management forms part of WRG activity. Both computer and manual records are maintained and other information is kept in reports, files and maps.

Staff resources attributed to computer data base management are 3 professional positions and 9 technical computations positions. The budgetted expenditure for these two groups in 1987/88 was $0.862M.

The nature of the activity is a fixed cost and there is little scope for use of external resources to carry out this activity.

There is significant backlog of surface water data input to the computer network. Catch up of this backlog would take about 10 years with existing staff resources. To reduce the "catch-up" period to 5 years would required additional resources equal to 48 man years which approximates $1.5M expenditure at present day costs.

All groundwater records are stored and maintained manually.

Flood Plain Studies

Flood plain studies are undertaken by the Surface Water Section of the Hydrology Division. The Section is a small group of 4 Engineers. The Budget expenditure for 1987/88 for the Section is $0.150M (mostly manpower costs). Flood Studies are the major part of the Section’s workload.

Flood Plain Studies are generated by the NT Government Flood Plain Management Committee. Flood Plain Studies includes flood plain mapping, development of flood warning systems, and flood damage studies which all form part of comprehensive flood plain management plans.
The activity is a fixed cost to PAWA WRG. Studies beyond the resources of the Section are devolved to consultants.

Laboratories

The Water Resources Group operates three fully self contained laboratories in separate locations in Darwin, and a small scale laboratory function in Alice Springs. The three WRG laboratories have the following broad responsibilities:

WATER CHEMISTRY - EAST POINT LABORATORY

Physical testing and inorganic chemical analysis of drinking water and stock and agricultural water supplies. Provide professional advice on water quality investigations, sampling programs and analysis for all types of water. Undertake approved projects.

MICROBIOLOGICAL - PARAP LABORATORY

Bacteriological and chemical analysis of water supply and wastewater systems. Monitors water quality of water supply storages and recreational water bodies, including surveillance for noxious water weeds. Undertaking micro biological and inorganic analysis of water samples as required. Provide professional advice on water and wastewater sampling of water supply and waste water systems. Undertake approved projects.

ENVIRONMENTAL CHEMISTRY - NIGHTCLIFF LABORATORY

Analysis of general parameters and for low to ultra-trace metals, nutrients and radium in water samples from the Alligator Rivers Region. Provide professional advice on sampling and analysis for water samples essentially related to environmental investigations and monitoring.

Laboratory water analysis is a responsibility of the Laboratory Division of WRG and is headed by a Chief Chemist who oversees the management of the laboratories, maintains technical standards and coordinates programmes. There are 28 staff overall and each Laboratory is headed by a Senior Chemist.

The total budgeted expenditure for the Laboratory Division in 1987/88 is estimated to be $1.441M.

Estimated 1987/88 Budget

<table>
<thead>
<tr>
<th>Location</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Point</td>
<td>$380,000</td>
</tr>
<tr>
<td>Parap</td>
<td>$489,000</td>
</tr>
<tr>
<td>Nightcliff</td>
<td>$518,000</td>
</tr>
<tr>
<td>Management</td>
<td>$ 54,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,441,000</strong></td>
</tr>
</tbody>
</table>
Total Laboratory recoveries in 1987/88 are estimated to be $125,000.

There is a significant shortfall in recoveries compared to costs. This shortfall has been made up each year by direct Government appropriation to the Water Resources Group.

The reasons for the shortfall in receipts compared with laboratory costs are as follows:

a. Charges made by laboratories do not include overheads.

b. NT Government Department clients have as a matter of policy been charged 25% of identifiable operational costs.

c. Laboratory charges have not been updated since 1983.

d. Nightcliff laboratory has not charged fees until this year.

e. A major client of East Point Laboratory is the Water Resources Group itself.

1986/87 workload in these laboratories was:

<table>
<thead>
<tr>
<th></th>
<th>Samples</th>
<th>Determinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST POINT</td>
<td>3,113</td>
<td>33,257</td>
</tr>
<tr>
<td>PARAP</td>
<td>11,533</td>
<td>65,735</td>
</tr>
<tr>
<td>NIGHTCLIFF</td>
<td>1,608</td>
<td>12,945</td>
</tr>
</tbody>
</table>

PAWA has advertised that consideration is being given to the transfer of WRG laboratory work to the private sector and has sought Expressions of Interest for this work. A number of positive responses have been received and are being examined by WRG management.

There have been previous trials using AMDEL facilities as a basis for assessing its competency to undertake WRG laboratory work. AMDEL was assessed by WRG as not meeting their quality control standards. Consequently the WRG concern is that transfer of government work to private laboratories would mean that the standard of work performed would be inadequate. This aspect is further examined hereunder.

A matter of concern to WRG staff is the belief that should the private sector take over work currently carried out by the laboratories, there will be a significant fall in quality. They suggest the work will not then meet the standards required by government agencies, including PAWA. They categorise such work into:

- public health
- operational control involving consumer demands
- resource protection and management
The WRG case is that although other work can be readily transferred to the private sector, PAWA work relating to the above categories should continue to be performed by an in-house government laboratory.

The Review team has made a number of enquiries about the potential for privatisation of government water analysis work. The results of the enquiries are documented in the Laboratory Activity Analysis in Appendix 10. From these enquiries the team could see no reason why the laboratory functions could not be undertaken by the private sector.

Private sector costing of WRG Laboratory analytical work has been based on advice provided by AMDEL. For the purpose of the review, AMDEL costs have been accepted as indicative of industry rates generally.

Based on worst case estimates, AMDEL advise its total cost for the East Point work would be $260,000.

An examination of time spent on non-analytical work at East Point shows that there would be a requirement for an in-house professional to be retained to undertake project and liaison work should East Point Laboratory functions be privatised.

The savings achievable by transferring East Point analytical work to the private sector are conservatively estimated to be $120,000 per annum at 1986/87 workload levels.

An examination of time spent on non-analytical work at Parap shows that there would also be a requirement for an in-house professional to be retained to undertake project and liaison work in the event of privatisation.

AMDEL advise that for Bacteriological and Water and Wastewater work performed at Parap, they calculate a cost of $480,000 - $520,000. If the worst case cost is used, then transfer to the private sector would result in an additional cost to Government of $31,000.

AMDEL advises that for Nightcliff 1986/87 work level, the order of $250,000 if performed by them although insufficient detail was provided to give accurate costings.

The non-analytical workload at Nightcliff is minimal, but given the sensitivity of this environmental work, it is considered an in-house professional would need to be retained to interpret and report on results. This professional may be employed by the Alligator Rivers Region Unit of the Department of Mines and Energy.

The savings achievable by transferring Nightcliff analytical work to the private sector are estimated to be $268,000 per annum at 1986/87 workload levels.

In addition to the abovementioned requirement for three in-house professional staff, there will also need to be close technical supervision and monitoring at a senior level of laboratory work performed externally together with some sub-professional support. It is considered the existing Chief Chemist position should perform this task in consultation with the other three in-house professional staff, and supported by two sub-professional staff.
The potential savings arising from the transfer of WRG laboratory analytical work to the private sector are summarised hereunder. There will be a net reduction of 22 staff (28 existing less 6 proposed).

<table>
<thead>
<tr>
<th>Laboratory Location</th>
<th>Net Potential Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Point</td>
<td>- $120 000</td>
</tr>
<tr>
<td>Parap</td>
<td>+ $ 31 000</td>
</tr>
<tr>
<td>Nightcliff</td>
<td>- $268 000</td>
</tr>
<tr>
<td>Laboratory Liaison Unit(1)</td>
<td>+ $190 000</td>
</tr>
</tbody>
</table>

Net Potential Savings $167 000

Note 1: The Laboratory Liaison Unit comprises 6 staff of 4 professionals and 2 sub-professionals. The $190 000 represents the transfer of 5 staff to join the Principal Chemist in a centralised location.

**Plant and Vehicle Maintenance**

WRG plant and vehicle maintenance is a responsibility of the Technical Services Division. The Section consists of 5 staff (Plant Inspector, storeman, Tradesmen) who report to the Depot Manager. They also provide support to field crews.

Total manpower costs attributed to this section is $270 000.

Much of the workload is in supporting field operations, plant and vehicle maintenance, stores operations and record keeping.

It is a fixed cost activity.

There may be scope for cost savings by rationalization of depot functions with other sections of PAWA.

**Hydrographic Instrument Workshop**

This Section services hydrographic and groundwater monitoring equipment including fine instrument maintenance and testing (including electronics).

The Section (which is part of the Technical Services Division) consists of a Technical Officer and two Tradesman Fitters.

The staffing of this activity has been reduced from 8 to 3 in recent years.

Manpower costs attributed to this activity is $104 000.

The activity is a fixed cost.

There is potential for rationalisation with Technical Services Sections of Power and/or Water Directorates. The specialist staff may need to be retained but some cost benefits would accrue from this action.
Construction Maintenance (Hydrographic)

This is a small section of 2 Tradesmen who report to the Senior Hydrographer. They provide field maintenance for all hydrographic installations throughout the Territory.

Total budgetted expenditure of this activity is approximately $200,000 (excluding overheads).

The activity is a fixed cost activity. Because of its nature (i.e., ad hoc, and small scale) there appears little scope for carrying out the activity by other means at this stage.

Advisory Services

The Water Resources Group provides advisory and information services on potential water supplies and water developments to other Government Departments, industry, rural enterprises and the general public.

The "Shop Front" of Advisory Services is the "Rural Advisory Section" of the Hydrology Division, which consists of a staff of three, being a Senior Technical Officer who heads the section, a Technical Officer and a Field Assistant.

The Section is located in Darwin and works closely with the Hydrogeology Section of the Division in Darwin and with the Hydrogeology Branch in Alice Springs.

The annual Budgetted Expenditure to maintain the group is $150,000 which is only a small part of the total Rural Advisory Service programme expenditure of $875,000 per annum (1987/88).

The group carries out regulatory and control activities such as issue of permits and licences for water extractions, private works in natural streams, and maintains a register of NT water drillers, as well as providing advisory services.

The activity is a fixed costs with no scope to change to variable cost.

At the present time there is a need for advisory services to be maintained, and encouragement by PAWA and government to industry and rural water users to maximise beneficial use of water could increase demand for advisory assistance. The present group should be maintained and its advisory role maximised.
CHAPTER 7
CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations collectively address matters raised in the Terms of Reference.

7.1 ROLE OF WATER RESOURCES GROUP

The Water Resources Group (WRG) is highly regarded as a professional and competent organisation by other government departments and private industry groups who have had working associations with WRG over a number of years. The information and service provided by WRG are valued throughout the Northern Territory.

Having regard to the stated policies of the Northern Territory Government and the powers and responsibilities of the Power and Water Authority there is an ongoing role for the Water Resources Group within the Water Directorate thereby providing a single Government Authority focus for all water related matters in the Northern Territory.

The appropriate role for the Water Resources Group spans four primary functions:

• Provision of professional and technical services to the Planning/Development and Operations arms of the Water Directorate.
• Ongoing assessment of the water resources of the Northern Territory including the processing, maintenance and dissemination of Water Resources data.
• Management and control of water resources and the water environment as required under existing and proposed government legislation.
• Provision of advisory and professional services to government agencies, industry and the public on appropriate cost recovery basis.

In carrying out its role of assessing and managing the Territory’s water resources emphasis should now begin to change to resource management rather than undertaking detailed studies for water utilization which could be undertaken by developers.

Recommendations

It is recommended that:-

(1) Endorsement be given to an ongoing role of Water Resources Group within the Water Directorate of PAWA spanning provision of professional and technical services to the Planning/Development and Operations arms of the Water Directorate, assessment and control of the Territory’s water resources and provision of advisory and professional services to other government agencies, industry and public.
7.2 COST RECOVERY

On the basis of 1987/88 expenditures and recovery of costs from PAWA water supply and sewerage activities, other government agencies and external clients only 35% of the WRG total direct costs and only 30% of total costs (including overheads) are being recovered in 1987/88.

The identification of "full costs" and classification of various projects carried out by WRG to "Business" "Client" and "General Community" if followed through and recovered will:

- Increase costs attributed to the operation of PAWA town water supply and sewerage system.
- Increase costs attributed to Aboriginal and remote community priorities.
- Transfer NT Government funding from PAWA/WRG to other NT Government Departments who have lead agency responsibilities and who should be determining priorities.
- Fully identify the cost of "General Community" programmes such as water resource assessment which are funded by NT Government.
- Increase cost recovery from non Government clients.

Management information systems for the entire costing and recovery process need to be implemented without delay. Considerable assistance will be required from Corporate Services Directorate to ensure that appropriate charge out rates and internal reporting systems are established and implemented.

Recommendation

It is recommended that:-

1. PAWA move to full cost identification and recovery of WRG programmes and discussion be held with Treasury to ensure commitment of funds to enable an agreed stable level of service to be provided by WRG to other NT Government agencies.

2. As some cost recoveries will be "in house" WRG should be set up as a "service unit" within PAWA and appropriate charge out rates determined for all its activities.

3. WRG and Corporate Services Directorate determine appropriate management information systems to provide sound financial practices for costing, cost recovery and other management requirements.

7.3 SURFACE WATER RESOURCES ASSESSMENT

Withdrawal of Commonwealth contributory funding in 1986 necessitated a rigorous examination of water resources data collection and processing activities.
The surface water resource assessment programme which is now funded by the NT Government by direct appropriation and by other government departments has been realistically established and covers those areas of the Territory where information is most likely to be required in future; this programme should be retained at current levels of activity.

**Recommendation**

It is recommended that:-

(3a) The existing programme of surface water assessment comprising 64 resource inventory river gauging stations should be retained and continue to be funded by government.

(3b) The existing programme of surface water assessment comprising 61 Project river gauging stations be retained as long as client departments, including PAWA, require the site specific data and are prepared to meet the full cost.

### 7.4 GROUND WATER RESOURCES ASSESSMENT

Based mainly on the statutory register of water bore drilling some knowledge of the groundwater resource exists for a wide coverage of the Northern Territory. Monitoring of bores of established groundwater supply systems and observation bores established during site specific investigations is providing valuable information on a regional basis but the distribution is sparse.

The practice adopted in Western Australia which, similarly to the Northern Territory has heavy reliance on ground water for further development, is to require developers to "prove" existence of satisfactory groundwater supply to support their proposals.

The stage has also now been reached in the Northern Territory where the Government and PAWA/WRG role should be in defining the broad availability of the resource and putting in place necessary management practices, rather than undertaking expensive detailed exploratory investigations.

To ensure that knowledge of the ground water resource will continue to grow and that sufficient data will be available in regions/areas where development relying on groundwater is likely to occur, a long term strategy should be prepared which could contain the following elements:

- requirement of all developers to prove groundwater resource in areas as needed to support their proposals. Should the Government wish to subsidise these developers, it is recommended that such subsidies be budgetted and administered by an another agency such as the Department of Industries and Development or the Department of Lands and Housing.

- development of systems designed to improve the reliability and value of groundwater bore data supplied by drillers to PAWA/WRG under statutory requirements by drillers.
use of modern geophysical methods in conjunction with limited exploratory drilling to infill groundwater knowledge on a broad regional basis in priority regions across the Territory determined on forecast of future development needs.

Recommendation

(4) Strategy proposals be prepared to ensure ongoing assessment of NT groundwater resources which maximizes the involvement of private drillers and private enterprise developers and sets out on a priority basis a programme of broad regional investigation to infill data obtained from detailed development investigations using modern geophysical techniques associated with limited investigatory drilling.

7.5 WATER RESOURCES DATA COLLECTION

Integration of hydrographic water quality and ground water monitoring field crews is possible and has been identified by WRG for early implementation. Some further productivity gains may be achieved by use of agency arrangements for data gathering and making it a requirement that remote towns and Councils of large Communities monitor their own supplies.

The ground water monitoring programme covers a substantial area of the Territory with about 1000 bores being monitored. WRG recognises the need to re-assess this programme with a view to rationalizing the number of bores being monitored.

Recommendation

(5a) Technical Services Division of WRG be restructured to include all field monitoring staff (surface water, ground water and water quality) reporting to one Principal Technical Officer, and the field staff employed on the combined activity reduced by 6. Only 5 of these positions are currently filled.

(5b) Agency arrangements (including remote towns and communities) for collecting data from river gauging stations and ground water monitoring bores be explored and action be taken to implement, where suitable arrangements have already been identified.

7.6 WATER RESOURCES DATA MANAGEMENT

The storage and retrieval of information, and data base management forms a major part of the Water Resources Group activity. Both computer and manual records are maintained, and other information is kept in reports, files and map records.

The Water Resources Group is developing one of the most effective, integrated computer based water information systems in Australia. The system links streamflow, rainfall, water quality data and ground water data into a single package. The information system is already proving to be valuable for water development planning and regulatory responsibilities of PAWA.
There is a substantial backlog of entry of surface water data into the computer system and at the current rate of progress it will take 10 years to catch up on all past records held in the manual system. Groundwater data is not being entered as computer software is still to be developed.

Benefits will accrue from accelerating entry of all surface water resource records into the computerised information system. Resources required to complete the backlog entry amount to 48 man years and an expenditure in the order of $1.5m.

Benefits will therefore need to be established in quantitative terms to justify complete catch up over a short term. Use of 5 technical staff made excess following integration of field crews for a period of, say, up to two years would catch up entry of priority data and can be justified.

**Recommendation**

6(a) Five technical staff made excess following integration of field crews be considered along with other staff affected by privatisation or rationalisation as a resource to catch up on backlog of surface water data entry.

6(b) Programme of accelerated catch up in excess of that provided in recommendation 6(b) should be subject to rigid cost/benefit analysis before any further resources are made available.

**7.7 FLOOD PLAIN MANAGEMENT**

With the inclusion of the Water Resources Group as part of PAWA, the Authority has inherited an involvement in flood plain management for the Northern Territory.

In other States flood plain management is a shared responsibility between local, state and Commonwealth Governments.

The current arrangements whereby an interdepartmental Flood Plain Management Committee provides the focus and priority setting for the NT Government Flood Plain Management Programmes is a satisfactory one provided the involvement of PAWA/WRG for carrying out flood plain management studies is funded from government appropriation either to PAWA or other government lead agencies.

WRG has become heavily involved in Flood Plain Management activities being the only government agency with the necessary hydraulic and hydrological expertise to undertake flood studies. The Water Resources Group maintains a small section which undertakes flood studies and maintains the Territory’s flood data records.

Use of private sector consultants for detailed and project type flood studies has been made in the past and this use should be maximised in future. The role of the Commonwealth Bureau of Meteorology in the issue of flood warnings throughout the Northern Territory should be established and this responsibility thus transferred from WRG.
Recommendation

It is recommended that:-

7(a) Use of consultants to carry out detailed flood studies be maximised.

7(b) The role of the Commonwealth Bureau of Meteorology in the issue of flood warnings throughout the Northern Territory be established with a view to transferring some of this responsibility from PAWA.

7.8 ADVISORY SERVICES

The comprehensive review of Rural Advisory Services contains a number of recommendations which are currently under consideration by the Water Resources Group.

Action has already been taken by PAWA to implement a major recommendation of the RAS review that the financial management aspects of the "Dud Bore" Scheme be transferred to the Department of Industries and Development; this Review endorses that action.

In respect to cost recovery the Review also endorses previous review findings that there is no justification for government to provide subsidies to land owners by way of the "Dud Bore" Scheme and considers that it should be phased out gradually over a period of 5 years.

Also, provision of "advice" in siting of bore locations including, where required, use of geophysical techniques should be recovered at full cost and such cost recovery should be phased in also over 5 years.

The present advisory service provided across the broad range of information sought on potential water supplies and water development proposals has as its "shopfront" a small section of 3 experienced technical officers, located in Darwin. This section is involved in "administrative" activities. There is a growing requirement for advice on farm water utilization from the rural sector and restructuring of this Section to maximise use of their field experience should occur.

Recommendation

It is recommended that:

8(a) The government subsidy in the form of the "Dud Bore" Scheme be phased out over a period of 5 years.

8(b) Provision of "advice" for location of bore sites be charged to landholders and costs gradually increased to full cost recovery over a period of 5 years.

8(c) Rural Advisory Services section be restructured and provided with administrative support from existing underutilised PAWA resources to enable greater use of technical staff time in providing on farm advisory services, this administrative support should not be an extra position (i.e. redeployed redundant position). To this end it is recommended that Corporate Services Directorate, in conjunction with WRG, reviews...
all clerical/administrative activities of WRG professional/technical staff to ensure that adequate clerical back up is provided and that non professional/technical duties are not being carried out by qualified professional/technical staff.

7.9 DRILLING

On the basis of estimates prepared by the Review team there is scope for cost reductions by letting all Government drilling activities to contract.

Many compelling reasons have been put forward in favour of retention of government drilling rigs; briefly these are:

- non availability of contractors at times required - particularly in emergency situations where supplies to towns and communities have to be re-established.
- lack of expertise of local drillers
- difficulty in specifying requirements for exploratory bore holes drilled under contract, and difficulty in contract Supervision.
- problems of employing contractors in remote and sensitive areas.

It is considered that all of the above objections can be overcome. It could be expected that the stringent work standards required of contractors for government drilling will increase the price of contract work. Such increases have been allowed for in making comparative cost estimates.

Use of contract drilling will remove a large fixed cost to government and ensure that the identification of full cost that will emerge from contract employment, will be reflected in careful assessment of the investment in exploratory drilling.

Use of contract drilling could be phased in over a two year period with some in-house drilling capacity retained during the first twelve months as a safeguard against any problems which may occur during the transition.

Recommendation

It is recommended that:-

(9) The use of contract drilling for the full government drilling programme be actively explored with the objective of transferring to full contract drilling over a two year period.

7.10 BORE TESTING

Bore testing is closely associated with the drilling programme. Bore testing is an integral part of establishing safe yields from potentially usable bores.

PAWA has a substantial investment in manpower and equipment in its bore testing capability which is a fixed cost. Because of the wide range of bore yields and depths there are no contractors or ground water consultants equipped to provide a contract service. Equipment costs are high and demand for the service is not high.
Recommendation

It is recommended that:

10) Current bore testing capacity should be retained by PAWA but continue to be reviewed as workload reduces and future capacity of contractors to provide some of the requirements is demonstrated.

7.11 DEPOT CENTRED ACTIVITIES

The following activities are based at the Technical Services Division store and workshop depot

- construction maintenance (Hydrographic)
- hydrographic instrument workshop
- plant and vehicle maintenance

These are all fixed cost activities for which there is some scope for cost saving by integration of depot and maintenance service functions with other sections of PAWA.

Recommendation

11) The store and workshop depot activity of the Technical Services Darwin be included in an overall review of PAWA depot functions with a view to maximum integration.

7.12 LABORATORIES

The functions performed by the WRG Laboratories can be readily undertaken by private sector laboratories. The essential issues to be resolved in making a decision whether or not to transfer are:

- availability of appropriate facilities in the Northern Territory;
- whether cost savings are achievable;
- whether the standard of service meets the requirements of the Power and Water Authority (PAWA).

The scope for the private sector to undertake PAWA laboratory work is in the process of being tested. Expressions of Interest have been invited in the national media, and these are currently being examined. It is believed that suitable facilities can be developed in the Northern Territory.

Cost analyses show that for at least 2 out of 3 laboratories savings are achievable by transferring the work to the private sector. It is considered the additional costs for the third laboratory are not at a level which would suggest this work should continue to be performed by an in-house PAWA laboratory. Experience in the Department of Mines and Energy when that Department transferred work from an in-house laboratory to the private sector was that there was a resultant significant drop in demand. A similar experience can be expected in relation to the three PAWA Laboratories, thus resulting in further savings.
There have been doubts raised in recent trials about the competence of industry to undertake Government laboratory work. However, extensive enquiries have been made by the Review team and it is considered that with close technical liaison and provision made for good quality control and reporting. The standard of service able to be provided by the private sector will meet the requirements of PAWA.

It is considered that the essential elements required to enable transfer of PAWA laboratory function to industry are all able to be satisfied.

Recommendation

It is recommended that:-

(12) The Expressions of Interest received from industry be examined on the basis that all water analyses functions performed by the East Point, Parap, and Nightcliff laboratories be transferred to the private sector over a two year period.
CHAPTER 8
STRATEGY FOR IMPLEMENTATION

Adoption by PAWA and Government of the general thrust of the Report recommendations would require follow up action as set out in this Chapter to achieve implementation.

Each recommendation stands alone and implementation could be in whole or in part and the "strategy" deals with each recommendation in turn and suggests a process and where appropriate a time table.

Some recommendations can be adopted immediately and require action only within PAWA.

Adoption of other recommendations will have external impacts and require further discussion with other NT Government Departments and some other organisations.

**Recommendation 1**

Role of Water Resource Group

Action: Endorsement by PAWA and Government then promulgation within PAWA Water Directorate.

**Recommendations 2a, 2b and 2c**

Full Cost Identification and recovery

Action: 2a. Discussion between PAWA and Treasury then follow up advice to NT Government Client agencies and other regular WRG clients indicating range of WRG costs for 1988/89.

Timing: As early as possible in 1988 and prior to start of 1988/89 Budget process.

Action: 2b. Determination of WRG charge out rates by Corporate Services Directorate and WRG (also needed for 2a).

Action: 2c. Internal discussion involving Corporate Services Directorate, WRG, Planning and Development and Operations Groups to determine internal process for management of cost recovery which will identify programme requirements and enable agreement on provision in budget estimates by all Groups.

Timing: 2b and 2c. Process should start immediately.
Recommendations 3a and 3b
Surface Water Assessment Programme
Action: Endorsement by PAWA and Government on continuation of the existing level of the programme. Also, consultation with other departments on full cost recovery of their required site specific project stations.

Recommendation 4
Ground Water Assessment Programme
Action: 1. Endorsement by Government of its support of requirement that private developers be required to "prove" to satisfaction of PAWA the availability of groundwater to support their proposals as prerequisite to issue of permit for extraction; and that, if subsidies are appropriate, they be provided by another government agency such as the Department of Industries and Development or the Department of Lands and Housing.
2. Strategy and programme for future groundwater resource assessment including involvement of private sector to be prepared by WRG for consideration by PAWA.

Recommendations 5a and 5b
Water Resources Data Collection and Processing
Action: 5a. Can be initiated immediately by WRG.
5b. Can be initiated immediately by WRG with involvement of Water Directorate Operations Group in setting up and enforcement of arrangements for Groundwater monitoring of existing supplies.

Recommendations 6a and 6b
Water Resources Data Management
Action: 6a. Implementation by WRG in conjunction with implementation of 5a.
6b. Further review and consideration by WRG Hydrology Division.

Recommendations 7a and 7b
Flood Plain Management
Action: 7a. Commitment by PAWA and WRG to the processes of making maximum use of consultants.
7b. Follow up by PAWA/WRG with Bureau of Meteorology.
Recommendations 8a, 8b and 8c

Advisory Services

Action: 8a & 8b. Phase out of "Dud Bore" Scheme and phase in recovery of cost for advice bore locations.

Agreement by Government to initiate discussions with Pastoral Industry representatives and other interested groups. Group Manager Water Resources to follow up on these proposals in conjunction with dealing on Milne Report.

Action: 8c. Maximise use of existing Rural Advisory Services Section in provision of advisory and information services on water availability and use to rural enterprises. Internal review by Corporate Services Directorate and Water Resources Group.

Recommendation 9


Action: 1. Prepare draft drilling period contract documents and discuss with Australian Drilling Industry Association and selected representatives of contract drillers before calling of tenders.

2. Let Period Contract for 2 or 3 year period starting 1 July 1988 for total government drilling programme except Arnhemland & coastal areas. This represents a large part of the drilling programme which is generally located in accessible areas and would be a large enough programme to attract competitive interest from suitable contractors.

3. Let separate Period Contract for 2 year period starting in July 1989 for Arnhemland and coastal areas. This work requires more specialised knowledge of the local working environment and would give local NT contractors the opportunity to compete for part of the government drilling programme. A 12 month delay in letting this period contract is a cautious approach which allows WRG professional and technical staff to gain further experience in managing a contract drilling programme before using contractors in remote and sensitive areas.


Plant could be made available on hire out rate to contractors during this period. Subject to satisfactory service from private drilling industry disposal of plant could occur during later part of 1989.

5. Arrange consultation with drilling crews and other drilling support staff likely to be affected by the transfer to full contract drilling.
Recommendation 10
Bore testing

Recommendation 11
Technical Services Depot Centred Activities
Action: Include in review of PAWA Depot functions.

Recommendation 12
Laboratories
Action: Transfer all water analysis activities to private sector laboratories.

Timing: The process of evaluation of private laboratories and the preparation of tender documents to be completed in time to enable calling and assessing of tender bids by 1 July 1988. Completion of the transfer to private enterprise of the full range of water analysis would be dependent on proposals submitted by the successful tenderer but completion by 30 December 1989 should be a condition of the contract.

Consultation Processes
Adoption of some of the recommendations will lead to a significantly reduced staff establishment.
Action: Consult with staff, unions, employee associations and the Public Service Commissioner on future employment/redeployment etc arrangements.
Timing: To start immediately and continue until action is complete.
APPENDICES
OF THE
REVIEW OF THE OPERATIONS
OF THE
WATER RESOURCES GROUP

A H CLEGG
JANUARY 1988
APPENDIX 1

REVIEW OF OPERATIONS OF WATER RESOURCES GROUP

TERMS OF REFERENCE

Having regard to the policies of the Northern Territory Government and the objectives of the Power and Water Authority including the requirement to operate on a commercial basis:

a. review all projects and activities performed by the Water Resources Group, and in each case identify the client, the purpose, the full cost, and the current source of funds;

b. undertake discussions with external clients concerning their continuing sponsorship, and projected programmes of work in the context of meeting full costs;

c. investigate scope for increased use of alternative resources to perform Group functions;

d. identify any group activities which are critical to the future development of the Northern Territory, and the extent of Government subsidy necessary to support the activity;

e. identify any economies and efficiencies that may be able to be achieved within the Group.

The team is to provide a report with recommendations on the results of the Review. The recommendations should include an assessment of the impact on staff, budget and revenue levels, together with a strategy for implementation.
APPENDIX 2

PERSONS CONTACTED AND INTERVIEWED AS PART OF THE REVIEW OF WATER RESOURCES GROUP

Power and Water Authority Board
Mr. Ray McHenry, Chairman
Mr. Phil Temple, Deputy Chairman
Mr. Kevin Jordan, Managing Director Water Directorate

PAWA - Water Directorate
Darwin Water Resources Group
Mr. Norm Watson, Group Manager, Water Resources
Mr. John Verhoeven, Chief Engineer Hydrology
Mr. Peter Garone, Technical Services Manager
Mr. Hugh Wilson, Chief Chemist
Mr. John Alcock, Senior Chemist, East Point Laboratory
Mr. Ed Czobik, Chemist, Nightcliff Laboratory
Mr. Kevin Boland, Senior Chemist, Parap Laboratory
Mr. Hyatt Qureshi, Hydrogeology
Mr. Bob Schultz, Project Officer
Mr. Peter Jolly, Groundwater Hydrology
Mr. Bruce Stewart, Senior Engineer Surface Water
Mr. Fred Barlow, Engineer Flood Hydrology
Mr. Jon Lawrie, Surface Water Monitoring
Mr. Bruce Thatcher, Bore Testing
Mr. Charlie Garske, Bore Testing
Mr. Peter Richardson, Drilling Section
Mr. Bill Stall, Drilling Section
Mr. Brian Kunde, Drilling
Mr. Rinke van der Velde, Rural Advisory Services
Mr. Hans Fischer, Depot
Mr. George Edwards, Foreman, Depot
Mr. Bob Masters, Surface Water Data Collection
Mr. Mike Nicholas, Surface Water Computations
Mr. Sim Lee, Computer Services
Ms. Heather Norris, Computer Services
Mr. Holger Henkel, Chemist, East Point Laboratory
Mr. Gordon Waldman, Chemist, Nightcliff Laboratory

Operations Group
Mr. David Hibbert, Group Manager, Operations
Mr. Daryl Day, Operations
Mr. Eddie Carey, Operations
Planning & Development Group
Mr. Richard Marks, Group Manager, Planning and Development
Mr. Ian Smith, Planning and Development

Alice Springs
Mr. Ron Freyling, Regional Engineer Alice Springs
Mr. Peter McDonald, Hydrogeologist, Planning & Management, Alice Springs
Mr. Derek Collin, Hydrology, Projects Alice Springs
Mr. John Childs, Projects Alice Springs
Mr. Terry Ritchie, Geophysics Alice Springs
Mr. Geoff Prowse, Hydrogeology, Alice Springs
Mr. Dave Miller, Groundwater Development, Alice Springs
Mr. George Tongia, Monitoring Alice Springs
Mr. Ian Balfour, Groundwater Alice Springs
Mr. Chris Marlow, Regional Engineer, Operations Alice Springs

Katherine
Mr. Lyall Bilton, Field Hydrographics
Mr. Bob Grenfell, Field Hydrographics
Mr. Len Haywood, Field Hydrographics
Mr. Robert Polley, Regional Engineer

PAWA - Corporate Services Directorate
Mr. Bob Magin, Managing Director
Mr. Terry McLoughlin, Manager Financial Services
Mr. Barry Luchich, Finance
Mr. Jeff Robinson, Finance
Mr. Jeba Jeyabalan, Management Accountant
Mr. Ray D'Ambrosio, Director, Administration
Ms. Gerry Adair, Personnel & Management Services
Ms. Wendy Mortlock, Recruitment

Northern Territory Government Departments
Department of Mines and Energy
Mr. Colin Hallenstein, Director, Alligator Rivers Region Unit
Mr. Bob Adams, Director of Mines Division
Mr. Ron King, Chief Government Mining Engineer
Mr. Jon Mason, Mining Advisor

Conservation Commission of the Northern Territory
Ms. Barbara Singer, Executive Officer, Environment Unit
Mr. John Wood, Management Planning
Mr. Allan White, Regional Manager
Ms. Rosemarie James, Regional Manager, Alice Springs
Mr. Dave Torlack, Land Resources, Alice Springs
Department of Transport & Works - Roads Division
Mr. Martin Jacob, Bridge Engineer
Mr. Peter McGuin, Assistant Director, Design

Northern Territory Treasury
Mr. Ken Clarke, Assistant Under Treasurer
Ms. Jennifer Prince, Director, Revenue

Department of Industries and Development
Mr. Bob Cavanagh, Director, Industries Assistance Division
Mr. Tony Hooper, Assistant Secretary, Industry Support Division
Mr. Allan Allwood, Assistant Secretary, Plant Industry
Mr. John Sturtz, Director of Crops
Mr. David Skerman, Animal Industry
Mr. Stuart Philpott, Assistant Secretary, Horticulture

Office of Local Government
Mr. Steve Dunham, Assist. Director, Management and Co-ordination
Mr. Peter Ryan, Acting Director, Field Services

Department of Lands and Housing
Mr. Ken Ward, Head of Division, Land Management
Mr. Graham Bailey, Planning

Northern Territory Emergency Service
Mr. Allan Beer, Director
Mr. Rowan Charrington, Executive Officer
Mr. Shane Wood, Divisional Officer Alice Springs

Department of Health and Community Services
Dr. Ella Stack, Chief Medical Officer
Mr. George Fyson, Chief Pharmacist
Mr. Gordon Lee Koo, Assistant Secretary (Finance and Accounting)
Mr. Don Hibble, Director (Supply and Works)
Ms. Diane Allwright, Executive Assistant

Commonwealth Government Departments
Commonwealth Department of Science & Technology - Bureau of Meteorology
Mr. Jim Arthur, Regional Director
Mr. Neville Quinn, Observer, Facilities and Information

Australian National Parks and Wildlife Services
Mr. Graham Marshall
Northern Territory Industry Group and other interested parties
Mr. Cliff Emerson, Executive Officer, N.T. Cattlemens Association, Darwin
Mr. Malcolm Roberts, Secretary, N.T. Cattlemens Association, Alice Springs
Mr. Chris McColl, Territory Grapes Farm, Alice Springs
Mr. Jeff Rowlands, Rowlands Dairy Farm, Katherine
Mr. Alan Allwood, Secretary, N.T. Field Crop Advisory Committee
Mr. Richard Luxton, N.T. Field Crop Advisory Committee
Mr. Alan Cipleys, Manager, Amdel N.T.
Mr. John Hickey, Drilling Contractor & N.T. President Australian Drilling Assoc
Mr. Malcolm Holt, Gorey & Cole, Drilling Contractor, Alice Springs
Mr. John Hall, Australian Groundwater Consultants Ltd, Darwin

Interstate
Government Departments and Authorities
Rural Water Commission, Victoria
Mr. David Dole, Director of Technical Services
Mr. David Welsh, Senior Limnologist
Mr. Danny Baker, Manager Private Diversions
Mr. Geoff Smith, Manager Hydrographic Branch
Mr. Bob Welsh, Director of Finance & Administration
Mr. Jim Wilson, Laboratories

Water Authority, Western Australia
Mr. Harry Ventris, Manager Groundwater Branch

Engineering and Water Supply, SA
Mr. Doug Lane

Tarago Water Board, Victoria
Mr. Ian Grawler

Sydney Water Board
Mr. Ian Small

Department of Local Government, Queensland
Dr. Ross Sadler

Snowy Mountains Engineering Corporation
Mr. Eric Lesleigher

Industry Groups and other interested parties
Mr. Rod McCullum, Australian Drilling Industry Assoc., Sydney
Dr. Wayne Drew, Analabs, Melbourne
Mr. Stephen Hancock, Australian Groundwater Consultants, Melbourne
Mr. Bob Morrison, Sinclair Knight & Paterners, Perth
SUMMARY RECORD OF CLIENT MEETINGS

WATER OPERATIONS GROUP

Water Operations confirmed the need for WRG to continue to monitor water supplies and to provide advice on water quality. Water quality is a special problem in Aboriginal communities. There was also a major role for WRG in relation to dam sites. Water Operations is generally satisfied with the service provided by WRG.

The Review team was advised that an excellent service is being provided by the WRG laboratories on water analysis, but that there might not be much difference between WRG's service and a commercial service if the laboratories were privatised.

TERRITORY GRAPE FARM - VIA TL TREE

The Farm Manager said the farm would not have been started in the NT if WRG had not established proof of adequate water prior to 1985 when the owners were looking for a site.

N.T. CATTLEMEN'S ASSOCIATION

The Cattlemen's Association said that if PAWA was moving towards a user pays principle, then the industry would be looking for a service to match, otherwise it would turn to private enterprise. The Association had no criticism of WRG services, and particularly praised the Rural Advisory Services Section. If the "Dud Bore" scheme was to be eliminated it should be phased out over 5 years, and in any case any move to full cost recovery should involve advance warning to industry. The Association view in relation to privatisation of drilling was that if the demand was there new contractors would move in.

The Association said any fee for service should be deferred in Barkly and Alice Springs until after the current drought has concluded.

ROWLANDS DAIRY - KATHERINE

The Manager acknowledged WRG advice during groundwater investigation stage (advice and location regarding production bores) and said that the water quality in the bore was satisfactory. He said that he did not use WRG bore drilling service because of the cheaper cost of using a private contractor from South Australia. NT contractors had not been engaged because of their unavailability due to pressures of work from the mining industry.

INDUSTRIES AND DEVELOPMENT, INDUSTRIES ASSISTANCE DIVISION

WRG present involvement with this client is provision of advice on farm water supplies.

The Review team was advised that Industries Assistance Division would have no problem assuming responsibility for administration of WSDA and Dud Bore Schemes as proposed by the recent review of Rural Advisory Services.
The Agricultural Development and Marketing Authority uses WRG services for water supply on farms. It was believed there would be no reduction in demand for those services (including drilling) arising from full cost recovery policy, and workload could be expected to increase because of trends towards increased horticulture and irrigation. Costs would be passed on to purchasers of land.

MINES AND ENERGY, ALLIGATOR RIVERS REGION UNIT

The Review team was advised the surface water gauging station requirements of the Unit were unlikely to decrease. The development of new mines coupled with a transfer of environmental responsibility from the NT would result in DME planning an increasing gauging workload on PAWA.

There was a substantial workload (500-600 samples a year) placed on the Nightcliff laboratory by ARRU. The team was advised that 40% of samples received by Nightcliff during 1986/87 were from ARRU. There is no alternative laboratory for ultra trace radium work. ARRU would not be interested in taking over the Nightcliff laboratory. It would be worth considering if all the work was ARRU.

ARRU agrees to full cost recovery and believes it may result in better management and professionalism within PAWA.

BUREAU OF METEOROLOGY

WRG interacts with the Bureau in flood forecasting, involving small amounts of pluviograph data.

The Bureau is also a client in that it receives rainfall records from instrumentation operated by WRG. It would not propose to pay for this as rainfall data received by WRG is for its own purposes, and transfer to the nation’s central data bank is secondary.

The Bureau tabled a paper setting out proposals which state that the Commonwealth has the intention of funding flood forecasting systems Australia wide. The team was advised that the Bureau would also offer assistance in developing and operating flash flood warning systems. The Bureau already has the infrastructure to perform the flood warning role.

NORTHERN TERRITORY EMERGENCY SERVICES

NTES depends on WRG for major assistance in flood plain and storm surge mapping and flood warning systems. WRG also assists NTES in production of brochures for public education. The NTES program of work for WRG is developed and endorsed by a Flood Plan Mapping Committee, chaired by Lands and Housing and of which NTES is a member.

NTES has no problem with the introduction of full cost recovery (provided the funds are appropriated to NTES) and does not see any decline in workload projections, although some prioritising would occur.
INDUSTRIES AND DEVELOPMENT - INDUSTRIES SUPPORT DIVISION

Industries Support Division requires water information as a resource base for agricultural use for development of industry bore sites, dam sites and potential for use in irrigation. There is an ongoing demand for this information in areas of development and potential development. Although industry would deal directly with WRG in most cases, Industries Support may sometimes be involved on total farm management issues, or in regard to loan applicants.

Industries Support argued strongly the need to continue to collect water data to meet longer term needs. This should not be stopped for immediate economic reasons.

WATER OPERATIONS GROUP - ABORIGINAL ESSENTIAL SERVICES

The AES client within Water Operations is the client for Aboriginal communities' water and sewerage requirements. Monitoring of supplies and discharges was required by WRG based on data collected at the communities by consultants employed by the Unit. There were also large sums spent on production bore drilling ($700,000 in 1986/87). There was no likelihood of any reduction in demand as a result of full cost recovery.

LANDS AND HOUSING - POLICY AND PLANNING AND LAND MANAGEMENT DIVISIONS

The Land Management Division uses WRG services for flood plain mapping (under the auspices of the Flood Plan Mapping Committee) and land use (urban, horticultural, agricultural, tourist, animal husbandry and aquaculture) including Aboriginal Communities.

All these requirements make water data essential and there is no prospect of a decline as a result of the introduction of full cost recovery. The Lands view was that even in the absence of an immediate external client WRG should continue to collect data because development proposals may emerge in the future.

CONSERVATION COMMISSION (Concom)

Concom said the need for WRG data was mainly park based and in beach areas for recreation and tourist activity. It often uses WRG on a consultancy basis, and recommends Concom be approached for environmental impact assessment. Concom believed demand would not decline and that WRG should continue to collect data. Concom expressed concern about the full cost recovery as it represented circular money and additional administrative workload.

DMF MINES DIVISION

Mines Division said WRG had a role in monitoring water discharge off mine sites to ensure there is no contamination. The aim was to keep government involvement on mine sites to a minimum. When larger mines are being established WRG also assists in contributing to impact assessments.

Mines Division said it saw a future role for PAWA in taking over water facility infrastructure when a mine is closed.
TRANSPORT AND WORKS - ROADS DIVISION

Roads Division's major use of WRG is for bore drilling and for water data regarding flood levels for road and bridge building. It was Roads' view that at least 20 years water data is needed for effective use in bridge design. The officers were concerned that Roads may be asked to meet full costs for station water data that may have other applications, and therefore others should share costs.

Water is needed when building roads and here contractors could do the drilling. Until now WRG costs have been minimal.

If full costs were to be charged for flood structures then Roads may go to a consultant. This would be a commercial decision.

HEALTH AND COMMUNITY SERVICES

Work done for Health was mainly laboratory work in the area of bacteriological monitoring. Until now Health has been charged operational costs only.

The Health view was that water quality monitoring of water supply systems in town centres and Aboriginal communities was a PAWA responsibility. It was not totally essential that the analyses be done by PAWA laboratories. The work could be put out to private. The Health role was one of interpretation and reaction. Any one-off requests for bacteriological testing would be referred with Health meeting full costs. Full cost recovery was accepted in principle. The Health view was that this would lead to some prioritising.

AUSTRALIAN NATIONAL PARKS AND WILDLIFE SERVICES

ANPWS require 3-4 bores drilled each year. Any increased costs will cause ANPWS to review the WRG service on the basis of using consultants as an alternative.

INDUSTRIES AND DEVELOPMENT - PRIMARY INDUSTRIES DIVISION

Primary Industries Division said that it requires WRG data as a source of advice for use in regard to availability of groundwater and surface water, and also potential farming locations. The Division did not believe the "user pays" principle should apply in regard to the collection of water data needed for consideration of development proposals and prospects.

The Division did not foresee any decline in the need for such data, and suggested the benefit of WRG having a "research unit" that undertook investigation at particular locations.

TREASURY - OFFICE OF LOCAL GOVERNMENT

Under previous (prior to 19/3/8) Administrative arrangements OLG had the role of advising on the coordinating the provision of services (including water) to Aboriginal communities. OLG had a particular interest in WRG drilling services and water quality testing. With regard to both there was acceptance of user pays. There would be some problems with water quality investigation in certain locations where there was no client group.
OLG was particularly concerned with the high nitrate levels in Alice Springs and believed
the water quality there presented a major Aboriginal health problem which should be
addressed by PAWA and Health and Community Services. Correspondence had been
initiated on this.

FARMERS (FIELD CROPS ADVISORY COMMITTEE)

The Review team spoke to a farmer who was a member of this I&D committee. He said
that WRG should continue to provide service via the Rural Advisory Services Section in
development situations. There were insufficient private sector consultants able to
provide on-farm advice.

He also believed there was a need for government financial assistance in certain
development circumstances but he saw no requirement for government to be involved in
construction of expensive community irrigation schemes.
The following submissions were received and taken into consideration by the Review Team. The "comments" relating to the contents of the submissions are summaries prepared by the Review team to indicate the range of topics on which submissions were made.

In addition to the "comments" indicated, most of the submissions pointed out the anxieties and low morale within WRG, which has been created by continuing uncertainties due to the succession of Departmental transfers, reviews and re-organisations. The submissions also sought from this Review positive recommendations and clarification of the future role of WRG.

### NAME

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Location</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>R J Roos</td>
<td>Technical Officer, Technical Services Division, Surface Water Assessment Section.</td>
<td></td>
<td>Proposed solutions for improved data collection, data collection management, and sundry other issues.</td>
</tr>
<tr>
<td>Hugh Wilson</td>
<td>Principal Chemist, WRG Darwin</td>
<td></td>
<td>Recommendations on inhouse versus privatisation of laboratory facilities, staffing, accommodation and costing.</td>
</tr>
<tr>
<td>Dr J Childs</td>
<td>Engineer Computing, WRG Alice Springs</td>
<td></td>
<td>Recommendations on improved resource data management.</td>
</tr>
<tr>
<td>N Watson</td>
<td>Group Manager, Water Resources</td>
<td></td>
<td>Recommendations and statements on many issues including historical changes and the direction for future changes, privatisation, administrative/financial systems and organisation.</td>
</tr>
</tbody>
</table>
J VERHOEVEN
Manager, Hydrology Division

Comments
Recommendations on surface water and ground water staffing.

GROUNDWATER
SECTION STAFF
WRG Darwin and Alice Springs

Comments
Submission to the Chairman PAWA querying the future of the
groundwater section.

WRG SENIOR
MANAGEMENT

Comments
A variety of comments and recommendations relating to the
terms of reference.

K BOLAND
Acting Manager, Bacteriological
Laboratories, Parap.

Comments
Proposal relating to rationalization of laboratories.

HYDROGEOLOGY
BRANCH
WRG Darwin

Comments
Statements on the importance of hydrogeological mapping and
staffing.
WATER RESOURCES ORGANISATION

DARWIN

BORE TESTING

ST02
   |
  TO2
  |
  TO1

TO1
FA2
FA1

TO1
FA2
FA1

TO1
FA2
FA1

16.
WATER RESOURCES ORGANISATION

DARWIN

SURFACE WATER MONITORING

PTO1

COMPUTATIONS
STO2
TO2
TO1
TO1
TO1
TA2
TA2
TA2
TA2
TA2

SURFACE WATER DATA COLLECTION
TO2
TO2

CONSTRUCTION MAINTENANCE
FOREMAN
TRADESMAN

INSTRUMENT WORKSHOP
TO1
2 x TRADESMAN

RECORDS
TA2

FIELD CREWS
TO1
TO1
TO1
TA2
TA2
TA2
TA2

18.
Those two Laboratories each have a locally engaged Administrative Class A3 officer to undertake laboratory administrative duties.
WATER RESOURCES ORGANISATION

ALICE SPRINGS

REGIONAL ENGINEER
P4

PLANNING & MANAGEMENT
P3

ASSESSMENT
P3
(Poster Sheet 11)

LABORATORY
TA2

TECHNICAL SERVICES
ST03
(Poster Sheet 12)

Sheet 10
WATER RESOURCES ORGANISATION

ALICE SPRINGS

ASSESSMENT

P3

GEOPHYSICS

P2
T01
T02
TA2

PROJECTS

P2
P1
TO1

HYDROGEOLOGY

P2
P1
TO2
TA2
ALICE SPRINGS

GROUNDWATER DEVELOPMENT

ST01

DEPOT

FOREMAN
LABOURER

DRILLING

TO1
FA2
FA1

BORE TESTING

TO1
FA1
LABOURER

25.
APPENDIX 6

WATER RESOURCES GROUP
FUNCTIONAL STATEMENT IN BRIEF

Water Resources Group is responsible for the assessment, promotion, orderly development and regulation of the water resources of the Northern Territory for the optimum long term community benefit. Functional activities can be broadly described as follows:

-formulates and implements policy and legislation related to the management of water resources;

-provides input to the formulation of forward strategies for the management of water resources;

-in close consultation with Planning and Development Group, and external clients, identifies and implements in the most cost efficient manner, annual programs of work;

-provides assistance to industry and the public through the Rural Advisory Service;

-collects, stores, processes, assesses and disseminates data related to both surface and groundwater resources of the Northern Territory;

-develops and undertakes environmental protection, monitoring and regulatory programs;

-actively seeks Commonwealth collaboration and financial assistance for programs and activities of national importance;

-conducts all activities in a professional, efficient and cost effective manner and in accordance with commercial principles.
## APPENDIX 7

### ESTABLISHMENT

#### WATER RESOURCES

In 1980 when Water Investigation (as the Branch was then known) was part of the Water Division of the Department of Transport and Works, the establishment of the unit was as follows (excludes Trainees):

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional/Executive staff</td>
<td>40</td>
</tr>
<tr>
<td>Technical and field staff</td>
<td>248</td>
</tr>
<tr>
<td>Administrative support</td>
<td>22(1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>310</strong></td>
</tr>
</tbody>
</table>

**Note:** (1) Excludes administrative staff employed centrally in Administration Division of Transport and Works.

In June 1982 a major reorganisation took place across Transport and Works. As a result 12 survey positions and 6 draftsmen were transferred from Water Investigation Branch to Roads Division. Other transfers also took place at this time but it is unclear what positions were involved.

In December 1984, Water Resources was transferred to the Department of Mines and Energy (DME). The establishment of the unit was as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional/Executive staff</td>
<td>52</td>
</tr>
<tr>
<td>Technical and field staff</td>
<td>177</td>
</tr>
<tr>
<td>Administrative support</td>
<td>41(2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>270(3)</strong></td>
</tr>
</tbody>
</table>

**Note:** (2) Excludes administrative staff employed centrally in Administration Division of Transport and Works.

(3) Excludes Trainees

During the period December 1984 to March 1987 (when Water Resources Division was transferred to the Power and Water Authority as the Water Resources Group) the following variations occurred:

- Rum Jungle Project positions transferred to Mines Division - 11
- Administrative positions transferred to Administration Division in DME - 17
- Positions employed on Alligator Rivers Region work transferred to Alligator Rivers Region Unit in DME - 12
- Reductions resulting from withdrawal of Commonwealth Funding support to Surface Water Assessment Programme - 30
Variations achieved through Reorganisation and other review processes within DME

Note: (4) This excludes 8 Trainee positions

As part of PAWA Water Directorate the WRG establishment advised to the Review Team as follows (excluding Trainees):

<table>
<thead>
<tr>
<th>Professional/Executive</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Staff</td>
<td>126</td>
</tr>
</tbody>
</table>

172

The variation from 192 to 172 is due to administrative positions being incorporated within Corporate Services Directorate after 1 July 1987, and some savings have been effected.
### 1987/88 PAWA Water Resources Group Budget

(Darwin Area)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manpower</td>
<td>4564</td>
</tr>
<tr>
<td>Stores and Materials</td>
<td>690</td>
</tr>
<tr>
<td>Transport</td>
<td>220</td>
</tr>
<tr>
<td>Travel</td>
<td>246</td>
</tr>
<tr>
<td>External Services</td>
<td>28</td>
</tr>
<tr>
<td>General Expenses</td>
<td>43</td>
</tr>
<tr>
<td>Communications</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Expenditure</strong></td>
<td><strong>5793</strong></td>
</tr>
</tbody>
</table>
## APPENDIX 8

### REVIEW OF WATER RESOURCES GROUP

#### FINANCIAL DATA 1987/88

1. SUMMARY OF OPERATIONAL EXPENSES

This summary includes all expenditure incurred on all activities the Water Resources Group is engaged in carrying out works and programmes for PAWA, NT Govt Departments, Commonwealth Departments and all other clients, including the NT Government.

The total budgeted expenditure is the total consumption of all resources utilised directly by the Water Resources Group: manpower, materials, plant, external services etc., but does not include a share of the cost of support services from other Groups of the Power and Water Authority (these are scheduled under item 3 below).

Water Resources activities undertaken by Katherine and Alice Springs centres are included.

<table>
<thead>
<tr>
<th>Operational Expenses</th>
<th>Darwin $x000</th>
<th>Katherine $x000</th>
<th>Alice Springs $x000</th>
<th>Total $x000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manpower</td>
<td>4463</td>
<td>172</td>
<td>1087</td>
<td>5722</td>
</tr>
<tr>
<td>Stores &amp; Materials</td>
<td>690</td>
<td>24</td>
<td>131</td>
<td>845</td>
</tr>
<tr>
<td>Transport</td>
<td>220</td>
<td>11</td>
<td>50</td>
<td>281</td>
</tr>
<tr>
<td>Travel</td>
<td>246</td>
<td>31</td>
<td>63</td>
<td>340</td>
</tr>
<tr>
<td>External Services</td>
<td>28</td>
<td>0</td>
<td>98</td>
<td>126</td>
</tr>
<tr>
<td>General Expenses</td>
<td>671</td>
<td>26</td>
<td>181</td>
<td>878</td>
</tr>
<tr>
<td>Communications</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Trust Accounts*</td>
<td></td>
<td></td>
<td></td>
<td>3300</td>
</tr>
<tr>
<td>Total</td>
<td>6320</td>
<td>264</td>
<td>1610</td>
<td>11494</td>
</tr>
</tbody>
</table>

Revenue (FWRAP, Labs, T/Accts*)

* Includes $700,000 requested for AES
### REVIEW OF WATER RESOURCES GROUP

#### FINANCIAL DATA 1987/88

#### 2. CAPITAL ITEMS

<table>
<thead>
<tr>
<th>Item</th>
<th>Darwin</th>
<th>Katherine</th>
<th>Alice Springs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$x000</td>
<td>$x000</td>
<td>$x000</td>
<td>$x000</td>
</tr>
<tr>
<td>Photomicrograph Microscope (1)</td>
<td>40</td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Fluorometer (1)</td>
<td>18</td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Portable Computing System (1)</td>
<td>12</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>6x6 HD Tray Trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min HP 300 (3)</td>
<td>326</td>
<td>163</td>
<td></td>
<td>489</td>
</tr>
<tr>
<td>4x4 Troop Carrier (2)</td>
<td>48</td>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Panel Van (Lite Ace) (1)</td>
<td>14</td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>4x4 6 tonne Tray Truck (1)</td>
<td>65</td>
<td></td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>6x4 8 tonne Tray Truck (1)</td>
<td>69</td>
<td></td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>Fuel Trailer (XC/F 86/87)</td>
<td>(35)</td>
<td></td>
<td></td>
<td>(35)</td>
</tr>
<tr>
<td>Total</td>
<td>557</td>
<td>0</td>
<td>163</td>
<td>720</td>
</tr>
</tbody>
</table>
3. OVERHEAD

This includes costs incurred by other Groups of Power and Water Authority which can be attributed to providing support/services to Water Resources Group.

These costs are itemised only in sufficiently broad detail to enable the origin of the expense to be identifiable. As accurate costs were not available, the overheads were determined in consultation with relevant staff. The methodology in determining the amounts varied as appropriate from a percentage of total function to specific manpower estimates etc.

The total overhead was apportioned to individual projects, pro rata to total estimated projects expenditure. The amount apportioned to each project is indicated at Appendix 13.

<table>
<thead>
<tr>
<th>Overhead</th>
<th>Darwin $x000</th>
<th>Katherine $x000</th>
<th>Alice Springs $x000</th>
<th>Total $x000</th>
</tr>
</thead>
<tbody>
<tr>
<td>WD Planning &amp; Development</td>
<td></td>
<td></td>
<td></td>
<td>316</td>
</tr>
<tr>
<td>WD Operations</td>
<td></td>
<td></td>
<td></td>
<td>94</td>
</tr>
<tr>
<td>WD Top Management</td>
<td></td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Commercial Services</td>
<td></td>
<td></td>
<td></td>
<td>710</td>
</tr>
<tr>
<td>PAWA Top Management*</td>
<td></td>
<td></td>
<td></td>
<td>77</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1144</td>
</tr>
</tbody>
</table>

(* Board, Public Relations, Secretariat, Audit)
4. CORPORATE EXPENDITURE

<table>
<thead>
<tr>
<th></th>
<th>Darwin</th>
<th>Katherine</th>
<th>Alice Springs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>$x000</td>
<td>$x000</td>
<td>$x000</td>
<td>500</td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Interest @ 15.2%</td>
<td></td>
<td></td>
<td></td>
<td>280*</td>
</tr>
<tr>
<td>Capital Repayment</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>816</td>
</tr>
</tbody>
</table>

*National - Interest becomes payable from 1/7/88

5. TOTAL EXPENDITURE

This is the sum of Items 1 to 4 above

<table>
<thead>
<tr>
<th></th>
<th>Darwin</th>
<th>Katherine</th>
<th>Alice Springs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Expenses</td>
<td></td>
<td></td>
<td></td>
<td>11494</td>
</tr>
<tr>
<td>Corporate Expenditure</td>
<td></td>
<td></td>
<td></td>
<td>816</td>
</tr>
<tr>
<td>Overhead</td>
<td></td>
<td></td>
<td></td>
<td>1144</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>13454</td>
</tr>
</tbody>
</table>
APPENDIX 9.0

PROJECT ANALYSIS METHODOLOGY

The analysis of each project making up the WRG 1987/88 total programme is based on:

Identification:

Each project is identified in terms of:
- the Programme of which it forms part
- life of the project i.e. on-off or ongoing activity
- the 1987/88 budget expenditure and the total estimated cost where the project spans a number of years.

Description:

A brief description is given for each project identifying its purpose and the client.

Legislation:

An outline is given of the provisions of the Control of Waters Act, Water Supplies Development Act, Power and Water Authority Act and any other Acts of Parliament empowering or requiring PAWA to undertake the project.

Classification:

Each project is examined and classified into one of three categories in terms of the following definitions:

Business: Projects which are required for the provision of water related services to PAWA consumers, i.e. are functions which are undertaken to deliver services to consumers whether or not charges are levied on specific users of these services.

Client: Projects carried out to provide a service or furnish information to other Government Departments, Local Government, private industry, private groups and individuals.

General Community: Projects which are not directly related to the provision of services to consumers but are carried out for the wider community benefit or in the Territory’s or national interests.
PAWA Responsibility

Responsibility for the management of the project is reviewed and following options considered:

- abandon
- transfer to another agency
- retain

Cost Recovery

Using 1987/88 expenditures project costs were apportioned to Business, Client and General Community, categories on a "full cost" basis.

The impact of full cost recovery funds required to support WRG services was analysed.
PROJECT ANALYSES

EXPLANATORY NOTE - ESTIMATES AND BUDGETTED EXPENDITURE

The amounts shown in the following budget analyses for "total estimated cost" and "1987/88 budget" refer to that portion of the project funds/costs which are allocated to the Water Resources Groups. In many instances there will be funds/costs which are managed/expended by other PAWA Groups, Departments etc.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Territory Grape Farm
Total Estimated Cost $36 200 (WRG)

1987/88 Budget $8 200 (WRG)
Overhead $1 435
$9 635

DESCRIPTION
This project is a "one-off" project involving the drilling and construction of a high yielding groundwater bore for irrigation. The work is being carried out by WRG drilling rig at the request of the client, Territory Grape Farm.

LEGISLATION
Sections 7 and 8 of the Water Supplies Development Act authorises PAWA to carry out such water supply development works on behalf of private landholders.

CLASSIFICATION
The project is for a specific private Industry Client and is classified "Client" accordingly.

PAWA RESPONSIBILITY
While existing legislation clearly empowers PAWA to carry out such works, it is NT Government policy to encourage provision of these services by the private sector and, as such, projects of this nature in future should be devolved to consultants and contractors.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $8 200 the amount being recovered is $6 486 (79%).

There should be full recovery of the project cost by PAWA/WRG from the client.

(Note: In this case the project spans over two or more financial years and actual cost recovery was prior to 87/88. For the purpose of determining the effect of full cost recovery the amount shown as being recovered in 1987/88 is pro rata to expenditure, i.e. if 75% of total expenditure has been recovered in previous years then 75% of 1987/88 expenditure is shown as being recovered in 1987/88).
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Surface Water Resource Inventory and Data Processing.

1987/88 Budget
$284 900 (WRG)

Overhead
$ 49 858

$334 758

Total estimated Cost - Not applicable is ongoing activity spanning several years.

DESCRIPTION
Collection and processing of surface water flows and rainfall data from stream gauging station sites for specific water supply projects and for managing extractions from streams by all users.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
Some of these specific purpose or project stations are for the collection of data for use in the development of water supply projects or the operation of existing water supply systems and are classified as Business (PAWA town supplies). It could be argued that the requirement to monitor the effect of extractions is to safeguard the security of water use by "Licensee" and therefore classified as business. However, the other project stations used for management of streams from which water is extracted under licence could be regarded as a requirement under the Control of Waters Act to maintain stream integrity for Territory and public good and classified as "General Community". If the Government wishes to pursue the recovery of costs it should do so by charging for licences and spread the costs over existing diverters. At this stage of Northern Territory development this element is small and "General Community" classification is appropriate.

PAWA RESPONSIBILITY
There is an ongoing practical need for the data to be collected and abandonment is not an option. There is no other government agency with the operational expertise to whom this activity could be transferred. Responsibility should remain with PAWA.

COST RECOVERY
Of the 1987/88 budgetted estimate of $322 200 only $27000 or 8.4% will be recovered. Full Internal Cost recovery should be made from PAWA Operations and PD Groups for
the Business activity of managing and planning augmentation of town water supplies (and these costs passed on to consumers).

Charging is appropriate for license fees for extractions to cover these and other administration costs.

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST (EXCL O/H)</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
<th>REVENUE SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAWA OVERHEAD</td>
<td>77 780</td>
<td>27 000</td>
<td>91 392</td>
<td>PAWA Consumers</td>
</tr>
<tr>
<td></td>
<td>13 612</td>
<td></td>
<td></td>
<td>91 392</td>
</tr>
<tr>
<td>GENERAL COMMUNITY OVERHEAD</td>
<td>207 120</td>
<td></td>
<td>243 366</td>
<td>PAWA Licensees</td>
</tr>
<tr>
<td></td>
<td>36 246</td>
<td></td>
<td></td>
<td>243 366</td>
</tr>
</tbody>
</table>
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Alice Springs Water Supply Augmentation Stage 1
Total Estimated Cost $1 300 000 (Approx)
1987/88 Budgetted Expenditure $ 812 000
Overhead $ 142 100

DESCRIPTION
Investigation of sites and construction of additional production bores and rehabilitation of existing bores to serve Alice Springs town water supply. The project is required by PAWA Operations Group.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
This project is required to maintain water supplies to Alice Springs consumers and is classified as "Business"

PAWA RESPONSIBILITY
The project is essential and is a direct management responsibility of PAWA.

COST RECOVERY
Of the 1987/88 budgetted expenditure of $812 000 the amount being recovered is $552 000 (or 68%).

There should be internal recovery by WRG from Planning and Development and/or Operations Groups of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
PROGRAMME
Water supply

PROJECT
Rural Advisory Services
Total estimated cost - Not applicable project is ongoing activity spanning several year.

1987/88 Budget Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$164,395</td>
</tr>
<tr>
<td>$1,103,795</td>
<td></td>
</tr>
</tbody>
</table>

DESCRIPTION
This activity comprises both regulatory and wide ranging advisory services on provision of water supply to rural enterprises and includes professional opinions and assessment and provision of data.

The activity also includes issue of permits and licences for extractions and works, and technical administration of "dud bore scheme". Advice to land managers (Department of Lands and Housing) on availability of water, flooding, and impact on water resources of land use changes is provided.

LEGISLATION
Sections 7 and 8 of the Water Supplies Development Act authorise PAWA to carry out such water supply development works on behalf of private landholders.

Sections 10 and 26 of the Water Supplies Development Act authorise PAWA to grant advances (loans) for constructing approved works and to administer the "Dud Bore Scheme".

CLASSIFICATION
The Rural Advisory Service provides services to a number of recipients: Government Departments, Industry, rural enterprises and the general public. These services are classified as "Client".

The control and regulatory activity of the RAS is directed towards maintenance of the integrity and conservation and use of the water resource and is therefore seen as serving the long term interest of the Northern Territory and the public good and is therefore classified as "General Community". It could however, be argued that control and regulatory activity is also in the interest of identifiable water users and therefore there is an element of Business service. At this stage of Northern Territory development this element is small and General community classification is the most appropriate.
PAWA RESPONSIBILITY

Abandonment of this activity in total is not an option in view of statutory requirement for control of extractions and regulation of streams and water courses. Advisory aspects of the RAS are also a consequence of the proper management of the water resource. Transfer to another Department or agency of this element of RAS is also not appropriate as PAWA is best equipped to carry out this role.

Transfer of management of the financial aspects of the "Dud Bore Scheme" to Department of Industries and Development is an option that is being pursued.

COST RECOVERY

The full cost of those activities within RAS which are classified as "client" services should be recovered from recipients of the service. In the case of non departmental clients, cost recovery could be on the basis of direct fee for service or as an "overhead" included in the charge for extractions of water (surface and groundwater).

The "General Community" element of the RAS e.g "counter and telephone advisory services" should continue to be a charge to NT Government.

The present cost recovery and cost recovery proposed based on 1987/88 estimates is as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dept. Ind &amp; Dev.</td>
<td>138 249</td>
<td>10 000</td>
<td>221 193</td>
</tr>
<tr>
<td>Overhead</td>
<td>32 944</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>221 193</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>116 250</td>
<td>136 594</td>
<td></td>
</tr>
<tr>
<td>Overhead</td>
<td>20 344</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>156 594</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lands &amp; Housing</td>
<td>116 250</td>
<td>136 594</td>
<td></td>
</tr>
<tr>
<td>Overhead</td>
<td>20 344</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>136 594</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENERAL COMMUNITY</td>
<td>518 651</td>
<td>30 000</td>
<td>609 414</td>
</tr>
<tr>
<td>Overhead</td>
<td>90 763</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>609 414</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 9.5

PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Lambells Lagoon Groundwater Investigation
Total Estimated Cost $280 000

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budget Estimate</td>
<td>$5,100</td>
</tr>
<tr>
<td>Overhead</td>
<td>$892</td>
</tr>
<tr>
<td></td>
<td>$5,992</td>
</tr>
</tbody>
</table>

DESCRIPTION

Investigation for the development of additional groundwater supplies for Darwin. As part of the project a regional groundwater investigation was completed and draft report was prepared as input to Darwin Structure Plan. The Clients requiring the investigations were Dept of Lands and Housing PAWA Operations Group and Dept of Industries and Development. Department of Lands and Housing initiated the project on the basis of funding being provided by the other Departments.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to carry out investigations for the development of groundwater supplies etc.

CLASSIFICATION

As the purpose of this investigation is to augment future supplies to Darwin and was required by PAWA Operations Group, the classification of this project is "Business". Where costs can be attributed to Department of Lands and Housing and Department of Industries & Development for their initial requirements the project should be regarded as "client" activity.

PAWA RESPONSIBILITY

Abandonment or transfer to another agency are not options and project should remain responsibility of PAWA.
### COST RECOVERY

Of the 1987/88 estimated expenditure of $5 100 there will be nil recovery in 1987/88 (although some $90 000 was recovered in previous years). As classification is Business and/or Client there should be full cost recovery on the following basis:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Department</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>PAWA</td>
<td>$2,996</td>
</tr>
<tr>
<td>Client</td>
<td>Dept of Industries &amp; Development</td>
<td>$2,996</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>$5,992</strong></td>
</tr>
</tbody>
</table>
APPENDIX 9.6

PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Jabiru Water Supply Augmentation
Total Estimated Cost $316 000

1987/88 Budgetted Expenditure
Overhead

$68 800
$12 040
$80 840

DESCRIPTION
Investigation to evaluate the regional groundwater resource potential for augmentation of supply to Jabiru Township for Jabiru Town Development Authority.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to carry out investigation for water supplies.

CLASSIFICATION
The project is being undertaken at request of another authority and is therefore classified as "Client" activity.

PAWA RESPONSIBILITY
While legislation clearly empowers PAWA to undertake the investigation the Authority could have employed "Consultants". As project is well underway management should be retained by PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $68 800 the amount being recovered is $22 600 (or 34%). There should be full recovery of the project cost by PAWA/WRG from the client.
APPENDIX 9.7

PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Darwin Water Supply Groundwater Augmentation Study (Stage 1).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Total Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$273,200</td>
</tr>
<tr>
<td>2</td>
<td>$310,000</td>
</tr>
<tr>
<td>3</td>
<td>$600,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$1,183,200</td>
</tr>
</tbody>
</table>

1987/88 Budgetted Expenditure

- Overhead: $297,100
- 51,992
- $349,092

DESCRIPTION
Evaluation of groundwater resource in the Darwin Rural Area involving Field investigations, Office Studies and Assessment including Computer Modelling to prove the resource for future augmentation of Darwin Water Supply at the request of WD Planning and Development Group.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
This project forms part of a total investigation to determine the most economical means of augmenting Darwin's water supply. The correct classification is "Business".

FUTURE PAWA RESPONSIBILITY
Is clearly an operational responsibility of PAWA and is a necessary activity; there are no other viable options to consider.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $297,100 the amount being recovered $100,000 (or 34%).

There should be internal recovery of the full project cost from PAWA Planning and Development Group which would become a charge against PAWA town water supply operations and be passed on to consumers.
APPENDIX 9.8

PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Aboriginal Essential Services

- Croker Island Water Supply $3,400
- Santa Teresa Groundwater Investigation. $8,200
- Milikapiti Groundwater Investigation $4,700
- Nguiu Groundwater Investigation $9,200
- Numbulwar Groundwater Investigation $10,200
- Mapping of Water Availability in Southern Region $66,600
- Maningrida Ground Water Resource Evaluation $159,200
- Wadeye Groundwater Investigation $121,300
- Kintore Water Supply Investigation $123,800
- Hermannsburg Water Supply Investigation $149,000

Total 1987/88 Budgetted Expenditure $655,600
Overhead $114,730

Total expenditure on above projects $770,330

DESCRIPTION

Investigation of Ground and surface water resource, for augmentation and improvement of existing supplies and development of new supplies, including installation and test pumping of production bores.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

Investigation and development of water supplies to aboriginal communities is an essential part of supplying water to identifiable groups of consumers and correct classification of this activity is "Business".
49.

<table>
<thead>
<tr>
<th>JOB</th>
<th>EXPENDITURE</th>
<th>TOTAL</th>
<th>REC</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>86/87</td>
<td>87/88</td>
<td>86/87</td>
<td>87/88</td>
</tr>
<tr>
<td>C. Isl</td>
<td>164.1</td>
<td>3.4</td>
<td>167.5</td>
<td>134.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>65.5</td>
<td>8.2</td>
<td>73.7</td>
<td>40.0</td>
</tr>
<tr>
<td>Mili</td>
<td>16.0</td>
<td>4.7</td>
<td>20.7</td>
<td></td>
</tr>
<tr>
<td>Ngiui</td>
<td>6.2</td>
<td>9.2</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>Nun</td>
<td>46.5</td>
<td>10.2</td>
<td>56.7</td>
<td></td>
</tr>
<tr>
<td>Mappings</td>
<td>34.0</td>
<td>66.6</td>
<td>100.6</td>
<td>46.0</td>
</tr>
<tr>
<td>Mun</td>
<td>100.0</td>
<td>159.2</td>
<td>259.2</td>
<td>198.0</td>
</tr>
<tr>
<td>Wad</td>
<td>11</td>
<td>121.3</td>
<td>132.3</td>
<td>63.0</td>
</tr>
<tr>
<td>Kint</td>
<td>117.8</td>
<td>123.8</td>
<td>241.6</td>
<td>75.0</td>
</tr>
<tr>
<td>Herm</td>
<td>140.5</td>
<td>149.0</td>
<td>289.5</td>
<td>75.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>701.6</td>
<td>655.6</td>
<td>1357.2</td>
<td>357.0</td>
</tr>
</tbody>
</table>

**PAWA RESPONSIBILITY**

Abandonment of this activity is not an option. Transfer to another Government agency is not appropriate as in house expertise and resources would not be available. Responsibility should remain with PAWA.

**COST RECOVERY**

Of the 1987/88 Budgetted Expenditure of $655 600 the amount being recovered is NIL. There should be internal recovery from the Operations Group for the full project cost which would become a charge against PAWA - AES water supplies and passed to consumers. Until such time as cost of operating of AES supplies are being recovered from consumers the NT Government would need to provide funds in lieu of revenue.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Ti-Tree/Pine Hill Groundwater Investigations.

Total Estimated Cost $23,700

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budgetted Expenditure</td>
<td>$16,200</td>
</tr>
<tr>
<td>Overhead</td>
<td>2,835</td>
</tr>
<tr>
<td></td>
<td>$19,035</td>
</tr>
</tbody>
</table>

DESCRIPTION
Investigation and preparation of reports on groundwater investigations to prove local availability of long term water supplies at site selected for horticultural industry, by Department of Industries and Development.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As the requirement for this project was initiated by the Department of Industries and Development the classification of the activity is "Client".

PAWA RESPONSIBILITY
Abandonment of the project is not an option i.e. is a client requirement.

Transfer to another Government agency also not appropriate as PAWA is the only NT Government agency with required expertise.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $16,200 the amount being recovered is $Nil. There should be full recovery of the project by PAWA/WRG from the client.
APPENDIX 9.10

PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Production Bore Drilling Programme
Total estimated cost - not applicable is ongoing programme.

<table>
<thead>
<tr>
<th>1987/88 Budget Expenditure</th>
<th>$3,510,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$614,337</td>
</tr>
</tbody>
</table>

$4,124,837

DESCRIPTION
Programme of production bore drilling mostly for PAWA but also for other departments. Drilling is carried out by contractors and in-house drill rigs. Includes test pumping (in-house), preparation of reports and in some cases an initial geophysical assessment. The installation of production bores for water supplies carried out for PAWA for AES supplies, NT Conservation Commission, NT Department of Transport and Works - Roads Division and Commonwealth Australian National Parks and Wildlife Services.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
This is part of the programme that is carried out for the AES water supplies and falls into the classification of "Business" activity. Installation of production bores for other Government agencies is "Client" activity.

PAWA RESPONSIBILITY
While legislation authorises PAWA to develop water supply systems and construct works for other Government agencies, this is not mandatory. There is scope for much of this work to be carried out by contract drillers under PAWA supervision or by the Government Agency requiring the water supply to arranging direct drilling contracts to carry out the works with PAWA providing technical/advisory services only.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $3,510,500 the amount to be recovered is $2,025,200 (or 58%). There should be full recovery of the project cost. That part of the project cost attributed to town water and AES supplies should be recovered internally by WRG from the Operations Group, and become a charge against PAWA town water
supply operations and passed on to consumers or in the case AES supplies the NT Government would need to provide funds in lieu of revenue.

That part of the project cost which covers the client’s requirement should be recovered from the client. On the basis of the 1987/88 programme and expenditure cost recovery would be as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA AES SUPPLIES OVERHEAD</td>
<td>2878610</td>
<td>1053200</td>
<td>3382367</td>
</tr>
<tr>
<td>OVERHEAD</td>
<td>503755</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3382367</td>
<td></td>
</tr>
<tr>
<td>CLIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CON COM OVERHEAD</td>
<td>210630</td>
<td>223000</td>
<td>247490</td>
</tr>
<tr>
<td>OVERHEAD</td>
<td>36860</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>247490</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSPORT AND WORKS (ROADS) OVERHEAD</td>
<td>210630</td>
<td>223000</td>
<td>247490</td>
</tr>
<tr>
<td>OVERHEAD</td>
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<td></td>
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<tr>
<td></td>
<td>247490</td>
<td></td>
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<tr>
<td>AUSTRALIAN NP&amp;WS OVERHEAD</td>
<td>210630</td>
<td>223000</td>
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<tr>
<td>OVERHEAD</td>
<td>36860</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>247490</td>
<td></td>
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</tr>
<tr>
<td>TOTALS</td>
<td>4124837</td>
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<td>4124837</td>
</tr>
</tbody>
</table>
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Deep Well Groundwater Investigation
Total Estimated Cost $140 000

1987/88 Budgeted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$120 700</td>
</tr>
<tr>
<td></td>
<td>21 122</td>
</tr>
<tr>
<td></td>
<td>141 821</td>
</tr>
</tbody>
</table>

DESCRIPTION
Investigation of groundwater supplies for Department of Industries and Development

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As the requirement for the project was initiated by Department of Industries and Development the classification of the activity is "Client".

PAWA RESPONSIBILITY
Abandonment of the project is not an option i.e. it is a "Client" requirement.
Transfer to another Government agency is also not appropriate as PAWA is the only NT Government agency with required expertise.
At the initiating stage of projects of this type consideration could be given to use of consultants.

COST RECOVERY
Of the 1987/88 Budgeted Expenditure of $120 700 the amount being recovered is $52 100 (or 43%). There should be full recovery of the project cost by PAWA/WRG from the client.
PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Adelaide River Water Supply Treatment

Total Estimated Cost $13,000

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>717</td>
</tr>
<tr>
<td>Total</td>
<td>4,100</td>
</tr>
<tr>
<td>Total Estimated</td>
<td>4,817</td>
</tr>
</tbody>
</table>

DESCRIPTION

Investigation of source water quality variation with objective of developing a strategy for operation of bores supplies to minimise adverse quality effects. The investigations were initiated by PAWA operations Group.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

This project is to solve an operational problem with Adelaide River town water supply which is operated by the PAWA. Classification is "Business".

PAWA RESPONSIBILITY

While Adelaide River town supply remains a responsibility of PAWA, this project is a PAWA responsibility.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $4,100 the amount being recovered is $nil. There should be internal recovery of the full project cost by WRG from Planning and Development and/or Operations Groups which would become a charge against PAWA town water supply operations and be passed on to consumers.
APPENDIX 9.13

PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Palmerston Groundwater Investigation.

Total Estimate Cost $80 000 (Approx project spread over 6 years).

1987/88 Budgetted Expenditure $ 9 200
Overhead 1 510

$10 810

DESCRIPTION

Determination of local groundwater potential for watering parks and gardens for Palmerston Town Council.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

Is a specific purpose project, not related to PAWA operational needs but for requirement of another agency and is classified "client" accordingly.

PAWA RESPONSIBILITY

Abandonment of the project is not an option i.e. is a "client" requirement.

Transfer - to another government agency also not appropriate as PAWA is only NT government agency with required expertise. At the initiating stage of this type of project consideration could be given to use of consultants.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $9 200 the amount being recovered is $nil. There should be full recovery of the project cost by PAWA/WRG from the client.

(Note: In this case the project spans over two or more financial years and actual cost recovery was prior to 1987/88. For the purpose of determining the effect of full cost recovery, the amount shown as being recovered in 1987/88 is pro rata to expenditure, i.e. if 75% of total expenditure has been recovered in previous years then 75% of 1987/88 expenditure is shown as being recovered in 1987/88)
APPENDIX 9.14

PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Katherine Ground Water Investigation

Total Estimated Cost $190,000 (WRG)

1987/88 Budgetted Expenditure

Operational Overhead

$167,900

29,382

$197,282

DESCRIPTION

Investigation of groundwater hydrology in Katherine rural area to provide basis for policies on groundwater development and management. There are competing users for ground water including:

- PAWA town water supply,
- local town users,
- Rural Subdivisions,
- Irrigation developments,
- Katherine River receives inflow from ground water.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

As this activity is to support Advisory Services to groundwater users it could be regarded as a "business" undertaking and so classified. However at this stage of development of groundwater in the NT this activity should continue as government service and therefore classified as General Community.

PAWA RESPONSIBILITY

There is a definite need for PAWA to determine policies for groundwater management in the Katherine rural area to ensure that supplies to existing competing users are safeguarded. Abandonment is not an option. PAWA should retain responsibility.

COST RECOVERY

The 1987/88 Budgetted Expenditure of $167,900 is being provided by WRG.
APPENDIX 9.15

PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Donkey Camp Water Quality

Total estimated cost not applicable, is ongoing requirement at consistent level of activity

<table>
<thead>
<tr>
<th>1987/88 Budgetted Expenditure</th>
<th>$7,400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$1,295</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$8,695</strong></td>
</tr>
</tbody>
</table>

DESCRIPTION
Survey and assessment of water quality of Katherine’s source water supply. Operations Group requirement for water treatment plant operation and water quality management purposes.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As this project is to assist in the operation of Katherine Town water supply system the Classification for this activity is "Business".

PAWA RESPONSIBILITY
Is clearly an operational responsibility of PAWA, there are no other viable options to consider.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $7,400 the amount being recovered is $1,000 (or 14%). There should be internal recovery of the full project cost from Planning and Development and/or Operations Groups which would become a charge against PAWA town water supply operations and be passed on to consumers.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Emily Creek Recreation Lake - Stage 2
Total estimated Cost Stage 1 $60 000 Stage 2 $153 200

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$26 810</td>
</tr>
<tr>
<td>Total</td>
<td>$180 010</td>
</tr>
</tbody>
</table>

DESCRIPTION
Investigate involving hydrologic engineering and environmental studies in two stages by consultants of site for recreation lake at Alice Springs, as an NT Government initiative with Department of Lands and Housing as lead agency.

LEGISLATION
There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION
The provision of recreation lakes is not a business activity of PAWA. As this investigation is NT Government initiative with Department of Lands and Housing being lead agency the appropriate classification for this activity is "Client".

PAWA RESPONSIBILITY
As PAWA has expertise to oversight consultant carrying out the study it is appropriate that it retain management responsibility for the study on behalf of the lead agency.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $153 200 the amount being recovered is $150 000 (or 98%). There should be full recovery of the project cost by PAWA/WRG from the client.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Limnology of Darwin River Dam and Manton Dam.

Total Estimated Cost - not applicable is ongoing requirement at consistent level of activity.

1987/88 Budgetted Estimate  $3,100
Overhead  542

$3,642

DESCRIPTION
Sampling and monitoring programme to assess ecology of reservoir to assist in preservation of Darwin water supply quality. Requirement of PAWA Operations Group.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As this project is to assist the operation of Darwin town water supply system, the classification for the activity is "business".

PAWA RESPONSIBILITY
Is clearly an operational responsibility of PAWA and there are no other viable options to consider.

COST RECOVERY
Of the 1987/88 budgetted expenditure of $3,100 the amount being recovered is $400 (or 13%). There should be internal recovery by WRG from Planning and Development and/or Operation Groups of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
APPENDIX 9.18

PROJECT ANALYSIS

PROGRAMME

Water Supply

PROGRAMME

Limnology of Maryanne Dam.

Total Estimated Cost not applicable; is an ongoing requirement at consistent level of activity.

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$2,240</td>
</tr>
<tr>
<td>$12,800</td>
<td></td>
</tr>
<tr>
<td>$15,040</td>
<td></td>
</tr>
</tbody>
</table>

DESCRIPTION

Sampling and monitoring programme to assess ecology of Maryanne Dam, which is a recreation lake serving Tennant Creek Community. Current responsibility for maintenance of the lake is vested in Department of Transport and Works.

LEGISLATION

There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION

As maintenance of this recreation lake is not part of PAWA water supply responsibility, and as this project activity is being carried for another Government agency classification is "client".

FUTURE PAWA RESPONSIBILITY

OPTIONS

Abandon - not an option as this service is ongoing requirement of client.

Transfer - project could be handed back to Department of Transport and Works to arrange for alternate supply of this service.

Retain - while PAWA has expertise and Laboratory Facilities it is an appropriate option to retain.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $12,800 the amount being recovered is $2,000 (or 16%). There should be full recovery of the project cost by PAWA/WRG from the client.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Public Health Water Analysis

Total Estimated Cost - Not applicable is an ongoing requirement at consistent level of activity.

1987/88 Budgetted Expenditure
Overhead $463,600
$81,130

$544,730

DESCRIPTION
Sampling and bacteriological analysis and reporting on town and community water supply systems for compliance with NHMRC standards. Also bacteriological testing of samples from open water bodies such as recreation lakes and swimming pools. Work is mainly carried out by Parap laboratories with small component from East Point laboratory for PAWA Operations Group in case of town and community supplies and for Dept of Health and local Town Councils in case of open water bodies.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
Bacteriological water quality monitoring of town and community water supplies is an essential operational requirement of this system and is for the benefit of water supply consumers and is classified as "Business". That part of the project activity which is required by Dept of Health and Community Services and Local Councils is for specific needs of these Authorities and is classified as "Client".

PAWA RESPONSIBILITY
Abandonment of this project is not an option; it is an operational requirement for maintaining safe water quality to consumers.

Transfer to another agency is not an option; while Dept of Health and Community Services has responsibility for safeguarding public health its role is one of "watchdog" and does not remove operational responsibility from PAWA.

PAWA has the required expertise and should retain management responsibility.
COST RECOVERY

Of the 1987/88 budgetted expenditure of S463,600 only S125,000 or 27% of the total cost is to be recovered. Included in this amount is approx S25,000 contributed by Dept of Health and Community Services to cover cost of monitoring AES community supplies. As this activity is classified "Business" and "Client" there should be full cost recovery.

The cost recovery for the "Business" part of the activity should be internal from Operations Group and passed on to consumers in case of PAWA town supplies, and to NT Government in case of community supplies. Funds provided for the community supplies should be included in the total funding provided by Govt to PAWA for AES water supplies and sewerage and not routed through Department of Health and Community Services as at present. Full cost recovery from this part of the activity classified as "client" should be obtained from Department of Health and Community Services and Local Councils as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AES Supplies</td>
<td>185,466</td>
<td>100,000</td>
<td>217,900</td>
</tr>
<tr>
<td>Overhead</td>
<td>32,454</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA Town Supplies</td>
<td>185,466</td>
<td>100,000</td>
<td>217,900</td>
</tr>
<tr>
<td>Overhead</td>
<td>32,454</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dept of Health &amp; Community Services</td>
<td>46,354</td>
<td>25,000</td>
<td>54,465</td>
</tr>
<tr>
<td>Overhead</td>
<td>8,111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various Councils</td>
<td>46,354</td>
<td></td>
<td>54,465</td>
</tr>
<tr>
<td>Overhead</td>
<td>8,111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td>554,730</td>
<td>S125,000</td>
<td>S544,730</td>
</tr>
</tbody>
</table>
PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Draft policy for controlled releases from Darwin River Dam.

Total Estimated Cost $10,000
1987/88 Budgetted Expenditure
Overhead

$1,700
297

$1,997

DESCRIPTION

Field work and inhouse desk study to determine minimum releases to maintain pre-dam river flows so storage and beneficial use of water can be maximised.

Project initiated by PAWA Planning and Development Group.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

As the project is directly related to Darwin River Dam which is operated for supply of Darwin consumers the classification of this activity is "Business".

PAWA RESPONSIBILITY

Operation of Darwin water supply is PAWA responsibility and Project management should therefore remain with PAWA.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $1,700 the amount being recovered is $nil. There should be internal recovery from PAWA Planning and Development of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
APPENDIX 9.21

PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Tennant Creek Borefield model
Total Estimated Cost $16 000
1987/88 Budgetted Expenditure $14 200
Overhead 2 485

$16 685

DESCRIPTION
Development of a computerised model of the ground water resource of Tennant Creek to serve as management tool for future operation, development, and groundwater recharge schemes. The project client is PAWA Operations Group.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As project is directed to operations of Tennant Creek Town water supply the classification for this activity is "Business".

PAWA RESPONSIBILITY
Tennant Creek, TW supply is an operational responsibility of PAWA and therefore management of this project should remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $14 200 the amount being recovered is $nil. There should be internal recovery by WRG from Planning and Development and/or Operations Groups of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Darwin Water Supply Surface Water Yields.

Total estimated cost $15 100
1987/88 Budgetted Expenditure $13 100
Overhead $2 275
$15 275

DESCRIPTION
In house study to update max yields from 6 potential surface water storages.
The project client is PAWA Operations Group.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
Project is planning for future augmentation of water supply dams which are operated for supply of water to Darwin and other consumers: the classification of this activity is "Business".

PAWA RESPONSIBILITY
Planning for future water supply augmentation of Darwin water supply is PAWA responsibility and project management should therefore remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $13 000 the amount being recovered is Snill. There should be internal recovery by WRG from Planning and Development and/or Operation Groups of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Darwin Water Supply Surface Water Yields.

Total Estimated Cost $250 000 (most of expenditure was prior 1985).

<table>
<thead>
<tr>
<th>1987/88 Budgetted Expenditure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$8 200</td>
</tr>
<tr>
<td></td>
<td>$1 435</td>
</tr>
<tr>
<td></td>
<td>$9 635</td>
</tr>
</tbody>
</table>

DESCRIPTION
In house study to update max yields from 6 potential surface water storages.

The project client is PAVA Operations Group.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
Project is planning for future augmentation of water supply dams which are operated for supply of water to Darwin and other consumers; the classification of this activity is "Business".

PAWA RESPONSIBILITY
Planning for future water supply augmentation of Darwin water supply is PAWA responsibility and project management should therefore remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $13 000 the amount being recovered is $nil.

There should be internal recovery by WRG from Planning and Development and/or Operation Groups of the full project cost which would become a charge against PAWA town water supply operations and be passed on to consumers.
PROJECT ANALYSIS

PROGRAMME
Water Supply

PROJECT
Kings Canyon Ground Water Investigation

Total Estimated Cost $250,000 (most of expenditure was prior 1985).

1987/88 Budgetted Expenditure
Overhead

DESCRIPTION
Investigation of groundwater resources in Kings Canyon area to support proposed future Tourist development.
Investigations involved drilling and test pumping, data assessment and preparation of report.
Department of Industries and Development and Department of Lands are the NT Government agencies sponsoring this development.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
This project is for the establishment of a water supply for specific future private development and is therefore classified as "Client" activity.

PAWA RESPONSIBILITY
Abandonment of the project is not an option, is a client requirement.
Transfer to another Government agency is also not appropriate as PAWA is the only NT Government agency with required expertise. At the initiating stage of this type of project consideration could be given to use of consultants.

SCOPE FOR COST RECOVERY
The 1987/88 Budgetted expenditure of $8,200 is being provided by WRG.
As this project is a "Client" activity full cost should be recovered from the client.
The client may be the NT Government agency sponsoring the development in this case Department of Industries and Development and/or Department of Lands if it is Government policy so to assist private developments.

Alternatively the private developer could be required to meet the costs of the investigation either by providing funds to the Departments or direct employment of private consultants.
PROJECT ANALYSIS

PROGRAMME

Water Supply

PROJECT

Groundwater Supply Monitoring

Total Estimated Cost - Not applicable project is ongoing over a number of years.

<table>
<thead>
<tr>
<th>Description</th>
<th>1987/88 Budgetted Estimated</th>
<th>Overhead $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection of water level data,</td>
<td>$429,200</td>
<td>$75,110</td>
</tr>
<tr>
<td>pumpage rate and water quality</td>
<td></td>
<td>$504,310</td>
</tr>
<tr>
<td>and interpret trends in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance of the resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with the objective of identifying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>areas under stress due to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pollution and to prioritise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>supply problems. This is the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>part of the total groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>monitoring programme that is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>directed at existing established</td>
<td></td>
<td></td>
</tr>
<tr>
<td>towns and community supplies and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>water supply systems.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

Most of this part of the total groundwater monitoring activity is directed to the maintenance of established town and community supplies which are the business undertakings of PAWA. The classification of this activity is "Business". Some of the project activity is for monitoring ground water areas of interest to other agencies and this part of the activity should be classified "client".

PAWA RESPONSIBILITY FOR PROJECT MANAGEMENT

Abandonment of this activity is not an option.

Transfer to another Department or agency also not an option as responsibility for supply of water in NT rests with PAWA and this project activity is an integral part of managing the established ground water supply systems.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $429,000 the amount be recovered is $nil. There should be full recovery of the project cost.

That part of the project cost attributed to town water and AES supplies should be recovered internally by WRG from Operations Group, and become a charge against
PAWA from town water supply operations and passed on to consumers or in the case of AES supplies the NT Governent would need to provide funds in lieu of revenue.

That part of the Project cost which covers the clients requirement should be recovered from the client. On the basis of the 1987/88 programme and expenditure cost recovery would be as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUSINESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA Town Supplies</td>
<td>137,356</td>
<td></td>
<td>161,394</td>
</tr>
<tr>
<td>Overhead</td>
<td>161,394</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA Community Supplies</td>
<td>227,503</td>
<td></td>
<td>267,316</td>
</tr>
<tr>
<td>Overhead</td>
<td>267,316</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLIENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lands and Housing</td>
<td>21,447</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Overhead</td>
<td>3,753</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Industries and</td>
<td>21,447</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Development</td>
<td>3,753</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Overhead</td>
<td>25,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palmerston Town Council</td>
<td>21,447</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Overhead</td>
<td>3,753</td>
<td></td>
<td>25,200</td>
</tr>
<tr>
<td>Overhead</td>
<td>25,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS:</strong></td>
<td>504,310</td>
<td></td>
<td>504,310</td>
</tr>
</tbody>
</table>
APPENDIX 9.26

PROJECT ANALYSIS

PROGRAMME
Waste Water Management

PROJECT
Rum Jungle Project Management and Rum Jungle monitoring. Total Estimated Costs $19.2 million spread over 6 years

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budgetted Expenditure</td>
<td>$303,100</td>
</tr>
<tr>
<td>Overhead</td>
<td>$53,042</td>
</tr>
<tr>
<td>Total</td>
<td>356,142</td>
</tr>
</tbody>
</table>

DESCRIPTION
Monitoring of surface and groundwater at and downstream of Rum Jungle for assessment of the effectiveness of rehabilitation programmes.

The work on this project is nearing completion and monitoring will be reduced by 1988.

Final report on Rum Jungle Project management has been completed. Final report on monitoring due end of 1988. The project is a requirement of Commonwealth Government.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
The project is a requirement of Commonwealth Government and is classified as "Client".

PAWA RESPONSIBILITY
As PAWA has the necessary expertise to carry out most of the field work, investigatory and analytical activity involved in this project it is appropriate that it act as the NT Government lead agency and be responsible for the project management.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $303,100 the amount being recovered is $204,400 (or 67%). There should be full recovery of the project cost from the Commonwealth and NT Governments for undertaking the project as a General Community activity.

Apportionment of recovery between Commonwealth and NT Governments is based on agreement between Commonwealth Government and NT that field expenses, consultant fees, and contracts will be paid by Commonwealth and all salary costs paid by NT Government.

As this project is not a requirement of PAWA "business activities full cost should be recovered from Commonwealth and NT Governments."
PROJECT ANALYSIS

PROGRAMME

Waste Water Management

PROJECT

Katherine Waste Water Disposal.

Total Estimated Cost $25 300

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$11 400</td>
</tr>
<tr>
<td>Total</td>
<td>$13 395</td>
</tr>
</tbody>
</table>

DESCRIPTION

Waste water from Katherine sewerage system is treated in holding ponds and the effluent disposed of by evaporation. Evaporative capacity is inadequate and surplus effluent is discharged to Katherine River when the river height has reached a predetermined level.

The existing system of disposal is being monitored and a model developed to estimate the effluent excess to be disposed over next decade so that an environmentally "safe" system of disposal can be developed.

The project is a requirement of the Operations Group.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

The purpose of the project is to assist disposal of Katherine Sewerage effluent. The Katherine sewerage system is operated by PAWA to service consumers and the project classification is therefore "Business".

PAWA RESPONSIBILITY

Abandonment is not an option. As management by Katherine sewerage systems is currently vested in PAWA transfer to another agency or Local Government is also not an option.

Management should remain with PAWA.
COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $11 400 the amount being recovered is $nil. There should be internal recovery from Operations Group of the full project cost which would become a charge against PAWA sewerage services and be passed on to consumers.
APPENDIX 9.28

PROJECT ANALYSIS

PROGRAMME
Waste Water Management

PROJECT
Ground Water Supply Monitoring Total estimated cost - Not applicable project is ongoing

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budgetted Estimate</td>
<td>$26,700</td>
</tr>
<tr>
<td>Overhead</td>
<td>$4,673</td>
</tr>
<tr>
<td></td>
<td>$31,373</td>
</tr>
</tbody>
</table>

DESCRIPTION
Collection of water level data and water quality and interpret trends in the resource with the objective of identifying areas under stress from waste water disposal pollution.

This activity is in respect to PAWA Sewerage system effluent outfalls and is a requirement of PAWA Operations Group.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
As this part of the total ground water monitoring activity is to determine the effect of waste water disposal from PAWA Sewerage Systems on receiving ground water classification should be "Business".

FUTURE PAWA RESPONSIBILITY
Abandonment of this activity is not an option.

Transfer to another Department or agency also not an option as responsibility of protection of the ground water resource in NT rests with PAWA. PAWA should retain responsibility for this project.

COST RECOVERY
The 1987/88 budgetted expenditure of $26,700 is being met by WRG. There should be full internal cost recovery from Operations Group, and these costs charged to PAWA business activity and recovered from its consumers.
PROJECT ANALYSIS

PROGRAMME
Waste Water Management

PROJECT
Frances Bay Mooring Basin - Water quality monitoring
Total Estimated Cost $30 000

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budgetted Estimate</td>
<td>$5 500</td>
</tr>
<tr>
<td>Overhead</td>
<td>$962</td>
</tr>
<tr>
<td></td>
<td>$6 462</td>
</tr>
</tbody>
</table>

DESCRIPTION
Monitoring and collection of water quality data to assess trends of mooring basin construction and operations on water quality in Darwin Harbour. The project is a requirement of COMTAG (Coastal Management Technical Advisory Group - Chaired by CCNT).

LEGISLATION
There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION
This is a one "off" project required by the Coastal Management Technical Advisory Group and as such should be classified as "Client" activity.

PAWA RESPONSIBILITY
PAWA is not required by Statute to carry out this activity.

PAWA through WRG has expertise to manage this project on behalf of another NT Government agency; alternatively projects of this type could be carried out by employment of Consultants with PAWA/WRG providing technical oversight.

At this stage of the project abandonment or transfer to another Government Agency are not options and management responsibility should remain with PAWA.

COST RECOVERY
Of the 1987/88 budgetted expenditure of $5 500 the amount being recovered is $nil. There should be full recovery of the project cost from the NT Government lead agency, the Conservation Commission.
APPENDIX 9.30

PROJECT ANALYSIS

PROGRAMME

Waste Water Management

PROJECT

Pine Creek Goldmine - Regional Monitoring

Total Estimated Cost not applicable as monitoring will continue for the life of the mine

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>$875</td>
</tr>
<tr>
<td></td>
<td>$5,875</td>
</tr>
</tbody>
</table>

DESCRIPTION

Field monitoring and assessment of data provided by Pine Creek Gold mine to provide ongoing advice on action necessary to prevent unacceptable impact on regional water resources due to mining operations.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

This project could be regarded as a requirement of NT Government to ensure protection of the NT Water Resources from degradation due to mining. If this is accepted then the activity would be classified as "General Community" as activity is being carried out to protect water resources for future users and the general public good.

It could also be argued that as mining activity is causing this requirement costs should be met by Pine Creek Gold. In this case classification of the project would be "Client". On the assumption that royalties paid by mining companies to government are intended to cover all costs the classification of General Community has been adopted.

PAWA RESPONSIBILITY

Abandonment of this project is not an option - as it is an ongoing statutory requirement to control discharges into the water environment.

As PAWA has the expertise and has the responsibility vested in it by Statute transfer to another Government agency is also not an option.

Responsibility for project management should remain with PAWA.
COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $5 000 the amount being recovered is $nil. There should be full recovery of the project cost from the NT Government for undertaking the project as a General Community activity.
APPENDIX 9.31

PROJECT ANALYSIS

PROGRAMME
Waste Water Management

PROJECT
Woodcutters Mine Regional Monitoring.
Total Estimated Cost not applicable as monitoring will continue for the life of the mine.

1987/88 Budgetted Estimate $5 000
Overhead $875
Total $5 875

DESCRIPTION
Field monitoring and assessment of data provided by Woodcutters Mine to provide ongoing advice on action necessary to prevent unacceptable impact on regional water resources due to mining operators.

LEGISLATION
Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
This project could be regarded as a requirement of NT Government to ensure protection of NT water resources from degradation due to mining. If this is accepted then the activity would be classified as "General Community".

It could also be argued that as mining activity is causing this requirement costs should be met by the mining company concerned. In this case classification of the project would be "Client". On the assumption that royalties paid by mining companies to government are intended to cover all costs the classification of "General Community" has been adopted.

PAWA RESPONSIBILITY
Abandonment of this project is not an option - it is an ongoing requirement by Statute to control discharges into the water environment.

As PAWA has the expertise and has the responsibility vested in it by Statute transfer to another Agency is also not an option.

Responsibility for project management should remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $5 000 the amount being recovered is $Nil. There should be full recovery of the project cost from the NT Government for undertaking the projects as a General Community activity.
APPENDIX 9.32

PROJECT ANALYSIS

PROGRAMME
Waste Water Management

PROJECT
Surface Water Resource Inventory and Data Processing.
Total Estimated Cost - Not applicable is an ongoing activity spanning several years.

1987/88 Budgetted Expenditure
$256 500
Overhead
$44 888
$301 388

DESCRIPTION
Collection and processing of surface water flows and rainfall data from stream gauging sites for monitoring effects of waste water disposals on quality of surface water resources.

LEGISLATION
Section 14 of the PAWA Act authorise PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
These specific purpose or "project" stations are for monitoring effects of waste water outfalls (consisting of urban drainage, sewerage, industry and mining wastes).

Those stations maintained specifically for PAWA to monitor sewerage and town water supply operations are classified as Business.

Stations maintained to monitor outfalls from industry and mining are classified as "Client".

PAWA RESPONSIBILITY
There is an ongoing practical need for the data to be collected and abandonment is not an option. There is no other Government agency with operational expertise to whom this activity could be transferred. Responsibility should remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $256 000 the amount being recovered is $89 000 (or 35%). There should be full recovery of the project cost.

That part of the project cost attributed to town water supply and sewerage services should be recovered internally from the Operations Group and become a charge against PAWA town water supply and sewerage services and passed on to consumers.
That part of the project cost which serves the client's requirements should be recovered from the client on the basis of the 1987/88 programme and expenditure cost recovery would be as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA (TWS)</td>
<td>38,638</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead</td>
<td>6,762</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45,400</td>
<td></td>
<td>45,400</td>
</tr>
<tr>
<td>CLIENT</td>
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<tr>
<td>ARRU</td>
<td>145,968</td>
<td>50,000</td>
<td>171,512</td>
</tr>
<tr>
<td>Overhead</td>
<td>25,544</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>171,512</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHP</td>
<td>15,250</td>
<td>15,000</td>
<td>17,919</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17,919</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUM JUNGLE</td>
<td>56,644</td>
<td>24,000</td>
<td>66,557</td>
</tr>
<tr>
<td>(Commonwealth)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Overhead</td>
<td>9,913</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>66,557</td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>301,388</td>
<td>89,000</td>
<td>301,388</td>
</tr>
</tbody>
</table>
APPENDIX 9.33

PROJECT ANALYSIS

PROGRAMME

Waste Water Management

PROJECT

Alligator Rivers Region Unit (Laboratories)

Total Estimated Costs - not applicable; is an ongoing program which will continue with mining activity in the region.

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$71,628</td>
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<tr>
<td></td>
<td>$480,928</td>
</tr>
</tbody>
</table>

DESCRIPTION

This project includes professional advice on sampling and analysis and reporting results on water samples from the Alligator Rivers Region. The sampling is for environmental monitoring of effects of radium mining activities. Analysis of samples includes low to ultra trace analysis for metals, nutrients and radium. The work is required by the NT Government Department of Mines and Energy.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

This project is a requirement of ARRU of Department of Mines and Energy which has responsibility under the Uranium Mining (Environmental Control) Act (UMEC Act) to ensure Government requirements for protection of the environment are complied with.

PAWA is providing a laboratory service to ARRU and the project is therefore considered as "client".

PAWA RESPONSIBILITY

Of the 1987/88 Budgetted Expenditure of $409,300 the amount being recovered is $nil.

There should be full recovery of the project cost from the Department of Mines and Energy.

PAWA has the laboratory resources and expertise to carry out analytical work for ARRU but transfer to ARRU is an option that should be considered. While PAWA has the resources however responsibility of Project Management should be retained.
COST RECOVERY

The 1987/88 Budgetted expenditure of $409,300 is being funded from WRG budget. As this is a client activity there should be full cost recovery from Department of Mines and Energy (ARRU).
APPENDIX 9.34

PROJECT ANALYSIS

PROGRAMME

Unallocated

PROJECT

Other Professional Advice Total Estimated Cost - Not applicable; is an ongoing activity at consistent level.

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>1987/88 Budgetted Expenditure</th>
<th>Overhead</th>
<th>Total Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$171,000</td>
<td>$30,047</td>
<td>$201,747</td>
</tr>
</tbody>
</table>

DESCRIPTION

Advice in response to requests from Government Departments, Agencies, Industry, Consultants and General Public requiring input (at P3 and P2 level). Includes advice on groundwater matters not covered under Rural Advisory Service, advice on flood plain matters, review of environmental impact statements and preliminary environmental reports.

LEGISLATION

Section 14 of the Power and Water Authority Act authorises PAWA to assess, manage and develop water resources in the Territory.

Section 15 of the Power and Water Authority Act empowers the Authority to participate in research projects.

CLASSIFICATION

The provision of this advice is in response to requests from Government Departments, industry, consultants and the general public for their specific requirements. As the nature of the services provided is adhoc and as it is administratively difficult to recover costs on a client services basis the activity is seen as a government service and is classified as General Community.

PAWA RESPONSIBILITY

Options

Abandon: Not an option as "advice" sought is an ongoing requirement by other Government Departments, Consultants and General Public.

Transfer: PAWA is the only NT Government Department with the necessary expertise and database to provide this service.

Retain: PAWA is the appropriate Government agency to provide this service and should retain responsibility.
COST RECOVERY

Of the 1987/88 budgetted expenditure of $171,700 the amount being recovered is $nil. There should be full recovery of the project cost by PAWA/WRG from the clients.

On the basis of the 1987/88 programme and expenditure, cost recovery of $201,747 would be from the NT Government.
APPENDIX 9.35

PROJECT ANALYSIS

PROGRAMME

Unallocated

PROJECT

Limnology Total Estimated Cost - Not applicable; is an ongoing activity.

1987/88 Budgetted Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$38,400</td>
</tr>
<tr>
<td></td>
<td>$6,720</td>
</tr>
<tr>
<td></td>
<td>$45,120</td>
</tr>
</tbody>
</table>

DESCRIPTION

Sampling and monitoring programme to assess ecology of open water bodies other than those that are part of PAWA water supply systems. The work is carried out at request of other NT Government Department, Private Developers, Tourist Industry and General Public.

LEGISLATION

There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION

As this work is a specific requirement of various "clients" and is not directed at maintaining ecology and hence service ability of PAWA water storages the project activity is classified as "Client".

PAWA RESPONSIBILITY

Options

Abandon: Could be abandoned by PAWA and those requiring the service obtain it from Private Sector Laboratories.

Transfer: While PAWA retains laboratory facilities and has expertise and resources to provide this service it is the appropriate Government agency and transfer is not an option.

Retain: PAWA should continue to retain responsibility for this service while it maintains its own laboratory facilities.

COST RECOVERY

Of the 1987/88 budgetted expenditure of $38,400 the amount being recovered is $nil. There should be full cost recovery of the project cost by PAWA/WRG from the client.

On the basis of the 1987/88 programme and expenditure, cost recovery of $45,120 would be from NT Government.
APPENDIX 9.36

PROJECT ANALYSIS

PROGRAMME

Baseline Inventory

PROJECT

Douglas/Daly Monitoring Bores Total estimated cost $42,500 (WRG)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budget Expenditure</td>
<td>$42,500 (WRG)</td>
</tr>
<tr>
<td>Overhead</td>
<td>$7,438</td>
</tr>
<tr>
<td></td>
<td>$49,938</td>
</tr>
</tbody>
</table>

DESCRIPTION

Regional monitoring of areas identified as having need for longer term information regarding groundwater resources concluding in 1987/88.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

The project is required to monitor the use of groundwater from an area where existing utilization is high and there is potential for further users. As the existing and potential users are spread over town water supply, industry, pastoral and irrigated agriculture classification is General Community.

PAWA RESPONSIBILITY

The project concludes in 1987/88 and is best completed by Water Resources Group.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $42,500 the amount being recovered is $nil. There should be full recovery of the project cost from NT Government for undertaking this project as a General Community activity.
APENDIX 9.37

PROJECT ANALYSIS

PROGRAMME
Baseline Inventory

PROJECT
Ground Water Supply Monitoring
Total estimated cost - not applicable, ongoing at a consistent level of activity.

Total 1987/88 Budget (WRG) $235,700
Overhead $41,247

$276,947

DESCRIPTION
Collect and store data to enable investigation of Regional groundwater hydrology to provide the basis for policies on groundwater development and management throughout the Northern Territory.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
The project is undertaken to enable most beneficial use of the Northern Territory groundwater resources with a view to potential development and is classified as "General Community".

PAWA RESPONSIBILITY
Abandonment would mean a deficiency of water resource base data in areas of potential development and would prejudice long term maintenance and security of existing supplies, and is therefore not an option.

Transfer to another Government agency is not appropriate as WRG has the necessary expertise. Responsibility should remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $235,700 the amount being recovered is Snil. There should be full recovery of the project cost by PAWA/WRG from the NT Government for undertaking this project as a General Community activity.
APPENDIX 9.38

PROJECT ANALYSIS

PROGRAMME

Baseline Inventory

PROJECT

Groundwater Data Processing Total estimated cost - not applicable, ongoing at a consistent level of activity

1987/88 Budget $158 300 (WRG)
Overhead $27 702
$186 003

DESCRIPTION

Maintain throughout the Northern Territory

(1) Groundwater data system

(2) Gradual placement of base data on computer storage.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

The project is to enable most beneficial use of the Northern Territory groundwater resources and is classified as "General Community".

PAWA RESPONSIBILITY

Abandonment would mean a deficiency of water resource in areas of potential development and would prejudice long term maintenance and security of existing supplies, and is therefore not an option.

Transfer to another Government agency is not appropriate as WRG has the necessary expertise. Responsibility should remain with PAWA.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $158 300 the amount being recovered is $nil. There should be full recovery of the project cost by PAWA/WRG from the NT Government for undertaking this project as a General Community activity.
APPENDIX 9.39

PROJECT ANALYSIS

PROGRAMME
Baseline Inventory

PROJECT
Technical and Scientific Computing Services
Total estimated cost - not applicable, ongoing at a consistent level of activity.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budget (WRG)</td>
<td>$64,500</td>
</tr>
<tr>
<td>Overhead</td>
<td>$11,287</td>
</tr>
<tr>
<td></td>
<td>$75,787</td>
</tr>
</tbody>
</table>

DESCRIPTION
Development and maintenance computer software for storing and placing Water Resources data into systems as part of surface and ground water resources monitoring and data processing.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
The project is undertaken as part of the total NT water resource assessment programme and is classified as General Community work.

PAWA RESPONSIBILITY
The function flows logically from all other Water Resources and is in general support of all programmes and abandonment is not an option. The function is best undertaken by Water Resources Group which has the expertise not available in other NT Government agencies and therefore responsibility should remain with PAWA.

FOR COST RECOVERY
Of the 1987/88 Budgeted Expenditure of $64,500 the amount being recovered is $nil. There should be full recovery of the project cost from NT Government for undertaking this project as a General Community activity.
PROJECT ANALYSIS

PROGRAMME

Baseline Inventory

PROJECT

Surface Water Resource Inventory and Data Processing

<table>
<thead>
<tr>
<th>1987/88 Budget</th>
<th>$ 846,100 (WRG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$ 148,067</td>
</tr>
<tr>
<td>$ 994,167</td>
<td></td>
</tr>
</tbody>
</table>

DESCRIPTION

Field operations, maintenance and construction of network of gauging stations and pluviographs throughout NT.

Collect and store data in computer system to enable investigation of surface water resources to provide the basis for policies on surface water development and management throughout the Northern Territory.

The majority of Resources Inventory Stations have one or more "secondary" clients who are stated as having a specific interest in the site. These clients include Roads Division (Transport and Works), Industries and Development, NTES, Conservation Commission, the Water Operations Group of PAWA, Commonwealth (Rum Jungle monitoring), ANPWS, ARRU (DME), Office of Supervising Scientist.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

Although a number of agencies have indicated their possible interest in the data at some future time, they have no current specific requirement. The project is therefore undertaken on behalf of the wider community with a view to potential development and is classified as General Community work.

PAWA RESPONSIBILITY

Abandonment would mean a deficiency of base data regarding Territory water resources in areas of potential development and would prejudice long term maintenance and security of existing supplies and is not an option. The function is best undertaken by WRG which has the necessary expertise not available in other NT Government agencies; responsibility should therefore remain with PAWA.
91.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $846,100 the amount being recovered is $nil. There should be full recovery of the project cost from the NT Government for undertaking this project as a General Community activity.
APPENDIX 9.41

PROJECT ANALYSIS

PROGRAMME
Baseline Inventory

PROJECT
Surface Water Quality Surveys
Total estimated cost $23,000 (WRG)

<table>
<thead>
<tr>
<th>1987/88 Budget Estimate</th>
<th>$13,000 (WRG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead</td>
<td>$2,275</td>
</tr>
<tr>
<td></td>
<td>$15,275</td>
</tr>
</tbody>
</table>

DESCRIPTION
Collection of base line information of some key rivers over a 6 month period. Field work is completed and funds now required only for completion of report. The Commonwealth Government provided funds under FWRAP in previous years.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION
The project provides data relevant to future development of the Northern Territory and is classified as General Community.

PAWA RESPONSIBILITY
Abandonment would mean a deficiency in water quality data in key rivers and is not an appropriate action. The function is best undertaken by WRG which has the necessary expertise to complete the project; responsibility should therefore remain with PAWA.

COST RECOVERY
Of the 1987/88 Budgeted Expenditure of $13,000 the amount being recovered is $nil. There should be full recovery of the project cost by PAWA/WRG from NT Government for undertaking the project as a General Community activity.
APPENDIX 9.42

PROJECT ANALYSIS

PROGRAMME
Baseline Inventory

PROJECT
NT Water Vol 2 and Water Plan Total estimated cost Vol 1, Vol 2 and Vol 3

1987/88 Budget (WRG) $71 200
Operational overhead $12 460
$83 660

DESCRIPTION
Volume 1: Resources assessment (completed)
Volume 2: Identifies problems and emerging issues for NT.
Volume 3: Strategy for NT planning. Clients are Commonwealth NT Governments.

LEGISLATION
Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

Section 15 of the PAWA Act empowers the Authority to participate in research projects.

CLASSIFICATION
The project is being undertaken as part of Northern Territory and National programme of water resource assessment, development and protection, and is therefore classified as General Community.

PAWA RESPONSIBILITY
The project provides for publication of essential information relating to Territory Water Resources and should not be abandoned. The function is best undertaken by Water Resources Group which has the necessary expertise to complete the task which should therefore remain a PAWA responsibility.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $71 200 the amount being recovered is $33 000 (or 46%).

The existing recovery is from Commonwealth Government contribution. There should be full recovery of the project cost from the NT Government for undertaking this project as a General Community activity.


**PROJECT ANALYSIS**

**PROGRAMME**
Flood Protection

**PROJECT**
Flood Warning Systems Total Estimated Cost $150,000 (WRG)

<table>
<thead>
<tr>
<th>1987/88 Budget Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>$48,600 (WRG)</td>
</tr>
</tbody>
</table>

**DESCRIPTION**
Install/upgrade flood warning system on NT rivers including the Katherine, Daly and Todd, involving establishment, setting up and testing on behalf of NTES. Commonwealth provides funding support.

**LEGISLATION**
There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

**CLASSIFICATION**
This project is a requirement of the Northern Territory Emergency Services and since it is undertaken at the request of that agency it is classified as a client activity.

**PAWA RESPONSIBILITY**
The project is essential to Emergency Services and therefore cannot be abandoned. PAWA/WRG has the expertise to oversight this work on behalf of NTES and PAWA should retain responsibility.

**COST RECOVERY**
Of the 1987/88 Budgetted Expenditure of $48,600 the amount being recovered is $10,000 (or 20%). There should be full recovery of the project costs from the client on the basis of 1987/88 programme and expenditure cost recovery would be as follows:

<table>
<thead>
<tr>
<th></th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commonwealth govt</td>
<td>57,105</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>NTES/NT Govt.</td>
<td></td>
<td>47,105</td>
<td></td>
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</tbody>
</table>
PROJECT ANALYSIS

PROGRAMME

Flood Protection

PROJECT

Surface Water Resources Inventory and Data Processing This is an ongoing programme at consistent level of activity

1987/88 Budget $245,000 (WRG)
Overhead $42,875
$287,875

DESCRIPTION

Field operations, maintenance and construction of network of project gauging stations and pluviographs throughout NT, to aid Territory developmental works. The information is required by Transport and Works (Roads), Lands and Housing, and NT Emergency Services.

LEGISLATION

Section 14 of the PAWA Act authorises PAWA to assess, manage and develop water resources in the Territory.

CLASSIFICATION

As these gauging stations are operated at the request of other agencies the project is classified as a client activity.

Clients are:

(1) The Department of Transport and Works Roads for bridge design.
(2) The Department of Lands and Housing as lead agency for Flood Plain Mapping
(3) NTES as lead agency for Flood Warning Systems

PAWA RESPONSIBILITY

The project is an ongoing requirement essential to the needs of other NT Government agencies and therefore cannot be abandoned. The function involves expertise and infrastructure that are best provided by the Water Resources Group. PAWA should retain responsibility.
COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $245,000 the amount being recovered is $58,700 (or 24%). There should be full recovery of the project costs from the clients on the basis of 1987/88 programme and expenditure cost recovery would be as follows:

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>COST</th>
<th>PRESENT COST RECOVERY</th>
<th>PROPOSED COST RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Transport &amp; Works</td>
<td>62,469</td>
<td>58,700</td>
<td>73,400</td>
</tr>
<tr>
<td>Overhead</td>
<td>10,931</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>73,400</td>
<td></td>
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</tr>
<tr>
<td>NT Emergency Services</td>
<td>91,265</td>
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<td>107,237</td>
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<tr>
<td>Overhead</td>
<td>15,972</td>
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<tr>
<td></td>
<td>107,237</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Lands and Housing</td>
<td>91,266</td>
<td></td>
<td>107,238</td>
</tr>
<tr>
<td>Overhead</td>
<td>15,972</td>
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<tr>
<td></td>
<td>107,238</td>
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<td>Total:</td>
<td>287,875</td>
<td>58,700</td>
<td>287,875</td>
</tr>
</tbody>
</table>
APPENDIX 9.45

PROJECT ANALYSIS

PROGRAMME

Flood Protection

PROJECT

Flood Plain Mapping Studies This is an ongoing programme at a fairly consistent level of activity

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987/88 Budget</td>
<td>$56,900 (WRG)</td>
</tr>
<tr>
<td>Overhead</td>
<td>$9,958</td>
</tr>
<tr>
<td>Total</td>
<td>$66,858</td>
</tr>
</tbody>
</table>

DESCRIPTION

Implementation of Government policy that flood plain Mapping be co-ordinated by Flood Plain Management Committee. Work programme of 4-5 years. Supported also by Commonwealth Government until funding was recently withdrawn.

LEGISLATION

There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION

The Department of Lands and Housing is the lead agency of the Flood Plain Management Committee, and the work is therefore classified as a client activity.

PAWA RESPONSIBILITY

The project is an ongoing requirement and cannot be abandoned. PAWA/WRG has the expertise to manage flood plain studies on behalf of the Flood Plain Management Committee. However, the work could be carried out by external consultants with WRG acting on behalf of the Department of Lands and Housing as Project Manager.

SCOPE FOR COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $56,900 the amount being recovered is $nil. There should be full recovery of the project costs from the clients.
APPENDIX 9.46

PROJECT ANALYSIS

PROGRAMME

Flood Protection

PROJECT

Kakadu Highway Hydrology

Total estimated cost $7,500 (WRG)

1987/88 Budget Expenditure $7,500 (WRG)
Operational overhead $1,312

DESCRIPTION

This is a desk top study and is directed towards identification of flood heights and streamflow along the Kakadu Highway and the implications for 6 bridge sites on behalf of Roads Division.

LEGISLATION

There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION

The project is undertaken at the request of another agency and is therefore classified as a client activity.

PAWA RESPONSIBILITY

The project is a requirement essential to the needs of a client agency and therefore cannot be abandoned.

PAWA/WRG has the expertise not available in any other NT Government agency. The function could be undertaken by consultants directly employed by Roads Division using Water Resources data on a charge basis.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $7,500 the amount being recovered is $1,000 (or 13%). There should be full recovery of the project cost from the client.
APPENDIX 9.47

PROJECT ANALYSIS

PROGRAMME

Flood protection

PROJECT

Social Ecological Impact of Floods - Alice Springs

Total estimated cost $6,900

1987/88 Budget Expenditure

Operational overhead $6,900 (WRG)

$1,207

$8,107

DESCRIPTION

Investigation to examine flood mitigation options available and consult community to identify strategies for protection of Alice Springs on behalf of the Department of Lands and Housing for the Flood Plain Management Committee. Commonwealth Government also support under FWRAP.

LEGISLATION

There is no legislation relevant to PAWA activities which specifically covers or prohibits involvement in this project.

CLASSIFICATION

The project is undertaken on behalf of Lands and Housing as the lead agency for the Flood Plain Management Committee and it is therefore classified as a client activity.

PAWA RESPONSIBILITY

The project is a requirement of the Flood Plains Management Committee and therefore cannot be abandoned. PAWA/WRG has the expertise to manage the study on behalf of the Committee. However, the work could be undertaken by external consultants with WRG acting as Project Manager.

COST RECOVERY

Of the 1987/88 Budgetted Expenditure of $6,900 the amount being recovered is $3,000 (or 43%). There should be full cost recovery of the project cost from the client with 50% provided by the Commonwealth under FWRAP and the remaining 50% by the Department of Lands and Housing as lead agency.
PROJECT ANALYSIS

PROGRAMME
Flood Protection

PROJECT
Alice Springs Flood Plain Management Study
Total estimated cost $80,000

1987/88 Budget estimate $71,800 (WRG)
Operational overhead $12,565
$84,365

DESCRIPTION
Investigation to examine flood mitigation options available and consult community to identify strategies for protection of Alice Springs on behalf of the Department of Lands and Housing for the Flood Plains Management Committee. Commonwealth Government also support under FWRAP.

LEGISLATION
There is no legislation relevant to PAWA activities which specifically covers or prohibits PAWA involvement in this project.

CLASSIFICATION
The project is undertaken on behalf of the Department of Lands and Housing as the lead agency to the Flood Plains Management Committee (FPMC) and therefore cannot be abandoned and is therefore classified as a client activity. Administrative Arrangements place co-ordination of flood protection responsibilities with the Flood Plain Management Committee, with Department of Lands as lead agency. Since the project is undertaken at the request of another agency it is classified as a client activity.

PAWA RESPONSIBILITY
The project is a requirement of the FPMC and therefore cannot be abandoned. PAWA/WRG has the expertise to manage flood plain studies on behalf of the Flood Plain Management Committee. However work could be carried out by external consultants, with WRG acting as Project Manager.

COST RECOVERY
Of the 1987/88 Budgetted Expenditure of $71,800 the amount being recovered is $35,000 (or 49%). There should be full recovery of the project cost by PAWA/WRG from the Clients. The Department of Lands and Housing should pay on a 50% cost recovery to extent that 50% is provided under FWRAP Agreement (this did not occur in 1987/88 due to exclusion of overhead costs).
APPENDIX 10.0

ACTIVITY ANALYSIS - METHODOLOGY

An analysis of each activity as given in the following page. The format of the analysis is as follows:

1. **Description:**
   
   A brief description is given of each activity including identification of the Project/Programmes which the activity forms a part.

2. **Organisation and Manpower**

3. **Cost:**

   Total annual expenditure on the activity and manpower cost.

4. **Workload:**

   Current workload and future trends.

5. **Nature of Activity:**

   Consideration of whether the activity is a fixed or variable cost (to PAWA) and the scope for shifting from fixed to variable costs.

6. **Scope for Alternative Means of Carrying out the Activity:**

   Consideration of scope for change of in house methods and arrangements or possible use of alternative resources i.e. or other agencies.

7. **Potential Savings:**

   Identification of any potential savings by use of other methods - in house efficiency gains or use of private sector.

8. **Recommendation:**

   Sums up analysis and makes a recommendation.

**NOTE**

**Costs**

The present financial reporting processes did not allow the Review Team to make a more detailed study of all the elements that make up the cost of each activity. The present financial reporting system does provide for adequate costing and cost/budget comparisons, however due to the short period (since 1/7/87) which the Water Directorate has had to utilise this system, there is little or no worthwhile information for the purposes of this Review.
However, in the major activities such as drilling, laboratories and Data Collection actual total cost details were available to allow adequate comparison with alternative methods of carrying out the activity.
APPENDIX 10.1

ACTIVITY ANALYSIS

DRILLING

1. DESCRIPTION

In the context of this Review "Drilling" covers the construction of bore holes for the investigation and assessment of groundwater resources and for the extraction of water of quality and flow rate suitable for specific uses.

In the Northern Territory bore holes for Water Resource investigations and utilization vary in size and depth over the following range:

Diameter of Bore holes - 150mm to 900mm Depth of Bore holes - 10 metres to 350 metres

The activity of drilling and constructing bores forms part of a number of projects undertaken by the Water Resources Group (WRG) and accounts for a large part of annual expenditure within the programme of Water Supply, Base Line Inventory, Waste Water Management and Rural Advisory Services.

2. ORGANISATION & MANPOWER

WRG has developed considerable expertise in drilling for water supplies in the Northern Territory and has built up considerable in house capacity in manpower, plant and equipment.

At the present time 4 drilling rigs are operated on a full time basis throughout the year.

In addition to PAWA owned drilling rigs approximately 40% of the WRG annual drilling programme during 1986/87 was carried out by local (NT) drilling contractors.

The four drilling rigs are each manned by a crew of 4 and supervision of PAWA drill crews and contract drillers is provided by 5 technical officers making a total of 21 staff employed fulltime on the drilling programme.

In addition to manpower directly employed on and in supervising drilling works a further 6 staff are employed at the WRG depot at Parap. Approximately 50% of the depot staff's time or the equivalent of 3 people are engaged in drilling related activities.

The number of full time positions directly engaged on or supporting field staff drilling activities is therefore equivalent to 24.

Drilling Plant and Equipment

Drilling rigs, supporting vehicles and plant have been kept under close review in recent years and surplus and outdated plant and equipment have been disposed of, and replaced only if justified by workload projections.
As a result of this policy the current drill rigs are modern and well maintained and in good to excellent condition and have a range of capacity to cover all drilling and bore construction requirements of the WRG Programme.

Three of the drill rigs are based in Darwin and operate largely within the Northern Region.

The fourth drilling rig is based in Alice Springs and covers work in the Southern Region. An additional large drilling rig is based at Alice Springs. This rig has capacity for deep and large diameter bores and is brought into action only when contract drillers are not available to take up larger size production bores. Drilling rigs based in Darwin are used if required in the Southern Region.

The present replacement value of drilling rigs and supporting equipment such as compressors and heavy duty vehicles is conservatively estimated at $5.0 million.

In addition to this capital outlay, minor equipment, tools and materials such as bore casing and screens, held in store to support drilling activity at any one time amount to an average of $0.200M.

The disposal value of drilling rigs and support plant and equipment is estimated by the Technical Services Division to be in the order of $1.00M. This figure is stated to be very approximate.

3. COSTS

The expenditure on the total drilling programme (including supervision) for 1986/87 and estimated for 1987/88, and projected for 1988/89 is as follows:

1986/87 $4.758M
1987/88 $4.985M
1988/89 $4.438M

(Note: it is likely that some of 87/88 programme will not be completed and will carry over into 1988/89.

These costs (actual 86/87 and estimated 87/88, 88/89) were provided by WRG and include arbitrary allowance for administration, and plant and equipment costs based on hire rates developed "in-house". Total organisation overheads are not included. These costs indicate the level of expenditure on drilling in comparison to the total WRG activities (i.e approximately 40%).

4. WORK LOAD LEVELS

The total annual drilling programme in terms of numbers of holes and metres drilled over the 6 year period 1982/83 to present time is shown in the following table. The amount of "in house"(i.e government rigs) and contract drilling is also shown.
The lesser amount of drilling carried out during 1986/87 is attributed to an unusual combination of a number of factors including:

- use of one rig on deep large diameter bores requiring slower drilling rate
- use of one rig in difficult slow drilling conditions.
- use of one rig on rehabilitation of existing production bores.
- contractor's rig being involved in long period of down time on one bore hole because of problems in casing the bore.

The lesser amount of drilling completed during 1986/87 is therefore not indicative of a trend towards a reduction of the WRG/government water drilling programme, and the level of activity in terms of expenditure is expected to remain fairly constant in the immediate future.

5. NATURE OF ACTIVITY

The drilling activity is largely a fixed cost to PAWA in that most of the expenditure is incurred on the operation of PAWA owned drilling rigs. The costs of manpower and to a lesser degree plant and equipment remain constant irrespective of the quantity of work carried out. Use of contract drilling (10% of total drilling expenditure in 1986/87) reduces the level of fixed cost.

Increase of contract drilling would reduce fixed costs and in theory enable scale up or scale down of activities to match funds available and work priorities.

The extent to which use of drilling contracts could be increased depends on a number of considerations and these are discussed in turn as follows.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

Availability of Appropriately Skilled Contractors

Within the Northern Territory there are currently 11 registered drillers operating on a commercial basis. At various times up to 5 of these drillers have been used under contract for "straight forward" government production bores or private bores drilled under WRG supervision under Water Supplies Development Act advice bore scheme.
At present there is a Period Contract let to one drilling contractor (initially the Period Contract was shared by 2 contractors but one has been cancelled due to unsatisfactory compliance). Under the Period Contract work is carried out as and when required by PAWA and paid for according to a schedule of rates. The current Period Contract expires on 1st June 1988.

It is the strongly held view of WRG professional and technical staff responsible for the planning, design and execution of the Government Drilling programme that with few exceptions NT contract water drillers have not the expertise to handle the total government drilling programme and that there are no NT contractors presently equipped with plant of a capacity to carry out the full range of drilling required.

To some extent this was confirmed by lack of response from local contractors to calling of tenders (early 1985) for the Period Contract. Only 2 NT contractors submitted tender bids. Both were awarded a share of the Period Contract and as previously stated one subsequently proved unsatisfactory.

The availability of drilling contractors was explored during the latter part of 1986 when expressions of interest for the total government drilling programme was sought by advertisement on an Australia wide basis. This attracted responses from 12 interstate and 3 NT Contractors. An overall assessment of these tenders taking into account their drilling rigs, equipment and support vehicles, experience and qualifications, and proposed base of operations concluded that 2 were suitable for operation in all areas of the NT, 2 for most areas, and one for drilling in the north end only.

This would indicate that on an Australia wide basis there are water well drillers with the appropriate skills to carry out the NT Government drilling programme.

During the course of this review, discussions were held with Sydney Headquarters of Australian Drilling Industry Association (ADIA). Detailed information covering the location, range of equipment, and any specialised services offered is currently not available. However, ADIA advised that it is currently employing consultants to carry out surveys on a state by state basis to establish details of the water drilling industry to assist those requiring services of water drilling contractors.

Discussions were also held with NT drilling contractors acknowledged by WRG as skilled and competent drillers, and with consultants specialising in ground water assessment. The view was expressed that private Contractors could carry out the range of work contained in the NT Government drilling programme with the following provisos:

- 12 months lead time would be required by some contractors to "gear up" for full range government work.

- The work would need to be let on contract rates that were realistic and under contract conditions that minimized the risk to contractors.
Specialised Nature of Drilling Activity

The allocation of drilling and bore hole construction between Government owned drill rigs and contract drillers is currently a decision made by WRG, based broadly on the following criteria.

- Investigatory drilling - Government Drill Rigs
- Straight forward production bore drilling - Drilling Contract
- Production bores where aspects of the work, and difficult access requirements make it high risk or otherwise unattractive to contract drillers.

This approach leads to use of Government drill rigs for the installation of production bores that are sited and constructed as part of the investigation process.

"Straight forward" production bores let to contract can be described in general terms as small to medium sized diameter bores, constructed in non difficult soil and rock strata and where access conditions are not difficult.

A procedure of seeking interest from or testing the market for contract drillers to install the difficult production bores is carried out by WRG before a decision is taken to use a government drill rig. This process is weighed against letting the work out to contract in that quotes obtained from contractors compare unfavourably with the cost of in house drilling. This is because "inhouse" or "fixed costs" have already been incurred by PAWA whether work is carried out in-house or not and these costs are not fully taken into account for comparison with cost of using contract drillers.

The drilling of investigatory bore holes and the construction of deep/large diameter production bores in difficult strata does require a specialist knowledge and employment of experienced drillers. However, the current approach of confining all of this type of work to government drill rigs does tend to ensure that contract drillers are not given the opportunity to demonstrate and/or improve their skills.

Practicality of Using Drilling Contractors

Several reasons have been put forward against the practicality of using contract drillers in favour of Government drill rigs on other than straight forward works. Most important of these are:

(1) difficulty in determining beforehand the precise nature and quantum of work involved in an investigatory drilling programme.

(2) difficulty in specifying requirements and writing a contract which is fair to the contractor but not open ended and uncontrollable in total end cost.

(3) difficulty in arranging a programme of work which is attractive to private contracts in that continuity of work would be available over a reasonable period of time and say 3 months minimum.
7. POTENTIAL SAVING

There are two avenues for potential saving in cost of government drilling programmes. These are:

(1) productivity gains in activity associated with use of government drill rigs,

(2) greater use of contract drilling.

Productivity gains in the use of government drill rigs has not been investigated during the course of this review but previous consideration and actions already taken have been noted. Reduction of 4 man drill crews to 3 was the subject of a detailed study but this proposal was rejected.

Existing drill crews are experienced and well trained, are keenly interested in their work and are highly motivated. The crews are well supervised by competent technical staff. Existing plant is generally modern and well maintained.

It is concluded that there is little scope for any significant productivity gains in drilling activity as currently carried out in house.

Greater Use of Contract Drillers - Cost Comparisons

There has been no serious attempt to compare the use of contract drillers for the full government drilling requirements over an extended period of 12 months, as against Government drill rigs on a cost basis.

Such a study has not been undertaken on grounds of lack of staff resources and based on the reasoning put forward that considerations other than cost dictate the choice between contract and in-house drilling.

While the costs issue has not been ignored in previous appraisals the approach taken has been to make "spot" comparisons between the actual cost of drilling jobs carried out by contract with estimates of cost of the same drilling jobs carried out in house and vice versa.
During the Review some more recent examples of similar "cost comparisons estimates" between "in-house" and contract drilling using bores holes constructed during 1986/87 were prepared by WRG.

As these sample comparisons are not conclusive and do not take into account all WRG plant and support establishment costs another approach was taken by the Review Team.

The total drilling programme carried out during 1987/88 has been examined and estimates made of cost of drilling at contract rates of the work carried out "in house".

The rates used have been based on contract drilling rates taken from the existing Period Contract and adjusted upwards following discussion with local NT Drilling Contractors and the Australian Drilling Industry Association. The rates so adopted reflect the contract price and conditions that would be set by the drilling industry for the NT Government drilling programme (refer attachment).

WRG costs have been added and the total all up cost of the 1987/88 Government drilling programme so estimated has been compared with actual drilling costs for that year.

The comparison of costs between the existing joint Government/Contract drilling arrangements compared with total contract drilling is summarised below.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract estimate of Northern Region</td>
<td>$1,303,000</td>
</tr>
<tr>
<td>Contract estimate of Southern Region</td>
<td>$871,000</td>
</tr>
<tr>
<td>Drilling carried out by Period Contract (actual)</td>
<td>$504,000</td>
</tr>
<tr>
<td>Total</td>
<td>$2,174,000</td>
</tr>
<tr>
<td>Other costs</td>
<td></td>
</tr>
<tr>
<td>Manpower and support costs of WRG</td>
<td>$480,000</td>
</tr>
<tr>
<td>for contract management and supervision</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$3,158,000</td>
</tr>
<tr>
<td>Actual Drilling Expenditure 1986/87</td>
<td>$4,758,000</td>
</tr>
<tr>
<td>Less other work</td>
<td></td>
</tr>
<tr>
<td>Croker Island Bore Rehabilitation</td>
<td>$150,000</td>
</tr>
<tr>
<td>and Drilling School</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$4,608,000</td>
</tr>
</tbody>
</table>

Based on the above estimates, savings by introduction of contract drilling would be $1.45M (31% of total Drilling cost).

8. RECOMMENDATION

It is recommended that the use of contract drilling for the full range of the government drilling programme be actively explored with the object of transferring to full contract drilling, over a two to three year period.
ATTACHMENT

Estimate of Cost of Carrying out the 1986-87 Government Drilling Programme by Contract Drilling

METHODOLOGY

Drilling and bore hole construction actually carried out by in house drill rigs during 1986/87 was grouped into discrete programmes in a locality or project area. This follows the normal planning of the drilling programme which seeks to minimize the movement of drillings (whether in house or contract).

With the grouping of investigatory drilling and drilling and installation of production bores, mobilisation and establishment costs are reduced and in the following calculations only one such cost is allowed for each area.

To ensure that adequate mobilisation costs are taken into account the following was adopted for the drilling programme in the Northern region - mobilisation costs of plant based at Alice Springs has been used. For Southern region drilling programme cost of mobilisation of plant based at Darwin or Adelaide has been used.

Mobilisation costs between bore hole sites at each location a group of bores has also been included in the estimates.

CONTRACT RATES ADOPTED

Drilling Rates

<table>
<thead>
<tr>
<th>Approx diameter hole/casing expressed in inches</th>
<th>Present Period Contract rate (as updated)</th>
<th>Contract rate adopted for these estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/5 (127 m OD casing)</td>
<td>$40.44/m</td>
<td>$50/m</td>
</tr>
<tr>
<td>8/6 (up to 168.3 m OD casing)</td>
<td>$47.88/m</td>
<td>$60/m (Note 1)</td>
</tr>
<tr>
<td>10/8 (up to 219.1 m OD casing)</td>
<td>$74.49/m</td>
<td>$100/m</td>
</tr>
<tr>
<td>12/10 (up to 273 m OD casing)</td>
<td>$106.41/m</td>
<td>$130/m</td>
</tr>
</tbody>
</table>

Hourly Rates

<table>
<thead>
<tr>
<th>Hire rate for working time for inserting of casing, screens etc reaming and extra work.</th>
<th>$127.60/hour</th>
<th>$150/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding time</td>
<td>$74.49/hour</td>
<td>$100/hour (Note 2)</td>
</tr>
</tbody>
</table>
### Mobilisation and Positioning of Plant

<table>
<thead>
<tr>
<th>Distance from Darwin to Site</th>
<th>Barge Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 500km</td>
<td>$8,000 per trip</td>
</tr>
<tr>
<td>Over 500km</td>
<td>$20,000 per trip</td>
</tr>
</tbody>
</table>

Cost of "barging" drilling plant has been allowed for both ways to each location.

### Air Fares or Air Charter to Remote Coastal and Island Locations

- $1,500 per location

### Material Costs

- Supply of materials
  - Existing period contract material costs have been used as a basis for these estimates by increasing all material items in contract upwards by 20%.

### Notes

1. $60.00 for meter rate for drilling holes (8” diam.) to take 168.3 mm casing (6” diam.) has been chosen after discussion with NT Contract Drillers. Also discussed with A.D.I.A.

2. Holding rate of 2/3 hourly working rate has been adopted - based also on discussions with contractors.

### Note on Island and Coastal Areas

- Locations marked * are island and coastal area locations. The total cost of these 5 sites (included in the above estimates) are $343,000; of this amount $196,000 (or about 60%) is for transport (road, barge cost and air travel).

- The number of bores and metres drilled in this part of the programme is 30 No. and 482 metres.

- All up costs work out at $712 per metre as against all up cost for the total programme of $274 per metre.
<table>
<thead>
<tr>
<th>Location</th>
<th>No. of Bores</th>
<th>Metres Drill</th>
<th>Est. Contract Cost $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Invest.</td>
<td>Prod.</td>
<td></td>
</tr>
<tr>
<td><strong>Northern Region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elcho Island</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Buymar</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Croker Island</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Garthalala</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Numbulwar</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Maningrida</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildman River</td>
<td>15</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Lambells Lagoon</td>
<td>13</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Leanyer</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooinda and Morella Park</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nanombu Creek</td>
<td>26</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bickerton Island</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub Total Northern Region</strong></td>
<td>86</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 135</td>
<td>1 161</td>
<td>1 303 000</td>
</tr>
<tr>
<td><strong>Southern Region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tarra - Neutral Junction</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Aileeron and Blatherskite</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Teresa</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Territory Grape Farm</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Arltunga</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roe Creek</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Sub Total Southern Region</strong></td>
<td>21</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 048</td>
<td>655</td>
<td>871 000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 183</td>
<td>1 710</td>
<td>2 174 000</td>
</tr>
</tbody>
</table>
APPENDIX 10.2

ACTIVITY ANALYSIS

BORE TESTING

1. DESCRIPTION OF ACTIVITY

This section has the responsibility for a variety of pump tests of groundwater supplies for government, semi government and private bodies as well as consultants. Samples for analysis are collected for determining hydrologic characteristics of the aquifer and hydraulic properties of the bore capacity of the bore and water quality are determined for accurate assessment of the groundwater potential. Ancillary functions include rehabilitation, spear pointing and equipping of bores. The Superintendent provides technical supervision to the Alice Springs Crew.

2. ORGANISATION AND MANPOWER

Bore testing is the responsibility of the Technical Services Division, Bore Testing Section. The Section consists of a supervising Technical Officer Grade 2 and 4 bore testing crews, one of which is located in Alice Springs. The Darwin crews each consists of a Technical Officer Grade 1 and 2 Field Assistants. The Alice Springs crew consists of a Technical Officer Grade 1, a Field Assistant Grade 1 and a Labourer. One of the Darwin crews is a specialist group which not only tests bores but drills and equips them as well.

To carry out the testing over the wide range of bore yields and depths encountered, there has been a considerable investment in pump sets, compressors and other support plant and vehicles. The current value of the equipment and vehicles is estimated as $800,000 with replacement value at present day cost of $1.9M.

3. COSTS

The budgeted expenditure for bore testing for 1987/88 is $1.71M. (There is a current level of annual expenditure of about $1.5M); manpower will account for $530,000 of the 1987/88 annual cost.

4. WORKLOAD

Workload is stable. Demand for bore testing as part of groundwater evaluation is dependent on various factors e.g. new industries, mining, weather patterns, population growth etc and can vary considerably over relatively short periods of time i.e. 3-6 months.

With supplies having been established at major and minor towns and communities, investigation work is declining and more emphasis is being put on rehabilitation of existing systems - replacing or upgrading them. This involves extensive use of bore testing equipment and crews.
Utilisation of all equipment for the period 86/87 was approximately 62% and 38% depot work, consisting of servicing of pumps, engines, modifications, resupply and minor repairs and maintenance.

5. NATURE OF ACTIVITY

This is a fixed cost activity with some potential for some change to variable cost provided private enterprise can be induced to operate. Utilisation of equipment for crews on field activities of 62% of time indicates benefits of transfer to variable costs.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

There are no similar functions carried out in other government areas. Basic (quick pump testing as ancillary to drilling using airlift techniques) testing is carried out by drilling contractors. There are no contractors operating in the NT who can provide accuracy, depth of data and presentation - poor quality results may be considered almost as unreliable as no results. Private contractors have made the effort to set up in the past but have found that adequate returns were not forthcoming.

Whilst there is no current alternative, efforts should continue to be made to interest private enterprise in this activity.

7. POTENTIAL SAVINGS

Savings may be achievable if there is a reduction in bore drilling and if a significant number of clients decide to take the risk with bore capacities etc rather than pay full recovery costs; any significant downturn in demand may warrant reduced staffing levels.

8. RECOMMENDATION

- That demand for this service be monitored and staffing levels and plant and equipment holdings be adjusted if warranted.
- That regular efforts be made to interest the private sector in this activity.
APPENDIX 10.3

ACTIVITY ANALYSIS
DATA COLLECTION

1. DESCRIPTION OF ACTIVITY

Data collection relates to the collection of hydrographic data from stream gauging stations and groundwater observation bores. It also includes collection of climatic and water quality data.

The activity of data collection is a major input into water resource assessment both for the base line inventory of surface and groundwater on a Territory wide basis and for collection of data for monitoring the resources of existing supply systems and for specific project purposes.

2. ORGANISATION AND MANPOWER

Data collection is largely the responsibility of the Technical Services Division of WRG. This Division directly manages the activity in Darwin and gives technical oversight to the activities carried out by staff located in Katherine and Alice Springs.

Data collection as presently organised involves separate crews for surface water data and groundwater data collection with the following field staff involved.

<table>
<thead>
<tr>
<th>Centre</th>
<th>Surface Water Field Crews</th>
<th>Groundwater Field Crews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin</td>
<td>13 staff</td>
<td>5 staff</td>
</tr>
<tr>
<td>Katherine</td>
<td>5 &quot;</td>
<td>5 &quot;</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>20 staff</td>
<td>10</td>
</tr>
</tbody>
</table>

There are also 3 staff in Hydrographic instrument workshop. Total field and depot staff directly involved on a full time basis in data collection is therefore 33.

The surface water field crews are teams of 2 hydrographers (Technical Officers and Technical Assistants) responsible to a Principal Technical Officer who is in charge of the Surface Water Monitoring Section. Also in this section is a "water quality group" consisting of 5 Technical Officers who provide services related to field analysis for a range of water quality parameters, and collection of samples for laboratory analysis. This group also processes water quality data backlog and is used as back up on special projects.

Groundwater field crews do not report to the Principal Technical Officer but are directly responsible to the Manager Technical Services Division.
3. COSTS

The 1987/88 budgetted expenditure for Water Resource Assessment is $3,065,000. This includes processing data, processing data backlog and dealing with enquiries for information. The cost of the "data collection" field activity is about 75% of the total cost.

4. WORKLOAD

At the current level of activity there is a consistent workload for staff employed.

Stream gauging stations are visited about 10 times per annum in the Northern Region (Darwin and Katherine based crews); 6 to 7 visits a year being the norm in the Southern Region. The field crews perform a variety of tasks on each visit: stream gauge measurement, servicing equipment, site surveys and site maintenance. The frequency of visits is based on the need to minimise loss of data in any breakdown situation. Use of a team of 2 (as against one) is based in the amount of work required on site, and the safety issue when travelling to remote areas, and in storm and flood situations. Site visits during the dry season into well travelled areas are often carried out by one person.

Field visits to groundwater observation bores vary in accordance with the nature of the information required. Production borefield monitoring is carried out at 6 weekly intervals. In the wet season visits are more frequent to ensure recording of recharge events. Monitoring of the regional groundwater systems is at intervals of 6 weeks, 6 months or annually depending on location of the bore in the region. Only a small number (13) of the bores are fitted with automatic level recorders.

5. NATURE OF ACTIVITY

Data collection is a fixed cost with little potential for change to variable cost.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

The activity of data collection of fully equipped stream gauging stations and maintaining the operation of these stations is to a degree a specialist activity requiring the attendance of a trained hydrographer at regular intervals throughout the year. The collection of data from observation bores is not a specialist activity.

In a recent internal report by the Water Resources Group (Review of Northern Territory Water Resources Assessment - September 1987) methods for data collection and information handling were considered and the following proposals put forward:

Field Staff Integration

- Surface water field staff and groundwater monitoring field staff be integrated, and the activity of data collection be placed under one Principal Technical Officer. Collection of data from both surface water gauging stations and ground water bores would be carried out in any area by one field team.
Alternative means of Field Data Collection

- Use of agency arrangements to collect data from stream gauging stations where local technical skills exist, and therefore reduce visit by WRG field staff to six monthly check visits. Project stream gauging stations at Gove and Groote Eylandt fall into this category.

- Continue use of gauge board readers where appropriate.

- Although of only varying success previously, use agency arrangements to regularly collect groundwater data from 33 remote towns and Aboriginal Community bore fields. WRG staff to check visit at six monthly intervals.

Use of New Technology

- Maintain a high priority on the appraisal of new technology to collect, record and transmit data, and on computer software development for data storage.

7. POTENTIAL SAVINGS

There is potential to reduce field staff by six with:

1. integration of field staff involved in data collection;

2. use of agency arrangements where local technical skills exist to collect data from river gauging stations;

3. use of agency arrangements to monitor and collect groundwater data from town and community.

The availability of appropriate new technology such as improved electronic instrumentation for collecting and communicating data continues to be examined; new electronic instrumentation is used to replace existing mechanical recording devices and manual operation. However, it would need to be demonstrated that new systems are suitable in Territory conditions and are cost effective having regard to initial capital investment, future maintenance costs and reliability.

The Groundwater monitoring network, consisting of 1005 observation bores, is currently being systematically reviewed by WRG. It is expected that the total number of bores which need to be monitored will be reduced.

8. RECOMMENDATION

It is recommended that proposals for integrating surface and ground water field staff and the use of agency arrangements, as outlined above, be adopted. The use of new technology to reduce the number of field trips to gauging stations should continue to be examined but all proposals should be subjected to a cost benefit analysis before being adopted.
APPENDIX 10.4

ACTIVITY ANALYSIS

DATA MANAGEMENT

1. DESCRIPTION OF ACTIVITY

The storage and retrieval of information and data base management form a major part of the Water Resources Group activity. Both computer and manual records are maintained, and other information is kept in reports, files, and map records. There is a large backlog of data yet to be stored in the computer - some of this is in digitised chart form.


2. ORGANISATION AND MANPOWER

Within WRG there is the equivalent of 13 full time positions (ranging from Professional Class 2 to Technical Assistant Grade 2) involved in Data Management. These positions are located in Computer Services Section, Hydrology Section (Hydrology Division), Computations Ground and Surface Water Assessment (Technical Services Division) and Water Resources Division, Alice Springs.

3. COSTS

Budgeted Expenditure for 1987/88 for the activity of Data Management is $860 000.

4. WORKLOAD

Because most of the work associated with computer based data management is associated with input to the data base (see DATA COLLECTION), little impact is expected on the Computer Services and Computation Section should there be a reduction in client demand.

5. NATURE OF ACTIVITY

Data Management within the Water Resources Group represents a fixed cost activity.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

There is little scope for use of external resources to carry out this activity.

The work is by its nature best performed in-house. However, there are problems with the existing arrangements because:

(a) there is a significant backlog of data input to the computer network. Catch up of this backlog would taken about 10 years with existing staff resources and an additional input of effort equal to 48 man years to catch up in 5 years.
(b) some data is still maintained manually, and in the case of groundwater records all data is maintained manually.

(c) there needs to be full cost recovery for data used by external clients, current cost recovery methods are loose and ill defined.

The problem of backlog of data processing and cost recovery methods needs more detailed analysis.

7. POTENTIAL SAVINGS

Some savings will accrue once the backlog of work is overtaken; data input staff can then be reduced to reflect ongoing workloads.

8. RECOMMENDATION

A study be undertaken in-house by WRG to ascertain resources required to catch up backlog of data input to computer network. Cost and benefits should be quantified and if justified strategy for fully computerizing all water resource data be determined.
APPENDIX 10.5

ACTIVITY ANALYSIS
LABORATORIES

1. DESCRIPTION

The Water Resources Group operates three fully self contained laboratories in separate locations in Darwin, and a small scale Laboratory function in Alice Springs. The three WRG Laboratories have the following broad responsibilities:

WATER CHEMISTRY - EAST POINT LABORATORY

Physical testing and inorganic chemical analysis of drinking water and stock and agricultural water supplies. Provide professional advice on water quality investigations, sampling programs and analysis for all types of water. Undertake approved projects.

MICROBIOLOGICAL - PARAP LABORATORY

Bacteriological and chemical analysis of water supply and wastewater systems. Monitors water quality of water supply storages and recreational water bodies, including surveillance for noxious water weeds. Undertaking microbiological and inorganic analysis of water samples as required. Provide professional advice on water and wastewater sampling of water supply and waste water systems. Undertake approved projects.

ENVIRONMENTAL CHEMISTRY - NIGHTCLIFF LABORATORY

Analysis of general parameters and for low to ultra-trace metals, nutrients and radium in water samples from the Alligator Rivers Region. Provide professional advice on sampling and analysis for water samples essentially related to environmental investigations and monitoring.

2. ORGANISATION AND MANPOWER

Laboratory water analysis is a responsibility of the Laboratory Division of WRG and is headed by a Chief Chemist who oversees the management of the Laboratories, maintains technical standards and coordinates programmes. Each Laboratory is headed by a Senior Chemist. The current establishment levels for the laboratory organisation of WRG are as follows:

<table>
<thead>
<tr>
<th>Management</th>
<th>Parap</th>
<th>East Point</th>
<th>Night-Cliff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Technical</td>
<td>8</td>
<td>4</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Administrative</td>
<td>1</td>
<td>1</td>
<td>NIL</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1</td>
<td>11</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
3. COSTS

The total budgetted expenditure for the laboratories in 1987/88 is estimated to be $1.441M (excludes overheads of $0.180M). The amount of $1.441M includes $0.139M corporate expenditure (depreciation, interest on loans, and insurance) which would represent savings should the laboratory activity transfer to the private sector.

The total budgetted expenditure of $1.441M can be further broken down to each laboratory as shown hereunder. Also shown are estimated 1987/88 recoveries for each Laboratory as well as the actual value of receipts from fees charged in 1986/87.

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Estimated 1987/88 Budget $</th>
<th>Estimated 1987/88 Recoveries $</th>
<th>Actual 1986/87 Recoveries $</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Point</td>
<td>380,000</td>
<td>31,200</td>
<td>27,106</td>
</tr>
<tr>
<td>Parap</td>
<td>489,000</td>
<td>87,500</td>
<td>50,438</td>
</tr>
<tr>
<td>Nightcliff</td>
<td>518,000</td>
<td>6,300</td>
<td>nil</td>
</tr>
<tr>
<td>Management</td>
<td>54,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>$1,441,000</td>
<td>$125,000(1)</td>
<td>$77,544</td>
</tr>
</tbody>
</table>

Note (1) This is estimated payments from Trade Debtors in 1987/88 and excludes ad hoc recoveries for non-recurring work.

There is a significant shortfall in receipts compared to costs. This shortfall has been made up each year by direct Government appropriation to the Water Resources Group.

The reasons for the shortfall in receipts compared with Laboratory costs are as follows:

a. Charges made by Laboratories do not include corporate expenditure and overheads.

b. NT Government Department clients have as a matter of policy been charged 25% of identifiable operational costs.

c. Laboratory charges have not been updated since 1983.

d. Nightcliff laboratory has not charged fees until this year.

e. A major client of East Point Laboratory is the Water Resources Group itself.
4. WORKLOAD

EAST POINT

In 1986/87 workload was:

<table>
<thead>
<tr>
<th></th>
<th>Samples</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Analysis</td>
<td>1351</td>
<td>22,972</td>
</tr>
<tr>
<td>Limited - Partial Analysis</td>
<td>52</td>
<td>382</td>
</tr>
<tr>
<td>Heavy Metal Analysis</td>
<td>820</td>
<td>5,237</td>
</tr>
<tr>
<td>Other Analysis</td>
<td>890</td>
<td>4,666</td>
</tr>
<tr>
<td></td>
<td>3,113</td>
<td>33,257</td>
</tr>
</tbody>
</table>

Clients: The major client is the Power and Water Authority. 46% of 1986/87 work was related to water quality testing for WRG purposes and 35% for Rum Jungle monitoring. The balance of 19% was mainly for other Government agencies (including Conservation Commission, Transport and Works and Community Development). 3% was private sector usage.

PARAP

In 1986/87 workload was:

<table>
<thead>
<tr>
<th></th>
<th>Samples</th>
<th>Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriological</td>
<td>5,443</td>
<td>19,057</td>
</tr>
<tr>
<td>Water and Wastewater</td>
<td>3,723</td>
<td>37,210</td>
</tr>
<tr>
<td>Limnology</td>
<td>2,367</td>
<td>9,468</td>
</tr>
<tr>
<td></td>
<td>11,533</td>
<td>65,735</td>
</tr>
</tbody>
</table>

Clients: The major client is again the Power and Water Authority. The Water Operations Group comprise 68% of the total workload and WRG 3%. Department of Health was 17%. The balance was mainly other Government agencies.

NIGHTCLIFF

In 1986/87 workload was:

| Samples (General parameters, nutrients, trace metals, ultra trace metals, uranium, radium 226) | 1,608 |
| Determinations                                               | 12,945 |
Clients: The major client is the Alligator Rivers Region Unit of Department of Mines and Energy with 75% of the total workload, 20% of work is analysis related to PAWA functions including nutrient analysis (13%) referred from the PARAP laboratory and Darwin Harbour water analysis (7%).

5. NATURE OF ACTIVITY

The water analysis functions performed by WRG laboratories represent a fixed cost to the Power and Water Authority.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT ACTIVITY

Availability of Appropriately Skilled Private Laboratories

PAWA has advertised that consideration is being given to the transfer of WRG laboratory work to the private sector and has sought Expressions of Interest for this work. A number of positive responses have been received and are being examined by WRG management.

Practicality of Using Private Laboratories

There have been previous trials using AMDEL facilities as a basis for assessing its competency to undertake WRG laboratory work. AMDEL was assessed as not meeting WRG quality control standards. The WRG concern is that transfer of government work to private laboratories would mean that the standard of work performed would be inadequate. This aspect is further examined hereunder.

Specialist Nature of Laboratory Activity:

A matter of concern to WRG staff is the belief that should the private sector take over work currently carried out by the laboratories, there will be a significant fall in quality. They suggest the work will not then meet the standards required by government agencies, including PAWA. They categorise such work into:

- public health
- operational control involving consumer demands
- resource protection and management.

The WRG case is that although other work can be readily transferred to the private sector PAWA work relating to the above categories should continue to be performed by an in-house government laboratory.

The Review team has made a number of enquiries about the potential for privatisation of government water analysis work. The results of these enquiries are summarised in the following paragraphs.

A. The Rural Water Commission of Victoria (RWC) maintains a substantial water science laboratory which services urban water supply and sewerage systems across the State. No significant amount of work is sent out to private laboratories by the RWC laboratory however some Victorian Water Boards now use private laboratories. The present Senior Management of RWC laboratories
expressed some doubts as to the quality control in some private laboratories being of a sufficiently high standard to ensure consistently reliable water quality analysis. Another concern was that use of non-government laboratories could lead to unnecessary analysis being carried out even when it was obvious that samples submitted for testing were contaminated.

B. An opposite point of view was expressed by a Victorian Water Board which was completely satisfied with the use of a non-government laboratory. The Board manage systems to service 15,000 water supply rated properties and 12,000 sewerage rated properties. The Board had used the RWC State water laboratory until 1985 when inclusion of all costs in the RWC price schedules substantially increased the cost of water analysis. The Board now uses East Melbourne Laboratories and advises that the prices are competitive, the standard for all tests is excellent and the standard of reporting exceeds that available from government laboratories. Further the Board does not find it necessary to employ any "inhouse" chemists to specify and administer the Board's requirements nor to monitor the work of the private laboratories.

C. Dr Wayne Drew, previously Manager of the Rural Water Commission laboratories, and currently Manager, ANALABS, Victoria, said that he is a long time believer in the need for Government to privatise technological functions such as water chemistry laboratory work. He believes the advantage of having in-house quality control is marginal. What is required are intelligible reports that management can use to make decisions. A significant disadvantage of Government laboratories is their fixed costs and their inability to quote flexible prices and offer discounts to Government clients in the way the private sector can.

D. Contact was also made with Water Authorities in Qld, NSW and SA. All these States have their water analysis work performed within Government Laboratories. Ian Small of the Sydney Water Board was helpful with regard to overseas experience. He had been overseas recently and explained that a percentage of water analysis work in the United Kingdom and Germany was being performed by private laboratories. Ian's view was that there was no particular objection to water analysis being performed privately, but government should ensure that there was good quality control and reporting, and technical liaison.

7. POTENTIAL SAVINGS

Private sector costing of WRG Laboratory analytical work has been obtained from AMDEL. For the purpose of the Review AMDEL charges have been accepted as indicative of industry rates generally.

AMDEL advise that it has estimated "worst case" costings for East Point work and has calculated prices based on 29,722 determinations for complete analysis of 1,351 samples (this assumes 22 determinations for each complete analysis as advised by WRG. The above actual 1986/87 figures imply a lesser average). AMDEL has not included any discount for batching, and all prices are quoted book prices. AMDEL advises significant discounts are available for large or regular programs where batching is possible such as at East Point.

Based on worst case estimates AMDEL advise their total cost for the East Point work would be $260,000.
An examination of time spent on non-analytical work at East Point shows that there would be a requirement for an in-house professional to be retained to undertake project and liaison work should East Point Laboratory functions be privatised.

Therefore the savings achievable by transferring East Point analytical work to the private sector are conservatively estimated to be $120,000 per annum at 1986/87 workload levels [i.e $380,000 - $260,000] excluding staff retained as part of a central Laboratory liaison unit.

AMDEL advises that for Bacteriological and Water and Wastewater analytical work undertaken at Parap it calculates a cost of $480,000-$520,000 based on 1986/87 work levels. This cost was calculated by taking a representative sample of Parap analytical reports.

An examination of time spent on non-analytical work at Parap shows that there would be a requirement for an in-house professional to be retained to undertake project and liaison work in the event of privatisation.

If the worst case cost is assumed then transfer of Parap work to the private sector will result in an additional cost to Government of upwards of $31,000 ($520,000 - $489,000] excluding staff retained as part of a central Laboratory liaison unit.

The analysis and costing of analytical work undertaken at Parap has excluded limnology samples (2367) on the basis that WRG advises that the bulk of this work is undertaken in the field. Accordingly most of this work would continue to be performed in-house.

AMDEL advises that it has estimated that the Nightcliff 1986/87 work level would cost of the order of $250,000 if performed by AMDEL, however insufficient detail was provided to give accurate costings. AMDEL also advises this represents a worst case situation in that it has not allowed discounts for large or regular programmes.

The non-analytical workload at Nightcliff is minimal, but given the sensitivity of this environmental work, it is considered an in-house professional would need to be retained to interpret and report on results.

The savings achievable by transferring Nightcliff analytical work to the private sector are estimated to be $268,000 per annum at 1986/87 workload levels [$518,000 - $250,000] excluding staff retained as part of a central Laboratory liaison unit.

In addition to the abovementioned requirement for three in-house professional staff for project and liaison work, there will also need to be close technical supervision and monitoring at a senior level of laboratory work performed externally together with some sub-professional support. It is considered the existing Chief Chemist position should perform this task with the other three in-house professional staff, and supported by two sub-professional staff.
The potential savings to Government arising from the transfer of WRG laboratory analytical work are summarised hereunder. There will be a net reduction of 22 staff (28 existing less 6 proposed).

<table>
<thead>
<tr>
<th>Location</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Point</td>
<td>- $120 000</td>
</tr>
<tr>
<td>Parap</td>
<td>+ $ 31 000</td>
</tr>
<tr>
<td>Nightcliff</td>
<td>- $268 000</td>
</tr>
<tr>
<td>Laboratory Liaison Unit (1)</td>
<td>+ $190 000</td>
</tr>
</tbody>
</table>

Net Potential Savings $167 000

*Note (1):* The Laboratory Liaison Unit comprises 6 staff of 4 professionals and 2 sub-professionals. The $190 000 represents transfer of 5 staff to join the Principal Chemist in a centralised location.

Even though there are no savings associated with the transfer of Parap Laboratory it is considered that the additional costs are not at a level which would suggest this work should continue to be performed by an in-house PAWA laboratory.

The experience in Mines and Energy when that Department transferred work from an in-house laboratory to AMDL on a full cost basis was that there was a significant reduction in demand as a result. A similar experience could be expected in relation to the three PAWA laboratories. If this occurs then there would ultimately be savings for the work currently performed at Parap.

A small laboratory function exists in Alice Springs for the purpose of collecting field samples in the Region and arranging for analysis. This function should continue for the foreseeable future.

An alternative to the closure of the three laboratories is their integration in a single location. A submission received by the Review Team suggested that this would result in an immediate reduction of 6 positions. The most suitable location would be Parap where there is scope for existing vacant Government accommodation to be refurbished as laboratories. The cost of this refurbishment is estimated to be $200-300 000. The Team does not support this option and believes that given the ability of the industry to undertake the work and that savings can be expected, laboratory water analysis functions should be transferred to the private sector.

8. **RECOMMENDATION**

It is recommended that the Expressions of Interest received from industry be examined on the basis that all water analysis functions performed by East Point, Parap and Nightcliff laboratories be transferred to the private sector over a two year period.
ACTIVITY ANALYSIS

PLANT AND VEHICLE MAINTENANCE

1. DESCRIPTION OF ACTIVITY

This section provides:

- facilities for storage of plant, materials and equipment;
- minor fabrication and mechanical repairs;
- preparation of equipment etc for field activities
- control and management of maintenance of plant and equipment (currently carried out mainly by the Department of Transport and Works.
- work for field staff during idle periods (wet season etc).

2. ORGANISATION AND MANPOWER

This group includes a Plant Inspector, Storeman (Plant and Equipment Records), and Tradesman Fitter in the plant section as well as a Foreman Non Trades and Senior Storeman. The group reports to the Depot Manager.

All positions except that of Storeman are nominally occupied. The storeman position is actually occupied.

3. COSTS

The Budgetted Expenditure for 1987/88 for manpower costs only is $262,000.

Items of expenditure incurred by this section are directly charged to specific projects, and cost details are not available.

4. WORKLOAD

Much of the workload appears to be in supporting field operations, plant and vehicle maintenance, stores operations and record keeping. Work is also arranged for field crews during "idle" time (e.g. wet season). There are no statistics on workload.

5. NATURE OF ACTIVITY

This is a fixed cost activity with potential for change to variable (in respect of WRG).

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

It is accepted that there is a need for base (depot) support for field crews in organising purchasing, repairs, storage etc. There is, however, scope for rationalisation within PAWA of functions such as warehousing, plant and vehicle
management, some purchasing, construction and maintenance of assets etc. The extent of rationalisation will depend on the physical location of the sections - if all groups are relocated to the Ben Hammon Workshops at Iliffe Street (Power Directorate Operations Complex) then there will be greater scope for rationalisation. In any event the following should be considered:

- warehousing - to be reviewed by Power Directorate Superintendent Stores with a view to implementing appropriate warehouse management and to consider assuming organisational (structural) control of this facility as is happening with the Water Directorate Operations Group stores. This proposals is not dependent on the physical location of the stores.

- plant, vehicle and equipment maintenance - to be reviewed by Superintendent Transport (responsible for the transport workshop) with a view to assuming organisational (structural) responsibility for this function. It would also be appropriate to remove, by 30 June 1988, the direct association with the Department of Transport and Works. This does not mean that the expertise could not be called upon, but it would not necessarily be the first option and would be at the discretion of the Superintendent Transport.

- Existing internal infrastructure suggests that it would be inappropriate to consider private sector capacity directly i.e. private sector capacity needs to be considered in the overall management considerations of PAWA’s plant and transport management (e.g. all PAWA light vehicles and generators may be serviced and maintained by private enterprise), purchasing and warehousing philosophies.

7. **POTENTIAL SAVINGS**

Savings are dependent on the extent of physical rationalisation possible which could provide "part people" rental and equipment savings. A PAWA review of vehicle requirements (held independently of this review) will determine any vehicle savings.

8. **RECOMMENDATION**

Rationalisation of depot functions with other sections of PAWA to be considered in detail an implemented as soon as practicable. Savings to be considered in the light of longer term physical location.
ACTIVITY ANALYSIS

HYDROGRAPHIC INSTRUMENT WORKSHOP

1. DESCRIPTION OF ACTIVITY

This section services hydrographic and groundwater monitoring equipment including fine instrument maintenance and testing (including electronics) from all areas.

2. ORGANISATION AND MANPOWER

This group consists of a Technical Officer Grade 1 and 2 Tradesman Fitters. The group reports to the Senior Hydrographer for technical requirements and to the Depot Manager for day to day activities.

The Instrument Workshop section reports to the Depot Manager for day to day activities. All three positions are nominally filled.

3. COSTS

The Budgetted expenditure for 1987/88 is $97 000 this being the manpower component.

4. WORKLOAD

Staffing has been reduced from 8 to 3 in recent years (due to cuts in Commonwealth subsidy) and workload is described as heavy. There does not appear to be any documentation of work/activities.

5. NATURE OF ACTIVITY

This is a fixed cost activity with potential for change to variable (in respect of WRG).

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

There is potential for rationalisation with Technical Services sections of Power and/or Water Directorates. Specialist skills and all staff may need to be retained but cost benefits may occur in management, accommodation, shared skills and workload.

7. POTENTIAL SAVINGS

Some savings will accrue once the backlog of work is overtaken; data input staff can then be reduced to reflect ongoing workloads.
8. RECOMMENDATION

A study be undertaken in-house by WRG to ascertain resources required to catch up backlog of data input to computer network. Cost and benefits should be quantified and if justified strategy for fully computerizing all water resource data be determined.
APPENDIX 10.8

ACTIVITY ANALYSIS
CONSTRUCTION (HYDROGRAPHIC) MAINTENANCE

1. DESCRIPTION OF FUNCTION

This section provides field maintenance services for all hydrographic installations throughout the Territory. Staff also assist with wet season operations, assist field staff with transport of equipment and materials in the field, arrange contracts for significant new construction and provide contract supervision.

2. ORGANISATION AND MANPOWER

This group consists of a Foreman Metal Trades and a Tradesman Carpenter. The group reports to the Senior Hydrographer for technical requirements and both positions are nominally filled.

3. COSTS

Total Budgetted Expenditure for 1987/88 for manpower costs only is $83,000. Items of expenditure incurred by this section is directly charged to specific projects and is not readily available.

4. WORKLOAD

Workload is difficult to assess; most time is spent checking and maintaining field equipment. There is currently building, fencing etc work being carried out at the depot in preference to field work. The section is called on to assist field staff mainly during the wet season (i.e. to replace a field crew member temporarily unavailable or to provide an extra person when necessary for safety or operational needs) - this wet season work and recreation leave accounts for approximately 4 months p.a.

5. NATURE OF ACTIVITY

This is a fixed cost activity with some potential for part change to variable cost (in respect of WRG).

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

The prime function of this section is to maintain field equipment, however given the other functions carried out which are of a piecemeal and ad hoc nature, and which may involve extended field trips, there appears to be little scope for carrying out the activity by other means. There are however, some works, such as the current building and fencing minor works which should be carried out by private enterprise leaving the section free to pursue more water resources oriented activities. Given the interaction with the field crews it is not appropriate to transfer this section to another area in WRG or PAWA.
7. POTENTIAL SAVINGS

There is little scope for savings at this stage.

8. RECOMMENDATION

That this activity remain as is but that work which could be done by other means is so done.
APPENDIX 10.9

ACTIVITY ANALYSIS

ADVISORY SERVICES

1. DESCRIPTION OF ACTIVITY

The Water Resources Group provides advisory and information services on potential water supplies and water development proposals to Government Departments, industry, rural enterprises and the general public.

The advice is made available free of charge by both professional and technical officers.

The "shop front" of the "advisory service" is the Rural Advisory Services section of the Hydrology Division.

This section works closely with the Hydrology Section of the Division in Darwin and Hydrology section of the Water Resources Branch Alice Springs.

The total Rural Advisory activity has been examined as a project of the WRG Water Supply Programme (refer Appendix 12)

The purpose of this activity analysis is to focus in on the "shop front" of the activity.

2. ORGANISATION AND MANPOWER

The Rural Advisory Services Section consists of a staff of three: a Senior Technical Officer who heads the section, a Technical Officer and a Field Assistant.

In direct line management the section is responsible to the Chief Engineer Hydrology Division. There is direct reporting to the Group Manager Water Resources in his capacity of Controller of Waters and Commissioner of Water Development.

3. COSTS

The annual cost of the Advisory Services "shop front" is approximately $150 000 per annum. This is a small part of the total Rural Advisory Service programme for which the Budgetted Expenditure in 1987/88 is $875 000.

4. WORKLOADS

The Rural Advisory Services Section carries out the following functions:

- Processes applications for water drilling permits in water control districts;
- Processes applications for licenses for extractions of water and licences for the construction of works on natural streams and water courses;
- Makes annual inspections of licences;
• Processes applications for "advice" bores and arranges for hydrogeological to geophysical investigations to determine the best site.
• Maintains Register of Water Drillers.
• Provides initial advice on water supply matters to other Government Departments;
• Provides advice including on-farm visits to Rural Industry and the general public.

A more detailed description of these functions is attached.

In some functions the work load has declined over the past two years (i.e. issue of drilling permits and processing of bore applications) but the overall work load trend is steady and demanding on the existing small section.

During the course of the Review, Department of Industries and Development senior officers and Rural Industry representatives stressed the need for PAWA through the Water Resources Group’s expertise, to maintain a capacity to provide advisory assistance. It was stated that this should be particularly at the technical and "hands on" level for land owners who are seeking to maximise on farm production by water harvesting and use of supplement rainfall.

5. NATURE OF ACTIVITY

This is a fixed cost activity with little potential to change to a variable cost.

6. SCOPE FOR ALTERNATIVE MEANS OF CARRYING OUT THE ACTIVITY

Apart from transfer of the financial administration of the "Dud bore" scheme to the Department of Industries and Development there are no alternative means for carrying out the activities currently being performed by the Rural Advisory Services Section.

7. POTENTIAL SAVINGS

Because of the steady and demanding work load placed on the Rural Advisory Services Section, there is no scope for savings by staff reduction and no other avenues for savings are readily available.

8. RECOMMENDATION

In view of the wide range of regulatory and administrative activities carried out by the Rural Advisory Services Section and the potential requirement for "hands on" advisory services to rural farming enterprises seeking to maximise production by on farm water use, it is recommended that the Rural Advisory Services Section be restructured and provided with administrative support from existing in-house resources to enable greater use of Technical Staff time on providing on site farm advisory services.
ATTACHMENT

ACTIVITY ANALYSIS

ADVISORY SERVICES

DETAILS OF FUNCTIONS CARRIED OUT BY

RURAL ADVISORY SECTION

1. DRILLING PERMITS IN WATER CONTROL DISTRICTS

Permits issued 1986 - 232
Permits issued 1987 - 213

The majority of applicants visit the office, where details are explained, some relevant brochures are handed out and some discussion takes place on the groundwater prospects of the site and other aspects of quality, management etc.

Inspection of the construction of the critical sanitation collar of the bore is carried out by a bore inspector on approximately 70% of all bores drilled.

2. WATER WORKS LICENCES

13 new licences were processed in 1987. A total of 76 licences are current, of these 53 are for water extractions and 24 are for works in watercourses, such as dams or causeways. 3 Licences allow for the extraction of 22,000,000 m of water per annum. Some of the extractions are metered, the meters are supplied, installed and read by the licence holder.

Some of the water is used for industrial, mining or community water supply, the remainder for irrigation of possibly 2200 Ha.

N.T. Government works are not bound by the Control of Waters Act so Government owned dams, causeways, bridges or government water supply extractions are not licensed.

Inspections of waterworks licences take place once a year for the majority of these licences. Unlicensed extractions under "Riparian rights" are inspected on an ad hoc basis.

3. ADVICE UNDER THE WATER SUPPLY DEVELOPMENT ACT (WSDA)

1986 - Advices processed 152
1987 - Advices processed 90

These figures do not include the Alice Springs and Tennant Creek regions. The reduction in advices this year is probably due to the economy, rainfall and a shortage of drillers, who this year have been heavily engaged in the mineral exploration boom.

Work on advice by this Section includes discussion with leaseholders, decision on eligibility for formal advice, yield requirements, quality, desired location and alternatives.
The Section then carries out a title search and collects all available information such as bore data, aerial photographs maps etc for the hydrogeologist; when he has completed his assessment a formal advice is prepared with recommendations for the Commissioner of Water Development.

Contact is maintained with the applicant and the driller, and in the case of a dud bore the Section processes the claim for reimbursement.

A percentage of the advice bores are supervised during drilling to:

(a) safeguard financial involvement of the government

(b) provide information to the hydrogeologist

(c) achieve a good bore in difficult situations

4. RURAL ADVICE WORK OTHER THAN PERMITS, WATER WORKS LICENCES AND ADVICE UNDER WSDA

Registration of Drillers - This is covered by the Control of Waters Act. The administration of the registration is minimal with possibly 10 registrations per year plus some renewals. Registration requires the drillers to supply borelogs which are registered and stored by the Hydrology Branch, water samples which are analysed by the laboratory, and rock samples which are sorted and passed on to Department of Mines and Energy for storage.

Water Resources also has a higher level of expertise in water drilling and is in the forefront of new drilling technology. As a result, the drilling Superintendent and his bore inspectors play an important role in disseminating this knowledge to the private industry; this includes the running of courses and at times solving equipment or drilling problems.

5. ADVICE TO OTHER GOVERNMENT DEPARTMENTS

Department of Industries and Development

This Department is actively involved in promoting development of agricultural and other industries. It frequently sends its customers to RAS for information on water related impacts of their proposals.

Department of Lands and Housing

All development proposals, subdivisions etc are sent to the Water Directorate for comment. Rural Advice comment relates to water pollution aspects as well as specific questions on water supply, effluent disposal and flooding.

Department of Health and Community Services

Health surveyors request comment on effluent or other waste disposal in relation to the safe guarding of surface or groundwater from pollution. Department of Lands and Housing and Department of Health and Community Services queries mainly relate to the Control of Waters Act.
Department of Mines and Energy

Again related to the Control of Waters Act. Questions are on mining and extraction of sand and gravel in or near rivers or creeks.

6. ADVICE TO OTHER CUSTOMERS

Other customers include the pastoral, agricultural and horticultural industries and the general rural population of the NT. Questions relate to water supplies, surface water availability, groundwater potential, drilling techniques, drilling cost, bore maintenance, water quality (both chemical and bacteriological) water management, irrigation, pumps, pipelines, farm dam construction etc.
### SURFACE WATER ASSESSMENT - INTERSTATE COMPARISONS

#### Period Of Surface Water Gauging Stations in years

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<th>STATE</th>
<th>50+</th>
<th>40-49</th>
<th>30-39</th>
<th>20-29</th>
<th>10-19</th>
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**NOTE:** INCLUDES ALL STATIONS EXISTING AND CLOSED DOWN
### WATER ASSESSMENT PROGRAMMES - SOME INTERSTATE COMPARISON

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<th>STATE/AUTHORITY</th>
<th>NT PAWA</th>
<th>WA WATER AUTHORITY</th>
<th>QLD WATER RESOURCES COMMISSION</th>
<th>SA ENG &amp; WATER SUPPLY DEPT &amp; SA MINES DEPT</th>
<th>VIC RURAL WATER COMMISSION</th>
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<td>14</td>
<td>continuous conductivity 5 continuous temperature 61 continuous samples + numerous field measurements</td>
<td>298 are part of above</td>
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### WATER ASSESSMENT PROGRAMMES - SOME INTERSTATE COMPARISON

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APPENDIX 12
### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMME

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<tr>
<th>PROGRAMME - WATER SUPPLY</th>
<th>1987/88 BUDGET</th>
<th>1987/88 COST</th>
<th>APPORTIONMENT</th>
<th>Business or Client Responsible to Moot Cost</th>
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<td>Overcosts etc</td>
<td>Present</td>
<td>Proposed</td>
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<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>$</td>
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APPENDIX 13

141.
## REVIEW OF WATER RESOURCES GROUP

### APPENDIX 13

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

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<thead>
<tr>
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<th>WATER SUPPLY</th>
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<td>Deep Well Ground Water Investigation</td>
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<td>Adelaide River Water Supply Treatment</td>
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<td>Palmerston Ground Water Investigation</td>
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<td>Donkey Camp Water Quality</td>
<td>Business</td>
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<td>Emily Creek Recreation Lake Stage 2</td>
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<td>Darwin Water Supply Surface Water Yields</td>
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<td>Kings Canyon Ground Water Investigation</td>
<td>Business</td>
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<td>Ground Water Supply Monitoring</td>
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### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>WATER SUPPLY</th>
<th>1987/88 BUDGET</th>
<th>1987/88 COST</th>
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<td>Percent</td>
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<td>&quot;NT Water&quot; Volume 2 and Water Plan</td>
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<td>12 460</td>
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## REVIEW OF WATER RESOURCES GROUP

### APPENDIX 13

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

<table>
<thead>
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<th>PROGRAMME - WATER SUPPLY</th>
<th>1987/88 BUDGET</th>
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<td>1987/88 COST RECOVERY</td>
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<td>PROJECT</td>
<td>CLASSTN</td>
<td>Direct Costs</td>
<td>Oncosts, etc</td>
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<td>Ground Water Data Processing</td>
<td>General Community</td>
<td>158,300</td>
<td>27,703</td>
</tr>
<tr>
<td>Ground Water Supply Monitoring</td>
<td>General Community</td>
<td>235,700</td>
<td>41,247</td>
</tr>
<tr>
<td>Douglas/Daly Monitoring Bore</td>
<td>General</td>
<td>42,500</td>
<td>7,438</td>
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<tr>
<td>Surface Water Inventory and Data Processing</td>
<td>General Community</td>
<td>846,100</td>
<td>148,057</td>
</tr>
<tr>
<td>Surface Water Quality Surveys</td>
<td>General Community</td>
<td>13,000</td>
<td>2,275</td>
</tr>
<tr>
<td>&quot;NT Water&quot; Volume 2 and Water Plan</td>
<td>General Community and Client</td>
<td>71,200</td>
<td>12,460</td>
</tr>
<tr>
<td>Technical and Scientific Computing Services</td>
<td>General</td>
<td>64,500</td>
<td>11,287</td>
</tr>
<tr>
<td>TOTAL BASELINE INVENTORY</td>
<td></td>
<td>1,431,300</td>
<td>250,477</td>
</tr>
</tbody>
</table>
### APPENDIX 13

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

**PROGRAMME** | **FLOOD PROTECTION** | **1987/88 BUDGET** | **1987/88 COST RECOVERY** | **APPORTIONMENT** | **Business or Client Responsible to Meet Cost**
--- | --- | --- | --- | --- | ---

<table>
<thead>
<tr>
<th>Project</th>
<th>Class</th>
<th>Direct WRG Costs</th>
<th>Onerous Costs</th>
<th>Present</th>
<th>Proposed</th>
<th>Business</th>
<th>Client</th>
<th>General</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice Springs Flood Plain Management Study</td>
<td>Client</td>
<td>71,800</td>
<td>12,505</td>
<td>35,000</td>
<td>84,365</td>
<td>-</td>
<td>84,365</td>
<td>-</td>
<td>Lands and Housing (FWRAP)</td>
</tr>
<tr>
<td>Flood Plain Mapping Studies</td>
<td>Client</td>
<td>59,900</td>
<td>9,958</td>
<td>-</td>
<td>66,858</td>
<td>-</td>
<td>66,858</td>
<td>-</td>
<td>Lands and Housing</td>
</tr>
<tr>
<td>Flood Warning Systems</td>
<td>Client</td>
<td>48,600</td>
<td>8,505</td>
<td>10,000</td>
<td>57,105</td>
<td>-</td>
<td>57,105</td>
<td>-</td>
<td>NTES (via Northern Territory Government and Commonwealth)</td>
</tr>
<tr>
<td>AS Social and Ecological Impact of Floods</td>
<td>Client</td>
<td>6,900</td>
<td>1,207</td>
<td>3,000</td>
<td>8,107</td>
<td>-</td>
<td>8,107</td>
<td>-</td>
<td>Commonwealth (FWRAP)</td>
</tr>
<tr>
<td>Kakadu Highway Hydrology</td>
<td>Client</td>
<td>7,500</td>
<td>1,312</td>
<td>1,000</td>
<td>8,812</td>
<td>-</td>
<td>8,812</td>
<td>-</td>
<td>Transport and Works (Roads)</td>
</tr>
<tr>
<td>Surface Water Resource Inventory and Data Processing</td>
<td>Client</td>
<td>245,000</td>
<td>42,875</td>
<td>58,700</td>
<td>287,875</td>
<td>-</td>
<td>287,875</td>
<td>-</td>
<td>Transport and Works (Lands and Housing, NTES)</td>
</tr>
</tbody>
</table>

**TOTAL FLOOD PROTECTION** | | 438,700 | 76,422 | 187,700 | 513,122 | - | 513,122 | - |
### REVIEW OF WATER RESOURCES GROUP

#### APPENDIX 13

**SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES**

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>WASTE WATER MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJET</td>
<td>CLASS'N</td>
</tr>
<tr>
<td></td>
<td>Direct WRG Costs</td>
</tr>
<tr>
<td>Hunt Jungle Project Management and Monitoring</td>
<td>Client</td>
</tr>
<tr>
<td>Ground Water Supply Monitoring</td>
<td>Business</td>
</tr>
<tr>
<td>Frances Bay Mooring Basin Water Quality Monitoring</td>
<td>Client</td>
</tr>
<tr>
<td>Pine Creek Goldmine</td>
<td>General Community</td>
</tr>
<tr>
<td>Woodcutters Mine Regional Monitoring</td>
<td>General Community</td>
</tr>
<tr>
<td>Surface Water Resource Inventory and Data Processing</td>
<td>Business and Client</td>
</tr>
<tr>
<td>Alligator Rivers Region Unit (Lab)</td>
<td>Client</td>
</tr>
</tbody>
</table>

**TOTAL WASTE WATER MANAGEMENT**

| 1 022 580 | 178 938 | 293 400 | 1 201 438 | 90 168 | 1 099 520 | 11 750 |

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### APPENDIX 13

#### REVIEW OF WATER RESOURCES GROUP

**SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES**

<table>
<thead>
<tr>
<th>PROGRAMME UNALLOCATED</th>
<th>CLASS/N</th>
<th>1987/88 BUDGET</th>
<th>1987/88 COST RECOVERY</th>
<th>APPORTIONMENT</th>
<th>Business or Client Responsible to Meet Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Direct Costs</td>
<td>Incurred Costs etc.</td>
<td>Present</td>
<td>Proposed</td>
</tr>
<tr>
<td>Other Professional Advice</td>
<td>General</td>
<td>171 700</td>
<td>30 047</td>
<td>-</td>
<td>201 747</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limnology</td>
<td>Client</td>
<td>38 400</td>
<td>6 720</td>
<td>-</td>
<td>45 120</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL UNALLOCATED</td>
<td></td>
<td>210 100</td>
<td>36 767</td>
<td>-</td>
<td>246 967</td>
</tr>
</tbody>
</table>
### APPENDIX 14A

#### REVIEW OF WATER RESOURCES GROUP

**SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES**

**APPORTIONMENT OF COSTS TO BUSINESS, CLIENTS AND GENERAL COMMUNITY**

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>1987/88 BUDGET (INCL ALL OVERHEADS)</th>
<th>PROPOSED RECOVERIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>13 050 366</td>
<td>6 555 063</td>
</tr>
<tr>
<td></td>
<td>3 532 851</td>
<td>2 912 339</td>
</tr>
<tr>
<td></td>
<td>13 001 253</td>
<td></td>
</tr>
</tbody>
</table>

- Excludes adjustment for previous years' recovery against 1987/88 expenditure.
REVIEW OF WATER RESOURCES GROUP
CONSOLIDATED SUMMARY OF COST RECOVERY PROPOSALS
BASED ON 1987/88 PROGRAMMES

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Expenditure</td>
<td>11,494,000(1)</td>
<td>13,050,368(2)</td>
</tr>
<tr>
<td>Total Cost Recovery</td>
<td>3,888,200(3)</td>
<td>13,050,368(4)</td>
</tr>
<tr>
<td>Shortfall</td>
<td>7,605,800</td>
<td>-</td>
</tr>
</tbody>
</table>

(1) Excludes Overheads
(2) Includes Overheads
(3) Excludes previous years’ recovery against 1987/88 expenditure
(4) Includes adjustment for previous years’ recovery against 1987/88 expenditure.

Proposed Source and Amount of Recoveries

**Internal**
- PAWA Town Water Supply and Sewerage Operations: 730,400
- PAWA AES: 1,460,200
- NT Government (General Community): -

**External**
- NT Government Departments: 527,300
- NT Local Government: 35,100
- Commonwealth Government: 542,400
- Non Government: 15,000(1)

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3,610,400</td>
<td>13,001,253(1)</td>
</tr>
</tbody>
</table>

(1) Excludes previous years’ recoveries against 1987/88 expenditure
# REVIEW OF WATER RESOURCES GROUP

## SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

Effect of Full Cost Recovery on Various Business NT Government Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery</th>
<th>Full Cost Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL COMMUNITY</td>
<td>NIL</td>
<td>2,912,339</td>
</tr>
</tbody>
</table>
### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery</th>
<th>Full Cost Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTG CLIENTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDUSTRIES AND DEVELOPMENT</td>
<td>10 000</td>
<td>221 194</td>
</tr>
<tr>
<td></td>
<td>223 000</td>
<td>391 212</td>
</tr>
<tr>
<td></td>
<td>52 100</td>
<td>390 546</td>
</tr>
<tr>
<td></td>
<td>62 100</td>
<td>(28 670)</td>
</tr>
<tr>
<td>NTES</td>
<td>-</td>
<td>107 237</td>
</tr>
<tr>
<td>CCNT</td>
<td>-</td>
<td>136 594</td>
</tr>
<tr>
<td>COMTAG</td>
<td>-</td>
<td>480 928</td>
</tr>
<tr>
<td></td>
<td>223 000</td>
<td>247 490</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANDS &amp; HOUSING</td>
<td>-</td>
<td>652 440</td>
</tr>
<tr>
<td></td>
<td>35 000</td>
<td>136 594</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>84 365</td>
</tr>
<tr>
<td></td>
<td>150 000</td>
<td>107 238</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>25 200</td>
</tr>
<tr>
<td></td>
<td>185 000</td>
<td>600 255</td>
</tr>
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</table>


### APPENDIX 14C.2

#### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY

**BASED ON 1987/88 PROGRAMMES**

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery $</th>
<th>Full Cost Recovery $</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTG CLIENTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSPORT &amp; WORKS ROADS</td>
<td>1 000</td>
<td>8 812</td>
</tr>
<tr>
<td></td>
<td>58 700</td>
<td>73 400</td>
</tr>
<tr>
<td></td>
<td>223 000</td>
<td>247 490</td>
</tr>
<tr>
<td>TRANSPORT &amp; WORKS</td>
<td>2 000</td>
<td>15 040</td>
</tr>
<tr>
<td></td>
<td>284 700</td>
<td>344 742</td>
</tr>
<tr>
<td>HEALTH AND COMMUNITY SERVICES</td>
<td>12 500</td>
<td>54 465</td>
</tr>
</tbody>
</table>
**REVIEW OF WATER RESOURCES GROUP**

**SUMMARY OF EFFECT OF FULL COST RECOVERY**

**BASED ON 1987/88 PROGRAMMES**

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery</th>
<th>Full Cost Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAWA OPERATIONS AND PLANNING AND DEVELOPMENT GROUPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAWA OPERATIONS AND PLANNING AND DEVELOPMENT GROUPS</td>
<td>27 000</td>
<td>91 389</td>
</tr>
<tr>
<td>PAWA OPERATIONS AND PLANNING AND DEVELOPMENT GROUPS</td>
<td>552 000</td>
<td>954 100</td>
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<tr>
<td>PAWA OPERATIONS AND PLANNING AND DEVELOPMENT GROUPS</td>
<td>-</td>
<td>2 996</td>
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<td>PAWA OPERATIONS AND PLANNING AND DEVELOPMENT GROUPS</td>
<td>100 000</td>
<td>349 092</td>
</tr>
<tr>
<td>OPS AV TW</td>
<td>-</td>
<td>4 817</td>
</tr>
<tr>
<td>OPS KTW</td>
<td>1 000</td>
<td>8 695</td>
</tr>
<tr>
<td>OPS DTW</td>
<td>400</td>
<td>3 642</td>
</tr>
<tr>
<td>OPS TW</td>
<td>50 000</td>
<td>217 900</td>
</tr>
<tr>
<td>OPS DTW</td>
<td>-</td>
<td>1 997</td>
</tr>
<tr>
<td>OPS DTW</td>
<td>-</td>
<td>15 275</td>
</tr>
<tr>
<td>OPS TW</td>
<td>-</td>
<td>161 394</td>
</tr>
<tr>
<td>OPS KWW</td>
<td>-</td>
<td>13 395</td>
</tr>
<tr>
<td>OPS WW</td>
<td>-</td>
<td>31 373</td>
</tr>
<tr>
<td>OPS TWS</td>
<td>-</td>
<td>45 400</td>
</tr>
<tr>
<td><strong>AENS</strong></td>
<td>730 400</td>
<td>1 918 150</td>
</tr>
<tr>
<td>AES</td>
<td>357 000</td>
<td>770 330</td>
</tr>
<tr>
<td>AES</td>
<td>1 053 200</td>
<td>3 382 367</td>
</tr>
<tr>
<td>AES</td>
<td>50 000</td>
<td>217 900</td>
</tr>
<tr>
<td>AES</td>
<td>-</td>
<td>267 316</td>
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<tr>
<td>AES</td>
<td>1 460 200</td>
<td>4 637 913</td>
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</table>
### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery</th>
<th>Full Cost Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-GOVERNMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TERRITORY GRAPE FARM</td>
<td>$6,486</td>
<td>$9,635</td>
</tr>
<tr>
<td>BHP</td>
<td>$15,000</td>
<td>$17,919</td>
</tr>
</tbody>
</table>
### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY

**BASED ON 1987/88 PROGRAMMES**

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery $</th>
<th>Full Cost Recovery $</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMONWEALTH GOVERNMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NTES)</td>
<td>10 000</td>
<td>57 105</td>
</tr>
<tr>
<td></td>
<td>3 000</td>
<td>8 107</td>
</tr>
<tr>
<td></td>
<td>13 000</td>
<td>65 212</td>
</tr>
<tr>
<td>NT WATER</td>
<td>33 000</td>
<td>33 000</td>
</tr>
<tr>
<td>ANPWS</td>
<td>233 000</td>
<td>247 490</td>
</tr>
<tr>
<td>RUM JUNGLE</td>
<td>204 400</td>
<td>356 142</td>
</tr>
<tr>
<td></td>
<td>24 000</td>
<td>66 557</td>
</tr>
<tr>
<td></td>
<td>228 440</td>
<td>422 699</td>
</tr>
<tr>
<td>TOTAL</td>
<td>507 400</td>
<td>758 400</td>
</tr>
</tbody>
</table>
### REVIEW OF WATER RESOURCES GROUP

#### SUMMARY OF EFFECT OF FULL COST RECOVERY BASED ON 1987/88 PROGRAMMES

Effect of Full Cost Recovery on Various Business Undertaking Clients and General Community Programmes.

<table>
<thead>
<tr>
<th>Business or Client</th>
<th>1987/88 Cost Recovery $</th>
<th>Full Cost Recovery $</th>
</tr>
</thead>
<tbody>
<tr>
<td>JTDA</td>
<td>22,600</td>
<td>80,840</td>
</tr>
<tr>
<td>PALMERSTON TC</td>
<td>-</td>
<td>(10,810)</td>
</tr>
<tr>
<td>OTHER TC</td>
<td>12,500</td>
<td>54,465</td>
</tr>
<tr>
<td>PALMERSTON TC</td>
<td>-</td>
<td>25,200</td>
</tr>
<tr>
<td>VARIOUS (LIMNOLOGY)</td>
<td>45,120</td>
<td>205,625</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,100</strong></td>
<td><strong>205,625</strong></td>
</tr>
<tr>
<td><strong>Net Effect</strong></td>
<td><strong>(10,810)</strong></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 15

BIBLIOGRAPHY

Books, Studies, etc. Published Articles etc.


--- draft: Annual Report 1986-87


Miscellaneous Documents Internal and Interdepartmental Memoranda, Reports etc.


NT Department of Industries and Development. Major Projects in the Northern Territory. Memorandum to other Government Departments September 1987.


BUSINESS PAPERS

Submissions from Water Resources Group to the Board of the Power and Water Authority


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Control of Waters Act (NT) 1980
Water Supplies Development Act (NT) 1980
Power and Water Authority Act (NT) 1976
Disasters Act (NT) 1982
POLICY STATEMENTS

Changes to Administrative Arrangements 14 July 1986
Chief Minister's Memorandum of 1 January 1987 re Direction of Government
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Ministerial Media Release 4 August 1987
Essential Services to Remote Communities September 1987.