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"There shall be ... a way"
A HISTORY OF THE ENGINEERING AND WATER SUPPLY DEPARTMENT OF SOUTH AUSTRALIA

by

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SYNOPSIS

The South Australian experience has been different. So many facets of today's mosaic have their roots in the nature and values of the early white settlement. The colonists were idealistic about the future. There would be greater opportunities, fairer systems and guaranteed freedoms. If there were problems there would always be a way to solve them.

The dryness and uncertain water supplies soon put the colonists to the test. Few were prepared to lead in the matter. Inevitably the responsibility fell to the central Government, the pattern of administration having been centralized from the start. Responsible Government, after all, was seen by the colonists as the means of shaping the future for the benefit of all.

As the colony developed and settlement flourished the Government's role in the field was reinforced time and again. Only the Government could mobilize the finance needed to build the large-scale schemes which finite catchment areas dictated.

At times there were too many organizations with overlapping fields of jurisdiction. And there was waste and mismanagement. But the people retained their faith in the quest for good government. More often than not their expectations were rewarded.

Ultimately the administration of State water resource activities was placed in the hands of a single body - the Engineering and Water Supply Department. It was clearly the rational step to take as the limited nature of supplies, and the interrelationships between them became fully known. The State's continuing involvement through one organization ensures the treatment of all aspects of water resources as a unified whole. The future lies in the hands of the people.

Most Australian states have two or more organizations involved in the water resource field. South Australia's pattern of total water resource management is therefore unique. She has tailored it to meet her limitations and needs. A way has been found ...

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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ABBREVIATIONS

S.A.A.	South Australian Archives
G.R.G.	Government Record Group
P.P.	Parliamentary Paper
C.S.O.	Chief Secretary's Office
C.P.W.	Commissioner of Public Works
E.O.	Engineer-in-Chief's Department
H.E.	Hydraulic Engineer's Department
C.W.	Conservator of Water's Department
C.L.	Crown Lands Department
L & S	Lands and Surveys Department
E.& W.S.	Engineering and Water Supply Department

INTRODUCTION

The white settlement of South Australia in the 1830's was unique and experimental in nature. It was no convict colony, no blot on the civilized world. Rather it was to be rational, ordered and optimistic, and settled by people of good moral fibre.

The provision of Government services was thus a target of idealism from the outset. The first settlers knew what kind of administration they did not want. Douglas Pike writes:

> . . . There was to be found, behind all plans, the idealistic hope that the new colony would be a land free from political patronage. . . .[1]

The diseases which pervaded British Government and the Civil Service - patronage, corruption, nepotism, irresponsibility and inefficiency - would have no part to play in South Australia.

And so the colonists fought for, and won self-government, Responsible Government, which they assumed would keep such failings in check. The only problem, however, was that everyone was new to the game. Politician, engineer and clerk alike were schooled in old ways, but confronted with a new environment.

For one, the physical aspect of that environment was unfamiliar. It was so dry, so unwatered compared with the Motherland. The passing of time was to prove just how stark the contrast would be. But the provision of facilities such as regular water supplies and drainage were vital to the establishment and development of communities and rural lands. Governments were forced to act; engineers were forced to implement English ideas until experiment and experience taught them otherwise; and services were thereby provided.

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[1] Douglas Pike, Paradise of Dissent, South Australia 1829-1857, (Melbourne University Press, 1967, 2nd edit.), p. 52.

How, when and by whom these services were bestowed - on the people with high moral and social reputations who lived in this dry land - is the history of Government provision of water supply, sewerage and engineering facilities in South Australia.

It can be no simple listing of achievements. Rather, the primary concern of the administrative historian is with "the relations between institutions and individuals, and with the connection between systems of administration and the societies to which they belong."[2] In other words, the history of the Engineering and Water Supply Department, (and its forerunners), must take account of the organization and its members considered in the social context, if it is to say anything useful at all.

This thesis then, looks at the continuing interaction between three non mutually exclusive groupings in South Australia. Firstly, it involves the politicians and Governments who set many of the targets, rules and checks at Parliamentary, Cabinet and Ministerial levels. Secondly, the process involves one (or more) departmental organizations which recommend, implement and administer the services within current guidelines. They produce the product. Finally, the process involves the needs, expectations and opinions of the community at large - the people of South Australia. How well they are served is the raison d'etre of the process - the point of it all.

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[2] R.L. Wettenhall, "History and Public Administration," in Part Four of Public Policy and Administration in Australia: A Reader, eds. Spann and Curnow; (John Wiley & Sons, Sydney, 1975), p. 216.

CHAPTER I: OPPORTUNITIES : 1836-1858

"In civic affairs the leading colonists failed to lead."

(D. Pike: Paradise of Dissent. . .,p. 507)

From the very beginning of the white settlement of South Australia, the need for freshwater supplies affected the judgements and choices which had to be made. Aboriginal inhabitants of the land had long solved the problem by living in a respectful and conserving relationship with their environment. But white settlers had different ideas about the value and uses of land, and the nature of communities.

To Colonel William Light fell the task of choosing a site for the first major town. A number of alternatives presented themselves, each with a converted band of supporters. But Light decided on the Adelaide Plains - the permanent water supply, drainage and soil potential were obvious - and thereby displeased the Port Lincoln, Encounter Bay and Port Adelaide supporters. He had investigated these alternatives but the lack of fresh water supplies ruled them out as serious contenders.* But such reasoning did not placate everyone. A public meeting was called on February 10, 1837, to decide the issue, mainly because Light's choice did not coincide with that of Governor Hindmarsh. A total of 218 voted for the motion that "the selection was a good one" and 127 against it. The issue was thereby resolved, but the Governor was not content to be out-manoeuvred by a civil servant. Light's few years in the colony were made uncomfortable and thankless. All he could do was to leave his decisions "to posterity"[1] to make the final judgement. Posterity has rightly praised his wisdom and Adelaide remains his enduring legacy.

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* Given the E.W.S. Department's later expensive struggles to keep up with water supply demands of Port Lincoln and Eyre Peninsula, there is every reason to be thankful that Adelaide was placed where it is.

[1] He recorded this notion in his writings: "A Brief Journal of the Proceedings of William Light," S.A. Facsimile Editions No. 1, Public Library of S.A. Adelaide 1963 p. IV (Preface).

Freshwater supplies, however, cost the settlers money and effort from the very beginning. The 'Buffalo' had 20 tons of water conveyed from the Adelaide settlement to Glenelg, the charge being £100. Nearly half of this amount alone was spent on bringing back the empty water casks by means of sledges.[2] Wells were randomly sunk by enterprising settlers but the major source was the Torrens River, as Light had intended it to be. Oxen and horses soon conveyed the water via specially-constructed vehicles, or people dragged their own supplies by barrel using a line attached to screws at both ends.

In 1840 the City Corporation was inaugurated. It was naturally interested in obtaining revenue, so it ordered that carts conveying water to the residents should be licensed. The policing of this and other money-making systems was short-lived for the Corporation was soon propelled into debt — largely by Governor Grey — and temporarily out of existence. For the water carters this meant a free rein again. They were responsible to nobody but themselves.

Meanwhile, the Special Survey system was working in such a way that the inadequacy of rural water supplies would early become a major limitation on settlement. Captain Sturt wrote to the New South Wales Governor Gipps:

> The Special Surveys have secured all that is valuable in the shape of water to a few individuals and rendered invaluable more than one-third of the provincial lands. . . .[3]

In the same way early exploratory trips to the interior quickly became aware of the value of any water supplies. Finding water simply meant survival and a safe return to Adelaide. Native wells and soaks were avidly utilized and their positions recorded.

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[2] H.T. Burgess, The Cyclopedia of S.A., 1907 Vol. I p. 93.

[3] D. Pike, Paradise of Dissent, South Australia 1829-1857 (Melbourne University Press, 1967, 2nd edit.), p. 178.

In 1841 a Colonial Engineer's Department emerged with the first Surveyor-General, Captain Edward Frome, as its Head. Roads, street-making, bridges, wharfs and public buildings were his direct responsibility. However, Adelaide's water supply and drainage problems early reached his attention and he was not slow to complain about them to the Chief Secretary and Lieutenant Governor, F. Robe. The nuisance caused by individuals pumping water out of their cellars into the streets incensed him. As well, he was annoyed by the damage done to the road leading to the ford crossing at the Torrens - water carriers used the spot to fill their carts and merrily slopped their way up the rise. His roads were regular bog-patches!

Others had begun to complain about the dangers to health associated with the Torrens waters. From the very beginning the river had been used for watering stock, bathing, refuse disposal and as a water supply. In 1839, after an epidemic of dysentery had killed five children in one day, Governor Gawler took the first step towards controlling the quality of the Torrens. He prohibited bathing, washing clothes and the throwing of dead animals into the stream within one mile of the town. But each summer the epidemic recurred and the complaints persisted. An enquiry was eventually organized in 1845, but Medical Officer J. Nash declared that dysentery cases were decreasing and therefore its causes lay in other directions than the town water supply. Still, he was at the time sinking a deep well at his own Grenfell Street home, so he was no advertisement for the merits of Torrens water! Not many years later another medico, Dr. Everard, declared that he would not be compelled to drink the river water for five guineas a day.[4]

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[4] See "Sanitary Reform . . . by John Stephens (1849)": S.A. Facsimile Editions No. 45, Public Library of S.A.; 1962 p. 34.

Meanwhile a number of enterprising individuals could see that an improvement of Adelaide's water supply system might be economically advantagous. An engineer called John Wyatt approached both Governor Grey and Governor Robe about the possibility of erecting a steam engine and associated machinery near North Terrace. In fact, he asked for the strip of land running from the Foot Police Station to the Torrens on which to erect the works. Robe promptly demanded that Wyatt submit his plans in detail and the scheme got no further. A year later, in 1847, a Dr. Davy proposed that a Water Company be formed to bore for artesian water and supply it to carters at a particular cost. This proposal failed, but Wyatt sank a well of his own at his foundry on North Terrace, and the good water thereby obtained was the envy of many Adelaidians.

In 1848 another scheme was mooted by a civil engineer, George Green, the local agent of a Liverpool engineering firm. He had two plans in mind, one of which was particularly well received by his friends. It envisaged a supply from Brownhill Creek via a six inch main to the town, and a supply reservoir below-ground at its point of destination. A meeting of interested men on October 11, 1848 decided to form a Water Company to put the scheme into operation. A committee of twelve was elected and one-fifth of the capital required, £20,000, was raised. The Adelaide Water Company then offered the rest of the shares at £10 each. However even the support of newspaper editorials failed to arouse sufficient interest. Few subscribed and the Company never got off the ground.

Citizens with capital were simply not interested in supporting expensive alternatives while they could afford to sink their own wells, buy tanks and pay any price the carters were asking. On the other hand, those who suffered most at the hands of the water carters lacked the capital and voice to lend their support. By the end of 1848 inhabitants were out-laying £5,616 annually to water carters - 36 carts were earning an average

of £3 per week each for delivering three gallons a day per person.[5] Rich and poor alike paid the same price . . . the distance they lived from the Torrens determined how much they paid.

One water carter, 'Worthy' George Nicholls, rejected the accepted system. He would frequently deliver free loads to the poor. His rationale, as a self-avowed Socialist, was that the profits he made were more than adequate for his own requirements. For this humanitarian behaviour, he was beaten up by fellow water carters, who had no wish to be undermined. Eventually they destroyed his cart and stole his horse. The Register even ran a campaign to raise enough money for the purchase of another horse, but the persecution of George did not let up. Only when he suicided did fellow water carters rest easy.

They remained for some time one of the most pampered groups in society. Water carts were the only wheeled transport exempt from tolls, licenses and fees, yet they were the worst offenders against the condition of roads. The gold rushes of the early fifties confirmed their stranglehold. Many went off to seek their fortunes, leaving the remaining carters to charge what they liked. Where water for fire-fighting was concerned, their efforts, however futile, were always in demand. But they were selective in the fires they fought. They often refused to carry water to Government fire engines, whereas they had agreements with the various insurance companies which guaranteed them payment for carting water to insured buildings on fire. As well, carters had no qualms about the quality of water they delivered for domestic purposes. The Register of February 6, 1852 carried an article on commonsense precautions to render such water as pure as possible.

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[5] The Register, Nov. 11, 1848

Just as there was little concerted interest shown in possible alternative water supply systems, so there was little interest in matters of sanitation. The year 1848 saw the opening of Adelaide's first firm of night-soil men. But one man was prepared to crusade for further action. John Stephens, the Editor and Proprietor of the South Australian Register and Adelaide Observor, was an avid writer on topics of civil and religious liberty. On February 13, 1849, he called a public meeting to discuss 'Sanitary Reform' at which he delivered (and later printed in booklet form) a lecture on the topic. Only 60 attended the meeting at the New Queen's Theatre. But Stephens pointed out problem areas with a gusto and chided the authorities for failure to act where the provision of drainage, water supply and building regulations were concerned. A temperature of 113 degrees and a nearby slaughter-house offal dump added odorous impact to his words! His zeal was to have little effect. He died in November 1850 and other crusaders were not forthcoming. Letters to Editors and petitions to the Government about any of these issues remained few and far between.

The next slow steps towards the provision of fair water supply and sewerage services for all came with the arrival of Governor Young and the formation of the City Commission in 1849. Many leading citizens declined to become City Commissioners but eventually a body of men was organised who began to take a serious look at the powers vested in them under Ordinance No. 11 of 1849. They were, in fact, the first body in South Australia given official powers to construct waterworks, sewers, control sources of supply and collect rates for services rendered.

The Commissioners soon issued separate licences for pumping and for delivery to Adelaide's inhabitants. Most of the pumping was still being done at the ford, midway between Morphett Street and King William Road. By 1852 a City Council had emerged to replace the City Commission and it

became interested in the possibility of obtaining a water supply without actually entering the Torrens with water carts. Consequently the Governor gave Messrs. Taylor and Berry permission to replace their specially-developed steam engine (and tanks) on Government land near the ford. Another firm, Pybus and Turner, entered into a lease which allowed them to pump water as well. This competition had one good effect - water was supplied to consumers a little cheaper than in the forties. Both firms supplied the water carters at 3d/load of 50 gallons from the same stretch of the Torrens, and they in turn charged between 1/6 and 3s per load according to the distance travelled.

But of more importance was the fact that the City Council was compelled to pressure the Governor and the Legislative Council to investigate measures to improve Adelaide's facilities. The wider issue at stake was the struggle by all groups to retain and extend their powers. The City Council had limited finance and it needed to offer revenue-reaping services to retain its powers and viability. Only the Governor had the power and access to finance to establish such services. Fortunately Governor Young, who arrived in 1848, was personally interested in the question of a permanent water supply scheme for Adelaide. That left only the Legislative Council members to convince - and they were busy agitating for Responsible Government and the powers it would bring. Still, they would need to be wooed.

Captain Freeling, as Colonial Engineer and Chairman of the City Commission was the man in the position to lead the struggle for an adequate water supply. In early 1850, at Governor H. Young's instigation and with the City Commission's approval, he prepared an estimate and report which recommendedthat water be brought from Brownhill Creek. He contemplated two dams (63 feet and 40 feet high respectively), crossing the creek at a cost of £40,000 for the embankments alone. The Governor drew

the attention of the Legislation Council to the matter at the opening of its first session. He pointed out that 11,000 citizens now paid £8,548 annually for impure water delivered by water carts. Then he proposed a plan of action. Prompted by the knowledge that a great fire had burnt out Elders Store, he proposed to the Council that £36,000 of the Land Fund's Crown moiety be lent to the City Commissioners for the scheme. To repay the loan he suggested a water rate of one shilling in the pound on the properties of landowners desiring the water.

At first the reaction was favourable. The non-official members of the Council agreed that a water supply was needed but ensured that the assessment to be levied would not exceed sixpence in the pound. A sum of £10,000 was voted so that work could begin on a scheme, and the City Commissioners were notified accordingly. Then an appropriate waterworks Bill was introduced and the backtracking began. During December the Council passed a motion delaying the second reading for six months. In September 1851 a further waterworks Bill was initiated. It was promptly referred to a Select Committee which continually asked for extensions of time. Eventually, the Committee reported against the Bill.

Meanwhile Captain Freeling had undertaken a series of experiments - the first of their kind in the colony - measuring discharges of creeks and streams in 24-hour periods. Maximum and minimum weekly flow guagings were made and as a result he abandoned Brownhill Creek in favour of the Torrens, as the Creek "might not deliver any water for eight to nine months of the year if we had two or three continuous dry seasons. . . ."[6] When appearing before the 1851 Select Committee, he advocated damming the Torrens at a point about six miles north-east of the city. Unfortunately two other engineers examined by the Committee recommended against this

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[6] 1851 Select Committee of Legislative Council into Waterworks Bill, p. 8.

scheme and suggested alternative streams and sites. Freeling had to concede that he had had no personal experience in the construction of waterworks, that two inch pipes (as he had first proposed) would be too small to be of much use, and therefore that the pressure and the water quality to be achieved by his scheme would be poor. So the Committee recommended that advertisements be issued calling for plans, specifications and estimates for permanent water supply schemes. Freeling's work was thus laid aside.

Worse than that, another Select Committee had been busy examining the "efficiency and necessity of the Colonial Engineer's Department." It recommended that the Department be abolished and its functions be divided between the Colonial Architect's and Surveyor-General's Departments. Governor Young's dream of a permanent water supply was thus seriously delayed by a self-dependent group in the Legislative Council unwilling to incur obligations. Instead, they were more interested in embarrassing the Governor as a means to an end. The workings of Government Departments and the appointment of civil servants were areas in which they had no say. Until there was self-government, and civil servants became answerable for their actions, there would be no point in incurring outlays of expenditure on such projects.

The struggle for a permanent water supply scheme continued. In 1852 Governor Young instructed the Colonial Architect, W.B. Hayes, to report on the question of a permanent water supply. Hayes went further than that. He advocated a combined water supply - sewerage system which would be vested in one responsible authority. Furthermore he considered that filtration was necessary to ensure the quality of the water supply, "the first and most important consideration of all."[7] Principles

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[7] See C.S.O. 2413/52.

embodied in the General Board of Health's report of 1850 into the London water supply provided his basic guide. Governor Young was impressed with Hayes' plans and perceptions, as was the City Council. Again it was the Legislative Council which showed little interest and willingness to act. A Waterworks Bill to raise the sume of £100,000 for Waterworks for the City of Adelaide was introduced by the Governor and supported by the City Council, but little came of it. The average daily attendance in the Chamber was poor and there were no petitions forthcoming from the people to give impetus to the waterworks issue.

In 1854, J.H. Fisher, Mayor of Adelaide, initiated an 'Adelaide Sewerage and Drainage Bill,' but Councillors were more interested in the course of the Crimean War and in constitutional questions. The Bill reached a second reading but Fisher was induced to withdraw it on the promise that the Government would give the whole question of waterworks and drainage their serious consideration in 1855. To reassure the City Council of their intentions the Legislative Council advanced the princely sum of £3,000 towards improvement of the existing water supply arrangements.

In the same half-hearted way a Committee was appointed to open and report upon plans and specifications submitted for the waterworks and drainage of Adelaide. The 1851 Select Committee had advocated this course of action . . . now, three years later, it was coming to fruition. The Committee consisted of the Surveyor General (Freeling), Messrs. Hamilton and Hanson and the Colonial Secretary. They concluded that neither of the two plans received fulfilled conditions specifically required in the Government Gazette so they did not recommend either. One proposed Fourth Creek as a source of supply, the other allowed the Government the choice of three possible streams. Perryman, the City Surveyor, and J. MacGeorge, the authors in question, then joined forces to demand that they be paid the second and third premiums. The Committee decided that the plans were not

worthy of premiums, and the new Governor, R. MacDonnell, acquiesced. Perryman wrote further letters to the Chief Secretary, claiming he had been duped in the competition, just as his original plans for the Company Mill Bridge, though rejected, were now being adopted as the design of Mr. Hamilton. Jealousies between Government and City Council technical staff thus did little to further the cause of a permanent water supply for Adelaide. The two men received some newspaper editorial and Legislative Council support after they had petitioned Parliament in early 1856, but they never received the recognition or prize money they sought.

The 1855-56 Parliamentary Session saw the realisation and acceptance of the notion that the Government had no choice but to act where waterworks for Adelaide were concerned. For some unknown reason Freeling, the Surveyor-General, and not the Colonial Architect, prepared a general report on the water supply and drainage of the City of Adelaide, apparently at the Chief Secretary's instigation.[8] Furthermore, Freeling chose to collaborate with G. Hamilton, (Inspector-in-Chief of Main Roads), and Mr. W. Hanson, (Engineer to the Gawler Town Railway), when preparing the report. They recommended a gravitation scheme, taking water from the Torrens north-east of Adelaide to an offstream reservoir by means of a stone weir. They also favoured a system of surface drainage to be collected and deodorized in tanks in the parklands.

The mobilization of some areas of public opinion also ensured that something would be done. In January, Parliament received its first-ever petition requesting the passage of Acts relevant to the establishment of waterworks and control of buildings in the city.[9] However, this contained only 399 signatures, and if the dearth of Letters to the Editor

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[8] Council Paper No. 109 of 1855-56.

[9] Council Paper No. 104 of 1855-56.

in the newspapers are any indication, the issue still did not evoke widespread public interest. The Register editorials in 1856 regularly dwelt upon the question of waterworks, favouring an advanced pumping scheme in preference to the expensive Government plan as proposed by Freeling. Even during the passage of the first Waterworks and Drainage Bill in June 1856, the lack of public interest in its form and intent worried newspaper Editor and Parliamentarian alike.

On Friday, June 13 the Editorial of The Register noted that

> A very extraordinary apathy characterises the public mind with regard to the proposed water supply and drainage of Adelaide. There are neither public meetings, public memorials, nor letters in the newspapers.

He went on to

> regret in common with the Government, that there is no expression of public feeling on a question, the financial, social and sanitary relations of which are of paramount importance.[10]

But there were enough influential people interested to ensure that action would be taken. Another request from the Mayor urging the Government to foster a Waterworks Bill, and a Select Committee into the whole question, combined to ensure that once the Bill was initiated on June 3, its passage through Parliament would be swift. True, there were Parliamentarians unwilling to commit themselves to the Government scheme but the Select Committee was adament in its support.[11] Such unanimity was natural given its carefully-chosen members. The Surveyor-General, Colonial Secretary, Advocate-General, Colonial Treasurer and Mr. Stirling had every reason to co-operate with one another. They recommended against temporary expedients as offered by witnesses Perryman, Pybus and Wyatt and supported by Jackson, Engineer to the Melbourne Waterworks. Babbage,

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[10] The Register: Editorial, Friday June 13.

[11] Council Paper No. 140 of 1855-56, Report of Select Committee on Water Supply and Drainage of the City of Adelaide.

Engineer for the City and Port Railway gave evidence in favour of the Brownhill Creek as the best possible source of supply. Only the evidence given by Hamilton and Hanson really supported the Committee's contention that the Government scheme was "the most comprehensive and efficient . . . for the joint object of water supply and drainage."[12]

The Governor had enough nominated and elected members of the Legislative Council on his side to push the Bill through in just over two weeks. There was even complete agreement as to the nature of the authority to administer the Act - namely, a Waterworks and Drainage Commission. The only amendment made ensured that no civil servant would be a Commissioner. Obviously, the Councillors were again placing their bid for Parliamentary control over civil servants, as the powers of Responsible Government were not yet theirs.

The only aspect of the Bill which evoked a public reaction and some related legislative debate was that of the system of rating. Very late in the day, on June 17 (and two days before the Governor gave his assent), a petition signed by 126 agitated property owners reached Parliament. They realised that the levying of construction and supply rates according to property value would mean payment of many times the amount they currently expended in the purchase of water. Worse than that, "the occupants of cottages in other [poorer] portions of the town, would be rated, in many instances, at not more than one-fifth of the sum they now pay."[13] Although the petitioners had supporters in the House, the opposition was too strong and it was too late in the day for changes to be made. An added limitation was the fact that the petitioners themselves could not, and did not, suggest a way of levying on a fairer principle.

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[12] Ibid.

[13] Council Paper No. 198, Vol. II, 1855-56.

The first Waterworks and Drainage Commission was therefore appointed on July 10, 1856 complete with its own seal - S. Davenport was Chief Commissioner at a salary of £500 p.a. and G.M. Waterhouse and J. Lazar fellow Commissioners at £200 p.a. Lazar was also Mayor of Adelaide at the time so the City Council's agitation for a say in the waterworks was apparently recognised. G.E. Hamilton, a previous witness in favour of the Government scheme, was rewarded with the position of Engineer to the Commission, at a salary of £800 p.a. Thus the status of the professional engineer was high from the outset, and rewarded appropriately, especially when compared with the positions of Secretary and clerk to the Commission. These positions were filled by C. Wornum and O. Babbage at salaries of £350 and £120 respectively. By the end of July 1856 temporary employment had also been offered to two surveyors at £1 per day.

From its very inception the Commission had no apparent rules to guide them nor recognised channels to work through. Its first report was forwarded to the Governor via the Surveyor-General (Freeling), the only reason being his interest in the question. The Commissioners were somewhat at a loss where current developments in the field were concerned. However, they early sought answers by sending their engineer, Hamilton, to visit Melbourne and Sydney, armed with a list of 33 matters to be investigated.

Meanwhile the first public water supply scheme in the Colony was completed at Port Elliot and had nothing whatsoever to do with the Commission.[14] Water from springs was collected by galvanized iron bedded in concrete and brick channels, into a large, covered tank from which domestic water was pumped and shipping supplied by two inch cast iron pipes to the jetty head.

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[14] See W. Bennett Hays, "Engineering in S.A. . . .": S.A. Facsimile Editions No. 46, 1856; (rpt. Adelaide: Libraries Board of S.A. 1965), pp. 39-41.

The Supervisor of Public Works for the Colony, another public servant, was responsible for the engineering and management of the scheme.

By early 1857 Hamilton had returned from eastern Australia with relevant information and the Commission was then ready to call for tenders for pipes, bends and other castings. On March 3, 1857 a memorandum was signed with Philip Levi and Co., their tender being the second lowest of the sixteen offers received. It was not the end of the matter. Mr. H. Martin, the man who had tendered the lowest offer and who was apparently used to getting Government contracts for that reason, immediately wrote to the Chief Secretary. His tender was in fact the lowest by £120 and he objected that he had received no sufficient reason from the Commissioners as to why the accepted tender was preferred above his. A stream of correspondence ensued, and the matter received Parliamentary attention and debate. Davenport, the Chief Commissioner, was adamant, arguing that Martin tendered as a single individual, had no fixed public business or address, and that anyway, the sixteenth clause of the specification had declared that the Commissioners would not be bound to accept the lowest tender. On the other hand Levi and Co. were a resident and long-established mercantile house, with greater experience in general shipments.// The Commissioner's decision was upheld by Parliament. However, in the eyes of many Parliamentarians, it provided an added reason why the activities of Boards, Commissions, and Trusts should be brought more directly under the control of Parliament. On April 4, 1857 the South Australian Parliament and responsible Government came into existence. Davenport promptly resigned as Chief Commissioner, as he had promised his electorate he would step down from the position if elected to Parliament. This was to be the beginning of other changes at leadership level, none of which helped the already unstable affairs of the Commission. W.H. Maturin was appointed Chief Commissioner and G.M. Waterhouse promptly resigned. Then, in 1858, when Maturin resigned Waterhouse sought and obtained the position of Chief Commissioner. The only constant

member was Lazar, the City's Mayor and he had more on his plate to worry about than attendance at the occasional meeting of the Commission.

Still, after the debacle in early 1857, and despite its turnover of personnel, the Commission was able to report progress, mainly through the efforts of its engineer, Hamilton. He finalized plans for a weir to be built across the Torrens Gorge, contractors were obtained with little fuss, and the work was left to the supervision of a Clerk of Works. By the end of 1857 the foundations had been laid, though at a greater depth, breadth and therefore cost than Hamilton originally planned. He also investigated thoroughly the question of a drainage scheme for Adelaide and concluded that the City could not be drained at a cost less than £175,000. His correspondence with S.C. Homersham, a Consulting Engineer in England, confirmed his opinion that the original scheme, with its tubular pipe sewerage and deodorization treatment, was contrary to current developments, practices and findings in Europe.

Parliament was happy to hear that expenditure in this area was not yet necessary and it passed Act No. 11 of 1857-58 thereby reducing the annual amount to be set aside for the Commission's programme. The money saved (£80,000) was promptly diverted for the building of the Gawler to Kapunda Railway line. A Member of Parliament called Neales took the opportunity to introduce a motion that the meetings of the Commission be made open to the Press. After some debate, the motion was withdrawn, but the discontent concerning lack of parliamentary control over such areas of expenditure remained. Before long, every opportunity was being taken to harass and interfere with Commission affairs. Only when Davenport was Commissioner of Public Works were relations between Parliament and Commissioners calm and civilized for Davenport himself had been one of the original Commissioners.

Ultimately Parliament was to get its own way. Act No. 17 of 1858 abolished the Commission and subordinated its staff and activities to the control of the Commissioner of Public Works. Many Parliamentarians assumed that a significant battle had been won, but in fact the Government was faced with events which left them no alternative but to disband the independent Waterworks and Drainage Commission.

The trouble began in late 1857, when the then Commissioner of Public Works, Thomas Reynolds, with no legislative authority to interfere, began to question matters of Commission responsibility. He had already earned himself a reputation in Parliament as one of the most outspoken critics of the activities of Boards, Commissions and Trusts and was looking for confrontation. He suggested to the Commission that in future their Engineer confine himself to the supervision of contractors, and refrain from interfering with the terms of the contracts. The Commission objected to this order, and in a minute to the Commissioner of Public Works dated December 30, claimed "the right of acting, when an emergency arises in such a manner, as the occasion may demand. . . ."[15] The Commissioner of Public Works was incensed at the minute. The Commissioners were the next party to be upset, when in late January, 1858, certain information, of which only the Commission and the Public Works office had a copy, was leaked to the press. The Commissioners requested an investigation but the Commissioner of Public Works declined to approach the Governor. The matter rested there.

//In July, four months of peaceful relations were broken by a heavy storm which sent floodwaters rushing down the Torrens. Its impact on the newly-completed weir was more than anyone had expected. Large amounts of puddle, footstones and ashlar work were simply washed away and the whole

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[15] See Parliamentary Papers, Vol. I, 1858, Paper No. 19, for details of correspondence which took place between Waterworks Commissioners and Commissioner of Public Works relative to the construction of the River Weir.

weir fractured in places where the concrete foundations did not extend. In the past, two early bridges over the Torrens built by the Surveyor-General had been washed away by unusual floods, so this was not the first disaster of its kind. However, the accusations began to fly thick and fast. The Government had Freeling and Hanson report on the state of the weir. While being very defensive where their friend Hamilton was concerned, these two reported that the weir "would not have sustained the injuries mentioned had the work been carried out according to specification."[16] They predictably blamed the Clerk of Works while the Commissioner of Public Works, (Blyth), inferred that Hamilton was aware of the defective nature of the work. In the Legislative Council on November 30 Dr. Davis moved for some sort of legal censure against Hamilton. However, friends of Hamilton such as Davenport, Morphett and Freeling ensured that the vote was lost ten to one. They stressed the fine manner in which other portions of the waterworks - reservoir, plans for the pipes, the culverts, etc. - had progressed under him.

Hamilton, however, resigned and took up employment under the Railway Commissioners after tendering his services at a very reasonable rate. John England was appointed engineer in his place and reported that the weir was beyond repair - the concrete was composed of useless materials, the mortar contained little or no lime, black earth was used instead of sand and the interior of the weir was found to contain an irregular mass of rough stones just thrown together. He went on to recommend the expenditure of an additional £10,655 to alter and complete the reservoir to his satisfaction. //The others involved in the weir fiasco were also replaced. The Clerk of Works was dismissed from the civil service while the contractors, Frost and Watson, survived by taking work on the railway extensions from Gawler under the supervision of the Railways Commissioners. In 1859 an action was eventually brought against the firm. The verdict indicated

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[16] Ibid.

the half-hearted approach the Government took to the case and the widespread notion that the Engineer in charge should bear the greater part of the blame. The Government was awarded the verdict, one shilling damages (only) and costs.//The Waterworks and Drainage Commission submitted gracefully to the Government's decision to abolish it and place the Waterworks under Ministerial control. It had, in fact, no choice. It had been regularly discredited in the public eye and rarely praised. But much had been achieved - forty acres of land at the Reservoir site had been purchased after negotiation with the S.A. Company; the Reservoir work was well underway; the Kent Town valve house and cottage were complete as well as a cottage at the site of the ill-fated weir; fine roads had been built to the Torrens gorge; some cast iron mains coated with Dr. Angus Smith's tar and pitch mixture had been laid; and the plans and sections of trunk mains and city distribution systems had been completed. Finally, temporary employment had been provided for many of the settlers who remained clustered in Adelaide, lacking the finance and incentive to fulfil the Wakefield plan of developing the colony by settlement of the hinterland.

There was one group which mourned the passing of the Waterworks and Drainage Commission. Years later a Town Clerk wrote:

> The City was thus deprived of all representation in the carrying out of the undertaking. . . .[17]

Although the Commission had not always bowed to City Council suggestion,[18] the Council had felt safe in the knowledge that the Mayor was virtually a permanent Commissioner. Now that Government control of the Waterworks had been established, the Council had no alternative but to fight for a share of the taxes which were in sight. Little did they know that they had no hope of ousting the State from its new area of interest.

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[17] Thomas Worsnop, History of the City of Adelaide, (T. Williams, Adelaide, 1878) p. 160.

[18] See 1858 Parliamentary Papers, Vol. II, pp. 78 and 84. The Council objected to the laying of pipes down the centre of their newly made roads, but the Commission declined to adopt a double main system (down each side of the street) on the grounds of economy.

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Twenty years of wasted opportunities passed before South Australia's leaders availed themselves of a permanent water supply scheme. True, there were financial limitations at times, but the few private and City Council initiatives attempted lacked enthusiastic and progressive planning as well. This inaction at least denied the merciless strictures of competing water companies and Boards which dominated the provision of water supply and drainage services in the Mother country.

The leaders in society failed to lead in this matter just as they had failed Wakefield by turning speculators rather than employers. A strangely apathetic people provided no prodding, no impetus to the whole issue. After all, many were busy tilling the land or working at any jobs just to make a living. Some had water tanks or wells, but most were used to dealings with the water carters. The poor were the hardest done by, but their's was a voice rarely heard or listened for. Furthermore, there were no severe droughts nor severe outbreaks of disease to move the people to action.

Eventually, the Government was forced to step into the picture as it had been forced to do where provision of other services and utilities were concerned. An interested Governor, a number of ambitious engineers and a City Council seeking rates combined forces to undertake the necessary promotion. After much contrariness by all concerned the Legislature finally co-operated, and a body was created to construct and administer permanent Waterworks. There were few or no rules of behaviour or action to guide the Waterworks and Drainage Commission. Interference was inevitable and instances of mismanagement combined to ensure that the Commission's popularity was never high and its existence short-lived.

Parliament was sure that the solution lay in the subjection of the Waterworks management to a responsible Minister. There was little dissent. At least the distrusted civil servant could be watched. It remained to be seen whether this relationship would achieve the efficient provision of water

supply and sewerage services. Responsible Government was still a new ball game for its untutored players.

And yet one man, the theorist Edward G. Wakefield, would have applauded Government intervention in this area. Quality of Government, in his eyes, was of less importance than the amount provided. The ultimate mistake lay in the "Government fail[ing] to supply some urgent want of the settlers."[19] Strangely enough, it had never been established that most Adelaidians saw a permanent water supply as an "urgent want".

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[19] E.G. Wakefield, A View of the Art of Colonization, in present reference to the British Empire... Reprints of Economic Classics, XXIV (1849; rpt. New York; A.M. Kelley, 1969), p. 212.

CHAPTER II: TENSIONS AND UNCERTAINTIES : 1859-1867

Now that South Australia had a Waterworks Department - by default rather than by design - it remained to be seen whether it would prove a more worthy vehicle than its predecessor. The idea of Responsible Government was still very new to politicians, civil servants and the public alike, and as such, there was every chance that rules would be bent and broken. At stake was the completion of Adelaide's first reservoir at Thorndon Park and the associated distribution scheme.

POLITICS:

The parliamentary debates of 1859 were again dominated by attempts to embarrass the Government, in particular, and other parliamentarians if necessary. No political parties were to emerge till late in the century, so meanwhile, the idea of the game was to attach oneself to a promising group of men in the hope that a Government could be formed. Many did emerge, rapidly being superseded by a rearranged Government or a new set of men entirely. //The fact that the Waterworks were now subordinate to ministerial control, (and a saving to the revenue thereby affected), meant that interest in their workings waned in 1859. There were occasions, however, when some political leverage was to be gained. Reynolds and Strangways introduced a motion censuring the Hanson Government for the delay in the execution of the waterworks and its effect upon employment of the laboring classes. Reynolds had his usual say about "the large staff of officers employed to carry them out" but the motion was lost. The only Government motion to do with waterworks was also unsuccessful. It was a Bill to enable the Commissioner of Waterworks to acquire certain lands, upon the condition that he supply the owners thereof with water. In fact, it was an attempt to avoid an awkward turn between the Reservoir at Thorndon Park and Glynde, at a saving of 1¼ miles of pipe. //The early

1860's saw Reynold's ministries dominating the scene. They had achieved electoral success by crying "Service Reform" so the Waterworks fiasco had obviously made an impact. The Department was affected in a number of ways. Firstly, Reynold's policy of pruning the Civil Service meant that the numbers of temporary staff were reduced. On the other hand, the Government's policy of completing waterworks and other schemes under construction was the means adopted for employing the surplus labour in the Colony. Thus the short-staffed Department was expected to manage and supervise an increased force of workmen. Tensions mounted. The Chief Secretary requested Heads to make their sub-estimates smaller than the grant voted for the current year. He also forwarded a circular reiterating an earlier Civil Service Regulation (C.S.O. August 26, 1854) that public officers should abstain from involvement in political movements or meetings and refrain from passing any information without authorization to do so.

Meanwhile, Waterworks held little interest for Parliamentarians. Some petitions were received for extensions of the water supply, the expenses of replacing the weir were tabled and a progress report received from the Waterworks Department. Eventually, in 1861, the Ministry introduced an Adelaide Waterworks Amendment Bill to extend the water supply to Port Adelaide and suburban townships and to make a uniform charge for service pipes to houses. The actual issues and practicalities had not been considered thoroughly so the matter was conveniently referred to the inevitable Select Committee. At the same time an issue had come to light which served to widen the terms of reference of the Committee to include an examination of the estimates, construction and management of the Adelaide Waterworks.//The trouble appears to have centred around the fact that the first Manager of the Waterworks, J.D. Woods, had been appointed by a previous Commissioner of Public Works and had an independence of action which infuriated Alexander Hay, the Commissioner of Public Works in all the

Reynold's ministries. Hay accused Woods of accepting a tender for the laying of pipes over the city parklands, which, after computation, was found to be much above the lowest tender which Woods had originally reported to him. Woods defended himself by claiming that Hay was not allowing for extra works; that there was a difference between "extra work" and an "increase in quantities of the contract work," the contract in question allowing the Engineer power to deal with this latter situation. England, the Waterworks Engineer, supported Woods, by claiming that he had in fact used the powers to increase the work as circumstances required. Furthermore, the area in which extra expenditure had been necessary had been duly reported by both the Manager and himself during a visit to the Commissioner of Public Works.

But Hay was adamant. The Cabinet supported his stand and decided against granting Woods a Board of Inquiry - that is, contrary to a Civil Service Regulation (C.S.O. Sept. 23, 1857) which gave a Departmental Head the right to appeal to the Governor. Woods was dismissed on March 4, 1861 on the grounds that he had "lost the confidence of his controlling Minister."[1]

Woods, in turn, wrote a long letter to the Commissioner of Public Works accusing him of shifting his grounds of attack in an unreasonable and determined effort "to get rid of me." He then petitioned Parliament to be awarded compensation for the loss of his position.

When the details of the case reached Parliament whatever interest existed in the Adelaide Waterworks Amendment Bill lapsed in favour of long debates concerning Wood's treatment at the hands of the Government. His local member, Glyde, spoke forcibly in his favour, asking the question, "were the Heads of departments to be subject to the caprice of the Ministers

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[1] Parliamentary Papers of 1861: See P. P. no 36: Waterworks Contract No. 52.

of the day?"[2] Eventually, the House moved, fifteen votes to fourteen, that there was no just reason for Wood's dismissal. Woods thereupon took his case to the Supreme Court where the lawyer for the defence relied on purely technical objections to save the Government's face. For example, it was argued that Woods had been appointed under Commissioner Blyth and therefore had no grounds against the present Commissioner Hay. The nominal verdict in the court case took the form of advice to the jury that they recommend an award of £500 compensation to Woods.

The matter was referred back to Parliament. There Wood's case was again subjected to much ill-feeling before it was agreed that the sum of £300 compensation would be awarded. Townsend put the motion that it was "expedient, for the Public Service, that Woods should leave his office as Manager." This motion was carried on July 12 but the Treasurer (and Premier) Reynolds would not let the matter rest. On September 20 he provoked another lengthy discussion by claiming that he had been at a meeting of a "joint-stock mining company" some twelve months earlier at which Woods and England had also been present. Glyde, in Wood's defence, ably proved that there was no conclusive evidence of his presence at the meeting. Reynolds then attempted to cast aspersions on Woods because his brother was a Catholic priest. He was forced to apologize. Thus Woods had to be content with £300 compensation for a dismissal from the Public Service of dubious justice, and to boot, a reputation tarnished by Parliamentary tongue-lashing.

October, 1861, saw the first Waterhouse ministry to power. During its two-year reign, three different men held the position of Commissioner of Public Works. One of the first problems which confronted the new Government was the Report of the Select Committee of the House of Assembly into the Adelaide Waterworks Undertaking. The Committee reported that the

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[2] Parliamentary Debates of 1861: House of Assembly, June 5.

outlay on the Adelaide Waterworks had increased from £164,000 to £225,000 and that the works as constructed, clearly differed from the original plans sanctioned by the legislature. They recommended that service pipes be laid at the Government's expense and suggested a new system of rating, the scale to be graduated according to assessed annual values. (The existing system - which rated according to the number of rooms, stalls and stockyards, or to assessed annual value or according to a combination of both of these systems - was obviously causing problems of implementation for the Waterworks Department.) Furthermore, the Committee declined to make a recommendation regarding extensions to Port Adelaide and the North-Eastern suburbs on the grounds that they had failed to elicit reliable information from the Engineer (England) and the new Manager (Boothby) as to the ability of the Torrens to supply other areas. (The Department was not, in fact, making frequent and careful gaugings of the river at this stage.)

Both men were accused of neglecting to answer or evading the questions put to them and of taking little interest in their work. Boothby was naturally upset and used a letter to Commissioner of Public Works regarding estimated water rates receipts to mount what defence he dared.[3] He simply pointed out, quite rightly, that no question was put to him by the Select Committee which, in the remotest degree, referred to the capabilities of the Torrens to supply the City.

England, on the other hand, in his professional wisdom, (and with the knowledge that he had friends in high places), did not take offence. Instead, in his Report on Proposed Waterworks Ratings[4] he made his point rather more subtly by detailing the many advantages which had accrued to

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[3] See Parliamentary Paper No. 188 of 1861.

[4] See Parliamentary Paper No. 74 of 1861.

the City under the Government Waterworks system. Some savings were less believable than others - for example, he suggested that £2,700 per annum worth of soap had been saved on account of the "great purity and softness of the water." Furthermore, he declared his general agreement with the Select Committee's suggested system of rating, with the important proviso that for buildings above £40 annual value, the rating should not be as quickly reduced as they recommended.

1862 again saw nothing come of the Waterworks Act Amendment Bill. However, the Mayor, Thomas English, forwarded a petition signed by those assembled at a public meeting to protest against existing water rates. The City Council had obviously not lost interest in the issue of who should be running the City waterworks. Some Parliamentarians also were not yet convinced of the wisdom of leaving the works in the hands of government. Kingston, in particular was a vociferous exponent of the view that the works had been managed badly, and should have been undertaken by a Company from the beginning. Changes in the rating system, however, remained the dominant issue in the debates surrounding the Amendment Bill.

On the other hand, the Port Augusta Water Supply Bill had a quick and easy passage as members all agreed that the town had potential as an expanding port. (Dr. W.J. Browne had originally brought the matter of a water supply for the town to the House of Assembly's notice in October, 1861.) However, the details involved - the questions of rating and source of supply - caused some disagreement so they were conveniently left out of the Bill. Eventually, another Act had to be passed in 1864 to amend, extend and clarify certain provisions of the original Act. Parliament was quick to pass as many Acts as possible in these years, but the limitations and omissions which invariably became apparent meant that many would soon be forgotten or need amending.

After two more tries, the Ayers ministry finally pushed through an Adelaide Waterworks Amendment Act late in 1863. It meant a new system of rating for the Department to implement as recommended by the 1861 Select Committee. Both the Manager and Engineer expressed general agreement with its basic principles. The other project which faced the Department, by now reduced in numbers by the Civil Service retrenchments of 1862, was that of provision of a water supply to Port Adelaide. England reported to Parliament that a scheme could be had for £30,000 and assured them that the existing Reservoir could cope with an extension of the service area. As usual, Parliament decided not to take advice at its face value and a Select Committee of the House of Assembly on the Port Adelaide Waterworks Bill was duly elected. When questioning the Manager of the Waterworks, some members of the Committee strongly inferred that his information regarding the quantities able to be safely provided, was far from reliable. But in the end they recommended going ahead with the Bill, as they had obviously intended to do in the first place. The Act to provide for a water supply for Port Adelaide thus had a quick passage at the end of the 1863 session.

1864 saw the introduction and passage of amending Bills relating to the Port Adelaide and Port Augusta Waterworks. The original Acts did not possess the scope and flexibility which a more stable Government system may have provided. But of more importance was the revival of an emotion-charged issue which had long remained unsolved. It concerned the City Council's claim to management of the waterworks, a claim which had, in fact, been written into the first Waterworks Act. Free water for the City Baths (opened in 1861) and attempts to co-operate with Council activities - for example the Department began giving them notice when opening streets for mains - did little to nullify the Council's claim for representation in the control of the Waterworks and its revenue. As well, attempts to obtain Government financial help for a drainage scheme had proved futile.

May, 1864, thus saw the introduction of a petition from the Corporation of the City of Adelaide, submitting eight reasons why the management of the Waterworks should be transferred to them. They had some support. Public meetings had been held at which the Council had sought to show the reductions which could be made in rates if the Waterworks were transferred to the City. But nothing came of the petition in Parliament other than an unsuccessful motion and a short pointless debate.

This did not stop the Council from working towards the goal of drainage and sewerage works for the City - a goal which they knew only the Government could afford to finance. Essays were called for on the topic of the Drainage and Sewerage of the City of Adelaide. Three money prizes were given for essays which did in fact cover the topic imaginatively and futuristically. In fact, some of the ideas were included in the Government sewerage scheme which only emerged over ten years later.[5] In actual practice, all the Council had the finance to do was to construct the first street drains along King William Street to North Terrace in 1865-66. They drained the town hall, Government buildings and parts of Grenfell and Rundle Streets. The drain petered out behind Trinity Church, so in fact the central city's drainage problems had only been transferred a few hundred yards away.

In 1867 the Council was still making overtures to the Government and Parliament in an effort to solve the uncertainty of their position in relation to the water supply and drainage works. Again they were thwarted. Fuller, a Member of Parliament for the City and also Mayor, introduced a City Drainage Bill. There was quibbling about the nature of the Bill - was it a public or a private bill? - and whether the Corporation could give any security to aid the borrowing of the £80,000 they requested. Others said the Corporation could not be trusted with so large an amount

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[5]For example, R.G. Thomas's suggestion that the western ends of all sewers be lowered by deep cuttings in order to obtain a sufficient fall, was utilized.

of money. A. Stow facetiously asked whether it would successfully remedy present nuisances. He pointed out that

> At present much of the drainage stuff went into the Botanic Gardens, and it had a very peculiar effect upon the ponds and birds, who could only protest against their treatment by dying off; and this some of them were geese enough not to do.[6]

In the end the Bill was conveniently relegated to the consideration of a Select Committee.

In fact, the likelihood of the City Council ever managing the waterworks became even more remote when Parliament began to consider the necessity of building another reservoir alongside Thorndon Park. The dry summer of 1864-65 and associated water shortages brought the matter to a head. Only the Government was in a position to tackle a second, larger waterworks scheme.

By this time too, the Dutton ministry's action of reducing water rates in the Adelaide district had done much to placate any agitation for a change of management. The assessment of Port Adelaide likewise confirmed the status quo, for the City Council's control did not, and could not extend to that region.

On the other hand, official interest in the provision of water supply facilities to country areas was never assured. Groups of settlers who agitated for permanent schemes were invariably met by uncertain and lethargic responses from Government, Port Augusta being the fortunate exception. People bought land on the faith that local watering places would be declared reserves, only to be disappointed when their petitions to that effect came to naught in Parliament.

In a minority of cases Government lethargy even led to disaster. Moonta, Kadina and Wallaroo suffered a severe water shortage and were

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[6] Parliamentary Debates of 1867: House of Assembly (Dec. 6) p. 1290.

paying sixpence a bucket for water before the authorities looked their way. An officer of the Engineer and Architects Office called Rogers was dispatched to thoroughly investigate all possible schemes to alleviate the situation. But Parliament dilly-dallied despite the calls by several members and a petition from Wallaroo for urgent action. Eventually a small sum was placed on the Estimates and Roger's detailed schemes were forgotten. Such dereliction of responsibility was to bear sour fruit. In the early 1870's these Yorke Peninsula towns suffered the horror of widespread outbreaks of typhoid fever.[7]

More often it was the well-placed individual who was able to win Government patronage and interest. The Clerk of Works of the Waterworks Department, for example, was not slow to use his contacts. On February 13, 1886, P. Santo, (Commissioner of Public Works in the previous Government), brought the man's case to Parliament. He urged a raise in salary as "the whole of the work of that Department was being performed by him." Obviously the officer in question was not content with the five percent extra which had been granted mid-1865 to all Government officers whose salaries were below £400 per annum. // Santo proved his worth as an ally. Parliament agreed to make provision for £80 in the Estimates for 1866, and the salary of the Clerk of Works rose to £220 per annum. Any measure that could be taken by a Civil Servant to ensure the security of his position was the order of the day - there were no official channels which guaranteed just treatment, opportunities for advancement and recognition of the status of Civil Servants. Successive governments used their patronage at will, and invariably ignored (and failed to extend or clarify) the few Civil Service regulations which did exist.

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[7] In 1873 more than 300 people at Moonta died from typhoid fever. Such epidemics the authorities unanimously attributed to the drinking of infected water. The Government built tanks at Moonta in 1874, but these were soon contaminated by drainage from roads and private properties. So lesser epidemics still persisted. From 1879 onwards the Government was forced to cart water, quite regularly, in the northern areas of Yorke Peninsula.

That there would be trouble working out authority relationships within the Civil Service was inevitable. Where the Waterworks Department was concerned, this problem was again to rear its head in such a way as to evoke concerted interest and debate in Parliament. Eventually, in 1867, it led to another reorganisation of the Public Works Department by the Government of the day.

The issue had its beginnings in December, 1864, when the Manager of the Waterworks (Boothby) reported a leak through the outside of the embankment of the Reservoir. England, the Waterworks Engineer, then conducted five months of intensive boring and reported to Parliament in 1865, that the leak was a result of part of the puddle wall resting upon a bed of conglomerate with which it could never make a junction. This evoked some concern in Parliament for the dry 1864 season strongly suggested that Reservoir supplies for 1865 requirements would be far from adequate.

England began investigating the need for another Reservoir in 1866, and by the end of the year reported to the then Commissioner of Public Works (English) that it should be built east of the existing Reservoir, and three and three quarter times its quantity.[8] At the same time he pointed out the inadequacy of the existing distribution system and suggested that a Waterworks Clauses Consolidation Act should be passed (as had been done in England) to save trouble and confusion thereafter. He estimated that the new Reservoir would cost £150,000.// Meanwhile, Boothby's sense of personal esteem was suffering in comparison with the status England enjoyed. In September 1865, Santo, (Commissioner of Public Works) removed from the Manager's hands responsibility for the care and control (the maintenance) of the Waterworks as completed, leaving him with duties confined to accounting and collection of rates. This action

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[8] Parliamentary Papers of 1866-'67: P.P. No. 46: Report on Waterworks Reservoir. Letter from England to Commissioner of Public Works dated August 16, 1866.

was apparently taken because Boothby volunteered a personal opinion to the Commissioner of Public Works on the presumed causes of the leak from the Reservoir. He did in fact strongly suggest that England was to blame. //Boothby was not pleased with the treatment meted out to him. Already there had been occasions when he and England had clashed, usually over the everyday workings of the Department. For example, in 1864 the Manager interfered with England's order to the Yard Storeman that he meet turn-cock Perryman to shut off the water at Payneham. This case reached the notice of the Commissioner of Public Works.[9] // Thus, when England recommended that £150,000 be raised for the purpose of constructing an additional Reservoir, Boothby very promptly wrote to the Commissioner of Public Works suggesting that an expenditure of £50,000 would suffice. He pointed out that he had already approached previous Ministers with the fact that England was responsible for the leakages of the present Reservoir and for losses of many thousands of pounds occasioned by the deepening of its South-Western corner. He claimed that Dutton, the previous Commissioner of Public Works had simply "censured /him/ for not conniving at the mistakes of Engineer England."[10] //On receipt of Boothby's letter, T. English, (the Commissioner of Public Works), and the Cabinet called for a Committee of Inquiry and urged Boothby to confine himself to giving a report substantiating his charges against the Engineer. The Manager's consequent report named errors and discrepancies in papers England had presented to Parliament. It detailed errors in his calculations and areas where his plans regarding the new Reservoir deviated from instructions issued by the Inspecting Hydraulic Engineer to the British Government

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[9] G.R.G. 53 (Series 24): Letter sent by Waterworks Department No. 245/64.

[10] See detailed correspondence in Parliamentary Papers of 1866-'67: P.P. No. 154: Reports etc. received by Government since 16th August, 1866.

regarding Reservoirs. Boothby was, in fact, taking issue against England in relation to engineering matters only. England answered Boothby's report as best he could and was supported by fellow professionals. R.G. Thomas, Assistant Architect in the Engineer and Architect's office affirmed that the proposed Reservoir would be stable if constructed according to England's plans, while Hanson, the Head of the same Office, expressed agreement with England's estimates and insisted that he had been guided by the practice of the best authorities.// Meanwhile, an inter-Departmental dispute confounded the issue. As early as September, 1864, the Auditor-General (O. Halloran) had complained to the Chief Secretary's Office that his efforts to obtain the Waterworks Books for the previous three years for auditing purposes had been thwarted by Boothby's attitude. Boothby, in fact, had asked for time to add up all the totals at home. When the Auditor did get the books he found a balance against one collector of £170, frequent alterations and occasional erasions, none of the columns of details of rates added up, incorrect summaries of accounts in nineteen out of the thirty half-yearly collections, and monthly schedules which lumped all accounts together from 1861 onwards. Nor had any statements on balance sheets ever been furnished by the Manager.[11]

Throughout 1865, Boothby gave answers to every point brought against him by the Auditor-General. At the same time he was quick to counter that the Auditor-General's office had never seen the necessity of checking the quantities upon which payment was made in relation to contracts of the Waterworks Department; nor did it examine the specification to see if items paid for as extra work were not included in the contract and thus paid for twice. In short, supposed irregularities in the handling of such

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[11] See Parliamentary Papers of 1866-'67: P.P. No. 216: Correspondence with Manager of Waterworks.

payments had been used to get rid of the first Manager, but since then the system had not been tightened up at all. The hollowness of the Government's accusations at the time was ringing true. They chose to see some irregularities while ignoring others.

Matters did not rest there. The Secretary to the Commissioner of Public Works was still writing letters to Boothby in 1866, urging him to "be more solicitous to meet the requirements of the Audit Department." Boothby in turn claimed that the hostility had not originated from his side. But the Auditor-General still complained. Eventually, in September, Commissioner of Public Works English brought the matter of relations between the two men to the notice of Cabinet. A decision was made. Boothby would not be paid until the Auditor-General was satisfied with the state of his accounts. Naturally Boothby co-operated (if only temporarily), with the Auditor-General. However, on November 3, 1866 the Auditor-General was again forced to write a minute to the Commissioner of Public Works drawing attention to the impossibility of carrying out his duties so long as he has to deal with "public officers of this gentleman's pertinacious peculiarities."[12] // Early in 1867, increasing Parliamentary interest in Boothby's continuing accusations against England provoked English, (the Commissioner of Public Works), to call for the documents and papers relevant to the situation. But now Boothby no longer confined himself to his original accusations. Instead he wrote two letters to the Commissioner of Public Works in January accusing hime of conveying the wrong impression of facts to the public. For example, he suggested that English's comments about the fullness of the Reservoir would "lead the citizens to use the water extravagantly."[13] Then he wrote to the

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[12] Ibid., see correspondence.

[13] Parliamentary Papers of 1867: P.P. No. 17A: Waterworks Correspondence.

Commissioner of Public Works urging him to stop his Secretary - that is, Secretary to Commissioner of Public Works - from raking up and publishing former complaints about matters long closed. He also declined to forward documents as requested by that officer, and suggested that his exposure of fraud by another officer, (as provided for in the Public Service Regulations), was being revenged by that officer and his friends through the Government and the Legislature.//By this time English, the Commissioner of Public Works, had had enough of Boothby's "impertinence" and "obstructive conduct". Accordingly, he notified the Chief Secretary and Cabinet and urged that Boothby be removed. Cabinet agreed and a letter was forwarded to him on March 13, 1867 announcing his dismissal.

Meanwhile, in February, a seven-man Commission had begun its Inquiry into the charges Boothby brought against England - namely that he had certified as correct certain accounts of contractors for work on Thorndon Park Reservoir which were incorrect, and thereby enabled the contractors to receive an unjustly large payment. They decided to bring in two independent Engineers to report on the accuracy of Hamilton's original plans and to measure the capacity of the Reservoir; and two surveyors to measure the earth taken out of the Reservoir and placed elsewhere. The case thus hinged about the issue of how much earth had actually been excavated from the Reservoir.

The resulting calculations did not agree, no doubt due to a number of contributing factors - original levels and plans no longer clearly existed, levels may have been raised by the contractors to their own advantage, original irregularities in the surface of the Reservoir basin could not be determined, and the degree of settlement was a point of debate as eight and a half years had gone by. The Commission, however, without granting England the right to call his own witnesses, but with the knowledge that none of the "impartial" calculations agreed with his estimates, found him guilty. England's response was to announce his resignation to

the Commissioner of Public Works "to relieve the Government from any embarrassment which might arise from the report of the Waterworks Select Committee."[14] However, he claimed his retiring allowance on the grounds that he had been guilty of no misconduct. When the Government informed him he had no just claim to an allowance he withdrew his resignation and assumed duties again. But it was too late. His resignation and its acceptance by the Government appeared in the Government Gazette on August 8.

There was, however, one more card to be played in this game of patronage and survival. England had friends in the Legislative Council, and thus, on November 19, a Select Committee of five men, (including Commissioner of Public Works, English) was appointed to report on Waterworks Management. At his request, the Select Committee took into consideration the question of shrinkage, the additional payments made for removal and replacement of conglomerates, clays and soils during the course of the work, and the fact that he was not responsible for the accuracy of plans and sections as he had taken charge when the Reservoir was three-quarters completed. Boothby's protestations were ignored, and the Committee concluded that England had acted honestly throughout the whole time of his supervision of these works. Each man had tasted some justice. //Thus a combination of factors - the failure of Ministers to take responsibility for public servant's actions; professional versus managerial jealousies in a Civil Service which provided no delineation of responsibility nor security of position; and the convenient rejection of the few Civil Service Rules and Regulations which did exist - combined to create a situation which did little to credit any of the parties involved and certainly coloured the Waterworks Department's efforts to establish itself as a viable and efficient organisation.

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[14] Parliamentary Papers of 1867: P.P. No. 103: Resignation of Engineer of Waterworks.

By early 1867 other factors had emerged to complicate matters. The Department of the Colonial Engineer and Architect, created in 1860, had brought together architectural, railway and Waterworks construction activities under the one organisation in an effort to effect economies. However, lack of staff and an absence of delineated responsibility soon created tensions which were not peculiar to the Waterworks Department. By early 1867, William Hanson, the Head of the Department, had suffered enough. He resigned in February after issuing the Commissioner of Public Works with an ultimatum.

In his letter of resignation, he spoke of "the increase in work in the Department without the corresponding increase in staff necessary to keep up with the work." He went on:

> No Head of a Department has so much increased work and responsibility as me but I have received nothing extra for my work. If I had been given the holiday I asked for I may have recovered sufficiently to get into work again . . . but now my Doctor says I must take 4-6 months rest.[15]

In this case, the Government granted a retiring allowance, plus £900 in bonuses. The untiring efforts of one public servant, at least, received some recognition, even if it was only after the event.

The Government now had a major problem on its hands. The provision of waterworks, railways and architectural services was gradually expanding but Parliament had little faith in the competency of Civil Service staff to handle the job of implementing and administering Government initiatives. The blunders, incompetencies are petty fighting unfortunately hid the valuable work achieved. Yet railways needed to be built and a second Reservoir to supply Adelaide was imperative.

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[15] See Commissioner of Public Works Office, G.R.G. 23/Series 1, CPW 168/67.

Reorganisation, once again, was to be the answer. The Department of the Colonial Engineer and Architect was accordingly dispensed with and all the engineering and building departments formed into two separate establishments. A Colonial Architect's Department and the Department of the Engineer-in-Chief emerged. The Engineer-in-Chief was to have responsibility for general public works construction and would also supervise railway construction as an ex-officio Engineer of Railways. //And so all former branches to do with Waterworks found themselves combined into one Department, with a Head called the Engineer-in-Chief. A 40 year old Victorian named Henry Coathupe Mais was the first to hold that dubious honour and position. To him fell the task of providing that expert supervision which the Government felt had been lacking in the past and which would, it was hoped, overcome all difficulties in the future.

ORGANISATION:

Early 1859 saw the emergence of the new Waterworks Department as designed by Parliament under Act No. 17 of 1858. J.D. Woods, who was in the useful position of being Secretary to the Commissioner of Public Works (Blyth) at the time, became the first Manager of the Waterworks Department. Patronage was very much in evidence. England, the engineer, was supposedly Head of the Department[16] but the nature of his relationship with the Manager was never made clear. There was bound to be trouble where matters of organisational authority were concerned. Wood's salary was £500 per annum while England's was fixed at the reduced rate of £650 per annum. The other staff consisted of a Chief Clerk and a Junior Clerk. The Department began its life with a balance of £6,685/9/11 which had been carried over from the defunct Waterworks Commission.

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[16] C.S.O. 25/1859.

Samuel Davenport,

when Commissioner of Public Works in 1857, created the basis of a system of answerability in the Public Works Departments. Prior to that date there were no official documents referring to the Public Works of the Colony. Henceforth, an annual Public Works Report would be required of all Departments under the Commissioner of Public Works. As well, Davenport used his initiative where control of expenditure and progress of Government works were concerned. He drew up a two-form 'Return' to be furnished monthly to each Department, filled in by that Department and returned by the fifteenth of each month. The Head was required to detail the current expenditure and progress made on all works under him. This then, was the basic system which confronted the newly emergent Waterworks Department. It was certainly not intricate, but then Colonial politicians had no tutors where the practical implementation of Responsible Government was concerned. There was still much freedom of movement.// Considering the limited engineering staff in the Department, much was achieved in the first year of the life of the Waterworks Department. Woods continually asked for more staff, but the Commissioner of Public Works (Blyth) was adamant and in fact, began to look for further possible savings once the first supply began to flow through the water mains. The result was another organisational change.

The construction branches of the Railways and Waterworks Departments were swept away and merged under a newly constituted Department called the Engineer and Architect's Office. Hanson, a Railways Engineer, was made Chief and the old position of Colonial Architect was abolished at the same time. England remained Engineer for Construction and for mains extensions but he now answered to the Commissioner of Public Works through Hanson. On the other hand, the Manager of the Waterworks retained responsibility for the operation and maintenance of the completed works and for the collection of revenue, and he answered directly to the Commissioner of Public Works.

Woods, the first Manager, was responsible for drawing up the first draft instructions where dealings with the Auditor-General were concerned. The Auditor-General's Office confirmed that they provided sufficient checks and they were approved by the Commissioner of Public Works (Hay). However, as we have seen, Woods did not remain Manager for long. W. Boothby became the next Manager at a time when retrenchment policies were in operation, yet an increased programme of work was the order of the day. So he ignored the systems Woods had developed - for example, "Manager's Instruction to Collectors"- for he was required to run the whole of the Department and short-cuts were therefore necessary. In this way, as we have seen, he laid himself wide open to removal by an unsympathetic Government a few years later. Development of effective organisational procedures were thus largely thwarted by the changing of personnel and structural arrangements at the whim of successive Governments.

Although most initiatives within the Department were due to the efforts of public servants, some attempts were made by successive Governments during the period to bring order and system to departmental procedures. From 1859 onwards the financial year for all Departments began from July 1, and in 1861 a printed form of Rates Book was henceforth supplied by the Government Printer. Then in 1862 Departments were instructed to regularly keep a Time Book of attendance, and before long Heads were asked to fill in for the first time a form headed 'Pay for Overtime'. In 1866 the Government asked Departments to follow strict instructions regarding the rendering of public accounts - for example, accounts for the month were to be rendered to Audit Office by the 25th - as Government contractors, tradesmen and others were tired of long delays before they received payment. By early 1867 a system of Departmental "Advances" had been put into operation to meet occasions where immediate payment was absolutely necessary.

As for the employment of labour and personnel, rapidly changing Governments (and policies) did little to promote a stable situation. At times, however, day labourers in the Waterworks Department had some bargaining power. In 1860 the masons working on the weir in Torrens Gorge went on strike and won for themselves an extra shilling a day. In 1863 and 1864, day labour was so scarce that the Department had difficulty in carrying out the necessary programme for the sums voted. Thus in 1865 the Ayers Government was forced to grant all day labour employed by the Government an extra sixpence a day.// Where the permanent and temporary officers of the Waterworks Department were concerned, there was even less security of office. Power to gain salary increases was limited - unless one used an influential friend in politics. England began as Engineer on a reduced salary of £650 per annum, and soon found himself forced to execute the work of Engineer, draftsman and surveyor for want of sufficient engineering staff. The position did not improve in the years which followed for retrenchment was Government policy and every year the Heads of Departments were requested to make do with less than they had spent the year before. In fact, in 1862, when the Government made severe cutbacks it doubted the legality of its actions to the extent of passing a special Act to validate the appointments and dismissals it had made.

From then on Government patronage was unfettered, for Civil Servants were forced to use their wits to gain or remain in a Government job. Some were able to use the system for their own gain. As we have seen the Clerk of Works of the Waterworks Department used a former Commissioner of Public Works, Santo, to successfully put his case for an increase in salary. Others, using the normal channels, were less successful. H. Spark's application for an increase in salary was ignored in 1862, although he was one of the few permanent clerical staff in the Department. Requests for extra clerical assistance in 1863-'64 also received no attention. An overseer

named D. Peryman was dispensed with in 1862, only to be reappointed again in 1864. A temporary draftsman named Whitfield had his tenure extended every three months by the Commissioner of Public Works according to the pressures of work. Even Boothby's audacious attempt to classify his own position as Manager, Accountant and Engineer on the sub-estimate sheet and then propose an increase of £100 on his annual salary was understandable, if unsuccessful. //Still, such were the only courses of action open to the Waterworks staff. The only blanket increase came in late 1865 when the Government granted five percent extra to all salaried officers whose salaries were less than or equal to £400 per annum. This did not solve the problem of security of tenure. Early in 1867 when the Manager was dismissed, Sparks was made Accountant (with no increase in salary) and ordered to make do with a reduced staff. There were only sixteen salaried men employed by the Waterworks Department at this stage. No wonder then that Sparks used what little authority he possessed to accept a tender made by a relative, namely Harry Sparks, to fill in, and keep the Collector's books up to date. //Other practices and Civil Service Regulations were used or denied at the whim of Governments and again the effect was to create uncertainties and tensions within Departments and the Civil Service. In 1860 the Government changed the 1854 Civil Service Retirement Act so as to abolish the non-contributory superannuation scheme and provided instead for retiring allowances. Yet when England claimed a retiring allowance upon his conditional resignation he was told he would get none. On the other hand, Hanson got his and a large bonus besides. It was impossible for an officer of the Waterworks Department (or the Civil Service in general) to look for security in his job. //Working conditions were to all appearances enviable by society's standards, yet a closer examination reveals that all was not rosy. The hours were 9.45 a.m. to 4.00 p.m. on weekdays (including a lunch hour) and 10.00 a.m. to midday on Saturdays both at the Public Works Offices and Waterworks Office at Kent Town.

However, pay was monthly and many hundreds of hours were worked in over-time, due to staff shortages, just to keep up with everyday work. Till early 1867 all salaried officers had to take out personal bonds with the Government as a surety for their employability. From then on all guarantee and future life policies for Government employees had to be assured from the one Company.//Office accommodation left much to be desired. In 1867 Sparks, (the Waterworks Accountant), reported to the Commissioner of Public Works that rain was coming in the roof of the Water-works Head Office. In 1865 workshops of stone were erected at Port Adelaide on the Government Reserve and a yard was fenced for storage of Waterworks fittings and materials. Meanwhile Goodiar, the first Superintendent at Port Augusta,battled drought and pleuro-pneumonia on the construction works there and was granted no concessions. For four and a half years he lived in a tent; then he moved into a cellar dug under a hill. Only in 1869, after eight years of such an existence, was he moved in his report to mention the need for a residence for the Superintendent.

THE PRODUCT:

In 1859, the first year of its existence, the Waterworks Department had the useless weir removed (by contractor C. Wilstead) and supervised the excavation of foundations for the new weir higher up the river, and the laying of mains between Torrens Gorge and the Reservoir and between the Reservoir and storage yard at Kent Town. Also in 1859 a report was received from J. Smith, Professor of Chemistry at the University of Sydney. He had been requested by the now defunct Waterworks Commission to make the first analysis of River Torrens water. He was satisfied that the water was not disagreeable or harmful.

Of most importance was the completion of Thorndon Park Reservoir at a much greater cost than the original estimates and after many

deviations from the original plans. It was an off-stream reservoir, fed from a weir on the River Torrens by a 21" main. These first works were officially opened on June 4, 1860, by Commissioner of Public Works, A. Hay, who laid the foundation stone of one of the wings of the Torrens Gorge weir made of squared rubble masonry. The total cost of the completed Reservoir was £57,000 or four times the original 1856 estimate of £13,750. Two additional increases in volume and acreages had been sanctioned during construction and the height of the weir raised four times on the planning board before completion.// In October, 1860, a leak appeared through the masonry near the by-wash at the Reservoir. The Department investigated, decided to excavate and the cost once again increased. As well foundations of the well-tower and completion of the weir were held up by a scarcity of coment in South Australia. To make matters worse some of the pipes on the eighteen inch mains burst due to flaws in the pipes themselves and safety valves had to be fitted as a future precaution. Although more than a year behind schedule, water finally flowed into Adelaide on December 28, 1860. The trunk main was an eighteen inch cast iron main which was carried along the Main North East Road to the Waterworks Yard in the East Parklands. It was controlled by a valve in an octagonal building at the Yard and from there it extended to Wakefield Street, spreading distribution mains as it went.// In 1861 water was first supplied to the City Baths in King William Road and for street watering but the year's activities were mainly concerned with extending services to houses. The following year saw the Department's limited well-sinking services taken over by the Crown Lands Department.

Meanwhile, water was supplied to Port Adelaide via railway carriers, while pipes were ordered for the future Waterworks there and at Port Augusta. In his 1864 Report, Boothby, the Manager, first proposed that meters be imported and that eventually all supplies be provided through meter. Only

in 1866 did the first meters arrive and they were promptly put into use. //1864-'65 saw the laying of mains in cross-streets in Adelaide. No provision had been made for these in the original plan of the City distribution, so it was necessary to break the mains in order to make the connections. This naturally proved a troublesome operation as the pipes were full of water. Considerable expense was also incurred in altering levels of mains and valves in streets not formed when mains were laid. Unfortunately the mains had not been laid uniformly deep throughout the city. //Another problem arose when a leak was discovered on the outside foot of the Reservoir's dam-head. Boring operations and guage measurements led the Waterworks Engineer (England) to conclude that the waste was immaterial. However, the leak and a number of other important factors - the dry years, increasing consumption, and extension of the water supply to the most populous Port Adelaide streets - ensured Departmental consideration of, and planning for, a second storage. Sixth Creek was guaged to investigate its potential. By 1867 over 20,000 consumers were being provided for directly from mains' services in the Adelaide and Port Adelaide regions. //The whole of the pipes were laid and water first supplied to Port Augusta by October 1864. The source was the Woolundunga Springs and the distance to the town was covered by 1,100 chains of four inch iron pipes. Storage tanks were planned and supervised by the Departmental Superintendent, who saw the pointlessness of the small, open tanks originally contemplated. He ensured that tanks of a greater capacity, ~~and~~ arched-over to prevent loss, would be built. By 1867, 450 people were supplied with water from the Government mains. At the same time, the Superintendent was overseeing roadworks in the region before they were handed over to District Road Board. //Thus, although uncertainties created by the irregular arrival of necessary materials, inconsistent plans of action and an alien environment coloured the actual provision of permanent water supplies by the Department, something at least was achieved in

practical terms. In this respect, officials had begun to prove they could be adaptive, imaginative and practical, as well as being quite capable of making blunders.

THE PUBLIC:

A once "strangely apathetic" public could not remain uninvolved once the convenience of an assured water supply system became a reality. And yet it was a new and confusing experience. The tensions and uncertainties of their situation were different from those encountered at the political and administrative levels, but they were no less real. Obviously, the bungles and inadequacies associated with the Waterworks did not exactly inspire widespread confidence.

The general feeling about the Adelaide Waterworks was probably similar to that expressed by Frederick Sinnett in 1862 when he wrote:

> Water is carried in pipes down all the streets, and is now introduced into most houses - an incalculable blessing to the inhabitants, though it has probably been obtained at an unnecessary expenditure of public money.[17]

There were positive expressions in favour of the Government works as people were advantaged by them. Working men in 1859 had seen the value of the Waterworks as a means of employment and they petitioned Parliament for the prosecution of the works. Villagers to the East of Adelaide in the area traversed by the Lower North East Road were quick to petition in favour of an extension of the scheme to their region. The poorer classes, in general appreciated the Public Baths and drinking places which opened in 1861 and received free water from the Government mains. North Adelaide, in particular became a favourite place of residence, once water was laid on there. As well all house and office owners with a permanent water supply laid on soon found themselves paying reduced fire insurance premiums.

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[17] F. Sinnett, An Account of the Colony of S.A., Published by W.C. Cox, Government Printer, for the International Exhibition of 1862. p. 56

Yet such beneficial achievements and unequivocal expressions of support did not cloud certain issues which early gave rise to general dissatisfaction. One provision of the Waterworks Act No. 17 of 1858 in particular gave the Department some headaches - namely, that on the laying down of a line of main in any street within the city, the water rates for six months in advance became due and payable by the owners or occupiers of all the houses or tenements in that street, whether they had been supplied with water or not. This was particularly unfair on those who owned or rented houses in by-streets where no pipes could be laid except at the owner's cost. Meetings were held by ratepayers on the subject and the Government was pressured to direct the Department not to enforce the provision.

The rating system as delineated under the 1858 Act was the cause of many individual confrontations with the Department. It was at least some improvement on the 1856 Act which had involved separate concepts of a construction and a supply rate and therewith the option of using (and paying) for the water or not. The new system was a mixed system which rated according to four different classes. Class 1 rated certain buildings according to the number of rooms; Class 2 rated stables and stockyards at 6d./stall or 6d./head of cattle per week; Class 3 rated certain buildings and property at £2/10 per annum on every £100 of their annual value and Class 4 buildings were rated partly according to Class 1 and partly according to Class 2. No wonder then that the Manager of the Waterworks Department in 1860-61 was forever altering the rates books after individuals angrily proved they had been wrongly assessed. Some Banks complained that by being charged under Class 4 they were being charged twice over for the house portion of the premises. They claimed the right to be assessed under Class 1 only, while other Banks requested different variations under which they felt they should be assessed. These cases eventually had to be forwarded to the Attorney General for an opinion. Meanwhile numerous

individuals approached the Department claiming they had been charged for too many horses or too many rooms or that their stables/outhouses had been assessed as dwelling places. Less complicated legislation would have done much to lessen these confrontations.

A general uncertainty about the nature and economics of the laying on of services created further ill feeling. J.W. Woods, when Manager of the Waterworks was upset at the "desultory and irregular manner in which people . . . applied for service pipes."[18] In a large number of cases the applications were postponed till the last moment, so at times people were temporarily deprived of a mains water supply in order that water could be laid on to premises of these late applicants. In 1860 180 houses were supplied, while the next year some 2,964 were connected so early fears must have been sufficiently allayed.

Extensive garden watering created the next problem as the water supply was only to be for domestic purposes. Eventually, under the 34th Clause of the 1863 Waterworks Act, the Commissioner of Public Works issued written authorisation to the collectors of water rates, empowering them to enter any house to examine if there had been any waste or misuse of water. This power to snoop, although necessary, did little to enhance the image of the Government provision of a water supply - and it was the average waterworks officer whose image was tarnished in the process.

Some members of the public refused to pay service accounts, (even when water was cut off), until compelled to do so, on the grounds that both work and materials were overcharged by the Department. Thirty-one cases of this nature occurred in 1862 alone. Eventually the Commissioner of Public Works gave instructions to the Department to only charge from the boundary of the property (and not from the mains) and people then began

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[18] P.P. No. 25 of 1860: Public Works Report for year ended December 1860. See Manager's Report.

to pay their dues. One of the regulars which usually appeared on the list of unpaid service fittings accounts was the Adelaide City Council. This was, in fact, but one indication of the tensions which existed between the Waterworks Department and the Council throughout the period.

The wider issue at stake was the Council's claim to the management of the Waterworks. As we have seen the Mayor urged Parliament's consideration of the matter in 1864-'65, but to no avail. Although the Council had a poor record where economic management of its own affairs were concerned, when this issue was raised much support was forthcoming from the ratepayers. Obviously a significant proportion of people were not satisfied with the idea of Government management of the Waterworks but were prepared to see them in the hands of the City Council. The Council's argument that rates would be reduced under their management was no doubt responsible for gaining much of this support. Later, in 1878, the Town Clerk (Worsnop) wrote: "It must be admitted that the agitation to acquire possession of the Waterworks was by no means general throughout the city."[19] This fact and the extensions of the water supply to Port Adelaide by the Government he cites as the reasons why the Government was inclined to retain management of the Waterworks.

While this struggle was going on the Waterworks Department had necessary everyday business to do with Council officers. Yet the question of management kept intruding. In 1859 the Waterworks Department applied to the Council for a plan showing the levels at which it proposed to finish the streets yet to be constructed, in order to furnish a guide to regulate the depth at which the mains should be laid and the length of the fireplug connections. The City Council refused this request and later had to put up with making very costly alterations.[20] In 1861 the Commissioner

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[19] T. Worsnop, History of the City of Adelaide, (J. Williams, Adelaide, 1878) p. 224.

[20] Ibid., p. 162.

of Public Works ordered the Department to give notice to the Corporation in future in all cases before opening streets for mains. But the Council was not to be placated. It refused to pay Waterworks accounts at times, and in turn, Departmental officers were quick to retaliate by informing the Council of every instance where water was being wasted at any troughs in the City.

Where the people of Port Adelaide were concerned the idea of a Government water supply scheme was widely welcomed, even though the Department's failings and failures were well known. As early as 1860, one hundred Port Adelaide residents petitioned Parliament to provide a Government water supply so that the supply would "not be in the power or discretion of any private parties."[21]

By 1863, 217 residents were prepared to sign a petition in favour of a Government supply. If the 1863 House of Assembly Select Committee on the Port Adelaide Waterworks Bill is any guide, the only fears held by people concerned the possible annual expense of the scheme. Certainly there were few dissenters against the idea of the Government controlling the Waterworks through a Department. The only witnesses against the scheme were men like W. Brind, the Manager of the S.A. Company, who objected on the grounds that the annual charges to be paid by owners of property would be too heavy. What he failed to disclose was the fact that his Company would miss the money they made through a water business on the Le Fevre Peninsula which provided much of the water carted to the Port.

When one considers the nature of the supplies people relied on initially it is no wonder that they expressed such interest in mains water. One early supply was a well on the Le Fevre Peninsula, water from which was pumped into tanks on a barge moored on the Birkenhead side of Port River. The barge then moved across to the Port Adelaide side of the

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[21] P.P. No. 182 of 1860: Petition for Extension of Waterworks to Port Adelaide.

river, where water carters took over the distribution.

Alberton and Queenstown were served by shallow wells in the sand-hills, one of the principal wells being that near Scott's Hill. One method of delivery of casks was to have them rolled along by goats, the charge varying from 20/- to 30/- per 1,000 gallons according to the distance. Near Semaphore jetty there was a fresh water spring covered by the sea at high tides but readily accessible at low tide.

From 1861 onwards water was purchased by railway carriers from the Waterworks authorities for 1/6d. per 1,000 gallons; individuals and shipping interests then received water at the uniform rate of 20/- per 1,000. By 1866 the first mains had reached the Port Adelaide area, connecting with the City's supply, and doing away with these temporary and expensive measures. At that point there was only praise for the Department's work.

In general most country dwellers were sceptical about the interference of Government finance in the provision of water supplies for communities. Certainly there were discussions at country meetings about whether or not the large expenditure required to supply Adelaide was warranted.[22] Fruitless attempts by Moonta, Wallaroo and Kadina people to draw the Government's attention to their plight left them embittered. In The Register of June 6 1865, the Moonta correspondent wrote:

> Some of us who were in immediate want were foolish enough to hope that the Government would have made out ours an extraordinary case . . . leaving at least a part of the red tape and due consideration until after the work was done and the people's wants supplied; but now we see the folly of such wishes.

Those efforts which were made by Government Departments often added to the scepticism. For example, a dam built by the Surveyor-General's Department between Auburn and Kadina proved useless for it was built on porous soil after local advice had been ignored.

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[22] Parliamentary Debates of 1865: See Cotton's comments about the matter, House of Assembly, March 13.

Port Augusta people were much less sceptical about the work of Government officials in their town. ~~For a start~~ They were not driven to petitioning Parliament for a water supply. A scheme was planned and implemented using local labour and there was simply little to complain about. They were receiving mains water at 20/- /1,000 gallons, whereas in the past the least they had had to pay had been 9/- for 50 gallons carted by bullock teams. At the same time they saw no displays of extravagance by the local hardworking Departmental Superintendent. There was as yet no Waterworks office, no red tape to cope with - and no house for the Superintendent to live in.

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The years 1859 to 1867 saw the first Waterworks Department racked by tensions and uncertainties. In the political sphere the ongoing struggle between the City Council and the Government threatened the Department's very existence. Thirteen Governments passed in and out of power and even more Commissioners of Public Works in and out of office. But what made matters worse was that such Ministers did not observe the basic tenet of Responsible Government where Civil Servants were concerned - namely, that a Minister must be held personally responsible for the actions of his officers. Senior officials of the Department were again left with ~~enough~~ much freedom of movement and were only accused after troubles eventuated. All sides were still feeling their way in this new game called 'Responsible Government'.

Tensions and uncertainties likewise thwarted the growth of a healthy organization within the Department. There were few Civil Service Rules and Regulations and successive Governments were content to conveniently ignore them when necessary. Patronage, and the cultivation of useful

friendships were some of the few options open to the Civil Servant if he desired some temporary security of office or an increase in salary. Governments paid, retrenched and rewarded Civil Servants as they pleased. No wonder then that Governments had to be content with the Civil Servants and blunders they got, while Civil Servants had to use their wits to survive. The casualties were great for the Department - two Managers and one Engineer were lost after tensions led to open confrontations. It looked as though the specialized Civil Servant, the engineer as against the clerical man, was slowly but surely winning the right to head any Department dealing with Waterworks matters.

Where its public image was concerned, the Department was faced with an uphill battle against the poor image of the Waterworks Commission which had come before, the desultory manner in which Governments made inadequate laws and provided the money to finance them, and finally against the technical and internal blunders of its own making. And yet, in the face of this, some communities began to make overtures to Governments, sometimes hesitantly, sometimes firmly, for the provision of Government-planned and Government-run Waterworks. Only the Government had the money to ensure that precious water would be stored for all.

Aside from the problems of the period some technical and organisational achievements had been made. Much was gleaned from English practice and as yet little credence had been given to colonial inventiveness and imagination. There was room for a man with Australian experience to enter the arena. That man was to be Henry Mais, the first of what would be many Engineers-in-Chief.

CHAPTER III: "CONSENSUS" : (1867-1878)

By early 1867 there was a general consensus that a further water supply storage for Adelaide should not be delayed, and furthermore that it should be supervised by a competent professional, fulfilling the newly-created position of Engineer-in-Chief. In this way the politicians thought that costly blunders would be a thing of the past. A spirit of optimism and co-operation was in the air.

POLITICS:

Much was expected of H.C. Mais, the first Engineer-in-Chief when appointed on March 27, 1867. He was responsible for the construction of railways, bridges, main roads, harbors and jetties, and the South-Eastern drainage works in addition to waterworks. By the end of 1867 he had asked for, and received, the position of General Manager of Railways as well. Thus, with the blessing of the Government, Mais accumulated wide powers, with little specific interest in the area of waterworks. For example, he was quick to suggest to the Government that the question of a second reservoir be solved by offering premiums of £400 and £200 for the best water supply schemes. Commissioner of Public Works Thomas English granted his permission. Mais drew up a list of the details required, (including possible means of filtration), to be forwarded by applicants before November 30, 1867.

Parliament displayed some wariness towards Mais in the early months of his appointment. Details of his past career were discussed in December, when the memory of the incompetencies of past Government (Waterworks) Engineers was still fresh in the public mind. By this time, Mais had also pensioned off some of the older public servants in the Public Works Departments and filled some of the vacancies with men from Melbourne. As well, there was a questionable aspect of Mais' career which had come

to light through the persistent investigations of certain politicians interested in embarrassing the Government.

Mais, in fact, was born in England, the son of an engineer, educated at Bishop's College, Bristol and was articled to one of the great Brunel's chief engineers. He worked on railways in England, Sydney and Brisbane before joining the City Commissioner's Department (Sydney) in 1855 as Assistant Engineer on Water and Sewerage works. In that year a Select Committee into the Department's handling of the sewerage works accused him and other city engineers of negligence, ignorance and corruption. The City Commissioners tried to protect him but the Government forced him to resign in 1856. He then became engineer and general manager of the Melbourne Railway Company, won praise and admiration for his work in that position, then joined the Victorian Water Supply Department for a year before becoming South Australia's first Engineer-in-Chief. He was selected out of five candidates and presented 23 testimonials to the Government as to his good character and ability.

The hint of incompetency in Mais' past was enough for certain members of Parliament. Once again a Head of Department became the subject of parliamentary debate. Strangways brought the details of Mais' career to light[1] and urged the Government to keep an eye on his handling of public works' accounts, if necessary by appointing an audit officer to ensure that no cases of overpayment occurred again. Santo, the Commissioner of Public Works answered him by claiming that Mais was the best man for the job. However, he added that he would not leave the making of appointments in Mais' hands. Coglin and Sutherland immediately entered the fray, claiming that the Commissioner deserved no such power and that it "was

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[1] 1867 Parliamentary Debates, House of Assembly, December 17.

right that a Head of Department should be allowed to secure competent men under him."[2] Most members left the issue there. Ministerial responsibility was as yet an unresolved issue, and the consensus of opinion felt that it was time to put trust in a professional head. Mais certainly had qualifications never seen in the South Australian Civil Service before.

In fact, Parliament soon had opportunity to display their trust in Mais' integrity. Two submissions for a new Waterworks scheme had been received in answer to advertisements in the newspapers, but a Board of Professional Engineers dominated by Mais concluded that neither fulfilled the conditions required. And so Mais was asked to investigate the question himself. Experiments were conducted to ascertain the exact quantity of water in the Torrens which could be utilized and additional rain guages were set up in the Gumeracha district. Mais himself, with his Assistant Engineer Patterson, examined gullies and creeks on the south bank of the Torrens, the natural basin at the mouth of the gorge and finally fixed upon a site where the outlet of two gullies at their junction could be dammed. The new reservoir, a quarter of a mile from Thorndon Park Reservoir would provide double the quantity of water under England's plan for half the cost.

At this stage Boothby, the dismissed Waterworks Manager, stepped in and urged Parliamentary consideration of his claims. He petitioned Parliament for reinstatement to his former position, compensation for indignities suffered and for payment of the highest premium for being the original author of the scheme Mais had just reported to Parliament. Boothby claimed that he had not submitted details of the scheme under the premium competition as he would have had to advance a considerable sum just to enter it. He had, however, visited Mais, asking him for employment

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[2] Ibid.

to survey his scheme. Mais declined to take him on, but Boothby subsequently claimed that at the interview he had shared enough information for Mais to deduce the reservoir site in question. What actually went on at that interview will never be known. Suffice to say that Mais claimed in ensuing Public Works Reports to be founder of the site and Parliament upheld his claim. Boothby, the non-professional, was left to seek redress of his alleged grievances in the years which followed.[3]

For a few years successive Governments did attempt to watch Mais' activities and keep him in line. However, his competency was soon made obvious and he gradually assumed a power and responsibility undenied by Parliament. So, for example, he (with other Heads) was exhorted to keep his Departmental sub-estimates as low as possible in the period 1868 to 1870. Although this meant that no increases in salary would be allowed Mais still put his own claim for an increased salary before the Minister.[4] He claimed quite truthfully that in no other colony did one officer hold the various duties which he, in South Australia, performed. His claim was refused. The next year, 1869, Mais requested permission to hire a horse to travel the long distance to the Hope Valley construction site as his own horse allowance covered distances up to seven miles only. Again the Commissioner of Public Works (Colton) took exception to his demands - even to the extent of finding Mais' minute personally insulting - and he suspended the Engineer-in-Chief till Mais eventually did retract the claim.

After this event the rapid changeover of Governments and the end of the Colony's temporary depression ensured that Parliament would have little time to spend in watching Mais' every move. Instead there was a growing consensus of opinion that Public Works, as planned and implemented by the Government would be the means of rapidly developing the Colony's potential.

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[3] Examples: CPW (in) 385/1869; CSO (in) 204/1881; CSO (in) 847/1881.

[4] CPW 357/68.

Thus, late 1868 saw two successive ministries - Ayers' then Strangways' - espouse the merits of a Waterworks Bill to ensure the construction of a reservoir at Hope Valley, as planned by Mais. Fuller, the City member, was the only constant dissenter in the matter, his fear being additional rates. Even the Legislative Council passed the Bill in a matter of sixteen days. For the rest of the session Parliament was content to have tabled Waterworks charges and figures relating to the financial position of the Adelaide Waterworks. These latter figures revealed healthy construction and rates accounts. No-one found anything to argue about.

The consensus of Parliamentary opinion remained in favour of Government involvement in all matters of water supply. This was proven again in the 1869-'70 session. A Bill to enable the City Corporation to create an ornamental lake in the Torrens was passed but included clauses which ensured ultimate Governmental control. The debates surrounding this Bill raised, for the first time, the question of who should provide a sewerage system for Adelaide, the Corporation or Government? The old Government versus Corporation fight for control of the Waterworks had gained a new dimension.

Furthermore, the Government was moving to ensure that it would always have control over the Colony's water resources. Arthur Boyle's request for permission to cut a water race from the River Onkaparinga to Echunga and the Jupiter Creek Goldfields at his own cost was denied on this premise. The value of preserving major watercourses in the public interest was thus being realized. At the same time, however, the continuing alienation of land in the Torrens and Onkaparinga watershed areas was ignored, despite warnings by Mais and the example of positive Government action in Victoria towards what was to be a successful closed catchment policy.

The 1870 session saw the final public attempt by the dismissed Waterworks Manager Boothby to discredit Mais. As a public servant with no legal claim to redress, his only hope was to petition Parliament for support. Although the general feeling was that enough money had been wasted investigating claims made by the man, the House of Assembly again succumbed to another Select Committee - this time on the "Carrying out of Public Works" - after Boothby, in his capacity as a Public Works surveyor, had reported Mais' estimate re the Port Augusta railway to be £200,000 greater than necessary. He was certainly close to the mark when he claimed that Public Works systems were open to abuse and needed reform, but he was quick enough to use the Select Committee in a bid to call attention to his previous arena of conflict and favourite hobby-horse - the Adelaide Waterworks. The Port Augusta railway was forgotten as he demanded the right to be allowed to go into "anything I think proper".[5] In particular he claimed that a great loss had been sustained on the Hope Valley Works in consequence of the specifications not being properly and clearly defined. But witnesses called by Boothby admitted that there was nothing unusual about the specification and did not agree that any preference had been shown. So Boothby's evidence was reported to be unreliable and the whole exercise a waste of public time and money.

To make matters worse for him two large contractors of Public Works (Watts and Hamilton) had been allowed to serve as members of the Select Committee while the shorthand reporter was J.D. Woods, the first (dismissed)Waterworks Manager. Boothby's protestations about this set-up were ignored. The Government felt it had given the man a fair chance. But now all were bored with the man, his bitterness and hometruths.

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[5] Parliamentary Papers of 1870-'71: P.P. 136: Report of Select Committee of House of Assembly on Carrying out Public Works. See Boothby's evidence for this statement.

In the same way, and in the same session, a general consensus of Parliamentarians solved another issue which had persistently led to tensions in the past. The old issue of ownership of the Adelaide Waterworks came to a head during debates on Bills to extend the water supply to various Adelaide and Port Adelaide townships and suburban areas. By this time the City Council had put its financial affairs in order, gained more enthusiastic, trustworthy officers and was ready for a fight to extend its powers and authorities.

Thus, when Baker, the Attorney General in Hart's Government introduced the Suburban Waterworks Bills with clauses which removed the right of purchase of the Waterworks by the City and Port Adelaide Corporations, much alarm was expressed in municipal quarters. The City Corporation promptly petitioned Parliament, claiming the right of purchase and the Corporation of Kensington and Norwood likewise claimed the right to buy the waterpipe system which the Bill in question was to bestow on them in the future. On the other hand the Mayor of Port Adelaide expressed no objection to the repeal of the clauses.

The consensus among most Parliamentarians was that the issue was already decided. For some the fight for extensions of the Waterworks system to places not yet included in the scope of the Bill was the issue in question. Tuxford, for example, argued for extensions of the water supply to Glenelg, the "grog [there] being of rather inferior quality."[6] But the Government owed the relevant Corporations a Select Committee and that is what they got. That Committee, predictably, upheld the Government's move, and used figures from the Auditor General to prove that the Corporation of Adelaide's financial ability to acquire the waterworks was getting more remote every year. Solomon, the Mayor, admitted the advisability of the Government retaining the Waterworks in the light of the

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[6] Parliamentary Debates of 1870: Legislative Council debates, Adelaide Suburban Waterworks Bill, December 15.

new reservoir and suburban extensions, but astutely claimed compensation for deprivation of rights. Thus, the Select Committee recommended, and the Act confirmed, that water should be supplied to the City and Port Adelaide Corporation buildings, establishments and for their watering purposes, free of charge. A consensus had been reached. Each side knew the realities of the situation and each side gained accordingly.

The 1872 session of Parliament saw the Ayers Government introduce a Reservoir Loan Bill to raise an extra £25,000 for completion of the new Reservoir. Cries of mismanagement and innuendoes about Mais' abilities were immediately raised. However, John Carr, the former Commissioner of Public Works, was quick to point out that the mistake made was in the original estimate and not in the carrying out of the work. Parliament was thus as much to blame as the Government. This quelled any further display of suspicion in the direction of the Government's professional officers. The Bill quietly passed both Houses.

In fact Parliamentarians were only too ready to pay the visiting professional to do the work, assess the situation and make the decisions. The consensus seemed to be "the more professional opinions we can get, the safer we will be to insure ourselves against bungling." Mais was only the first of a line of men employed in this way. In 1871 the services of an irrigation expert from India called Lt. Col. Sankey, were obtained after he had completed some investigation work for the Victorian Government. Sankey, (with the Engineer-in-Chief) visited catchment areas of streams debouching in the Adelaide basin and compiled tables showing their ultimate capabilities. In his report he concluded that gauging of streams by hydrometers should be introduced as there was "no reliable information at present available on which to base renumerative water schemes."[7] Furthermore he suggested that the Engineer-in-Chief be

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[7] Parliamentary Papers of 1871: P.P. No. 97: Report by Lt. Col. Sankey on Water Supply.

supplied with an Assistant as he had no time to undertake the evolution of a systematic plan of operation. He also warned that measures should be taken to prevent the permanent alienation of all streams throughout the Colony.

Before long, the services of another visiting professional were needed and employed on Mais' advice. The trouble began with the appearance of a soakage in the bottom of the new (Hope Valley) Reservoir in late 1872. Mais recommended that the services of W. Doyne, the Chairman of the Victorian Commission on Water Supply, be obtained to advise on the most economical method of dealing with the escape of water. Doyne had already examined the Adelaide Waterworks two years earlier at Mais' request. He was hired again and soon suggested that clay puddling of the bottom of the reservoir would be the best solution. Furthermore, he assured the Commissioner for Public Works (W. Cavenagh) that "in design and excellence of workmanship, the works are most satisfactory." He was particularly impressed with Mais' novel design of the channels conducting water into the reservoir. Concrete in cement lining had been used instead of the usual plan of rubble pitching.

It was just as well that Mais and his Department were praised by an independent authority, for at the same time, an aspect of their operations was the subject of a Parliamentary Committee of Inquiry. The Inquiry emerged at the request of William Walker, the contractor for the aqueduct channel between Hope Valley Reservoir and Torrens Weir. He claimed that he had been treated to great injustice and hardship at the hands of the Commissioner for Public Works, Mais and his Department and that he had not been paid by the Government since his contract had been terminated in April, 1871. Galt, the Resident Engineer on the Hope

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8 See 1873 Parliamentary Papers: P.P. 38: Correspondence relative to Hope Valley Reservoir; letter to Commissioner for Public Works from Doyne, dated 8th May, 1873.

Valley works answered for Mais before the Committee, for Mais at the time was not a well man. His evidence stood out for its fairness and impartiality. In the end the Committee concluded that Walker had not been subject to fraud, nor unfair dealings on the part of the Government; but they recommended that the Government return his deposit plus the sum of £3,800, (or half the figure Walker claimed). Once again the manipulation of a contract by both sides and the failure to observe the rules therein had led to an embarrassment which the Government was forced to deal with. What was new about this case was the fact that the Civil Servants involved were protected and not used, (as had happened in the past), as public scapegoats.

In fact, enough Parliamentarians were in a benevolent mood toward public servants to pass a long-awaited Civil Service Act, (No. 3 of 1874). It was not an ambitious Act but what was interesting was the consensus displayed and the easy passage it thus enjoyed. Civil Servants had even been given the opportunity to comment before a Select Committee and several of their amendments had been incorporated into the Bill. It divided the Civil Service into Professional and Ordinary divisions and provided for appeal against classification of officers within the set salary classes. In effect that is all it was - a salary plan which was not worked out in enough detail to be a true classification of officers.[9]

It solved little. Parliament was still called upon to deal with any squabbles which reflected on the Civil Service. For example, when Fairweather, the Clerk of Public Works, let a tender to his son for alterations to the new Waterworks offices, another builder, (Chapman),

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[9]See Geoffrey N. Hawker's, The Development of the S.A. Civil Service 1836-1916; PhD. thesis, A.N.U. Sept. 1867, pp. 133-135.

wrote to the Commissioner for Public Works querying the legality of the situation. The ensuing correspondence was tabled in Parliament. The Government architect (G. Light) absolved Fairweather from any deliberate attempt to set-up the situation in his son's favour, but the Commissioner for Public Works decided that it would be best not to accept any future tenders from Fairweather (Junior). Chapman was not placated - he wasn't happy with the fact that Fairweather (Junior) had sent in a tender while still working for him. However, he never carried out his threat to take the matter to Parliament.

Furthermore, in 1875, when the Blyth Ministry considered granting Mais an Assistant there was dissent of a different kind to be dealt with. Commissioner for Public Works(H. Bright) and Mais decided to elevate an engineer called Hargrave to District Engineer status until various assistant engineers stepped in and began to make a fuss about his promotion. Thus when various Civil Servants were approached to fill the new position of Engineer of Public Works and Waterworks - leaving Mais entirely occupied with railway matters - all declined on the grounds that the salary offering with the position was inadequate. Given the difference between the suggested remuneration and Mais' already elevated income compared with other engineers in the Department, it was no wonder. Still, one of the assistant engineers (W.B. Hull) did become Engineer of Public Works and Waterworks for a short time, although this position as such, did not appear in the Public Service lists. Suffice to say that it suited Mais - he lost some of his responsibilities (including Waterworks) without a commensurate loss in salary. His status and powers were assured.

The political issue which had the greatest effect on the nature and extent of Government water supply services in the seventies was the question of the provision of sewerage facilities. Acceptance of responsibilities in this area by Government was slow in coming. Too often the ever-glamorous railway system was the subject of Parliamentary

zeal and attention while the drainage question was invariably put aside. By December 31, 1875, Railways dominated the outstanding Public debt to the tune of £6/11/0 per head. Its nearest rival, Waterworks, owed £2/8/6 per head.[10] But a consensus of opinion in favour of the implementation of a system of deep drainage - armed with the knowledge of Adelaide's high mortality rates - ensured that in 1878 the first Sewers Act would be passed. With it came the emergence of a new Department to handle the implementation of deep drainage as well as increasing demands for water supply facilities.

The City Corporation, in fact, was to play an instrumental role in this mobilization of political opinion. As early as March 1864 the Mayor and Town Clerk had concluded (in a report on the subject) that deep drainage was the only system which could surmount the City Council's difficulties. In 1870 a Corporation Committee of Inquiry was formed, (during Solomon's term as Mayor), with the intention of bringing about deep drainage. Yet attempts to obtain funds from the Government simply resulted in muddled, ill-formed debates when the matter was raised in Parliament.

In the 1870-'71 session Strangways introduced the first motion re the drainage of Adelaide. He drew attention to the bad smells in the city, the enormous amount of sewage already absorbed in the ground and the necessity to push the Corporation into action. Although the division went in his favour the Government was content to claim that the state of the city was nowhere as bad as represented. Strangway was quick to retort: "Some people might like a heap of muck under their noses, but I confess I do not."[11] In the 1871 Session interest in the issue extended

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[10] South Australia: Its History, Resources and Productions, edited by William Harcus, (Sampson, Law, Marston, Searle & Rivington, London, 1876). p. 347

[11] Parliamentary Debates of 1870-'71: House of Assembly debate about drainage of Adelaide, Dec. 21.

to the tabling of a circular on the Dry Earth System of Dealing with Excretment. Thus, the City Council was forced to carry out its own systematic inquiry in 1872.

The River Torrens Improvement Bill of 1872 touched upon the issue of diverting sewage drains from the Torrens River but a clause to that effect was eventually deleted. The sanitary state of the City, however, was well-debated during Parliamentary consideration of the Colony's first Public Health Bill in 1873. Rees and Solomon, (with the knowledge of favourable support from the major newspapers and many doctors), began their fight for the implementation of deep drainage as the panacea for many of the City's problems. However, the Public Health Act which eventuated ignored the issue except to provide the power to prevent the flow of drains into the Torrens. Still it did create the Central Board of Health, a body which was to prove a useful ally in the fight.

The President of the Central Board of Health (W. Gosse) was quick to report that the severe outbreaks of typhoid fever in 1874-'75 in Moonta, Kadina and Wallaroo were solely caused by a contaminated and poorly constructed water supply system. This at least spurred the Government into belated action. The construction of new water storage tanks could not, however, bring back the hundred of people in these towns who had already died from typhoid and enteric fever.

Nor could the Central Board of Health work wonders when its powers of sanitary administration were subject to a limited Public Health Act. It could only clearly and consistently point out existing evils - namely, the pollution of streams; the increasing mortality from diseases such as typhoid, directly related to the use of impure or polluted water;[12]

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[12] Second report of Central Board of Health, 1875-'76; P.P. No. 64 of 1876: This report details the fact that in 1874-'5 the mean average death rate for the year was 17.72 per 1,000; i.e. greater than that of any of the other colonies. Adelaide's death rate was 25.0 per 1,000 compared with Melbourne's 21.28. In 1875-'76 Adelaide's death rate was 26.25.

and the inefficient and unworkable Sewerage System to which the City was subject. The Board consistently pointed to the efficient new sewerage systems in areas of England which had "so universally resulted in diminished death rates as to have passed from experiment to that of established fact."[13]

The Commission appointed by Parliament in late 1875 to inquire into the whole question of sanitation in the province[14] simply corroborated the findings of the Central Board of Health. Rees became Chairman at the unanimous choice of the Commission's members. Evidence taken in relation to the City and Port Adelaide drainage confirmed the urgency of the situation and overwhelmingly favoured deep drainage as the best possible solution. Men like W. Bennett Hull, Assistant Engineer to the Engineer-in-Chief, honestly and forthrightly commented on existing danger spots - for example his comment about the water in public tanks at Kadina was that it was "so filthy, it ought to be pumped out and thrown away."

Witnesses and representatives from the City Corporation were also honest about the situation. Details of the existing system were described by the Overseer of Drainage and the Town Clerk. The East Terrace collecting tanks regularly overflowed and became offensive. After heavy rains the Botanic gardens were inundated with impure matter from the Terrace - so fish died, ponds silted up and the Director's family suffered typhoid fever. Rundle Street drainage was carried to a tank in North Terrace and thence down Frome Road to the Torrens. Solid refuse was still taken from the tanks and deposited near the Gaol. Hindley and Morphett Street drainage flowed to the willows near the Gaol, where it too, was supposedly absorbed. At this stage the Corporation paid £4,400 per annum

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[13] Ibid. In the same report.

[14] P.P. No. 18 of 1876: Report of Commission appointed to inquire into the whole question of Sanitation for the Province.

for scavenging and employed twelve carts and 24 men on the work, as well as three licensed nightmen who emptied cesspits and buried nightsoil in the long-suffering olive plantations near the Gaol. A few waterclosets were connected to Corporation drains and the Corporation was spending well over £1000 per annum on keeping pits in proper order and in cleansing drains.

If the Government was impressed with the findings of the Sanitation Commission and its warnings of imminent dangers, it did little about them. True, a survey of the route for a main trunk sewer was completed in 1876; also the Marine Board conducted an experiment whereby hundreds of floats made of pine were thrown into the sea at a proposed point of discharge of City Sewage into the Gulf. A Drainage Bill was drafted after the Corporation had initiated negotiations with the Government. However, three changes of Government during the year, and a general disinclination by any of them to divert money from Railway and other major works, forced the Corporation to prepare its own detailed Bill. This was introduced in the 1877 session, but at its second reading was thwarted by the Speaker who conveniently declared it to be a private Bill.

Even a collision in 1876 between the Central Board of Health and the Corporation failed to move any of the succession of Governments to action. The Board ordered the Corporation, as Local Board of Health (under the Public Health Act of 1873) to disconnect all underground drains which emptied onto the Parklands. The Corporation would not comply with this direction - they could not until a proper system of drainage had been established - so the Central Board of Health took them to the Supreme Court. The case was eventually postponed and proceedings abandoned.

It was the advice of a number of reputable engineers which was to sway the politicians, and in fact make the decision for them. The increasing call for Government-provided water supplies imposed a strain

on Public Works engineers which could only be solved by obtaining, and paying adequately for, the services of a competent Hydraulic Engineer. Once Hope Valley Reservoir was finished, Parliament authorised extensions of the water supply to six suburbs of Port Adelaide, eighteen suburbs surrounding the central City area and to Glenelg. Finance was also provided for the construction of water supply schemes for Yorke Peninsula mining towns, Magill, Port Pirie and Kapunda. The Colton Ministry of 1876-'77 was the first Government to realize that this increasing burden on a small group of men in the Engineer-in-Chief's Department would be best executed under the supervision of an expert. Perhaps it is no coincidence that on this rare occasion in South Australia's political history when the Commissioner of Public Works also filled the position of Premier[15] something was done. Certainly Colton had inherited Premier Boucaut's passion for progressive public works policies. As his instigation, the Agent-General in London was prevailed upon to appoint an engineer to take charge of Government waterworks throughout South Australia.

Oswald Brown, at the age of 30, thus became South Australia's first true hydraulic engineer. Certain staff were transferred to the new Department - the Hydraulic Engineer's Department - from the Engineer-in-Chief's Department as from June 1, 1878. Very soon Parliament proved itself willing to ratify any advice or recommendation issued by the new expert and his Department.

As well there was virtually no questioning of the fact that all new schemes under contemplation would be run by the Government. Only Fisher, in the Legislative Council debate on the Kapunda Waterworks, suggested that the Government was setting a precedent for other towns to make

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[15] On p. 113 of his PhD. Thesis, The Development of the S.A. Civil Service, 1836-1916 Geoffrey Hawker shows that in the nineteenth century the Premier was more often than not Chief Secretary and least often Commissioner of Public Works.

similar claims on them. Reservoirs for North Adelaide and Burnside, water supply schemes for Mitcham and Yatala Prison and extensions to the Glenelg water supply were pushed through and additional powers provided so that land necessary for such waterworks purposes could be obtained more readily.

It was Brown's confirmation of the detail of a sewerage scheme prepared by a visiting consultant engineer which ensured that a consensus was reached on the sewerage issue. The most important Act of the 1878 Session was thus No. 106 - "An Act for the Better Sewerage and Cleansing of the City of Adelaide and Suburbs thereof."

In July, 1877 Engineer-in-Chief Mais recommended that the services of the celebrated English Hydraulic Engineer, William Clark be obtained, ostensibly to report on the value of the Hope Valley scheme and the question of an extended water supply to Adelaide. He had no trouble in persuading the Boucaut Government to invite the expert, who was already in Australia at the request of the Governments of the Eastern Colonies. In fact Sir James Penn Boucaut followed closely "the careers of men whom he had appointed or believed in . . . [and] H.C. Mais was one of these."[16] To him Mais was "the smartest and most versatile man in the Public Works Service."

Clark soon arrived in the Colony. He travelled the Mount Lofty Ranges examining creeks and rivers and recommended that the junction of Sixth Creek with the Torrens be examined with a view to building a storage there. Of Hope Valley Reservoir he wrote that "no more suitable scheme could at the time have been devised"[17] and added that "it appears improbable that any cheaper construction can be obtained here."[18] He

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[16] The Register, November 13, 1923. Reminiscences of C.E. Owen-Smyth, retired Superintendent of Public Buildings.

[17] Report by W. Clark on Adelaide Waterworks. Government Printer Adelaide 1877, p. 4.

[18] Ibid.

went on to detail possible means of rendering the Reservoir watertight and also suggested regulations which could well be included in the by-laws - for example, that only properly qualified plumbers should be allowed to do the work connected with house supplies. O. Brown was later to implement this, and other suggestions made by Clark.

It was the City Council which, in early 1878, sought Clark's opinion about the drainage of the City of Adelaide and the disposal of sewage. The result was a report including detailed plans, sections and diagrams, in which Clark proposed a scheme estimated at £145,000. It excluded surface drainage, allowed for a sewage farm near Hindmarsh and discharge of the City's main sewer into the sea. The Government readily adopted the expert's report - the mortality rate in the City was by this time alarmingly high compared with the country - and Brown set to work on more detailed estimates. He agreed with Clark's basic principles but allowed for extras such as the cost of land for the sewage farm.

Thus, the 1878 Parliamentary session ended in consensus on the sewerage issue. The expert and the engineer Department-Heads were widely quoted and accorded prestige and freedom. When the Drainage Bill was discussed there was no questioning of the fact that the Government would be undertaking and running the works through its Departmental officers. There was no dissection of Brown's qualifications and competency to do the job. Waterworks and sewerage works complemented each other - therefore they should be run easily and economically together. The only consistent objections which were raised related to the apportioning of the financial burden.

A few expressed personal misgivings worth nothing. Rees stressed that sewage should not be carried to the sea for fear of deleterious effects on coastal inhabitants. Dr. Campbell felt that the connection of waterclosets with sewers should not be left to the individual's discretion as proposed in the Bill. But H. Scott, the then Mayor of Adelaide and

Member of the Legislative Council, thought the Bill so perfect he would not care to amend it.

The passage of the Bill was not delayed. Almost unanimous approval was recorded in both Houses. The important task - the implementation of a scheme and system - lay ahead, in the hands of a new Department with a young Head at the helm.

ORGANIZATION:

When Mais became Engineer-in-Chief the division in the Waterworks Department formerly known as Waterworks (Management) continued to function as a separate Department under the title of Rates Department with an Accountant, H.P.G. Sparks, as its permanent Head. Sparks had in fact been Chief Clerk at the time when Boothby (the Manager) was dismissed. Thus his elevation to the position of Accountant constituted a clever saving in the numbers of personnel in the Department, rather than a careful consideration of the matter by the Minister in charge. Still, he had materially reduced the cost of management by the time William Harcourt Squires succeeded him as Accountant in 1870.

By 1873 Squires had sought and obtained the title of Manager of Rates Division and he ran his branch quite independently of the Engineering Division which was naturally the Engineer-in-Chief's concern. These two Heads had little to do with one another - their duties, status and level of remuneration kept them naturally apart - but both were to introduce and alter systems which affected the organisation of the Department. As well, both used their powers of access to the current Commissioner of Public Works to recommend the employment of individuals, the adoption of certain policies and ideas re future legislation. Because of his major and necessary concern for railways, it was Mais who apparently approached the Minister on fewer occasions than the Manager. An unwritten and unspoken consensus kept Mais and Squires from interfering in each other's sphere

of interest. Such interference had caused major upsets in the past.

One of Mais' first moves was to recommend the purchase of a horse, dray, and spring cart with sets of harness to cart waterworks fittings and materials from the Waterworks yard to places where repairs were necessary.[19] The cost was estimated at £80 in all, as against annual Departmental hiring costs of £200. The Minister was impressed with the savings to be made, and the Department was on its way towards accumulating a fleet of service vehicles.

Mais was also keen to employ Solicitors wherever possible to get in outstanding rates. In 1869 the first summon's case was taken out in the Port Adelaide Local Court against one of the locals who would not pay his rates, in an effort to determine its effect on others. Mais had noted the outstanding rates owing to the Department and was amazed that so few cases of the kind had been carried to a Court of Law in previous years.[20] By late 1869, a solicitor had been appointed by the Government to look after all Public Works Department business. After February 1870 Law Officers of the Crown generally handled all cases.

By 1872 Mais saw the desirability of employing a new category of officer - the Inspector of Services - to ensure that new services would be laid in accordance with updated regulations, and to report any undue waste of water. By the time Oswald Brown, the Hydraulic Engineer arrived, two Inspectors of Services were looking after the City and suburbs, while one "foreman and inspector" looked after Port Adelaide. Brown added two more insepctors in 1878. Act No. 9 of 1874, a Waterworks Consolidation Act, ensured that such men were given powers to enter, examine and repair or remove fittings where necessary.

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[19] See E.O. 127/68.

[20] See E.O. 491/68.

From January 1, 1875 the Engineering Division collected as well as issued service fittings accounts. This pleased Mais for in the past both the Rates and Engineering Divisions had sold fittings but this had only led to mix-ups; then the Engineering Division had done the issuing and the Rates Division had collected the accounts. At last the work was solely in the hands of the Engineering Division where Mais felt it rightly belonged. This was one of the few instances where the work of the two divisions had overlapped and caused problems, even to the extent of the Auditor-General becoming involved.

New systems also affected the workings of the Rates Division. The Accountant, in particular, had to deal with a new system of Government finance which was instituted in early 1868. The system of paying advances out of the Treasury into separate banking accounts ceased and an advance-warrant system took its place. A drawing account was opened at the Treasury in the name of the Department, to be operated upon by cheque/order certified by the relevant Head.

This did not cause many problems. Other areas of bookkeeping however, aroused the Auditor-General's interest. In 1871 he spent much time organizing improved methods and arrangements for checking the receipts and governing the records of service fittings accounts; also for keeping necessary account distinctions between construction and management in the several divisions of Adelaide, Port Adelaide and Suburban. His 1873 report was the last one in which he (again) made reference to the fact that the finance of revenue and of personal accounts were not organized on a proper basis. But the Manager was a busy man and certainly had little time to set aside for lessons in accounting, even if they would have been available.

Other areas of the Rates Division displaying a lack of system were also pounced upon by the Auditor-General. In particular he got increasingly annoyed with the Superintendent at Port Augusta (Goodiar) who

delayed forwarding revenue and details of the local collector's accounts. Waterworks officials could not get him to co-operate either so eventually an assistant auditor was sent, at the Commissioner of Public Work's request, to investigate. Goodiar suffered as a result of "his laxity and want of business method."[21] He was dismissed, but not before he was made to co-operate in the Auditor-General's painstaking efforts to draw up balance sheets for years past. Other important factors bearing upon his work - such as the fact that his office was seven feet by six feet and his home a cellar excavated in the side of the hill - were unfortunately ignored. His successor confirmed the trials of the job - he resigned after a few months at Port Augusta.

After 1873, the Auditor-General's criticism of Waterworks Department systems tapered off. In 1878 he was even impressed enough to write to the Manager of the Rates Division, praising the Superintendent of Port Pirie for his adoption of a sensible, simple form of return.[22] However he went on to suggest that the Superintendent at Port Augusta be instructed as to the correct way of filling in the return. Apparently Octavius Wastell, the Superintendent, persisted in showing the uncollected amounts at the close of each month as "unbanked cash". Poor Wastell! Even the new Hydraulic Engineer (Brown) lost patience and removed him from his position in 1879, when it had become apparent that he did not have the technical knowledge to cope with construction work either.

Manager Squires experienced one very satisfying victory in his term of office. It concerned the assessment of properties for waterworks rating purposes. In 1869 his predecessor, Sparks, had approached the Minister urging him to ensure that the City Council appoint a competent valuator to make a proper assessment of the City. Sparks was not impressed

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[21] P.P. No. 4 of 1872; Auditor-General's Report for 1872.

[22] E.O. 180/1878.

with successive valuers for he wrote: "When the City and Port properties are efficiently assessed the result will more than cover the working and clerical expenses of the Rates Division of the Waterworks."[23] Squires took up the cause, and in 1873 the special definition of districts in the expanding area serviced, and the inapplicability of the District Council Assessments for Waterworks purposes, ensured that the appointment of a Departmental Valuator would be necessary. The first such Valuer was W. Cooper who had previously been a Collector in the Department. Cooper gave general satisfaction through his first (1874) assessment. Only one appeal was taken to the Local Court. The point had been made and a new system instituted.

By 1875 Squires had arranged that the day books detailing the hours of work put in by Departmental labour would be forwarded regularly to the Waterworks Office. But the collection and rendering of accounts was the main work of his Division. By 1878 his officers were issuing and collecting 16,000 rates notices bi-annually and 1282 meter accounts monthly. Certain officers personally rendered and collected accounts while a number of clerks spent their days solely keeping Rates Books up to scratch. The days of the combined collector/clerk were temporarily over.

As well, the conditions of employment in the Waterworks Department were changing. For one thing, from October 1870 onwards, Civil Servants were required to "attend" work for longer hours - 9.30 to 4.00 on weekdays, the interval formerly allowed for lunch was discontinued, and the hours worked on Saturday were 9.30 to 12.30.

However the use of patronage was still in evidence. Within the Department it was common to find one or more individuals with the same surname - for example, Perryman, Sanders and Sparks were names invariably

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[23] CPW 842/69.

on the payroll. But having a mentor did not always mean unlimited tenure of office. J. Ashmeade, for example, was appointed Turncock and Storekeeper at Port Adelaide Waterworks by Mais in August 1867. He thankfully assured Mais that he would "spare no pains to do his duty,"[24] but by September was tendering his resignation. He had been told to shift to the Port by September 20, but was unable to do so by that date as there was simply no house to go to. Some arrangement must have been made, for later files from the Engineer-in-Chief reached him at the Port Adelaide Office. Then, in March 1868, Mais dismissed him for "misconduct". He got himself a lawyer and a judicial investigation followed, but he was never reinstated. The power of the Head to employ or dismiss at will was a dominant feature of public service conditions in this period.[25]

Where growth of the Department and salary levels were concerned, the period was dominated by two distinctive trends. The years 1867 to 1873 saw little or no growth in the Department whatsoever, and in fact salaries of officials actually fell steadily. Thus in 1871 Squires was forced to "respectfully refer to the increased business of the Department since 1866 with numerically the same staff."[26] Likewise, Public Works Secretary W. Sheppard wrote in 1873 of the "increasing and onerous duties of the Engineer-in-Chief" and that "the large increase of work in the Department has . . . necessitated the temporary employment of additional draftsmen. . . ."[27]

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[24] E.O. 157/1867.

[25] See Hawker's thesis, Chap. VI: Control from the Top pps. 226-261.

[26] See Public Works Report for 1871, P.P. No. 37, Report from Accountant of Waterworks, p. 25.

[27] Public Works Report for 1873, P.P. No. 27, Report by W.T. Sheppard.

A series of files bear witness to the fact that no salary increases were granted in 1868 or 1869. Then in 1870, individual officers such as Galt, Sanders, Goodiar and Marriott were informed of reductions in their salaries. These did not always take effect from the same date. Goodiar, (the Port Augusta Superintendent), had his salary reduced as from October 3, while Marriott (an Inspector) was reduced from 12/- to 10/- per diem from September 1. No travelling expenses were allowed after the November accounts were passed, and in 1871 the salary of turncocks was reduced to 8/6 per day. At least the few positions which did become vacant during these years were filled by men within the Department. They were, in effect, promotions. Chas Sanders, for example, was elevated to the position of Reservoir Keeper in 1871, at a salary of £150 per annum.

The labourers in the Departments employ, on the other hand, possessed a little more bargaining power. In 1869 they were apparently better paid than their counterparts in private industry,[28] so a loss of wages of 1/- a day in 1870 brought them closer in line. But the Hope Valley Reservoir Works were dogged by a shortage of labour and by 1872 the men on works under Galt's supervision were in a position to force the Commissioner of Public Works to accede 6d. per day extra. Waterworks mechanics and labourers were successful in having their working hours altered. In 1873 the Commissioner of Public Works approved increases of 1/- per day to teams working at the Reservoir and 248 labourers on the site received a 6d. per day increase.

The years 1874-'75 ushered in the second trend of the period, namely, an acceleration of Public Works activities which meant the expansion of jobs and creation of new positions within the Department. Labourers found themselves in an even better bargaining position. This class of employee

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[28] CPW 123/69.

became such a scarce commodity that in 1874 John Mann, the Commissioner's secretary, noted: "Increased cost of labour and materials have caused much inconvenience and delay and swelled the cost of works executed. . . ."[29]

William Duffy, Overseer at Port Pirie, had so much trouble attempting to organise a workforce to lay the Nelshaby-Pirie main - most men were busy with the harvest - that he urged the Department to send men from Adelaide. A group of navvies was accordingly dispatched aboard the ketch, "The Prima Donna," but many of these would not stay till Christmas. So more men were dispatched and more expenses of passage were paid by the Department.

In 1874, the numbers of Departmental staff also began to increase. An extra suburban collector (J. Bee) was appointed, bringing the total number of collectors to five. An Overseer, (W. Square) was appointed in charge of works at Port Pirie and other newly created positions were Inspector of Services and Departmental Valuator. By the end of 1878 two more Inspectors of Services, another collector and a "rates-book" clerk had been appointed, not to mention additional (temporary) clerical and drafting assistance. Not that all problems were solved. The Chief Clerk in 1875 was still drawing attention to the "absolute necessity which exists for additional clerical assistance."[30] A couple of men already in the Department were trained to read meters and a turncock was placed at Stirling. Wage increases were granted, at first not uniformly but as the Civil Service Act No. 3 of 1874 began to make its impact, these tended to be handed out more evenly and across the board by Departmental Head and Commissioner of Public Works alike.

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[29] P.P. No. 34: Public Works Report of 1874, p. 6.

[30] E.O. 1677/75.

Not that the Civil Service Act had any radical effect on personnel affairs, delineation of responsibilities and security of office within the Department. A copy of "Rules for guidance in performing duties of Turncock" were forwarded to each turncock, but other employees remained uncertain as to the exact nature of their duties and extent of their responsibilities. For example, half a year after his appointment as overseer of Works at Port Pirie, we find William Squire writing to Head Office asking if the five men employed about the Pirie Waterworks were under his supervision.[31]

The Act still left complete control of appointments, salaries, retrenchments, temporary employment and officers to be retained after reaching an advanced age, in the hands of the Head and his Minister. Thus Chas Seymour's request for an investigation in 1875 as to why he was not on an equal position with other Superintending Staff, was simply put aside. And again, O. Wastell's request, as Port Augusta's Superintendent, to be placed in the Professional Division was ignored, as were repeated requests by a clerk R. Tapscott, to be placed in the Fifth Class.

In fact it was better to join the Service as a provisional or temporary officer than as a cadet. Under the 1874 Act, appointment of cadets (16-18 years of age) by examination was introduced, successful candidates being placed on three months unpaid probation. Temporary employees, by contrast, were eligible for permanent positions without examination. Although the Act provided for periodical classification of the Professional and Ordinary divisions, this was never done because of the absence of any machinery for enforcing it. Thus, the great bulk of the Department's officers desired to be classified, for good reason, as provisionals or temporaries. Still the Civil Service was a reasonable place to be by

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[31] E.O. 555/75.

the late 1870's. Public Works programmes and policies ensured that good men were needed and paid accordingly.

Office accommodation and working conditions, on the other hand, left much to be desired, although again there was a steady improvement throughout the decade. In 1869 the Accountant (Sparks) visited the Port Adelaide Waterworks Office for the first time, only to find that it did not have a door and that the walls were black with dirt and the passage of time. The Minister readily approved his suggestion that a door be fixed and the walls whitewashed.

The Adelaide Waterworks office staff suffered as a result of a different problem, namely the temporary and cramped nature of their accommodation. In Early 1869 the Accountant was annoyed at the proposition that the Waterworks Office be used as the venue for a Ball to be held in honour of His Royal Highness the Duke of Edinburgh. He rejected the "honour" saying it would disrupt business too much, and used the opportunity to suggest that, as the lease of the office would be expiring soon, the matter of placing the office in a permanent position ought to be considered.[32]

Later in the year he suggested that the offices of the Commissariat Department would admirably meet the requirements of the Waterworks Department, being on the ground floor and having a public entrance from Flinders Street.[33] The Commissioner of Public Works was impressed with the idea, and recommended that it be carried out at once. And so, on May 25, 1869, the Department moved into new rooms. This move solved the problem till 1874 when the rooms were pulled down and again temporary accommodation had to be found. The first step towards permanent accommodation came in 1877 when the Government offered a premium for the best

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[32] CPW: 146/69.

[33] CPW: 368/69.

design submitted for a new Government office building. A Melbourne architect won and work began on the site at the corner of Wakefield Street and Victoria Square in 1879.

Meanwhile the degree of indifference shown by successive Governments to the conditions under which Civil Servants existed and worked in the country, can only be described as remarkable. Despite frequent reference in his annual reports to the apalling conditions endured by the Port Augusta Superintendent, Mais could not get successive Governments to place enough money on the Estimates to rectify the situation. In his 1873 report he was still calling attention to the need for a new Superintendent's office, "the present one /being/ a box composed of wood and iron (7' x 6') in which the thermometer frequently stands at 120° for several days during summer months."[34] At last in 1875 a small office and repairing shop for the turncock were built and the Waterworks Reserve fence in - this had previously been used as the town's rubbish dump. Wastell, the Superintendent, used this sudden interest in his region to get two new horses after complaining that the current ones were "almost useless through old age."[35] In the same year Duffy, (the Superintendent at Port Pirie), wrote to Head Office urging that the workshops there be given a roof. This request was acceded to.

1878 ushered in a whole new organisation - the Hydraulic Engineer's Department. The Hydraulic Engineer and Manager of the Rates Department still operated separately, but it remained to be seen how long that arrangement would continue. One step was made towards uniformity - a separate balance sheet, showing operations under the Waterworks Department as a whole, was drawn up for the half year ended June 30, 1878. This revealed the true position of the Department's workings - expenditure was

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[34] P.P. No. 27: Public Works Report for 1873. See Engineer-in-Chief's Report, p. 12.

[35] E.O. 653/75.

greater than receipts. However, Manager Squires was quick to point to the fact, as he had always done, that all Government and Corporation buildings and establishments were supplied free of charge. Such concessions affected the true economic position of Government Waterworks. But no-one was particularly interested.

THE PRODUCT:

The Waterworks Department began the period as a poor relation with a poor track record, led by an Engineer-in-Chief who devoted four-fifths of his time to railways. It was staffed mainly by men shared with other public works undertakings and was run by a few permanent officers. At the end of the period it emerged as a new Department, the Hydraulic Engineer's Department, headed by a young but highly trained Hydraulic Engineer and having an additional task to perform - namely the implementation of sewerage facilities in Adelaide. What then had it achieved?

Mais' first moves were to alter the types of water meter and fire plugs used. After some experimentation he ordered the gradual changeover to Seimen's meters and to Bateman and Moore's fire plugs. At the same time Waterworks officials began to place all persons using water for other than domestic purposes under meterage. This meant a large outlay on meters, and on cleaning, fitting and fixing them and was soon to become an ongoing feature of the Departments activities. It was a unique situation, for at the time the general practice overseas was for meters to be provided by the owners and approved by the Government authority or Company providing the water.

A more important task was the search for a second Reservoir site to serve Adelaide's growing needs. Mais and engineers Babbage and Patterson selected a site just north of Thorndon Park, 240 acres of land was purchased from E.M. Bagot and the rest, (for the line of the proposed acqueduct channel), was more tortuously and less cheaply obtained from

the relevant owners and occupiers. The cast-iron work for the valve tower and wrought iron tube for crossing the Torrens were ordered from England, to be manufactured under the supervision of S.C. Homersham, consulting engineer for the South Australian Government in England. Finally the contract for the construction of the embankment to retain the water was signed with Messrs. Fry and Co. of Kapunda. P. Galt was was installed at the site as Resident Engineer. Hope Valley Reservoir slowly began to emerge and the weir was raised twelve feet in expectation. At the same time three tanks were completed at Port Augusta under Superintendent/Overseer Goodiar and J. Rogers returned from Mount Gambier, having investigated two possible modes of water supply for the town.

Heavy rains and the difficulty of obtaining a constant supply of suitable labour during the harvest, dogged the work of Fry Bros. at Hope Valley in 1870. Departmental officials also expressed dissatisfaction at the firm's use of inferior materials for pitching. Then in 1871, the contractor for the aqueduct channel between the Reservoir and the Torrens Weir, W. Walker, walked off the job. Some of his allegations were later found to be justified, but for the time being the Department was forced to step in and complete the work. As well, Thorpe and Thredgold threw up their contract for trenching holes so further responsibilities landed in the Department's lap.

Still, work on the embankment by E. & R.E. Fry went well after the harvest, for then there was no shortage of men. A total of 240 were employed, as well as 60 horses owned by the brothers and 60 local horses and their drivers. The pug-mill was the centre of activities. Clay for the wedge of pug in the embankment was brought to the site by tram line. At the mill clay was pulverised, puddled with water and delivered to the embankment in 'dobbins' ... that is, three wheeled trucks pulled by horses. This selected clay was then well packed in twelve inch layers

by means of heavy corrugated iron rollers, drawn by four-horse teams. The Frys imported these 'punning rollers' specially from Melbourne for the purpose.

Thus by 1872 the Reservoir and aqueduct channel were complete and water was admitted on June 20, 1872 and first supplied to Adelaide on November 6. At this stage reticulation pipes and services reached twenty suburbs. Trees (mainly pinus insignis) were planted around the Reservoir for protection from storms and notices were erected warning against foulingthe waters. One problem remained - a strong clay had to be found to puddle the bottom of the Reservoir which appeared to be seeping. G.C. Fry won the first contract to puddle the bottom and he had carried the clay up to the 26 feet water line by November 1873. Till 1879 this intermittent work of puddling went on ... but when the Hydraulic Engineer Brown arrived he decided that the so-called leakage bore no relation to fluctuations of water in the Reservoir, so the work ceased.

The scheme at Port Augusta was also troubled by leaks. The new, lead pipeline across the Gulf to serve the Western areas proved to be constantly leaking. A set of tanks was erected to break the supply, but at times the Department had to resort to barging loads of water across to the other side.

1874 saw the completion of the main connecting Adelaide and Glenelg and water was distributed in that suburb from July. Port Pirie saw its first piped water on December 14. Pipes were laid from Nelshaby Springs eight miles away to a standpipe in Ellen Street under the supervision of Resident Engineer Duffy. At the same time the old Station Dam wall was raised. A few years later a further branch main was laid from Napperby Dam, also eight miles away. Meanwhile pipes were relaid in connection with the Port Elliot Waterworks and four stone underground tanks, (with galvanized iron roofs to retard evaporation), were built at Moonta.

In 1875-'76 work began on a new Reservoir at Nelshaby to serve Port Pirie. A set of Dr. Normanby's Patent Distilling Apparatus was ordered from England in an attempt to further the supply of the Yorke Peninsula mining towns while extensive surveys were underway. Back in Adelaide a contract was let for a large tank at Magill and by November 1876 a stand-pipe was open to the public. Another tank was built in 1878 to supply the Magill area. An extremely dry summer forced the Department to undertake further puddling of the Hope Valley Reservoir, enabling it to be filled to the depth originally intended. By the time an extra piece of land in the neighbourhood of the Reservoir was purchased with good clay for puddling, the cost of the Hope Valley works stood at well over £140,000 - that is, virtually double Mais' original estimate of £75,000.

The search for a reservoir site for the Kapunda Waterworks was eventually solved in 1877 when Taylor's tap on the road to Tarlee was selected and tenders called. Surveys re water supply systems for Gawler and Mount Gambier were undertaken but most of the Department's energies in 1878 were spent supervising a rash of ongoing projects. In some cases there were initial difficulties over the purchase of land. Work however, began on service reservoirs at North Adelaide (to ensure better pressures at the Port), and Darlington (to supply Brighton and Glenelg), while a main to the Dry Creek Labour Prison was completed. Self contained schemes at Mitcham and Burnside were also begun in 1878, the supply of the former being a well on Ellison's Creek, while the latter was served by a well built on Second Creek.

In the midst of this activity Departmental employees were inspecting private services, leaks and wastages of water, baths and water closets; syphons were being reported and removed and public troughs repaired. Others were laying new services, repairing leaks, altering services, laying mains or fire plug pipes and providing new (or making repairs to existing) stop valves and fire plugs. Routine work had come to stay.

This work of servicing the larger centres of population in South Australia was being augmented in other directions by other agencies. Private individuals and other Government agencies were also involved. They provided for smaller isolated groups on a less sophisticated scale. The Surveyor-General's Department was already providing wells, tanks and dams all over the Colony; Local Road Boards were sinking the odd well and attaching troughs and tanks at Government institutions as required. The numerous efforts made by individual pioneers were perhaps the most important of all. Their haphazard investigations of the nature and extent of water resources - ostensibly to meet their own needs - provided an indisputable store of information for the official surveys which were to follow later.

THE PUBLIC:

Relations between the South Australian public and the Waterworks Department during this period were tempered by the development of a consensus of opinion on two important issues - firstly, that the Government should provide for the people's needs through effective Public Works policies; and secondly, that public health and sanitation in South Australia was a growing problem which also required Government action and intervention.

Thus, on the one hand, the period is dominated by a constant stream of deputations and petitions to Parliament, Commissioners of Public Works and the Heads, requesting water supply extensions or facilities. Over 25 of these were received. They came from city suburb and country town alike - the deputation was a necessary feature of life as public administration in South Australia had been centralized from the very start. As well, numerous petitions of a more general nature were received by Parliament in the Second Session of 1875 ... they favoured Government Public Works and promoted the introduction of a Stamp and Succession Bill as a means of obtaining the necessary finance.

The few petitions, deputations and memorials received against Government action and policy in the field of Waterworks were essentially single stands on different issues. There was a small group of Port Adelaide manufacturers who would not enter into a water agreement with the Commissioner of Public Works; there were petitions in 1870 from the Adelaide and Kensington/Norwood Corporations for the right to own and run their own sections of the Waterworks system; there was a petition from 210 people in 1873 for reduction of water rates and charges; there was a request from 160 persons in 1874 for the right to use syphons free of charge; and finally, a memorial from Port Elliot residents criticizing the wasteful manner in which the repiping of the local Waterworks system was being carried out by the Public Works Department.

The odd case ended in Court. A Boord repeatedly placed his syphon in the Hope Valley Reservoir aqueduct channel, much to the Department's annoyance. He argued that the Government had deprived him of the natural stream flow he had had before the inception of the scheme. After fruitless years of arguing, the case evolved into a two year Court battle from 1875 to 1877.[36]

The Waterworks Department was thus seen by most people as reasonably efficient providers of a necessary service. Reductions in the scales of water rates reinforced this impression. Port Adelaide was brought in line with other suburbs in July 1871; City rates were reduced by one-tenth and surburban rates by one-fifth in 1873; Port Adelaide and Suburbs rates were reduced by one-tenth in 1875 and Magill rates were reduced after the Waterworks there had been functioning for two years. Even the first few assessments made by the Departmental Valuator were well received. Only one appeal against the 1874 assessment went to the Local Court, none were lodged against the 1875 assessment and two were lodged against

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[36] Boord vs. CPW : See CPW 1959/77; C.S.O. 1315/77 etc.

the 1876 assessment. Applications for employment with the Department were steady for most of the period and then rose dramatically in 1876. Complaints of poor pressure received by the Department were far and few between, although they were on the increase by 1878.

Rather it was the Department which seemed to be doing much of the watching and complaining - chasing up cases where individuals had illegally connected pipes to services laid by the Department or infringed the by-laws concerning fittings. Inspector's reports concerning the misuse of water were constant, and they listed rich and poor, politician and Corporation alike. If one owned a large bath, one was suspect![37]

There was some newspaper criticism of the Department's work and systems. Letters to the Editor like 'Circumlocution' in The Register September 24, 1868 highlighted some of the inadequate arrangements which irritated the customer seeking a simple and efficient service. In this particular case the applicant had discovered that service fittings/ pipes could be ordered from both divisions of the Department with the result that there was rarely a systematic handling or follow-through of requests. A series of Editorials in April's Register of 1869,[38] dealing with the development and achievements of the Waterworks Department, was not slow to stress the official incompetencies and blunders which had characterized the whole undertaking in the past.

However, in the seventies the newspapers appeared to let the Department be. The criticisms they did make were largely confined to its Head, the Engineer-in-Chief Mais. They expressed alarm at the large discretionary powers which senior professional officers, like him, appeared to possess.[39] But he was more often than not identified with

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[37] See E.O. 385/74: In this file Inspector George Smith reports that Messrs. Caterer and Rounswell have very large baths.

[38] April 1, 9, 21 and 23, 1869.

[39] See Hawker pp. 226-235 for details of relevant editorials, articles.

Railway issues, the most extravagant Public Works of the decade, so the image of the Waterworks Department was rarely tarnished directly.

But for many others the image Mais presented was quite a different story. To them he was a gentleman, a splendid host, and a prestigious acquaintance. In the late 1870's he entertained often in his large house opposite the brewery in Rundle Street, Kent Town. He usually "gave musical evenings with a carpet dance to follow; then a sit down supper - huge turkey, ham, trifle and champagne! - very enjoyable evenings they were."[40]

Where relations with the City Council and emerging Corporations were concerned, Mais ensured that relative peace would prevail. There was some trouble at the beginning of the period when the question of ownership of the Waterworks had yet to be decided. Waterworks Accountant (Sparks) also felt very strongly that the valuation of the City, as determined by the City Council assessment, was quite ruinous to the interests of the Waterworks. No doubt heated words on this subject by the Mayor in the Adelaide Waterworks Office was the reason behind an ensuing and uncontrolled display of emotion by Sparks. In January 1869, Sparks was called before the Commissioner of Public Works for having insulted the Mayor in the street. He defended himself by claiming that the Mayor had provoked him on an earlier occasion when, "being in a Government office, . . . /he/ was powerless to resent it. . . ."[41] He had remained controlled and neutral in his official capacity and objected that the Minister was now reprimanding him for what had happened out of office hours. In the end, he was forced to write an apology to the Mayor and the matter was closed.

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[40] Reminiscences of "Old Adelaide Identities" by C.E. Owen-Smyth, The Register Nov. 20, 1923.

[41] CPW (In) 20/1869.

For the rest of the period relations were amicable enough. Mais ordered that the City surveyor be informed when water was laid on in private streets and the relevant Corporation before any suburban streets were touched.[42] This latter order was given only after an irate Town Clerk had written to Mais urging co-operation. Other contacts were routine - the City Surveyor was notified whenever leaky fountains needed fixing and the Town Clerk was ordered to remove an illegal syphon from use at the Town Hall. By the end of the period the City Corporation readily handed over land on Barton Terrace (North Adelaide) for a service reservoir while the Town Clerk, Thomas Worsnop was even prepared to give praise, as he did in his book, A Guide to Adelaide and its Environs. He wrote:

> The water supply is under the care of the Government, and is as complete in its arrangements as full in its quantity, and as pure in quality as is enjoyed by any city or town on the Australian Continent.[43]

Relations with District Councils remained peaceful, except for the odd occasion when Departmental workmen upset local sources of pride. For example, in 1874 the District Council of Torrens drew attention to the bad state in which the streets of Thebarton had been left after Departmental pipe laying. Long-suffering Waterworks Manager Squires must also have come in for criticism, for in his report for the first half of the year, 1878, he ventured some forthright remarks. He suggested that it might be better if District Council's and Corporate bodies did manage their own waterworks, for they would "be satisfied with a description of work which they could not tolerate if executed by Government and if any failure in supply took place, they would help themselves, and not raise an outcry against the Government for making incomplete and temporary

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[42] E.O. 1458/69 and E.O. 108/72.

[43] T. Worsnop's A Guide to Adelaide and its Environs, (George Robertson, Melbourne, 1880). p.4

works. . . ."[44] At times both sides deserved the right to strong words!

Where the Superintendent of the Fire Brigade was concerned, Mais apparently did his best to please. He tested a new type of fire plug which he had seen used in Melbourne, but did not recommend a gradual change to their usage until the Superintendent had expressed himself satisfied with their performance. Fire plugs were laid by the Department at intervals of 70 yards with the Superintendent's approval and reels were placed in positions recommended by him. Then Mais suspended S. Boddington, one of the Departmental turncocks whose job it was to attend fires, after A. Baker, the Superintendent, made a complaint about him.[45]

Enlightened public opinion moved towards consensus on another major issue in this period. Again there was a spin-off effect on the Waterworks Department. People began to recognize the extent of, and search for solutions to the Colony's sanitary problems.

Evidence of this movement can be seen in the petitions to Parliament in 1873 in favour of the passage of the Public Health Bill then under discussion. As well, the subject was a constant and popular topic in Metropolitan and country newspapers throughout the decade, especially when typhoid outbreaks took their toll. In fact editorial opinion early saw Deep Drainage as the answer to many of Adelaide's sanitary problems. Thus, in 1876, when Parliament appointed a Sanitation Commission, it was no wonder that the issue of the City and Port Adelaide drainage dominated the evidence as presented by witnesses. Virtually all witnesses had an opinion about deep drainage, and the vast majority were in favour of it. Even the manufacturers, usually the most vocal about Government interference in their activities, showed an awareness and enthusiasm equal to that of many of the medical, and professional witnesses. Only two of the

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[44] See Manager's Report in Public Works Report of 1878, P.P. No. 29, p. 52.

[45] E.O. 13/70.

ten manufacturers who gave evidence spoke against deep drainage and the increasing Government control and regulation it could bring.

There was no argument about who should construct and manage the deep drainage works. There was no suggestion that a private company should take the job in hand. Instead it was widely assumed that the old Waterworks Department, headed by a qualified Hydraulic Engineer and henceforth known as the Hydraulic Engineer's Department, was the organisation for the job. Much was expected of the Department and the system known as Deep Drainage. The only argument left to be solved was where the sewage should go - sea or farm?

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The years 1867 to 1878 can thus be seen as a period when consensus and agreement was reached by many South Australians about several important issues. This consensus was to mean new directions and new goals for the Waterworks Department.

Agreement had been reached that competent professionals and their expertise would bring out the best in Government Departments. This proved to be true where the appointment of Mais, and Brown were concerned. They brought a professionalism to the service which had hitherto been lacking - and was still lacking in most Departments.[46] In particular the appointment of a qualified hydraulic engineer to head the Waterworks Department and the decision to make it a separate entity in its own right (as the Hydraulic Engineer's Department), appeared to ensure that due status and attention would be accorded the organisation in the future. Favourable comments from visiting experts had been heeded. Waterworks

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[46] See Hawker's thesis pp. 238-40. There he concludes that the best heads were the few professionals like Mais.

branches themselves had helped pave the way by proving their competency, their capacity for internal co-operation, and ability to stay out of the news (for the first period ever). No longer would Waterworks be the lowly brother under the Engineer-in-Chief's disinterested gaze, subordinate to Railway expenditure and glory.

General agreement had also been reached about the need for big-spending Public Works and policies. This meant an increasing demand for Waterworks facilities (amongst others) which in turn generated growth, experience and expertise in Departmental staff. There was little or no argument as to who the provider should be. It was the central Government. The only argument lay in the order of priority which successive Governments accorded the provision of facilities. In the seventies city Parliamentarians dominated Governments so it was the City and Suburbs who gained most. Typhoid-ridden towns like Moonta and Wallaroo were the obvious losers.

Of most importance was the fact that people had come to agree about the necessity of dealing with public health problems. The widespread acceptance of the need for deep drainage for Adelaide was an important manifestation of this interest. Successive Governments cast it aside until the experts agreed on technical detail, the numbers of deaths from typhoid fever began to speak volumes, and money was freely available, even for unglamourous projects such as this. That the Waterworks Department should handle the scheme was understood.

There were thus no hard-fought battles, unlike in the parallel British situation, which had to be won. There the vested interests - Water Companies, the medical profession, the local authorities, the political parties and the sanitary reformers - had struggled for decades to ensure that a consensus would not be reached until it was in their particular favour. But there, too, important concepts had been established.

Chadwick had developed his notion of an arterial system of town drainage, utilising gradients and the egg-shaped sewer and motivated by water supply; the science of hydraulics had taken off in the fifties and by 1866 the true connection between polluted water supply and certain diseases was proven.[47] The important experimentation had been tackled and methods and systems had evolved.

For South Australians then, the decision concerning Deep Drainage was basically an easy one to make. They showed their rationality and good moral sense by grasping the essentials and utilizing the opportunity when greater and lesser colonies were content to wait and see. Thus visiting Englishman, Richard Twopenny, could write in the early 1880's: "In most important reforms . . . South Australia has either led the way or been amongst the first." He felt that the "more advanced views of the earliest settlers" had limited the abuses to be done away with, and "hence, the work of reform has in every case been carried out in a more just and moderate spirit." [48]

It remained to be seen whether a new Department headed by a young Englishman could handle the technical problems of implementing deep drainage in the unique terrain and environment.

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[47] See S.E. Finer's The Life and Times of Sir Edwin Chadwick (Methuen Library Reprints, London, 1952) p. 301.

[48] See R. Twopenny, Town Life in Australia, (Elliot Stock, London 1883, Penguin Colonial Facsimilies; Ringwood Vic., 1973). Quotations from p. 163.

CHAPTER IV: INSIGHT AND INADEQUACY, 1878-1888

The decade 1878-1888 presented new challenges to politician, administrator and citizen alike. The seventies boom had faded and instead, the colony was faced with a large public debt, a host of unremunerative Public works to upkeep, and the beginnings of an embarrassing unemployment problem. Good leadership and administration were needed, especially to keep water supplies up to an expanding population.

POLITICS:

The Morgan Government which came to power late 1878 was quick to utilize the services of the new Hydraulics Engineer, O. Brown. By the end of 1880 his Department had investigated and reported on numerous waterworks schemes, and the Government had accordingly instigated relevant bills. Water supplies were provided for Magill, Gawler, Tea Tree Gully and Modbury and Glen Osmond, as well as extensions to facilities at Port Pirie, Port Augusta and Glenelg.

It was G.C. Hawker who ensured that some intelligent progress would be made in the waterworks and sewers field. He had an unbroken term as Commissioner of Public Works from 1877 to 1881 and did much to implant the notion of ministerial responsibility into the political system. He regularly answered and defended charges against public servants in Parliament. As one of the more educated men in Parliament, he could see the value of accepting advice from astute Heads. In practice this meant that most of the Government's policies concerning waterworks and sewers were taken directly from the Hydraulic Engineer, Oswald Brown. He aimed for a businesslike administration, and was thus much in tune with the 1879-'80 Royal Commission into the Construction, Maintenance and Management of Public Works of the Colony. Systematic and economical management became the order of the day. The only problem was that successive Govern-

ments had different ideas about how this would be achieved, and varying notions as to what constituted reproductive undertakings.

Thus, when dissent was expressed in the 1879-1880 sessions of Parliament at the Morgan Government's water supply and sewerage policies, it was invariably rooted in the question of economics. The 1879 Bill to provide Tea Tree Gully and Modbury with water was negatived in the House of Assembly after many had expressed it to be a costly exercise for the few people it would serve. In 1880 the Bill passed both houses, the scheme's cost having been lessened by £1,000 by leaving out the Modbury portion. Still, Rees warned that it "would be taken as a precedent" and that "the principle was totally opposed to what the Commissioner of Public Works laid down some two years ago, when he refused to grant a water supply to any place, the inhabitants of which would not guarantee to pay 10% upon the outlay."[1] Likewise the dissenters against the Glen Osmond Waterworks Bill of 1880 were concerned with the economics of that scheme. Hawker attempted to assure them by stating that, rather than trying to increase his staff, the "Hydraulic Engineer at any rate, took quite a different view as the Estimates would soon show."[2]

On the other hand, Members were unanimous in their support of the Waterworks Bill of 1879 (Act No. 147) which sought to gain more revenue by repealing the provision of free water to lands and buildings used by the Government for public purposes. (The Department had been fighting for this move for years) The Bill also extended the water area to include substantial areas in the western coastal suburbs and empowered the Commissioner of Public Works to fix scales of charges - by rating, or assessment or from sale of water by measure - as he thought necessary.

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[1] Parliamentary Debates of 1880: House of Assembly: Tea Tree Gully Waterworks Bill, June 2.

[2] Parliamentary Debates of 1880: House of Assembly: Glen Osmond Waterworks Bill, June 10.

The question of economics was also to rear its head in relation to the sewerage system. The first objective of a Sewers Bill introduced in 1879 was easily achieved - namely, the leasing of a triangular block on the West Parklands from the City Corporation for the storage of drainage materials for a term of 21 years. However, the second objective proposed a change in the site of the sewage farm and the purchase of a larger acreage than W. Clark had initially suggested. The Hydraulic Engineer (Brown) proposed the change from the Reedbeds (Findon) to Tim O'Shanter for reasons relating to the relative character of the soils, acreage available and economics of disposal. He also decided to provide for the City and principal suburbs, whereas Clark's initial estimates contemplated the sewering of the City and North Adelaide only. The cost was thus escalating.

Parliamentarians were not pleased. The idea of taking a "sewage picnic" was bandied about, and eventually Commissioner of Public Works Hawker arranged vehicles to carry Members of Parliament to both sites on July 17. This achieved little, for lengthy debates followed on the merits (and economics) of Clark's as against Brown's scheme. Hawker quoted numerous details from the Reports of the British Rivers Pollution Commission of 1868 and examples of sewage farms on particular soils in Great Britain. Eventually and predictably, a Commission on the Sewage Farm Site was arranged. For once men qualified to investigate such a technical problem - a Victorian engineer, a local Professor of Natural Science, a PhD. and two others - were appointed. They quickly and unanimously reported that Tam O'Shanter was the best alternative, and two of the four reasons they gave for their choice were influenced by economics. The price per acre would be cheaper; effluent to the sea from the reedbeds would be more expensive and the cost of constructing the main sewer to the Belt would be cheaper by £9,000. Parliament was placated and nothing further

was said, except that the Commissioner of Public Works promised to look into the possibility of using colonial pipes in the scheme.

Meanwhile the Commission appointed in the 1880 session to report on Public Works presented its report in 1881. As intended, it primarily dwelt on the Railways Department. Very little space was devoted to the Hydraulic Engineer's Department and in fact, the few recommendations made were straight out of the mouth of Hydraulic Engineer Brown. The Commissioners expressed open confidence in Brown's supervision, re-organization and proposals for further savings. The only area in which they could see his Department making no obvious effort towards amelioration was the matter of pollution of the Torrens watershed. They suggested that an officer be appointed to patrol the watershed.

By 1881 another matter was capturing the imagination of vigilant Members of Parliament. Influential gatherings had been held and petitions forwarded by the public on the subject of water conservation, artesian boring and exploration of the interior. The provision of Reservoirs and wells by the Surveyor-General's Department outside hundreds and on stock routes paled into insignificance in the light of moves by the Victorians to legislate for the provision of water conservation schemes in settled and agricultural districts. Something had to be done as demands for water supplies were being received from all over the Colony. A diamond drill was accordingly imported at a cost of £8,379 to drill near Eucla and twelve men in the employ of the Surveyor-General's Department began their investigations, without the guide of a geological survey. A motion easily passed the House of Assembly on September 28 urging the importation of more diamond and other drills to facilitate water (and mineral) exploration. The sum of £82,000, the largest ever allowed for development of the interior by well-sinking (etc.), was included in the Public Purposes Loan Bill.

Not to be outdone, Hydraulic Engineer Brown suggested a plan whereby country towns could share in the offerings. Works would be constructed and maintained by his Department, but the local authorities - Corporations or District Councils - would annually pay the cost of maintenance and interest upon construction at a rate of 3% for the first year, 4% for the second year and 5% for succeeding years. The authority would recoup itself by rating or selling water by measure or standpipe according to guidelines fixed by the Commissioner of Waterworks. Naturally it was a highly acceptable idea - the Government would be pleasing the people without accumulating an increasing burden - and it accordingly appeared in a Waterworks Bill of the 1882 session along with many of Brown's other recommendations. Not surprisingly, the Hydraulic Engineer's Department was promised a Diamond Drill of its own, the first experiment to be made at Stirling North. Meanwhile the only other Waterworks measure of the session was the previously ill-fated Mount Gambier Waterworks Bill which now passed both houses fairly easily. Glyde, the member for the region, assured the House that the people were at last showing a swing in favour of the scheme.

June 1881 saw the Bray Government come to power. Retrenchment in the Civil Service had been a strong election issue, so both Houses aided the passage of an Act which abolished retiring allowances, except to those over 60 or with 20 year's service to their credit. There were other ways the Civil Service could be brought down to size - for example, the Commissioner of Public Works instructed that no free water supplies would be granted to officers in Government Service in the future.[3] The services of the Hydraulic Engineer, Secretary to the Commissioner of Public Works (Mann), Patterson and Mais (the Engineer-in-Chief) were metered and placed

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[3] H.E. 371/81.

on the paying list. Only the Storekeeper who lived at the Waterworks Yard (Kent Town) and the various country Superintendents remained on the free list. To be a Civil Servant was suddenly to be unpopular.

There were the exceptions. The resignation of Hydraulic Engineer Brown in April 1882 came as a nasty shock. He had taken leave of absence with the permission of the Commissioner of Public Works (Ramsay) in December 1881, ostensibly to return to England on private business. However he requested his salary as usual, on the grounds that he would be looking into Departmental matters, (especially the purchase of water meters), and that his past labours had been of great benefit to the Colony. He gave examples of the savings his management had achieved including the fact that the Adelaide Waterworks now produced 5% on the cost of the works whereas at his arrival the working expenses had absorbed the whole income derived from rates.[4] The Bray Government declined to offer him the twelve months with full pay, unless he accepted another term of office of not less than three years' duration. So Brown went off to England declining to bind himself to a new term or to the examination of meters at his own expense. In April he wrote from England, forwarding his resignation and explaining that his English news meant that there would be little chance of his returning to South Australia.

The House of Assembly demanded that the relevant correspondence be tabled while the Central Board of Health expressed regret at the resignation of "a man in entire harmony with them."[5] His efforts and recommendations were honoured in a number of ways. Act No. 269 of 1882, an Act to Amend and Consolidate the laws relating to Water Supply, was essentially a plethora of his ideas. It caused little debate and was to remain the

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[4] Parliamentary Papers of 1882: P.P. No. 66: Correspondence relating to resignation of the Hydraulic Engineer.

[5] P.P. No. 151 of 1882: Report of C.B. of Health 1881-'82.

archetype, with little alteration, well into the twentieth century. Provision was made for leasing Waterworks to Corporations, District Councils or groups of persons. The list of charities (etc.) allowed exemption from paying rates was severely cut back; the obligation of the Commissioner to supply water for domestic purposes only was deleted and the principal of paying-for-measure was included. These provisions and many of the by-laws had been direct recommendations from Brown and his senior officers.

He left his stamp in other ways. The Government decided that if they could not have him as Hydraulic Engineer, they would get someone very much like him. Accordingly the Premier and Treasurer Bray wrote to the Agent-General in London urging him to find a new Head with the requirement that "a young man with ability, similar to the late Hydraulic Engineer, would be preferred."[6] In fact, the memory of Brown's competency and ability remained strong; many years later there was even a vain attempt by the Government to induce him to return. Perennial politicians kept his name alive throughout the decade, his advice was regularly called for and the notion that the offer of a greater salary would have ensured his services remained widespread. For the time being A.R. Lungley, the Department's Chief Draftsman, was quickly promoted to first class, Professional Division as Assistant Engineer. With a Cabinet-approved bonus of £150 p.a. he became acting Hydraulic Engineer. An escape of sewage into the Torrens just after Brown's departure did little to endear him to a sceptical public and Parliament.[7]

A prolonged drought in the Kadina region necessitated the costly carting of water from Gawler by railway and reverted attention to the

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[6] P.P. No. 205 of 1882: Correspondence re Successor to H.E.

[7] See leading article in The Observor, May 6, 1882 headed "The Late Hydraulic Engineer".

issue of water conservation. Several motions urging the subsidizing of District Council borings and the desirability of dividing South Australia into water areas for procuring and conserving water, caused much debate. Various Members demanded to know what steps the Government was taking in particular areas, and full details of water conservation works carried out by the Surveyor-General's Department were sought and tabled. By November the Government felt it was time to comment. The session was at its end so it made known the fact that it was "seriously thinking about creating a new Department to carry out a policy of reproductive water conservation in settled districts."[8]

The challenge was there - no other question was seen by politicians as being as important as water conservation - but the arrangements made were to prove inadequate. A new Department called the Department of the Conservator of Water appeared in late 1883 but it was simply a new label for those officials in the Surveyor-General's Department concerned with water-boring, including its Head, James W. Jones. Thus, when questions were asked in the 1883-'84 session concerning the progress of water conservation activities, answers were forthcoming from four Departments - the Surveyor-General's Department, Conservator of Water, Hydraulic Engineer's Department and Engineer-in-Chief's Department. Each Department, for example, was boring for artesian water with its own sets of machinery, none apparently being any more successful than their counterparts.

Likewise a Water Conservation Bill introduced by the Bray Government proved to be inadequate. It proposed to divide the country into districts in which local Boards appointed by Government and ratepayers would have power to make by-laws covering the leasing, care and control of any Waterworks/Irrigation works. The feeling in the House of Assembly was that

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[8] Parliamentary Debates of 1882: House of Assembly, November 2.

the Bill was too lengthy and complicated considering the very simple object in view. Tomkinson, for example, admitted that the subject was indeed related to the "life-blood of S.A.", but gave details of recent borings to show that most had been costly, non-remunerative exercises. The boring at Stirling North by the Hydraulic Engineer's Department had cost £2,300, only to reveal brackish water.[9] The increasingly familiar cry of unfair taxing of the City for the country's benefit was also raised. But it was the Legislative Council which negatived the Bill twelve-six in a very short space of time. Those against the measure felt that it was utterly unsuitable in a country which was not capable of being irrigated on a sound financial basis. Those in favour took the half-hearted view that the Bill was necessary to "legalize an important experiment."[10]

Meanwhile Tomkinson and fellow members of the City Corporation were responsible for the advent of a Bill to give relief to those who could not afford a connection to the sewerage system. It enabled people to apply to have the work done by the Government on a deferred payment system. As well the Commissioner was given power to refuse the entry of certain sewage matter - the result of a long-winded court-case against a candle factory owner named Burford - and to use the Waterworks assessment as the basis for the sewers assessment.

The arrival of the new Hydraulic Engineer, R.L. Mestayer, mid-1883, evoked little interest. His salary of £900 p.a. was less than that of the previous Hydraulic Engineer, despite the fact that he had been selected from a field of 150 candidates. Unfortunately complaints about the sewage system were at their height in the years 1884-'85, and some Parliamentarians

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[9] Parliamentary Debates of 1883-'84: House of Assembly debate on Water Conservation Bill, October 25.

[10] Parliamentary Debates of 1883-'84: Legislative Council, November 8.

were quick to judge the new man by association. Complaints of offensive smells arising from sewer ventilators in North Adelaide were so numerous that the new Colton Ministry was forced to take action. Even Rees, in the House of Assembly, one of the strongest proponents of the 1878 Sewers Act, moved for a Commission into the drainage system and sanitary condition of Adelaide and suburbs. He eventually withdrew his motion, by which time the advice of the former Hydraulic Engineer, Oswald Brown, had been sought. Mestayer, in fact, solved the problem in his own way. Even the Commissioner of Public Works Thomas Playford, in his Public Works Report for the year ending June 30, 1884 commented: "Mestayer . . . had solved the difficulty before Brown's letters reached the colony."

However popular prejudice against products from the Sewage Farm did little to enhance Mestayer's image in the eyes of the politicians. His requests for extension of the Sewage Farm acreage were ignored and on December 3, 1885, the Legislative Council put and passed a motion that the Government examine and report upon the management and economy of the Sewage Farm, and the value of sewage for purposes of irrigation.

In 1886 Dr. Allan Campbell (M.L.C.), was still asking questions of the Government about the ventilation of Deep Drains - he had previously conducted a press campaign against various aspects of the system - despite the fact that the Central Board of Health was by this time congratulating Mestayer on the success of his sewer ventilation, the complaints reaching them having entirely ceased.

In the same year, a Sewers Bill designed to grant an extension in time of payments for connection with the sewerage, gave rise to further criticism. The Bill, however, passed both Houses easily enough. The M.P., Coglin, in fact ended the House of Assembly debate (and alleviated the tension) with a quick-witted play on words:

> I have had practical experience of the system at Brompton Park, where as a result of Deep Drainage, there could now be seen health in the physiognomy of the people when they were met perambulating in the precincts of that suburb.

Hansard faithfully records the reaction - "Hear, hear and laughter"!

The performance of Mestayer and his Department in the provision of water supply and water conservation facilities was the subject of even greater Parliamentary interest. On the one hand they were subject to the cutbacks in staff, salaries and overtime which successive Governments implemented in the Civil Service. On the other, together with the Department of the Conservator of Water, they were expected to solve the Colony's problems through the medium of remunerative water conservation works. It was one of the few areas of high public expenditure in the mid and late 1880's and as such the politicians expected the problems of unemployment and small-time local industries to be solved as valuable by-products. Great expectations indeed!

The 1884 election confirmed the passionate interest in water conservation, for the subject took pride of place in many candidates' speeches. The Colton ministry came to power, reduced water rates, abolished meter rent and lowered the fee for fixing a meter. Mestayer was induced by the Commissioner of Public Works to investigate and prepare schemes for an increased Metropolitan water supply and to examine Beetaloo Springs as a possible source of supply for Yorke Peninsula and Gladstone/Laura. Commissioner of Public Works Jenkin Coles did not make the pressures any easier to bear - he was one of the less approachable Commissioners in his time, making it a rule of his Ministerial office to clear his desk daily - and he did it! The Conservator of Water, meanwhile took his orders from the Commissioner of Crown Lands and Immigration. The task of surveying the irrigation possibilities along the Murray thus came his way. The spheres of influence of both Departments were bound to coincide. The Ministry remained in office for one year, in which time the positions of

Commissioners of Crown Lands and Immigration and Public Works both changed hands twice. So much for any real hope of effectively and consistently implementing policies.

One debate of the session which was to seriously affect the Hydraulic Engineer's Department was that which centred on the acceptance of local iron pipes for Waterworks purposes. Eventually the resolution was passed that "Fulton and Company's tender for the supply of water-pipes should be accepted by the Government," in an effort to foster local industry and reduce unemployment. The Government acquiesced and for the first time ever an order went to a (supposedly) local manufacturer instead of overseas. In fact the firm was English, had only just purchased land at Kilkenny on which to build a pipe-works, and promptly brought out fifteen skilled labourers from England. The first Ironmoulders' Union in South Australia was to grow out of the firm's unfairness to their workers.[11]

But it was the Commissioners of Audit who were most annoyed at Mestayer's failure to object to the tender. He had inferred in a memorandum to them that he considered the cost unjustifiable. However, reported the Auditors, "as he made no direct suggestion or recommendation to the Government, the onus of doing so was thrown upon us."[12] They pointed out that the contract would cost the Department 46% more than a shipment, and that in reality the actual bonus to Fulton and Company became 115%, a preference given utterly disproportionate to the local expenditure thereon. No action was taken, and as if to placate them, the House of Assembly passed a resolution in the next session to the effect that a Comptroller of Stores would be appointed. This the Auditors had recommended in a Special Report on Stores and Contracts, in order to institute the simultaneous practice of annual contracting for supplies in all Departments.

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[11] See L.E. Kiek's The History of the South Australian Labour Unions. (M.A. thesis, Adelaide University, 1948.) p. 35

[12] 1884-'85 Report of Commissioners of Audit: See "Special Report No. 2: Contracts for Public Works."

The Downer Government which took office in June 1885 was even more adamant that the water question was the biggest problem which had to be faced. Downer himself said: "There has been enough railways constructed for the present, and now is the time for water."[13] The occasion was the passage of the Public Purposes Loan Bill. Water schemes to the value of £1/2 million were at stake and for once the lines of expenditure relating to them sparked off considerable debate. The Hydraulic Engineer contributed to the uncertainty by issuing two contradictory reports on the Beetaloo Springs proposal. In his first report he stated that he could not recommend a heavy expenditure on a Reservoir built across a creek. The proposition was unprofitable. Later, on September 24, he recommended one site above three others, basing his conclusions on the testimony of residents in the District, and urged that all lands which would derive any benefit from the scheme be rated. He had little choice. A water supply was needed in the region, and the country was represented in Parliament by country dwellers as never before.[14] Thus, beyond questioning Mestayer's volte-face, the first instalment of £80,000 towards the scheme was passed as printed.

As well the Government intended that £200,000 be provided towards a start on the £700,000 Barossa scheme. The damming of the South Para River where it joined Victoria and Malcolm Creeks was first suggested by James Martin many years before. However, after the hot dry summer of 1884-'85, Mestayer reported favourably, if reluctantly, in its favour (because of its distance from Adelaide), as a much needed boost to Adelaide's water supply. At the same time he reported against the alternatives of a dam in the Torrens Valley or a Reservoir in Sixth Creek. Again Parliament wondered at Mestayer's wavering enthusiasm. Certainly there was little

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[13] Parliamentary Debates of 1885: House of Assembly December 8, Public Purposes Loan Bill.

[14] J.B. Hirst, Adelaide and the Country: 1870-1917. (Melbourne University Press 1973), p. 74.

information before Parliament. The result was that the Barossa water scheme instalment was negatived by a vote of twenty eight to eight. Instead the money was added to the general loan for water conservation, although no-one questioned where the money would be specifically spent.

The Downer Government itself did little to boost Parliamentary faith in Mestayer's ability. An engineer from Victoria, W.W. Culcheth, was engaged to examine the Conservator's report re Irrigation from the River Murray and the Beetaloo Scheme, the Barossa scheme and alternatives examined by Mestayer. Culcheth generally confirmed J.W. Jones' findings but clashed with the Hydraulic Engineer about his recommendations. He could not agree that the Barossa scheme should be a combined water supply and irrigation scheme, while Mestayer in turn objected to his suggestion that the river channel be used as a channel for irrigation and that open channels be used instead of pipes wherever possible.[15] Culcheth also opposed the Beetaloo scheme, suggesting a smaller reservoir on a different site, or the examination of the Hummocks Range and River Broughton possibilities.

These alternatives had already been ruled out by the Hydraulic Engineer's Department years before. In fact the Government must have considered the Department and Mestayer to be competent enough for at one stage they seriously contemplated placing the Conservator of Water's Department under the Hydraulic Engineer's control. The Commissioners of Audit even allowed certain expenditures "on the assumption that this Department would be placed under the control of the Hydraulic Engineer . . . but it was afterwards determined to keep it separate."[16]

Meanwhile Parliament was becoming increasingly concerned about the Colony's public debt, her unemployment problem and unreproductive works.

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[15] See P.P.'s 50, 51 and 52 of 1886 for relevant reports.

[16] Commissioners of Audit Report for 1855-'56.

The Government took action. In 1885 it abolished the 10% differential between the Professional and Ordinary divisions of the Public Service, and followed that with a 10% reduction in addition to the 10% reduction in the 1886 Estimates. This may have appeased the public, but civil servants in all Departments were not amused. They had already seen hours of work lengthened, leave reduced, free holiday travel passes stopped and paid overtime abolished. All Departments suffered. Meetings were held at which personnel from all Departments were represented. Solace was found in the formation of the Public Service Association of South Australia.

The Government also offered a Water Conservation Bill as a cure-all for the Colony's financial problems. It was, in fact, very similar to the 1883 Bill which had failed, except that it was limited to proclaimed Hundreds only. The general feeling was favourable although the dry season, coupled with financial stringencies and the dearth of expertise, should have warned that community interest might not be so passionate. This time, at least, some politicians attempted to put in perspective just what had been achieved to date. E.W. Hawker for one gave an astute, even masterful, assessment of the situation and brought cheers from the whole House.

It was June 29 in the House of Assembly. Hawker contended that the existing system needed adjusting, as six different groupings were involved in the area of water conservation. Private enterprise (through men like Thomas Elder), had spent close to £2 million to date, without reference to the geological features of the country. The result? Many useless wells. Likewise the Surveyor-General's provision of dams and tanks left much to be desired. Surveyors with little knowledge of hydraulics were responsible and supplies were provided irrespective of a united scheme.

The Railways Department had long provided dams for supplying water to locomotives without the slightest regard to the surrounding district. Thus places like Crystal Brook, Gladstone and Mount Barker had become

battlegrounds for struggles by the inhabitants, the Hydraulic Engineer's Department and Railways Department for adequate water supplies. Hawker particularly delighted in detailing the Mount Barker set-up. There a dam was constructed by contractors for the Railway, bought by the Railways Department, reticulated by the Hydraulic Engineer Department, leased to the District Council, and during the current year, nearly drained dry by the Railways Department. Meanwhile the Department of the Conservator of Water, which controlled the most costly machinery purchased by the Government, had had virtually no success with its steam-scoop programme.

The last and most satisfactory organisation, Hawker contended, was the Hydraulic Engineer's Department. This he said was due solely to the efforts of one man, O. Brown, a man the Colony could have retained if he had been offered £2,000 or £3,000 p.a. Yet that Department and the Conservator's were constantly running into one another - the latter would report on a scheme, and it would be surveyed a second time and carried out by the Hydraulic Engineer's Department. The advantages of the Hydraulic Engineer's Department were clear - it took a scientific approach and possessed first class workshops where men were being trained. The answer, therefore, lay in the appointment of one highly scientific man at the Head of the Department. Hydraulic Engineers under him should first make a thorough data-collecting, state-wide examination. That one Department only should handle applications from people, the advantages being unity of design, one lot of workshops, work done cheaper and better, and an end to the jealousy between Departments. After examination of the country, the Department could divide the Colony into districts, and supervise the construction of water schemes for local trusts.

Never again would a politician show such an understanding or give such an exposition on the Government provision of water conservation facilities. He was masterful! Yet nothing but inconsequential alterations were made to the detailed Water Conservation Bill. The Act passed both

houses and the chance to re-organise inadequate organisational arrangements was lost. A year later no community had availed itself of the provisions of the Act. Each Department carried on as before. New South Wales and Victorian Royal Commissions into the utilization of the Murray waters for irrigation (and navigation) purposes put the fear of God into the Downer Government. But still there was no attempt to create a single pool of expertise and information which could begin to tackle the evaluation and utilization of the Colony's water resources.

The 1887 election centred around the state of the Colony's finances. Government proposals included the appointment of a Civil Service Board to retrench and thereby save money. But people were disenchanted for many reasons. T. Playford, for example, was defeated in the East Torrens election, one contributing factor being that constituents in the Norwood-Kensington area rejected the efforts of Commissioner of Public Works (Furner) to force Deep Drainage on them. So Playford stood for and won the less controversial seat of Newcastle. He then put together a Ministry and took office on June 11, 1887.

Many problems needed solving. Playford attempted to introduce a Civil Service Bill, modelled upon the Victorian Civil Service Act of 1884. The legislation envisaged a Board with powers to deal with matters beyond the implementation of measures of economy. It was therefore rejected. Most politicians could see only the need for immediate, rigorous cutbacks, and not the desirability of reassessing existing systems. The best the Government could then do was to facilitate the appointment of a Royal Commission into the Civil Service. Playford selected Commissioners who would keep the inquiry subdued and direct their investigations towards the goal of economy.[17] In 1888 the Commissioners began their "thankless, disagreeable, onerous and important task."[18]

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[17] See Geoffrey Hawker's The Development of the S.A. Civil Service, 1836-1916; PhD. thesis, Australian National University, 1967, p. 370.

[18] Parliamentary Debates of 1888: These words form part of a Legislative

Meanwhile other events were taking place which would also affect the nature of Government organisations concerned with water supply, water conservation and sewerage facilities. A Railways Commissioner's Act was passed in 1887, creating an independent board of three commissioners and a Supply and Tender Board to assume control over tenders for the Engineer-in-Chief, Railways, Waterworks and other Departments.

Engineer-in-Chief Mais was not pleased and eventually resigned in 1888, at least partly because the Board reduced his powers. However, another element contributed to his demise. In 1886 he had accepted private engineering work with the Silverton Tramway Company, after some ambiguous communications with the then Commissioner (L.L. Furner) on the subject. Some months passed and it was 1887 before the subject reached the notice of Parliament. The House of Assembly then appointed a Select Committee into the Appointment of Public Works officers which naturally did Mais's image little good. He contended that he had acted in an unusual manner as the outcome - a connection from the Barrier Ranges to the trans-continental railway in South Australia - would have benefited the Colony greatly. There was some consolation. The Progress Report of that Select Committee did not hesitate in criticizing Furner for having allowed the question of Mais's employment to remain in such an indefinite form. At last there was some emphasis on the notion of Ministerial Responsibility.[19]

Other tensions were brewing. An Interpreting Act, (No. 416 of 1887), had to be passed after the Commissioners of Audit found that the Hydraulic Engineer's Department had failed to apportion interest and establish sinking funds in respect of loans raised for the Adelaide sewers. As well

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[18](cont.)
Council resolution of September 25, which expressed thanks to the Commission for their effort to date.

[19]Hawker's thesis, p. 346.

the 1886 Water Conservation Act had not been availed of by any community, so the Government was only able to place limited numbers of unemployed men on water conservation works. The Chaffey Brothers Irrigation Bill was thus seen as a welcome, if temporary, godsend. Here was the experience and capital to experiment with large-scale irrigation on the South Australian section of the Murray, and provide some employment at the same time. The detail of the Bill was blissfully ignored by politicians grateful that some interest was being taken in the Colony's potential.

Meanwhile relations between the Commissioner of Public Works (A. Catt) and the Hydraulic Engineer (Mestayer) began to deteriorate. An extraordinary drought forced the Department to lay, with the help of the unemployed, 30 miles of mains to the Hundreds north of Yorke Peninsula, work not contemplated in the original Beetaloo scheme. The Government thus introduced a Bill in the 1887 session to enable some revenue to be returned from the Beetaloo district. It introduced a new concept - the annual construction rate on country lands - as recommended by the Department. Those who benefited by mains passing near their land would have to pay, even if they did not take the water. The Bill passed easily enough, but when the assessment based on the value of the land was made and issued, the Government was deluged with a storm of public meetings and deputations. So, the Government was forced to introduce a new measure in the 1888 session which assessed according to acreage and allowed rebates in the shape of water for the rates paid. Also the price of water was reduced from five shillings to three shillings per 1,000 gallons.

In the midst of the turmoil Carr used the Hydraulic Engineer as a scapegoat on a number of occasions. For example, he told a deputation from Port Germein, Terowie and Baroota early in 1888 that assessment notices forwarded to the farmers near Port Germein had been forwarded by the Hydraulic Engineer's Department without his authority. Mestayer, in reply, maintained that he had the Commissioner's approval on an earlier file and

was able to forward the relevant documents to prove this.[20] Before long the two men clashed again over the question of vacancies in the Department created by death. Carr refused to allow the positions to be filled, and Mestayer in turn declined to accept any further responsibility for the failure to get in rates punctually as he was not allowed sufficient staff.[21]

In the same way the existence of the Department of the Conservator of Water was being undermined. An amendment to the Water Conservation Act was introduced by the Government in the 1888 session. It transferred the control of that Department from the Commissioner of Crown Lands to the Commissioner of Public Works, in an effort to get more value for money expended on water conservation activities. In Parliament Catt reeled off a list of works undertaken by the Department in an effort to justify its five-year existence. But some like E.W. Hawker grasped the realities of the situation. He demanded the real cost of wells (etc.), saying:

> We've spent hours over cutting down the salary of some unfortunate member of the Civil Service and yet spent hundreds of thousands of pounds on water conservation without any member knowing how the money had actually been spent.[22]

By June Mais, the Engineer-in-Chief, had voluntarily retired under the Civil Service Act. He was granted six month's leave after he had agreed to pay the fees received from his questionable private work into the Treasury. Carr tried to get Lovell (Mais' Assistant Engineer), to take on the vacant position at £1,150 p.a., but Lovell declined and in fact resigned in the same year. Next Carr suggested that Alex Bain Moncrieff be offered the position at £1,000 p.a. Cabinet approved and Moncrieff, who had begun his career with the Engineer-in-Chief's Department as a draftsman in 1874, accepted the position at the age of 43.

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[20] See C.P.W. 18/88 (GRG 23/1).

[21] See C.P.W. 99/88 (GRG 23/1).

[22] Parliamentary Debates of 1888: House of Assembly, November 20 Amendment of Water Conservation Act.

The need for economy was used as the excuse for the next piece of manoeuvring by the Playford Ministry. The Premier simply and hastily amalgamated the Hydraulic Engineer's, Conservator of Water and Engineer-in-Chief's Departments, having called for reports from the Heads concerned, only after he had made the decision.[23] Naturally they protested. Mestayer was particularly upset as he was the only Head to be dismissed and with six week's notice at that! Catt smugly attempted to appoint J.W. Jones as the head of the amalgamated Department on the premise that he had been "longest in the Service." The Conservator, however, declined the position "in consequence of the expression of public feeling against the placing of the City Sewage and Waterworks under my charge."[24] It was then that Catt suggested (and Cabinet approved) the placing of the amalgamated Departments under the Engineer-in-Chief. Jones would be given charge of water conservation and country water districts and C. Bayer would receive an appointment as Sanitary Engineer in charge of Adelaide Water District and sewers. Naturally, Bayer, at the age of 29, jumped at the chance. He had begun his career as an Assistant Surveyor with the Waterworks Department in 1882, becoming Assistant Engineer a year later.

There were a number of futile efforts to retain Mestayer's services. Furner, a former Commissioner of Public Works, demanded to know (in the House of Assembly, June 5), what qualifications the Engineer-in-Chief had for the position of Hydraulic Engineer. Then, a deputation of Parliamentarians, Mayors, Councillors and Aldermen met with Commissioner of Public Works Catt urging the Government to rescind their decision. There was talk of false economy, Adelaide's much-reduced death rate and Mestayer's capabilities and qualifications compared with those of Jones. Catt remained unmoved. He claimed that Mestayer's engagement had only been temporary

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[23] C.P.W. (in) 219/88.

[24] Ibid.

while Jones "is a South Australian who has been here all his lifetime" and has "rising talent".[25]

Poor Mestayer himself had a try. He forwarded Catt a statement of a number of his management successes - for example, the reduction of the yearly cost of maintenance from £3.32% on the Capital expended on Adelaide Waterworks in 1878 to £1.70% for Adelaide Waterworks and Sewers in 1886-'87. But the Government stood their ground. The colonial product would serve their purposes, especially as there was money to be saved.

The immediate savings to be had involved the retrenchment of a number of officers. Beyond that there was every promise that the new arrangement would not work smoothly. In no case had adequate consideration been given to the functional role of the Departments which had been submerged. Structural problems were inbuilt in the new set-up. True, the problems of a multiplicity of Government organisations concerned with water conservation had been done away with. But they were swapped for the problems which the subjugation of a variety of Governmental functions under the one Head, in turn answerable to many bosses, would bring.

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[25] See C.P.W. 480/88 for details of the interview.

ORGANIZATION:

As we have seen, the provision of water supply and sewerage activities in this period was largely patterned by a number of major political initiatives. Structural arrangements were confounded by the advent of the Water Conservator's Department in 1883, successive Governments pursued retrenchment policies in the Civil Service, and by 1888, economic considerations outweighed any others in the policy-making process. But each Head of the Hydraulic Engineer's and Conservator's Departments was equal to the challenge. In turn they implemented and improved systems as best they could, given the limitations imposed on them.

Oswald Brown - a handsome man who "invariably dressed in blue serge with a Burberry billycock hat"[26] - probably made the greatest impact of any of the Heads. This was no doubt due to his own personal passion for order and efficiency, which happily coincided with the wishes of the politicians. As well he was around when economics were not yet so tight as to prevent his manoeuverability, while Mestayer and Jones followed and bore the brunt of more severe budgeting. The keynotes of Brown's four-year administration were business-like efficiency at all times, the sharing and implementation of ideas, and fair pay and equal working conditions for all.

In 1878, aided by Assistant Engineer W.B. Hull, he began to reorganize. On the accounting side he ensured that the new Chief Clerk and Accountant J.G. Ashton got extra clerical assistance. The working expenses of the Adelaide Waterworks were annually absorbing nearly the whole of the revenue, so Ashton had to be given the time and freedom to bring order and system to the accounts. He found that stores were not issued under any proper system and construction stock was jumbled up in the maintenance

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[26] S.A.A. (1011): Newspaper articles written by C.E. Owen-Smyth. Superintendent of Public Buildings. See The Register December 23, 1924 article in the series.

accounts. This he began to rectify by charging stores accurately to construction or maintenance and instituting regular stocktaking. By the end of 1878 further assistance was necessary. Frequent errors in the accounts from the Waterworks Yard caused delays in the Accountant's branch and brought criticism from the Auditor-General. Arrears in office business were accentuated by the prolonged absence on sick leave of the Waterworks Clerk, W. Square. He never returned, dying in 1879. So Hull and Brown supported Ashton's request for a Bookkeeper, which the Commissioner of Public Works approved and it was arranged that accounts from the Waterworks Yard would be forwarded three days before payment.

But still much overtime was being worked, and Brown ensured that it was paid. Likewise, he was pleased to forward individual's applications for promotion to the next class to the Commissioner of Public Works although the number of officers on the Fixed List were minimal. This situation was causing discontent; Ashton wrote on one file that "for a Department of the importance of the Hydraulic Engineer's it would be desirable to have more officers on the Fixed List than merely the Accountant and Waterworks Clerk."[27] But Brown was also cleverly keeping salary increments down. For example, he declined a raise to two draughtsmen-surveyors (Clerke and J. Balfour) for the reason that although their qualifications merited it, "the work they're called upon to perform does not merit more than the amount at present paid."[28] Balfour resigned in 1879. Brown also declined applications from a number of Inspectors for full forage allowance and increases in salary on the grounds that he was appointing two additional Inspectors to share the work.[29]

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[27] H.E. 821/78 (G.R.G. 53, Series 17).

[28] H.E. 538/78.

[29] H.E. 874/78.

The staff were upset when Brown issued stringent regulations which required them to make written instead of verbal application for leave of absence. He gave the Chief Clerk power to grant such leave in the absence of the Assistant Engineer, and ordered that the times of arrival, departure and temporary absence be entered in a time book. Six officers, Lungley et al, protested against this unwarranted delegation of authority and "want of confidence in us."[30] But the Commissioner of Public Works reiterated that the Hydraulic Engineer "has power to make rules and regulations as he sees fit" and the new systems were implemented.

Complaints concerning the system of meter reading in operation urged Brown to further action. Meter Keeper Perryman was given approval to classify the meter readers according to performance, so seven were listed as First class, and four as second class.[31] Brown also suggested that the form issued should bear both the previous reading and present reading, and should be filled in at the rates office, thereby being less open to error than when the old form was filled in by the reader. This was done, and a book was prepared in the office before being taken by the meter reader on his rounds.

The compilation of data for research purposes was also implemented, beginning in 1878. Correspondence was opened up with major towns and cities in the other colonies and New Zealand and information requested re rates charged, systems of assessment, management expenses and profitability. In this way, Brown fostered a flow of information between similar bodies in the colonies which had never existed before. Regular gaugings of stream flow were taken - these reached their peak in 1888 when the politician's fervour for useful water conservation works reached its height under Commissioner of Public Works, Catt - and continuous evaporation gaugings

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[30] H.E. 69/78.

[31] H.E. 39/1878.

were made. Hull's suggestion that analyses of water at certain places at particular times of the year be taken, was also acted upon. The analyst George Francis began to forward such reports. As well, Brown tightened up the watch on waste and misuse of water. One Inspector of Services called Esam Smith even made special visits in his districts at different hours, (during the day and at night in summer months), and at least three to four times a week, in an effort to give offenders little rest.

Troubles with the contractors working on the Kapunda and Nelshaby Reservoirs drew Brown's attention to the General Conditions of Contract used by the Department. As clause 23 stood, it seemed that a contractor could claim payments for materials twice over. Was there an echo of truth in the much-maligned claims of years before? The clause was clarified and other alterations made by the Crown and Waterworks Solicitor (R.B. Andrews) with the Commissioner of Public Works' approval.

There was one nuisance which had to be drawn to Brown's attention by C. Smith, an Inspector of Services, although the problem was right under his nose. On November 14, 1878 Smith complained of an "abominable smell which pervade/d/ the Waterworks Clerk's office" and asked permission to carry a ventilating pipe to six feet above the roof, an escape of sewer gas no doubt being to blame. Hull confirmed the nuisance - "it has often given me a bad headache . . . and all the Government employees have complained and in some instances have been very unwell."[32] Brown urged Hull to do what was necessary to rectify the problem.

The year 1879 saw Brown making important changes of personnel. First of all he removed O. Wastell from the position of Superintendent at Port Augusta and Cabinet appointed his nominee, J. Hullett, in the position.

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[32] H.E. 684/78.

Wastell was demoted in pay and position but accepted the job of "Receiver" at Port Adelaide after being forced to choose between the retiring allowance which he had accrued, and the appointment. In 1881 this position was abolished while poor Wastell was away on his holidays. He was never re-employed. Others lost their jobs more predictably - Clerks of Works lost their positions when projects were completed, the exceptions being individuals like Ellis Negus who went on to become Superintending Inspector of Sewers.

Brown rewarded competency. For example, he asked Cabinet that the position of Chief Draftsman be created and that A. Lungley be promoted to the job. This was approved and Lungley took the position, although no extra pay was attached to it. What it did do was to provoke a number of surveyors into asking that they receive orders from the Hydraulic Engineer or Assistant Engineer instead of through their newly-elevated workmate. But Brown was adamant and decided to raise any instruction issued by the Chief Draftsman to a status equal to those given by the Hydraulic Engineer or Assistant Engineer.[33] He also brought one officer from England, a draftsman called Jenkinson who was known to him from an earlier period of employment in the same firm of engineers. Cabinet approved and Consulting Engineer Homersham testified to the man's capabilities.[34]

Applications for promotions to the next class and increases in salary received greater success in 1879. For example, Richard Watson, a draftsman who had been 20 years in Government service, was at last promoted to the Third Class and placed on the Fixed List. Brown also recommended and implemented the abolition of two rates of pay to draftsmen and surveyors - one when in the office, and another when in the field. One

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[33] H.E. 887/79.

[34] C.P.W. 1221/79.

uniform rate was adopted. It also seems that he regularly filled in Form C under the 1874 Civil Service Act - that is, a form filled in by the Head assessing each officer's conduct, efficiency and worthiness of a salary increase.

But Brown also expected certain behaviour of his officers. He was determined that his Department maintain good relations with the public. Thus, for example, he forwarded a circular to all his staff dealing with "Incivility of Officers".[35] He also made known, after several cases had come to his notice, that any man found drunk on duty would be summarily dismissed. Slapdash office procedures at the Waterworks Yard came to his notice and he ordered Ashton to tighten them up.[36] He also prohibited men smoking at the Yard during working hours, and had 100 copies of this order made up by the Government Printer to ensure that it was taken seriously.

Where accommodation for the Department was concerned he displayed the same vigour. He got permission to rent a room alongside the Waterworks Office, (previously occupied by Higgs, the Superintendent of the Fire Brigade), on account of his officers being so crowded together. The Rates Department moved into the new office in June and upset the landlord of the abandoned Flinders Street office with the suddenness of the move. Brown also selected land at Thebarton for the Sewers Yard, assuring the Commissioner of Public Works that the building erected "would not be unsightly".[37] Meanwhile, at the Waterworks Yard he ensured that new offices were completed promptly by the contractor, N.W. Trudgen. Prior to that Storekeepers and clerks were crowded into one corner of the work-shops. Brown then got permission to engage Trudgen to build a new workshop at the Yard.[38]

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[35] See H.E. 595/79 for reference to it.

[36] H.E. 397/79.

[37] C.P.W. 855/79.

[38] H.E. 1260/79.

His fight for economy and efficiency displayed itself in a number of ways. He fixed particular types of taps at drinking fountains so as to prevent waste and frequently (though unsuccessfully) asked for authority to charge Government Departments for the water they consumed. The Manager of the Rates Division ensured that all Departments were placed under meterage by the end of the year.

Hull drew Brown's attention to the fact that large expenditures on cab hire were being incurred in order that surveyors could do their duty. Brown supported his suggestion that the Government should provide their own traps, horses and drivers. He also put into effect a suggestion from Hull that the Department's cartage "could be more economically done by contract."[39] And again, he asked that all requisitions from the Engineer-in-Chief's Department be forwarded to him after Hull informed him that that Department was getting materials from the Waterworks Department without giving much notice. When urgent and necessary Brown never hesitated in going ahead and laying certain mains before actually getting the Commissioner of Public Works' approval. There were never any objections . . . such was the prestige and reputation for getting things done he early achieved.

In 1880 Brown continued his search for efficiency. A major move was to gain control of the Rates Division. Squires, the Manager, was dismissed and his position abolished in the interests of efficiency and to prevent "the clashing of the two divisions, which before occasionally occurred."[40] And yet Squires appears to have been behind many intelligent changes. For example, he pointed out that the Department was "becoming rather mixed in [its] system - charging meter rent in one place and not in another, laying on services to a boundary in one place and charging whole expenses in another."[41] As a result of his plea for reorganisation, Brown (with the

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[39] H.E. 1092/79.

[40] Public Works Report for year ending June 1880.

[41] H.E. 76/80.

Commissioner's approval) decided on one particular approach and assimilated the systems in the High Levels and some of the Country districts. Likewise, it was Squires who pointed to the fact that an old rule - the forwarding of turncock's books showing sales of water to the Rates office every month - had fallen into disuse. He suggested a stricter control and instituted a form to be filled in monthly and forwarded by the turncock in lieu of the books.[42] //It was Chief Clerk and Accountant (Ashton) and Bookkeeper (J. Bee) who benefited most from the abolition of Squires' position. They were as new to the Department and as young as Brown and he accorded them room to move. He supported Ashton's efforts to overcome the inconvenience of the system of audit before payment of Treasury accounts. Ashton's recommendation that payment by Imprest orders be instituted was in fact taken up and implemented throughout the service. Brown told his Minister that "it is extremely gratifying to me to note that to this Department, and notably to Mr. Ashton, is due the credit of initiating this system which will undoubtedly be of great convenience to the public."[43] Likewise, Ashton had a hand in altering the confused system of Treasury credits to the system of Transfer orders.[44]

Further complaints about inefficient practices at the Waterworks Yard again prompted action from Brown.[45] He issued instructions delineating the duties and powers of officers.[46] The men and goods were placed under control of the Storekeeper from July 1, 1880, and the duties of Superintendent of Mains and Services were confined to the supervision of outdoor work and to ensuring that correct accounts of material and labour were handed to officers appointed by the Storekeeper to record the same. The system of

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[42] H.E. 299/80.

[43] C.P.W. 1376/80.

[44] H.E. 420/88.

[45] H.E. 299/80.

[46] H.E. 1126/80.

assembling the men at the Yard in the morning was dispensed with and the Superintendent was required to instruct the men the day before of their work schedule. He was also told to forward a weekly return of works proposed to the Hydraulic Engineer. The Storekeeper, meanwhile, was to supervise the flow of materials, examine all returns of outside work, check and certify all accounts, supervise the work of the Timekeeper and countersign all paysheets signed by the Superintendent. // Colebatch, the Storekeeper, implemented further system with Brown's permission. He organized a system of numbers to replace the calling of men's names at the yard in the morning. Each man was required to deposit his number in a box outside the Time Office.[47] He also submitted a new system which allowed no time for men absent with or without leave, except in cases of illness, and then the production of a Medical Certificate would be necessary before payment was made.[48] Brown regulated further. He implemented Rule No. 36 of the Railway Department which observed the payment of one month's full pay to an employee involved in an accident at work not caused by his own neglect. Then he instructed that Waterworks Yard men work the same hours as those required in the Railway Shops and by private contractors, namely 7.30 to 5.00, (one hour off for lunch), and 7.30 to 1.00 on Saturdays. In December, the Government implemented extended hours throughout the whole service, so Brown's initiative was by no means a shock. Henceforth, officers worked 9.30 to 5.00 (Monday to Friday) and 9.30 to 12.00 on Saturdays.

Brown was killing two birds with one stone. He was attempting through such reorganisation to lessen class and Departmental distinctions by making the hours worked and conditions the same for all who were employed at the Yard.[49] Simultaneously he was saving time and money and perpetrating

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[47] H.E. 1139/80.

[48] H.E. 1330/80.

[49] See H.E. 1489/80 for confirmation of this intention.

the notion of efficiency. He made it quite clear that this is what he expected. For example, he wrote: "I see no reason why meters should not be fixed within 48 hours of application." Furthermore, he ordered the Storekeeper to compile a Return of the cost of Repairing Trenches.[50] These were measures never heard of before.

For the most part there were few expressions of discontent. Only Seymour, the Superintendent of Mains and Services, complained directly to Brown, no doubt because he was piqued at the Storekeeper's new authority. He claimed that the Storekeeper's figures were different from the costs of works executed by himself and complained that he had "no permanent hands [under his control] since the new regulations have been in force."[51] Brown dismissed the allegations as being without foundation and gave him the right to keep three men in the yard. His quest for efficiency continued. In cases where pipes were broken and Waterworks men were responsible for unloading them from the ships, the man in charge had his wages reduced by sixpence a day for one month.[52] Cases of poor reading of meters by turncocks became so frequent that Hull tested them and Brown imposed a fine of 10/- for every mistake discovered. Eventually men were hired specifically to read meters, turncocks were employed on their ordinary duties and their pay reduced accordingly to compensate for the new meter readers. Brown also instructed that meter readings be supplied on daily returns and entered daily in the meter ledger by the meter ledger keeper.

Brown expected a high standard of his country officers. J. Goldsworthy at the Gawler Trial Shaft complained of working a 17 hour day while only being paid for eight hours. The Hydraulic Engineer allowed him overtime pay but warned that if he could not manage without assistance he would find

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[50] H.E. 1976/80.

[51] See H.E. 1353/80 and H.E. 1460/80.

[52] H.E. 1868/80.

someone else who could.[53] The new Superintendent at Port Augusta (Hullett) reported regularly to Head Office but was often unsure as to the extent of his powers. Thus, he had to ask Brown if he could dismiss a man for drunkenness without Head Office approval. He was given permission to do so, but in the next file was chastised for advertising for a Clerk without Head Office authority.[54] Brown sent Ashton to Port Augusta to instruct Hullett and his clerk on the principles and details of office work. After a time communications between Port Augusta and Head Office ran more smoothly and Hullett's interest in his position was no doubt assured by the completion of a new house for the Superintendent in 1881.

The last year of Brown's headship of the Department saw a continuing interest in the implementation of modern systems. However it was becoming apparent that a Government crackdown on men and materials would soon call the tune. The staff level of 75 (including 17 on the Fixed List) and a force of 32 labourers, was a high point soon to be eroded.

W.B. Hull's position was abolished by the Commissioner for the reason that, "having one competent engineer at the Head of the Department means that a second one is not necessary."[55] He received £605 compensation. Actually this made him one of the lucky ones. Those paid out of the Loan Account were less fortunate in the matter of retiring allowances. Two turncocks were dispensed with after a rearrangement of districts. Four workmen were summarily dismissed from the Waterworks Yard. They hired lawyers to demand a month's wages in lieu of notice. The Waterworks Solicitor agreed that it would only be fair to meet their claim but the Commissioner of Public Works refused to do so. Other dismissed persons had as little recourse.

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[53] H.E. 385/80.

[54] H.E. 454/80 and H.E. 456/80.

[55] H.E. 840/81.

Of necessity, a few positions were created. The positions of Superintendent at Gawler and Mount Gambier were filled by Pollit and Jobson respectively, men already in the Department. Only two outsiders were employed in new positions - A. Watt became the first Manager of the Sewage Farm and T. Ball (engaged in London) became Foreman in Charge of the Diamond Drill Boring Machine.

Pay increases were no longer so easily obtained. Blacksmiths received sixpence a day extra, men at the Gawler Waterworks working in water (cleaning out the well) received a shilling per day extra and workmen at the Waterworks Yard got pay rises following the foreman's recommendation. However, most requests by officers for increases got nowhere, for Brown was only prepared to recommend in what he judged were deserving cases. Thus he was successful in obtaining a bonus for surveyor C.W. Bowyer-Smith on account of the extra responsibility and longer hours thrown on him. Likewise he obtained a regional allowance for a cadet who was transferred to the Port Augusta office. (He copied this practice from the Telegraph Department which had been making such an allowance for some time.)

However, his recommendations did not always meet with the approval of the Commissioner of Public Works. In 1880, 1881 and 1882 he repeatedly urged class promotions and pay increases for Bee, (the Bookkeeper) and Ashton, (the Accountant). The Government was not moved by Brown's pleas. He claimed they had been so efficient "that the working expenses of the Department have been so reduced that it is now possible to reduce the water rates by 30% and yet to make the Waterworks renumerative."[56] On another occasion he wrote:

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[56] H.E. 1596/80 and H.E. 1597/80.

> The hon. Commissioner of Public Works had doubtless observed that I do not hesitate to punish or remove negligent and incompetent officers; I think therefore it is but just to reward the meritorious.[57]

The logic of his employment policy was lost on a Government interested only in saving money in the most obvious ways.

But progress was still being made in many directions. By 1883 telephonic communication was established between the Waterworks Yard (Kent Town), Head Office (Victoria Square), Police Station, Fire Brigade Station, the Reservoir Keeper residing at Thorndon Park, Kensington Pumping Station, the Superintendent at the Port Adelaide office and to Brown's house in Gilles Street. Even the Waterworks Yard and newly completed cottage at Kapunda Reservoir Reserve were connected.

An alternate Waterworks Yard was purchased at Port Pirie and the old one was auctioned off. The Port Adelaide office was henceforth open every day of the week instead of only two. As well, the Hydraulic Engineer and the draughtsmen in his Department were at last able to move into the newly completed Government offices on the corner of Wakefield Street and Victoria Square.

Brown also approved a collector's suggestion that suburban offices be rented in each district so that people would not have to go into Adelaide itself to pay their rates. At the same time he tightened up the payment of accounts with the Commissioner of Public Works' approval. Henceforth, the second call was made at an interval of 21 days after the first call . . . if payment was not then forthcoming a peremptory notice would be delivered and acted upon.[58] Even Government Departments were warned to pay their monthly accounts or be cut off. Inspections by the

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[57] Ibid.

[58] H.E. 153/81.

Departmental Bookkeeper of the Port Pirie, Port Augusta and Kapunda offices led Brown to instruct the Superintendents to tighten up the collection of monthly meter accounts in those towns.

Otherwise, Bee was happy with the workings of the country offices. In fact the Superintendents used their initiative to foster local industry where savings were possible. Thus, for example, Forsaith at Port Pirie got permission to make fire-plug posts at the Waterworks Yard instead of freighting them from Adelaide. In the same way Hullett at Port Augusta was able to purchase cement locally as that proved cheaper than carting cement from Adelaide. Hullett, in fact, was one of the most imaginative men in the Department. He simplified Kutter's formula for calculation of the discharge of water to a more readily available form. As well, he put a fence around the Waterworks Yard at Port Augusta, and put sewers from the Yard to the wharf just for the Yard's sanitation purposes. The toilets were even elevated a few steps to ensure the necessary fall!

Brown also listened to and approved recommendations made by Colebatch, the Department's Storekeeper, in the direction of better financial control. He agreed that instead of allowing meters requiring repairs to stand over till the end of the month before repairs were affected, they should be repaired at once so that the value of the surplus consumption would not be lost to the Department. Before he left, Brown also gave Colebatch permission to sign the official orders for stores, to ensure that supplies could be obtained more directly. Colebatch was expected to forward a weekly return of all stores ordered to the Chief Clerk and Accountant, for examination.[59] // Brown's outward passion for order and efficiency was even to be seen in the layout of his section in the 1880-'81 Public Works Report. He had the year's workings "stated in a manner usual with Water-work Companies, a form which affords the best and most business-like view

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[59] H.E. 516/82.

of the position of each undertaking."[60] Behind the scenes however, some questioned his means of attaining results. The Auditor-General (Sheppard) called attention to the fact that the Hydraulic Engineer's Department was acting irregularly by incurring large expenditures before obtaining the proper provision - namely the Governor's Warrant. Brown maintained that the Governor's authority to commence and carry out a project was obtained when he assented to the relevant Loan Act. However, he did not press his claim and agreed to get the Warrant beforehand in the future.[61]

There is no doubt that Brown was a clever and efficient officer, who saw the value of co-operating with and listening to the officers under him. The real reason why he returned to England is not known. Perhaps he felt that he had initiated enough changes to set the Department in efficient working order - or perhaps he foresaw the stringent economic conditions ahead. Whatever the reasons, the savings he and his officers made were acknowledged by all and long remembered. Most of his major policy recommendations were implemented - like the guarantee system for the creation of Waterworks in country areas and the inclusion of the concept of payment by measure in various Acts - even though the disheartening economic climate put paid to any long-term success they may have had.

Some of his ideas were never put to the test. At one stage he called for the extension of Departmental usefulness through the construction of sanitary works in small towns whose local authorities were prepared to meet working expenses and a certain rate of interest on the money advanced by the Government.[62] The Government was not moved. Thus the inquiries

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[60] P.P. No. 25 of 1881: Public Works Report for year ended June 30, 1881, p. 111.

[61] H.E. 899/81.

[62] Ibid. P.P. No. 25 of 1881, p. 114.

received from country townships in a flush of interest in Adelaide's new Deep Drainage systems came to nought. Still, the mystique surrounding Brown lived on.// His protégé, 33 year old Arthur Lungley, acted as Hydraulic Engineer for just over a year. Lungley relied heavily on the advice and initiative of the officers under him and in turn supported their recommendations whenever possible.

He called Surveyor R. Watson back in from the field to help with pressing work, and promised that the time worked would be added to his leave. Jenkinson became Acting Chief Draftsman and suggested certain systems which were all implemented. For example, weekly reports of all mains laid, altered (etc.) were required from all Superintendents in order that he could keep plans up to date. As well, Inspectors were ordered to forward to him all alterations and additions made to services, (both water and sewers), in Public Buildings. In his own time, at the overtime pay of 4/- per hour, he prepared and mounted a plan of the city showing sewerage operations and connections, as there were no personnel available to do the job continuously throughout the day. For his responsibilities - namely, control of all outside water supply works - Jenkinson eventually received £50 extra a year, after Lungley had strongly supported his case before Cabinet.// Storekeeper Colebatch also suggested new approaches to problems and again Lungley arranged their implementation. For example, cases of Waterworks trenches being left in a dangerous state had often caused many problems. Colebatch suggested that all trenches passing from under the direction of the Department for each month be examined by a competent officer, repaired if necessary, and a notice forwarded to the various Corporations or District Council's involved, informing them that they were responsible for future maintenance. Forms of notifications were accordingly printed for the purpose.[63] Likewise the Storekeeper

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[136] See H.E. 1691/82.

brought to notice the high rates the Department was charged for packing cases from England. The Auditor-General was consequently informed that the Department could obtain the item more cheaply in the Colony. After Colebatch had reported on the success of an experiment to test the first 100 hydrants manufactured in the Colony - they were just as good and cheaper than the imported article - Lungley recommended that they be made at the Waterworks Yard in future.[64]

In the same way, Lungley relied on the initiatives of the Chief Clerk and Accountant, the Cashier, Sewer draftsman (C. Bayer), Mechanical draftsman (Mc Cullock), Superintendents and Inspectors. He praised their efforts, and supported their claims for better working conditions, pay or status increases whenever possible. When Sydney Smith, an Inspector of Sewers, resigned Lungley saw where the fault lay. He arranged that two Inspectors of Sewers be appointed at 12/- a day on the same salary as that paid to the Waterworks Inspectors. The Chief Inspector's salary was raised as plumbers could then command 12/- a day and the compulsory clauses of the Sewers Act needed enforcing. Lungley wholeheartedly supported a plea by the draftsman in the Drawing Office that their hours be reduced to a 9.30 to 4.00 day. He acknowledged that "the close application in a stooping position generally acts prejudicially and sometimes ends fatally" and quoted a case in part from the Department to support this latter assertion.[65] Cabinet rejected the request. The Engineer-in-Chief, meanwhile, had matting placed in that same Drawing Office. His office was immediately below and he was tired of the noise created by employees walking over the bare floor above.

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[64] H.E. 2310/82.

[65] See H.E. 1412/82.

Lungley approved a pay rise to the draftsmen under Superintendent Jobson at Mount Gambier, and praised the team's work saying:

> . . . the works have progressed so far towards completion without a hitch of any sort and without necessity of inspection, which under the circumstances would have seriously interfered with my duties in Adelaide and elsewhere.[66]

Likewise, Lungley was only too pleased to bear testimonial to the manner in which Ashton and Bee's work had lightened his load. These men asked for his good opinion when they knew he was leaving. "There is an impression abroad," they noted, "which has been expressed in Parliament that the ordinary run of Civil Servants are not capable of managing business successfully, except that of a mere routine nature."[67]

Morale was certainly falling, another example being the threatened resignation of McCulloch, the only mechanical draftsman in the Department. Only by adopting this tactic was he able to get an adequate salary increase. Others did not possess the same bargaining power and resigned in a spirit of disillusion. The rest had to accept that there was little rhyme or reason to the granting of salary increases, despite Lungley's efforts to be fair. The final decision in such matters rested with the Commissioner of Public Works.

Retirement was no easy way out either. The 1881 Act cutting back retirement allowances caused much heartbreak. A number of retiring Waterworks employees sought the advice of solicitors to back their claims for compensation. However, there was little hope of success if they could not prove that the men had been employed on a regular basis . . . Ambiguity about the question of what constituted "regular work" did not help. The Cabinet proved itself more likely to make compensation in

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[66] H.E. 261/83.

[67] H.E. 1053/83.

cases where a man was killed when in the Department's employ. For example, when a 22 year old man named Barlow died from complications arising from a pick-axe being struck through his hand, Lungley suggested that £50 compensation be awarded to the widow, but Cabinet raised the amount to £100.[68]

Some employees were compensated in other ways. Turncocks were assured of receiving renumeration for attending fires in accordance with Act No. 273 of 1882 - that is, an Act to provide for the establishment of Fire Brigades. Meanwhile, Superintendent Hullett at Port Augusta put his inventiveness to work, and with the Commissioner's permission took out a patent for "Consolidated Automatic Wheels and Axles for Break-of-gauge Railways." He also prepared plans for a scheme of irrigation called the "River Murray Water Supply and Irrigation Scheme," after requesting records of gaugings of the Murray from the Engineer-in-Chief's Department. Such were the compensations he gained from his position.

Lungley had other problems to deal with besides an overworked and unsettled staff. The Sewage Farm was simply not paying. A dairyman's cottage was completed, but the Department was unable to sell all its milk and was forced to make the rest into butter, at a loss. Eventually Lungley accepted a request from a firm prepared to take all the farm's milk. Watt, the Farm's Manager, remained unhappy despite salary increases. Just before Lungley was about to leave the Department he urged that he be allowed to implement his own scheme if the farm was not to be "a disgrace to all connected with it."[69] He demanded the right to choose the means of expending funds, arguing that the management of the farm was not like any other branch of the service. Lungley could see that too much money had indeed been spent on buildings as against works of a reproductive character and he gave Watt the temporary go-ahead. Finalization of this and other matters had to wait until the new Hydraulic Engineer arrived.

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[68] H.E. 1046/83.

[69] See H.E. 1071/83.

R.L. Mestayer began his duties as Hydraulic Engineer in July 1883. His five years were to be characterized by persistent efforts toward economy and a "general tendency . . . to reduce staff instead of increasing it."[70] Whatever his personality may have been, it could never have outweighed the fact that successive Governments used him as axe-man. Unfortunately, the good that he did was never trumpeted. It is significant that not one officer under him protested openly against his dismissal in 1888.

Yet Mestayer was decidedly prepared to take advice when he began his term of office. Assistant Engineer (and fellow English-appointee) Jenkinson pointed out that valuable pieces of machinery and meters needed covering at the Waterworks Yard. The Hydraulic Engineer approved extensions worth £500 without question and later agreed with Jenkinson's suggestion that tracings accompanying compulsory notices be done by draftsmen willing to do them in overtime. Colebatch suggested that the Department connect Government buildings with the sewers. Again the Hydraulic Engineer agreed, while the Commissioner of Public Works ordered that "compulsory notices be given as rapidly as possible, in order to find work for the plumbers that have been brought from England."[71] Mestayer endorsed Watt's suggestions concerning the Sewage Farm, entailing a reorganization of staff and the boarding of workers at the farm.

But the Hydraulic Engineer was also prepared to make moves of his own. He ensured that the position of Patroller of the River Torrens would be created and regular reports received in an effort to deal with severe cases of pollution in the watershed. For £50 he obtained a copy of the City Assessment from the City Valuator's office, for he could see no point in continuing the past system whereby a copy had been made by officers of the Department in overtime. He soon made known his desire

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[70] Mestayer's own words in H.E. 2128/83.

[71] H.E. 1594/83.

for the strictest economy. Superintendent Hullett was chastised for purchasing an ivory ruler, although no wooden ones were available at the time.

Mestayer began 1884 with the warning to his staff that he would not entertain any applications for increases in salary. Again, he supported any moves towards greater efficiency and saving money. He agreed with Watt's decision to pay the men hay-harvesting at the Sewage Farm their overtime in the form of an allowance of beer instead of money. No doubt the workers involved did not object either! The suggestion by Colebatch and Jenkinson that permanent residences be established for turncocks in the Adelaide water area also gained his support. He could see the investment it would mean for the Government and the greater efficiency permanent premises in each turncock's district could bring. But the Commissioner of Public Works expressed disinterest although the turncock's dwelling at Glenelg was in such a state that a new house was necessary by the end of the year. Mestayer also pushed for the purchase of land at Mount Gambier after the valuator reported on the Superintendent's difficulties there. He was forever having to rent different office premises for one reason or another.

Meanwhile, the pressure on Mestayer to retrench and economize was constant and disheartening. Cabinet made it known that it would entertain no applications for increases. Appointments made - such as those of new Superintendents at Mount Gambier and Gawler - were of temporary status only. The Secretary to the Commissioner of Public Works constantly urged Mestayer to make reductions despite his plea that the Department was "by no means overmanned at present, and work suffers if anyone's away from illness."[72] Typhoid being prevalent, this was often the case. The Under

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[72] H.E. 1873/84.

Secretary urged Heads to report to their Minister on the conduct and efficiency of officers of their Department. The Civil Service Act of 1874 thus came in handy when it could be used against Civil Servants. Finally all overtime was discontinued and free railway passes were no longer issued at Christmas.

Considering these orders Mestayer acted in a fair and understanding manner. He allowed turncock E. Trapmann one month's leave of absence with full pay, acknowledging that "the illness was to a certain extent caused by the work."[73] He discharged several men he was "very sorry to lose"[74] and had Colebatch classify men at the Waterworks Yard and make reductions there. At the same time he could see that staff reductions at the yard would mean work being carried out less promptly, and he agreed to pay wage increases to the remaining men as recommended by Colebatch.

Many staff members began to apply for transfers when they saw the possibility of retrenchment. In these cases - such as Inspectors of Sewers who applied for transfer to the new Taxation Department as collectors - Mestayer gave them the highest possible recommendation. He regretted the decision by Jenkinson, his Assistant Engineer to resign in favour of an appointment in Brazil.[75] He contradicted the Commissioner of Public Works' decision to allow an employee two weeks leave without pay, pointing out that "the man cannot afford to take a holiday without a salary, as he has had his salary deducted for the whole of the time he has been absent from illness,"[76] The man got his two weeks with pay. Late in the year he was forced to lay off nine more men from Head Office after the Commissioner of Public Works expressed the opinion that the

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[73] H.E. 823/84.

[74] H.E. 1096/84.

[75] I doubt that he ever got to Brazil, as he died sometime in 1885.

[76] H.E. 2382/84.

completion of Deep Drainage should make this possible. But he jumped to defence after the Commissioner queried Ashton's
Ashton's travelling expenses on a Mount Gambier visit. Ashton had only claimed the usual rate. Finally he forced the Commissioner to re-employ Inspector Sykes, after it was made clear that Sykes and Day, (a Waterworks Yard employee), were the only two plumbers left in the Colony of 57 who had been brought out from England in 1883.[77]

In the midst of this turmoil a weaker man would surely have given in. A boy and girl at the Sewage Farm went to hospital with typhoid fever and Mestayer was forced to stop the sale of milk despite the fact that no direct relationship could be proven between the two factors. The deferred payment system became law during the year and that meant extra work at a time when staff numbers were being reduced. Furthermore, Departmental officers had to judge who was poor enough to receive Government assistance. Cases of bad plumbing had to be watched and contracts sorted out in several instances, in particular at Mount Gambier. Still, Mestayer managed to obtain information about rating systems in other Colonies and to study any relevant Royal Commission findings and Health Board Reports.

1885 saw the same financial strictures in operation, with Mestayer still trying to take positive measures to cope efficiently with the increasing workloed. He decided to limit all pipelaying and jointing work to the Department's own men as he found "by experience it was better done than when let by contract."[78] The Chief Draftsman's suggestion that 100 test stopcocks be made at the Waterworks Yard to compare the cost with the imported article, was also approved. He appointed Colebatch, (who had managed a pastoral Company before joining the Department), as Manager of the Sewage Farm in an effort to stop the heavy annual losses incurred by it. New by-laws were drawn up and an Inspector of cast iron pipes

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[77] H.E. 2902/84.

[78] H.E. 1210/85.

appointed (from the Department's ranks) to ensure that Fulton and Company's pipe contract would be fulfilled to his satisfaction. As well Mount Gambier finally got its first offices - actually it was a combined office and Superintendent's house in Helen Street.

A number of serious inadequacies, however, came to the fore and indicated that all was not well within the Department. The Commissioners of Audit objected to Mestayer's recommendation in favour of Fulton and Company's tender for water meters. They had already made quite clear their opposition to the letting of a major pipe contract to the firm at a heavy cost to the Department. They saw his acceptance of the contract as a bad precedent on the grounds that the firm had been permitted to substitute other samples than those specified and exhibited. Mestayer stood his ground and maintained that the meter in question was far superior and cheaper than the "notoriously defective" Siemen's turbine meter then in use.[79]

Later the Commissioners attacked the Department's system of obtaining Annual Supplies, both in a personal communication to Mestayer and in their 1884-'85 Annual Report. The facts were that the Hydraulic Engineer's Department had a greater number of items on each individual schedule than the Public Works and other Departments. Numerous items appeared unnecessarily while many others simply appeared again and again. Worse than that, the Auditors were able to show that the Department was paying out 25% too much on most contracts, (even important ones like iron and steel), because tenderers set-up bogus prices.[80] Such inadequacies were not confined to the Hydraulic Engineer's Department alone but collectively they ensured that a central storekeeping agency to handle the requirements of all Departments would be established.

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[79] H.E. 1288/85.

[80] P.P. No. 3 of 1885: Report of Commissioners of Audit for 1884-'85; See pp. 20-22 of Special Report No. 2.

Other inadequacies came to light. It became apparent that the Department possessed a limited number of staff qualified enough and with the time to investigate the many demands made by politicians and public alike for water and irrigation schemes. Surveyor J. Cole was naturally upset that the Department (and Hydraulic Engineer in particular) found fault with the contour lines and trial borings his party had made and the expenses they had incurred in relation to the Barossa Water Scheme, a full six months after Mestayer and the Government Geologist had visited and approved the site. Happily enough that project came to no immediate fruition, for the Beetaloo project demanded all available energy. Indeed, Chris Jobson (former Mount Gambier Superintendent) was chosen by Mestayer to be Resident Engineer in charge of the project, but at the same time was still expected to investigate any potential country water schemes as requests came to hand.//If any less competent engineer had had charge of the project, the Beetaloo exercise would have been an organizational nightmare for Mestayer. It was the Hydraulic Engineer who recommended that local unemployed in the Beetaloo neighbourhood be employed on the works, but for the rest of the time he simply approved or recommended initiatives suggested by Jobson in his weekly report. The leading mains were laid before the dam was started under his watchful eye as an urgent measure to alleviate drought conditions in the north. Up to 400 men were employed on the mains which were fed from a weir constructed in a stream at Beetaloo.

It was Jobson who ensured that life in the camps was bearable. He tried to establish a library for the men but this was only successful when a temporary meeting hall was erected. Above all it was Jobson who recommended that the main dam be built of concrete instead of masonry;[81]

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[81] H.E. 1057/86.

it was Jobson who recommended the laying of temporary mains to give men employment after he had personally travelled the area to be served and ascertained that the people were in favour;[82] it was Jobson who recommended the construction of an earthen Service Reservoir at Paskeville to enable a larger area south of Paskeville to be reached and improved supplies to low-lying Mundoora and Wokurna;[83] it was Jobson who came up with a system of reticulation to meet all applications received for branch mains; it was Jobson who, (for want of adequate support staff), "scarcely took his clothes off for days,"[84] contracted typhoid fever and was carried off to hospital.

Back in Head Office, a depleted staff managed the everyday work as best they could. A 10% reduction in all salaries above £200 p.a. did little to aid morale. A draftsman retrenched from the Engineer-in-Chief's office had to be taken on as there were so many draftsmen out and about on various projects. The Commissioner of Public Works was forced to accede a £40 per annum pay rise to Hicks (the Inspector of cast iron pipes) for fear of losing his services. In some cases the moulders engaged in the manufacture of the pipes were receiving more than him. However the Commissioner of Public Works refused to allow a continuation of the practice whereby rates notices were written up by piecework . . . so Collectors were forced to write rate notices in their own time, although many were already too busy to take holidays. Already Collectors were receiving much less than £160 per annum, which had been the minimum salary paid to them a few years before. Mestayer was astute enough to realize that the "temptation to irregularities in accounts will be greatly increased by payment of an inadequate salary."[85]

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[82] H.E. 1517/86.

[83] H.E. 880/87.

[84] H.E. 1360/87.

[85] H.E. 1426/86.

Still, none of the Department's officers appeared on the Auditor's annual list of defalcations throughout the eighties while all other Departments of its size were appearing quite regularly. Employees were only too happy to have a job at a time when all applications for employment were being turned down by the Commissioner of Public Works. Even railway passes were deducted, at the Commissioner's order, from the pay of men proceeding to Beetaloo Waterworks, and it seems that the men were not informed of this intention till they received their first docked pay packet.

Some new systems were instituted. Samples of waters from all over the Colony were regularly forwarded to Professor Rennie (the Government Analyst) for analysis. Mestayer did not take such analyses lightly - for example, he arranged the purchase of an eight acre cowyard near the east end of the Hope Valley Reservoir "to prevent any suspicion of contamination arising."[86] He also got the Commissioner of Public Work's approval for all public buildings to be placed under the Department's control as far as drainage was concerned. This was necessary after it became apparent that pipes laid and alterations made at the Adelaide Hospital, Destitute Asylum, Government House and Parliament House had not been inspected and passed by Departmental Sanitary Inspectors. Bayer's report on the inadequate drainage system at the Adelaide Hospital had been particularly revealing.[87]

The remaining one and a half years of the Department's existence saw a continuing erosion of morale and increasing tension on all sides. Johnstone, (the Port Pirie Superintendent), complained of being sent the wrong meters without a word of explanation and Jobson likewise regularly failed to receive the goods he needed. Mestayer began to find fault with Hullett's work at Port Augusta and arranged that he furnish daily returns of work carried out. Chief Clerk and Accountant Ashton personally visited

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[86] H.E. 157/86.

[87] H.E. 1450/86.

the Beetaloo works to investigate why surveyors continually delayed returning vouchers to Head Office. He delineated the areas of responsibility of the staff there. Then there were constant troubles with Fulton and Company's pipe contract and J. Christmas' pipe cartage contract to Beetaloo. The Sewage Farm again ran into efficiency problems as much of it was continuously deluged for four months of the year and Cabinet refused to buy more land.

The Stores Commission reported unfavourably on the Department's arrangements for keeping account of its stock and materials, although they neglected to call for evidence from the Chief Clerk and Accountant. Superintendent Sanders at Port Adelaide was relieved of his work as Departmental agent for shipped goods by the Controller of Stores, and such work (for all Departments) was henceforth placed in the hands of one Government shipping agent. This takeover meant increasingly costly outward shipments for the Department, (for example, between Adelaide and Port Pirie), and many more delays than in the past.[88] Finally, to complicate and slow all processes, the Commissioner of Public Works ordered that all purchases costing greater than £20 were to be submitted for his personal approval.

On the personnel side, wage increases were rare and applications to be placed on the Fixed List or in the next class were simply ignored. R. Gunner, (Foreman at the Waterworks Yard), was one officer fortunate enough to be awarded an extra 1/- per day after recommendations made by Colebatch. The Hydraulic Engineer, Mestayer wrote:

> The low price of Waterworks material manufactured at the Yard is largely owing to the skill and ability of Mr. Gunner, who by devising new and original tools for the working, has greatly reduced the cost.[89]

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[88] H.E. 343/88.

[89] H.E. 14/87.

A new special casting was invented, whereby a cracked pipe in a main need not be removed, nor water shut off while the necessary repairs were being effected. As well, pillar hydrants, fireplugs, fireplug strut boxes, stopvalve street boxes were being made in the workshops at much less than the cost of comparable imported goods. All Departments in the Service were by this time being supplied with any hydraulic appliances they required.

But the average officer and worker remained discontented. By the end of 1887 Jobson was having difficulty in retaining men - many left for the Wallaroo Mines - because the Government would not pay 8/- a day. Some men employed in the Port Germein area were upset when they were placed on piecework instead of daywork. The Beetaloo maintenance men resorted to subtle tactics in order to have their claims heard. They forwarded the Commissioner of Public Works a case of pumpkins and melons which they had grown in their spare time at Wokurna. Naturally, the Commissioner praised such a purposeful use of leisure time. However, in the next file he received a memorial from the same men asking that wages be raised by sixpence a day and that overtime be paid on the Beetaloo works.[90] Before long overtime was paid at the same rate as that paid in the Waterworks Yard.

Meanwhile, at the Waterworks Yard certain clerks and foremen expressed dissatisfaction at the erosion of their positions. They objected to being paid with the workmen at the Time Office. Their status was their only cause for pride. Assembling with the workmen, they felt, did "not tend to promote that respect . . . which our offices entitle us to."[91] Ashton, (the Chief Clerk and Accountant) was appalled at this and claimed that "in a democratic community like these colonies I do not consider it

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[90] H.E. 316/88.

[91] H.E. 1489/87.

desirable to make class Departmental distinctions, unless absolutely necessary for efficiency's sake. . . ."[92] Mestayer granted the request and thereby added salt to the wound.

Ashton's general discontent was so great that he attempted to leave the Department. In 1888, at the age of 39, and with 21 years in the Civil Service, he applied for the position of Railways Commissioner (Financial). Then he applied, again unsuccessfully, for appointment as Secretary to the Railway Board. The poor man could clearly see that the proposed amalgamation with the Department of the Conservator of Water and Subordination to the Engineer-in-Chief's Department would place him on the list for retrenchment.

Mestayer too, was reaching the end of his tether. As we have seen, the Government did its best to disgrace and edge him out of the picture, well before he was finally dismissed. In less trying conditions he may have mustered the support of staff and public alike. But it was not just him that the Government was tryingto replace with another Hydraulic Engineer. It was a whole Department which disappeared overnight in 1888. No doubt Mestayer went back to England a tired and dejected man, wondering why he had ever bothered to come in the first place.

The Department of the Conservator of Water was the other body responsible for Government water conservation schemes. Its very existence for five years alongside the Hydraulic Engineer's Department meant that administrative overlapping was inevitable. That the wrangling between the two never ended in bitter disharmony was largely a result of the personalities involved. J.W. Jones, the Conservator, was the acme of politeness - in fact, he was known throughout the service by a nickname coined from his polite manners. Mestayer was a more forceful but by no

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[92] Ibid.

means belligerant character. Thus, for example, in the case of the Crystal Brook Water Supply when both felt their sphere of action was involved, Mestayer could still write:

> . . . and from the courtesy and consideration I have always experienced from the Conservator of Water I am convinced that he would not have proposed to carry off the waters I am using without giving me some intimation of what was suggested. . . .[93]

This lack of co-ordination and clashing of interest was also to be seen in the handling of a number of other water supply schemes.

On the purely administrative level, this overlap of authority created many a time and paper consuming exercise before a consensus of opinion was reached. For example, when the Secretary of the N.S.W. Royal Commission into the Conservation of Water wrote asking for information on Water Conservation in South Australia the information was compiled as follows - the Commissioner of Public Works forwarded the request to the Conservator of Water who furnished a report and returned it to Commissioner of Public Works via the Commissioner of Crown Lands; the Commissioner of Public Works then forwarded it to Hydraulic Engineer to add his reports, and then returned all of the information to the Conservator to be forwarded to N.S.W.[94]

Jones and his Department were faced by many of the same problems which restricted the Hydraulic Engineer's Department. Requests for increases in pay, travelling allowances and overtime pay were increasingly ignored and reductions in wages implemented. Efforts had to be made towards economy - so horses were not allowed to have oats as well as chaff and overseers were ordered to write instead of wiring unnecessarily and to reduce the numbers in their parties. A number of foremen resigned

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[93] H.E. 326/85.

[94] H.E. 1462/84.

and men regularly left their parties on account of reductions in pay. By 1886 Foremen were ordered not to let the men make greater than 7/- per day on piecework.

In Adelaide the Department's Head Office accommodation was limited and its existence was not widely publicized. Jones was even forced to ask the Commissioner of Crown Lands if the Department's name could be painted on the wall near the foot of the main northern staircase of the new Government office block for the benefit of the public.[95] It is doubtful whether he ever got the extra rooms he asked for. As well he was often forced to draw the attention of the Commissioner of Crown Lands to the fact that no provision had been made for contingencies for his Department.

Jones did his best to implement reliable systems of feedback. Journals of work were instituted in 1883, and in December of the same year, a new weekly report form was put into use. But it was his Inspector of Works, E. Strawbridge on whom he had to rely for most of his information. That officer regularly reported on his inspections of dams under the control of lessees, completion of contracts, arrangements made for leasing completed works to particular Trusts, and indirectly, the progress of Departmental work gangs. J.R. Mann, stationed at Coward Springs, aided the flow of information when in the mid-1880's he began to forward photographs of the progress of work to Head Office.

More complicated systems of administration seemed unwarranted. Certainly the regular occurrence of mishaps in the field put paid to any hope of fine costing. Invariably it was the distance between Head Office and work gangs in the outback and the poor means of communications open to the Department which lay at the root of its administrative problems.

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[95] C. of W. 2488/86.

Thus, on many occasions the men's pay was received late and the amounts were invariably incorrect. Likewise the wrong articles were often sent and breakdowns in boring equipment, in particular, meant long delays. Axles regularly snapped, shaft brackets cracked, pump blocks and cables were broken, and tubing collapsed. Boring parties were also reliant on the regular receipt of castor oil, kerosene, chaff, asbestos and oil. On occasion Government camels were lost and time had to be spent in a search, unless an aboriginal could be induced to track the animal for a reward. Any serious accidents - for example, a leg being crushed - meant a long trip to medical treatment, but more often than not meant death.

The rapid turnover of camp cooks did little to enhance the quality of life, and in most cases married men were forbidden to have their wives in camp. The shortage of water was also a persistent reason why progress was delayed. For example, O. Sampson at Barunga Gap Bore reported that he could not get anyone to cart water at any price.[96] At Pereyton Bore the party there bought water at 55 shillings per 200 gallons.

In 1887 the Department was directed by the Government to create Relief Works for the unemployed, and this did little to enhance the poor economic performance of its operations. About 500 men were employed on the excavation of Reservoirs - they were allowed tents and tools, but no rations or cooks were provided. The average daily pay was 4/7d. It was widely known that plough and scoop excavation by contract would have achieved the same result at 25% less cost than this use of day labour.[97]

By 1888, when the Department was placed under the Engineer-in-Chief's control, 24 officers were employed with salaries ranging from the Conservator's

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[96] C. of W. 2769/84.

[97] See P.P. 121 of 1887 for details of relief works carried out by Water Conservation Department.

£650 p.a. down to 2/6 per day. Plant consisted of six sets of Fowler's steam scooping machinery, three diamond drills, four cable drills, hand-boring tools, tubing, spare parts, 50 horses and 40 camels . . . in all valued at £25,000. At least amalgamation and reorganization of water conservation activities ensured that this plant and any expertise accumulated in the Conservator's Department in the five years of its independent existence, had a second chance of proving themselves. The Department was in fact, to remain relatively intact under the Engineer-in-Chief, (Unlike the Hydraulic Engineer's Department), for water conservation was popularly seen as one way of arresting the Colony's economic malaise. Yet it was the Hydraulic Engineer's Department which, under successive Hydraulic Engineers, had continuously and advantageously refined many of its systems and administrative processes, despite increasing economic limitations.

THE PRODUCT:

By the end of 1879 the North Adelaide Service Reservoir on Barton Terrace had been completed, and was stabilizing pressure at the Port and ensuring a better supply to Kensington and Norwood. Service Reservoirs ensured Mitcham and Burnside water supplies and Yatala Labour Prison had been connected by main from Hope Valley Reservoir. Kapunda and Nelshaby Reservoirs were completed and a new tank built at Woolundunga (at the joint expense of the Hydraulics Engineer's and Railways Departments). As well seven monthly-gaugings of the leak at Hope Valley Reservoir and trial shafts through the embankment had convinced the Hydraulic Engineer that the leak was saltwater and was not proceeding directly from water in the Reservoir. He therefore discontinued theexpensive business of puddling the bed of the Reservoir. Observations made re Clark's suggested scheme of supplying Glenelg from River Sturt convinced Brown that such an exercise would be too expensive. For the same reason he ruled out the

building of a dam on Victoria Creek near its junction with South Para Reservoir as a means of supplying Gawler.

In 1880 the Quorn Waterworks - a pipe from Pinkerton's Well to the town standpipe - were completed and handed over to the Railways Department. A larger main from North Adelaide Reservoir to Port Adelaide was completed, and carried over to Semaphore where a large wrought iron tank was raised upon a high brick-work tower to ensure a supply there when Jervois Bridge was being raised for shipping to pass through. A larger main from Nelshaby Reservoir was laid to Port Pirie, replacing the old three inch main, and making private services possible.

1881 saw the completion of a new 18" main from Hope Valley Reservoir to the City, the contractor being C.A. Braillie. As well a covered service reservoir for the supply of Glenelg was built on the corner of South and East Terraces and another Service Reservoir, Burnside South, near the mouth of Waterfall Gully, was built to aid the High Levels. The Kensington Pumping Station ensured adequate pressure in the mains supplying the High Level Water Districts. A tank built of brick set in cement and roofed over, was built by contractor J. Jude, while the boilers for the station were provided by J.A. Martin & Co.

Progress had also been made on Adelaide's sewerage system. The Sewage Farm of 470 acres was laid out four miles to the north at Islington, near where the Railway workshops were later to appear. The main sewers, (chiefly made of cement concrete in oviform section), were completed by two contractors - John Styles, and the firm of Walker, Swan and Styles. As well John Styles got the Bowden division sewer contract, and that of the outfall channel from the Sewage Farm. On the latter project alone he had 30 carts at work. On January 7, 1881 the whole of the sewage previously running into the Torrens was taken along the main sewer to the Sewage Farm.

In 1882 the Gawler water scheme - the pumping of subterranean (well) waters into a storage reservoir - was completed in time for waters therefrom to be railed to Kadina and other Peninsula towns in the throes of a severe drought. A concrete weir backed with dry stone was built across First Creek in Waterfall Gully and water delivered to the Burnside South Reservoir by means of a six inch main. Schemes at Tea Tree Gully - Modbury and at Palmer — the storing of waters from springs in concrete tanks — were completed as was the Port Germein water supply, taken from springs in Back Creek Gorge. At Kapunda a tunnel was cut on the Waterworks Reserve in order to divert storm waters from the creek above the Reservoir into the Reservoir. The fish perch were obtained from Ballarat and were placed in the Reservoir in an effort to clear the water. Later lime was added as the fish had failed to do their duty.

In 1883 a new water tower was completed to aid the water supply for Port Augusta West, and in January the scheme at Mt. Gambier commenced operation. By then a well had been sunk on the east side of the Blue Lake, a pumping station erected, a service reservoir sited on Keegan Drive and eleven miles of main laid. Work lapsed at the Wilmington diamond drill bore site when sides of the borehole caved in, but a year later a successful supply was obtained from another borehole.

Back in Adelaide the embankment at Hope Valley Reservoir was raised to its full height, giving a much-needed extra storage of 77 million gallons. Extensive surveys began in an effort to supplement existing Metropolitan supplies. Progress on the sewerage system was dogged by major problems which demanded urgent attention. All of North Adelaide was connected by December 1883, and the practice of smoke testing connections had begun. Flooding at the Sewage Farm was slightly alleviated by separating Corporation drains from the sewers. Ventilating problems were solved by the erection of ventilating pipes in North Adelaide on the Parklands; some boundary traps were refixed in different positions; disconnector

traps were altered such that in future they would ventilate the sewers while still acting as disconnectors between sewers and house drains. This remedy proved to be successful, so the same system of ventilation was carried out in the City and in those portions of Hindmarsh and Bowden through which the main sewer passed.

In 1885 schemes were constructed to supply water to Burra, (pumping from Bon Accord Mine), and to further utilize Crystal Brook and Nectar Brook supplies. In the Adelaide Water District standard hydrants were fixed, replacing fireplugs fixed in the centre of streets. However, the most important work of the year was the beginning of the Beetaloo water scheme. All available sites for the main dam were tested before final selection of a site in the Wirrabara Forest Reserve. Then contracts were let for all work and supplies where possible.

1886 saw the completion of a Reservoir, storing Castle Creek water for a new water district at Hawker. As well a Reservoir and pumping station were erected at Mannum to obtain water for that town from the Murray. At Port Augusta a new main was laid across the Gulf to Port Augusta West while a four inch pipe was urgently laid to connect Nelshaby Reservoir with Beetaloo and thereby secure Port Pirie against drought. Leading mains were meanwhile being laid before the actual Beetaloo Reservoir commenced. These projects ensured the optimum use of the Kent Town workshops, water being used to power the machinery for six months of the year, while a gas engine was used in summer.

In 1887 the main pipe had been laid 80 miles from Beetaloo to Paskeville. A pipe crane machine was designed and constructed by Mr. Jobson (the Resident Engineer), ensuring that six or more pipes could be lowered into the trench at a time. As well, work on the Beetaloo dam - the largest concrete dam of its size ever attempted in the Southern Hemisphere - had begun. The entire machinery and plant for its erection had to be designed and made by the Department. The dam section was determined by principles laid down by the eminent French engineers, Graeff

and Delocre and the formula recommended by Professor Rankine was adopted for calculating the profiles. Cement was obtained from Alsensche Cement Fabriken of Hamburg, Germany, and tests proved it to be of the highest possible quality. It was mixed mechanically in a mixer best described as a trough with horizontal paddles - again designed and manufactured by the Department. By mid-1888, when the Hydraulic Engineer's Department was dissolved, the head works were well under way, the service reservoir at Paskeville was finished, and 134 miles of main laid.

As for the progress of the sewerage system - by 1888 the City of Adelaide and corporate towns of Hindmarsh, Thebarton and St. Peters were fully benefiting and the work of connecting Kensington and Norwood was well under way. The Sewage farm too, was well established and operated on a broad irrigation principle combined with intermittent downward filtration in the winter months. The sewage, after passing through strainers, was conducted over the farm by means of cement concrete carriers and wooden troughing. A centrifugal pump erected on the banks of the outfall drain ensured that enough effluent water would be pumped back in the summer months to adequately water all the crops.

A great variety of successful and luxuriant crops were grown. The dairy and orchard had to be abandoned on account of prejudice against their produce, so by 1888 the farm operated with a view to grazing and fattening stock and the growth of root crops and other fodder plants. Lucerne, Italian rye-grass, marigolds, sorghum, wheat, barley, vines and wattles were all grown, and the cheese-room and dairies were soon converted into silos. Cattle were depastured at a weekly rate, and pig breeding in particular was very profitable. The farm had its own smokehouse.

The Conservator of Water's Department even managed a small irrigation experiment. An experimental farm was created at Hergott Bore and maize, peas, yam tubers (etc.), were grown under the watchful eye of a Chinaman called Ah Tan. As well, the possibility of irrigation schemes at various

sites - along the Murray, Parachilna Creek, Lakes Leake and Edward in the South-East, Mount Gambier, River Broughton below junction of Bundaleer Creek - were examined in detail. In fact, F.N. Burchell, a Water Conservation Department employee, won a first order of merit at the Jubilee Exhibition of 1887 for his plan for locking and canalization of the Murray between its mouth and the New South Wales border, and for utilization of its waters for irrigation.

But more important was the work the Department had undertaken on the ten authorized stock routes in the Colony and at various places both inside and outside Hundreds. By 1888, 130 reservoirs and 24 tanks had been excavated, 62 wells and 22 well-borings made, 150 station dams had been resumed, 21 tanks and 125 wells improved, provided with appliances or repaired. Along stock routes water was provided at intervals of about 20 miles, and a succession of water-raising appliances began. Bucket and windlass were replaced by chain and bucket, while windmills and engine-driven pumps were to eventually oust them all. Tanks constructed were of three types - the simple excavated dam; circular or rectangular masonry or concrete tanks into which the natural run-off was diverted by means of drains and embankments; and finally, tanks with artificial catchment areas made of sheets of galvanized iron fastened to a timber framework a few feet above the ground with an exposed area discharging water into the tanks.

THE PUBLIC:

Criticism of the Civil Service was undoubtedly more vocal in the 1880's than in the decade before. The privileges and comparatively higher rates of pay compared with the private sector were of little issue during the public works boom of the seventies. But now that the economy was in trouble, and taxes were still being paid according to the old, high values at a time of shrinking incomes, the Civil Service was a natural target of critical interest. Unfortunately as the decade wore on and the Service

was shorn of men and privileges, the quality of services rendered to the public could only but decline as the workloads of most Departments were continually expanding. A leading article in The Observer of March 24, 1886 put it this way:

> . . . the Government are assuredly not to be blamed for carrying out steadily that policy of retrenchment which the country has so decisively approved.

The Conservator of Water and Hydraulics Engineer's Departments were not exempt from this criticism, although to some extent the newspapers compensated for it by their passionate fervour for discussing water conservation, artesian water and irrigation topics. All sorts of ideas for water conservation works were bandied about and printed. For example, W.B. Rounsevell suggested the importing of experts from India to supervise such works, while others such as A.A. Fox advocated public purchase of the watersheds of streams which supplied reservoirs and making them into recreation areas so that the water would be as pure as possible.[98] Yet the importance of practical and effective water conservation measures was never lost from sight. "The whole subject," wrote The Advertiser on March 1, 1884, "is worthy of the careful consideration of our legislators! The man who can and will successfully grapple with it will be regarded by posterity as the greatest benefactor this Country has known."

Oswald Brown's efforts were watched closely, but appreciatively. There was some criticism of smells from the sewerage system, water rates, pollution of the Torrens and the failure to alleviate the water famine on York Peninsula. However, when Brown resigned all the newspapers expressed regret at the announcement, printed his letter of resignation in full and described him as "an officer in whom great confidence was felt."[99] They

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[98] See The Register March 27, 1884 and March 31, 1884.

[99] The Observer, May 6, 1882.

expressed little confidence in Lungley's ability to complete the drainage scheme, but agreed that it would be "unwise to take the responsibility out of the hands of the Hydraulics Engineer's Department."[100]

J.W. Jones' appointment as head of the new Conservator of Water's Department was greeted with enthusiasm, as was the idea that henceforth all water conservation efforts would be concentrated in that one Department. On the other hand Mestayer's early days in the Colony were identified with his Department's continuing efforts to solve the "sewer gas nuisance," and the possible connection between certain typhoid cases and milk from the sewage farm.[101] In fact The Register on October 30 1884, even printed an article and editorial detailing possible solutions to defects in the drainage system which had been obtained from the former Hydraulic Engineer, Oswald Brown, in England. As well, the fact that Adelaide nearly ran out of water in the dry summer of 1884-'85 was blamed on the Hydraulic Engineer and his Department, although Mestayer had not been long in the Colony. In this way, any possible credibility Mestayer could have had in the public eye was undermined, despite the fact that it was he who eventually solved the sewer ventilation problem.

By 1888 the Hydraulic Engineer was being criticized for every dead carcase noticed on the Torrens watershed, for waste of money on Beetaloo works and general inaction, which was "by no means unusual in matters where the Hydraulic Engineer /Was/ concerned."[102] Even Jobson, Resident Engineer at Beetaloo, commanded more support when accusations were made against his administration. Letters to the Editor praising his efforts well-outnumbered the few against him. Little wonder then that Mestayer became very wary of press coverage of any matter to do with his Department. For example in early 1887 when fish were again found in the pipes of

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[100] The Observer, April 22, 1882; leading article; "Sanitary Condition of Adelaide."

[101] Examples: The Register, March 10, 1884. The Advertiser, Jan. 21, 1889.

[102] Wallaroo Times, Editorial Feb. 8, 1888.

Adelaide's water system, he ordered that the mains be scoured immediately "as I don't want to wait until the papers get hold of the matter."[103] Even the announcement of the amalgamation of the Conservator of Water and Hydraulics Engineer's Departments produced little comment in Mestayer's favour. The papers did suggest that he could have been given more notice and that his removal could have waited a little longer till the Adelaide Drainage system was complete. But no-one bemoaned the fact that the Hydraulic Engineer's Department was disappearing.

J.W. Jones' reputation still remained high, his Department being associated with the necessary (and glorified) outback search for water supplies. Only the odd letter was printed which reflected upon his management - for example, "Disgusted" in The Observer of April 17 detailed the dissatisfaction amongst the unemployed at the way Jones administered relief works; men were not prepared to go outback or along the Murray for 12s/per week, a wage which would barely keep themselves, let alone their families.

The 1880's brought a great increase in the number of people actually affected by activities of the Hydraulics Engineer's Department. Where the sewerage system was concerned the number of initial voluntary connections were small . . . either the sewerage rate or scarcity of plumbing labour were holding people back. In fact the compulsory powers of the Commissioner had to be involked by the Department before there was any real progress made re house connections. Then the Department was inundated by constant complaints of smells from the sewers. "The stench is unbearable and injurious to our children" wrote "A mother,"[104] while many people truly believed that extension of Deep Drainage would mean propogation of typhoid fever in every street of the City. A number of

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[103] H.E. 166/87.

[104] H.E. 2334/84.

cases of typhoid at the Sewage Farm in early 1884 turned these fears into open panic. So strong was the public feeling, and so feeble were the Department's efforts to placate it, that the dairy at the farm was forced to close. Most contractors declined to take its milk and produce, while the few who did so stipulated that delivery should not be made in carts belonging to the farm for fear they would lose customers. Still, much Sewage Farm butter continued to be eaten by the public without them realizing its source. What people don't know won't hurt them!

The municipality of Kensington and Norwood made a determined effort to oppose the introduction of Deep Drainage into their area, on the grounds that "the system is not only unrequired in our town, but these bad times would render the burden on property quite unsustainable."[105] They were appalled at the Department's extension of deep drainage to Kent Town and public meetings were called, memorials were signed and deputations were organized to demonstrate against the system being forced upon them. It was the Departmental officials and workers who had to bear the brunt of criticism when the Playford Ministry was finally brave enough to order the extension of sewers to Norwood in 1888. By 1898 it was apparent that the system was working well, and much of the opposition abated.

But if there was criticism there was also praise of the Department's supervision of the Deep Drainage system and Sewage Farm. Chandler and McNamee, contractors involved in the Adelaide sewer work, even wrote to the Hydraulic Engineer "bearing testimony to the courtesy at all times shown us by the officers in charge, frequently under trying circumstances . . . /and of/ the valuable assistance rendered us by your officers in the execution of the works in question."[106] Little was heard from those

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[105] M.A. Blackburn's, The History of Kensington and Norwood, Council of City of . . ., Norwood, 1953, p. 52.

[106] H.E. 508/84.

landowners who granted easements to the Department on their own terms and conditions, be it free connections, cistern and closet fittings or money in hand. The Ariel Bicycle Club were greatly pleased at what they saw at the farm and they voted it "the best run of the season," and made the trip again the following year.[107] As well a number of artists and newspaper illustrators regularly sought permission to sketch there. By the late 1880's successive Commissioners of Public Works were proudly noting the stream of distinguished interstate and overseas visitors to the farm and the praise it was being accorded. The Mayors of Melbourne and Sydney, the Victorian Royal Sanitary Commission, and the Medical Congress of Victoria, were just some of the visitors who ensured that Adelaide's sewerage system would be known and admired Australia-wide.

The figures spoke for themselves. Adelaide's mortality rate dropped from 23.5/1,000 in 1881 to 14.3/1,000 after only five years of sewerage. Typhoid was almost completely eliminated from urban areas. No wonder then that John Conigrave could call it "one of the cleanest cities in the Southern Hemisphere,"[108] and H.J. Scott "the best drained city in the Southern Hemisphere,"[109] even if they were both writing propaganda for forthcoming exhibitions.

The general public was less pleased with the Department's exertions in the water supply field. In Adelaide complaints were received as never before about poor pressure, poor water quality, inaccurate meter registration and meter readings and the behaviour of particular officers. In particular it was the rate collectors who came in for abuse, especially

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[107] H.E. 384/85.

[108] South Australia: A Sketch of its History and Resources - A Handbook compiled by J. Fairfax Conigrave for Colonial and Indian Exhibition, (London 1886: Frearson & Brother, Adelaide), p. 34.

[109] South Australia in 1887-'88: A Handbook for the Centennial International Exhibition, Melbourne 1888. (Government Printer, Adelaide, 1888), p. 66.

1881 onwards, when the public were given 21 days to pay and were then issued with a peremptory notice. It was only natural that people should feel resentful, especially the poor and increasingly unemployed labouring classes. But it was often the man in a secure position who squealed the loudest.

For example, the Collector George Day had trouble with a woman servant working for Dr. H. Whittell, President of the Central Board of Health. Whittell defended the woman and demanded that Day never intrude on his premises again. Poor George was forced to write a letter to the Hydraulic Engineer absolving himself of the lies the woman had told about his visit. He wrote:

> Had I been a pariah dog and an outcast from Society, he [Dr. Whittell] could hardly have spoken of and about me more contemptuously. . . . Complaints from high quarters and by iteration here and there are prone, in various ways, to affect one's good name.[110]

Others, like the M.P. Lavington Glyde protested strongly at their rates assessments while Hon. J.C. Bray[111] and Chief Justice Way[112] simply refused to pay their accounts and the amounts were invariably written off - certainly they were never paid in full. P.B. Coglin (M.P.) even refused to apply for an extension of a water main under the usual guarantee system - the Commissioner of Public Works at the time accepted Coglin's terms, the main was laid and the value of asserting one's status was proved yet again.[113]

Even civil servants were not slow to object loudly. John Mann (the Commissioner of Public Works's Secretary) complained about his meter making 'radical jumps', objected to the way the meter was tested by the

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[110] H.E. 774/85.

[111] H.E. 1057/87.

[112] H.E. 1164/87.

[113] H.E. 732/86.

Waterworks men and demanded that he be reimbursed for five years of inaccurate registration. Eventually, after a long-winded battle involving the Commissioner of Public Works, Bayer and the Engineer-in-Chief, he got a rebate, although certainly not the amount he had hoped for.[114] Another civil servant was intensely annoyed to find that a Collector had left a final notice on his desk, at work.[115]

Then there were the individual grievances. In 1879, E. Hitchin was incensed at hearing that the Waterworks Yard would remain at its Kent Town site. He lived on Dequetteville Terrace and claimed compensation at the rate of £3 per foot for deprivation of view, arguing that he had been there first. Catherine Helen Spence, (a well-known public figure) was angry that she had been charged 7/2 for inspection of a leak by a Waterworks man, even though he had declined to do anything after the problem was found to be inside her house. Assistant Engineer Hull assured her that she would not have to pay the account.[116] When the Waterfall Gully weir was constructed a Mr. Mugge and other gardeners took legal action to prevent the diversion of the water to their detriment. A Supreme Court judgement was made in the Commissioner of Waterwork's favour, but officers of the Department arranged that water would be let down the stream in the summer at the demand and convenience of the disputants.

But while complaints about the Department's failings were trumpeted, its troubles with the public were ignored. Certain actions by the public constantly irritated Departmental officials. People continued to defy the turncock's authority by refusing to untie horses from pillar hydrants; others would not stop shooting parrots and hares on the Waterworks reserve;

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[114] H.E. 2277/87.

[115] H.E. 101/88.

[116] H.E. 1072/80.

plumbers regularly failed to do work according to by-laws but were always given a second chance; people making mistakes in their tenders were often allowed to alter their quotes, while contractors asked for, and were regularly given, extra time to complete their contracts.

The Department's willingness to compromise and co-operate was rarely praised. Yet never before had the Department written off so many rates or granted so many extensions of time to pay as it did in the 1880's. The deserving cases - the poor, the jobless, the widowed, the ill, and those whose industry and sobriety was proof of good intentions - increased as the decade wore on. Bailiffs who did the Department's unpleasant work were dismissed if their behaviour towards the public was abusive.[117] At the same time as the 21-day period to pay rates was implemented, the charges for cattle and carriages were abolished. Distraint notices were not issued to families just before Christmas if at all possible. St. Peters Cathedral and the Town Hall were guaranteed sufficient water pressure for their organ recitals - as long as they gave the Department sufficient warning. Finally, individuals were granted civil and informative replies if the request were made in the same manner. A Mr. Norman of North Adelaide was very pleased to receive a fulsome reply to his request for information re the pressure of water in the Hill Street main, and wrote back saying: "I can only wish that other Departments of the Government were as polite and considerate."[118]

The Department's image in the country towns it increasingly served was largely a reflection of the men it stationed in them, and of the tactics adopted by the current Town Council or Corporation. Mount Gambier people, for example, disagreed initially about which lake the town supply should be drawn from and whether the works even needed to be supervised

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[117] H.E. 646/81.

[118] H.E. 273/86.

and worked by a Government Department at all. Petitions from all sides were forwarded to Parliament before the matter was settled. Understandably many people could not get over the fact that an outside body was rating them for use of their own unlimited water supply. Successive Corporations showed their resentment by such means as objecting to the positioning of the street hydrants[119] and by actively promoting a takeover of the Water-works in 1886 after some ambiguous discussions with Commissioner of Public Works Playford on the subject. In turn Departmental officials adopted a certain wariness in their dealings with local officialdom - a wariness which remains to the present day. However the first Superintendent, Chris Jobson, was well equipped to contain the resentment and ensure the implementation of the Blue Lake scheme. His involvement in the town's activities - as a leading cricketer foremost and as first Fire Chief and organizer of a voluntary fire fighting force - earned him a wide respect and, on his departure in 1884, one of the largest farewell socials the town had ever seen.

Superintendent Hullett was stationed at Port Augusta for the whole decade and in that time remained on good terms with the people and Corporation. His willingness to assist in any engineering matters was availed of by the Corporation, while the fact that the town remained unrated did little but good for his image. Often he was rapped over the knuckles by the Hydraulic Engineer for giving too much of his time and using too much personal initiative in certain dealings with the public.[120] Still, he supervised the erection of the Electric Lighting Plant at the Town Hall, as requested by the Corporation. As well, he agreed strongly with those petitioners who were upset by the absurd position of the standpipe

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[119] H.E. 2420/82.

[120] e.g. H.E. 1305/87.

provided in conjunction with the supply of the Port Augusta extension - they won their case and altered the position of the standpipe. Then he successfully forwarded memorials and letters to Hydraulic Engineer for removal of the standpipe and Waterworks yard to the entrance of town, after water-mad bullocks charging through the principle business area to the Yard had created (and confirmed fears) that people and children would be injured. Hullett was thus at one with the people and Corporation and they accepted him as such.

Where the Kapunda Water Supply was concerned, the people praised Superintendent Smith for his consistent efforts to husband out the water[121] but remained firmly unwilling to be rated until the quality and quantity - by 1888 the Reservoir had still never once been filled - were improved. There was some trouble with the Local Council when streets were opened by Departmental men without notification, but relations remained calm. The hiring out of Departmental tents to interested groups of people for picnics helped matters.

On the other hand when the ever-fastidious Gawler Corporation was upset the Hydraulic Engineer was invariably forced to intervene. This was necessary when the Corporation requested slight alternations in the course of the pipetrack, when they requested that the hydrants be painted white instead of black by the Department and when they insisted that all earth dug out of trenches could be returned with the aid of water. In this latter instance Hydraulic Engineer Brown even visited Gawler to inspect the evenness of surfaces after the pipe work, but this did not stop the Corporation from subjecting Superintendent Pollitt to further criticism.[122] The matter was partially solved when a Mr. Roediger asked for surplus soil from the trenches. Brown warned that if the Corporation

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[121] See H.E. 2161/87.

[122] H.E. 1879, 1922, 1931, 2000, 2079, of 1881.

"exercise undue severity with us, they need not expect future concessions of any kind from this Department."[123] The Corporation in turn demanded an explanation of the threat implied in these words.[124]

In other cases the Department was caught in the middle of in-fighting and factionalism. At Port Pirie it was the residents who did the agitating where water supply matters were concerned, usually with little or no support from the local Corporation. They pressed for a house to house service in 1880; they expressed discontent when free supplies to troughs (for cattle) were allowed in the face of poor summer supplies from Nelshaby Reservoir; and finally they, as ratepayers, wrote directly to Hydraulic Engineer Mestayer urging the rating of the town even though this was against the wishes, and without the approval of the town councillors.[125] Only when a water famine became imminent in 1886 did the Corporation make the special effort of urging a connection of the town with Beetaloo mains. Superintendent Johnstone proved a more successful ambassador than his predecessor, (Forsaith), who retired because of failing eyesight. In Forsaith's time the local Board of Health even found it necessary to draw attention to the "filthy state of the closets in the Waterworks Yard"[126] and ordered that they be emptied and erected according to the Act. Johnstone, on the other hand, was seen to tighten up administration and to be "doing all he could"[127] to serve the town's needs, although the railway's first option on available water supplies angered many.

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[123] H.E. 1879/81.

[124] H.E. 1922/81.

[125] H.E. 190/85.

[126] H.E. 1885/82.

[127] See "Corporation notes" in the Port Pirie Advocate, Dec. 29, 1888.

The guarantee system of providing water supply to country towns in practice did little to enhance the Department's image. At Mannum there was decided opposition to the formation of a Trust and the Department was caught in the middle with the task of building the pumping station. Still, when the water was actually laid on, some of the opposition subsided, although there was some truth to the complaint that the pumping caused each service and meter to undergo a distinct shock at every vibration of the engine.[128] At Wilmington, the residents petitioned for a Government water supply scheme knowing that the lessee of the dam which supplied them for the present was unwilling to give up his lease. A Committee was formed and had the gall to ask, as one of its early requests, that private services be laid to the guarantor's residences and business establishments - the expenses involved to be added to the cost of the scheme.[129] Faulty Waterworks at Hawker did little to endear the Department to the guarantors there. They eventually refused to sign a lease on the grounds that the work cost them more than they had anticipated. Also the existence of a Railway Reservoir open to the public complicated matters. At Mundallio the guarantors squabbled amongst themselves and failed to pay any money on account of interest or water sold.

Port Germein and Tea Tree Gully - Modbury were two of the first towns to receive Waterworks under the guarantee system, but by the end of the period they too were plagued with problems. The Port Germein Waterworks reverted to the Department after the guarantors failed to observe the conditions under which they were taken on. The Department was forced to spend £750 to restore them to usefulness. Tea Tree Gully and Modbury guarantors regularly paid their interest, took out a fresh lease and negotiated successfully with the Department for a new Reservoir. Then in 1888

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[128] H.E. 199/87.

[129] H.E. 2041/86.

the Department was caught in a tussle between the Tea Tree Gully guarantors and the Modbury guarantors. The Tea Tree Gullyites refused to be lumbered with the cost of the collection of Modbury rates as they were already owed monies by the Modbury guarantors.

Burra, Crystal Brook and Mount Barker water supply arrangements were all complicated by an additional factor. In each case the Waterworks had originally been built by or for the Railways and thus the efforts by the Hydraulic Engineer's Department to release the works to the relevant local councils were complicated by communications with Railways officials on questions of ownership and payment for certain portions.[130] Invariably the power and financial wrangles only resulted in stalemate situations, and the Department was forced to step in and rate the towns.

Thus, where some rural communities were concerned, the Department was variously seen as adviser, arbitrator, interloper and usurper, despite its efforts to give guarantors and lessees freedom of movement.

The country waterworks scheme which created the greatest uproar in the period was the Beetaloo scheme. It owed its inception to the development of the coppermining industry at Wallaroo and surrounding districts in the early 1880's. March 1883 saw an influential deputation waiting upon the then Commissioner of Crown Lands (A. Catt) urging a regular supply from Beetaloo Springs. In fact they even presented a preliminary estimate to the Surveyor General, although it was the Conservator (Jones) who was given the task of undertaking more thorough investigations. The problem for most was not the actual implementation of the scheme. In fact Chris Jobson, the Resident Engineer on the works, was widely respected. It was, more predictably, the question of rating which created the discontent.

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[130] For example, see H.E. 712/88 for details of the Crystal Brook situation.

The problem centred around the proposed rating of towns and country lands within the new district, obviously an important issue at a time of impending economic depression. The first assessment in 1887, based on the concept of a construction rate, resulted in "numerous objections /as to/ the scale of rating as also to the assessed value of the land."[131] Well attended protest meetings were held all over the district, the matter dominated newspapers, accounts remained unpaid and eventually the 1888 Waterworks Amendment Act brought relief. In future rating would be levied upon the acre without reference to the value. There was no shortage of requests for services, mains and standpipes throughout all this turmoil, so the objection was not against the scheme as such. By April 1888 it was obvious that water was bringing an increased value to certain farmlands; at least one farmer sold a farm for £1000 more than he could get for it before advent of the water.[132] Still, as the year wore on and economic conditions failed to improve, the dissatisfaction in the north surfaced again. In August 200 farmers and residents of the Pirie-Crystal Brook district met in Pirie to urge that the assessment be swept off the books and the rate reduced by fifty percent.

Then there were the organisations whose opinions and reactions were important to the Department's operations. The City Corporation, as in the past, was still a force to be reckoned with, particularly when its City Surveyor delighted in persistently drawing attention to any failings on the Department's behalf. Many of his complaints were reasonable - for example, in 1881 he reported that labourers on the West Terrace Sewage Works were using the plantation as a convenience. He suggested that a moveable screen and tub be provided as "their present style of sitting upon the fence rails is extremely objectionable and the Health Board

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[131] These are Departmental Valuator's own words in H.E. 1153/87.

[132] H.E. 690/88.

will be compelled to take proceedings."[133] However, he succeeded in aggravating many officers of the Department in less reasonable respects. Watt, the Manager of the Sewage Farm was disgusted with the way the Surveyor plucked heads of Indian Corn and walked through newly planted potatoes. Colebatch, (the Chief Clerk and Accountant) was annoyed at the way he complained of Waterworks trenches being improperly filled in — the Surveyor allowed such cases to "pass over for several months and subsequently made a formal complaint in such general terms as to render it impossible to deal with."[134] Even the unperturbable Bayer was driven to comment: "It appears to me that the City Surveyor is trying to make mountains out of molehills."[135]

The City Council itself kept a watchful eye on Departmental activities. It arranged its own regular analyses of Adelaide's water supply. As well, deputations were quick to visit the Commissioner of Public Works on a variety of subjects - querying the Hydraulic Engineer's right to see plans of buildings before Council passed them and complaining of odours from the sewerage system and of damage to the streets caused by the ongoing drainage works.[136] In fact the Corporation even urged that a Commission into the Deep Drainage system be held after a number of serious typhoid outbreaks in 1882. There was no question that Councillors were questioning Departmental competency. In many paltry ways they managed to promote this attitude. They refused to pay accounts for repairs or renewal to drinking fountains and to allow sewer contractors to deposit surplus earth on the parklands. They charged the Department for sand, (while themselves receiving free water), then cut off the supply altogether.

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[133] H.E. 180/81.

[134] H.E. 976/86.

[135] H.E. 2176/87.

[136] For example, see report of deputation to Commissioner of Public Works Ramsay, The Register July 11, 1882.

Still, the Department was useful at times, if not always ready to be used. The Council saved itself time and money by allowing the Waterworks men to mow grass for Departmental horses on the portion of parklands between the Waterworks Yard and East End Market. Likewise they were quite happy to hand over all repairs of fountains and troughs to the Department although the question of "renewals" created a small furore. No wonder then that Bayer sought a Solicitor's opinion in a case where the Council built a watertable over a submain and resolutely declined to alter it. Only in this way was the Department steadily able to accumulate some undeniable rights.

Relations with other organisations - the utilities, Fire Brigade, Central Board of Health and other Government Departments - were generally less troublesome. By 1880 the matter of the relevant positioning of mains had been settled with the Gas Company. Tram Companies on the whole co-operated well, although the Parkside Tram Company refused to slow down past sewer excavations because it "had timetables to keep".[137] That firm's employees further aggravated the Department by washing their hands with soap at fountains. The Operative Plumbers and Gas Fitters Society remained in close contact with the Department, and thus helped to ensure that practical fittings and by-laws would be implemented.

These years also saw the old antagonism between the Department and Fire Brigade rear its head again. It had its beginnings in the usual bone of contention - the lack of pressure for fighting fires - and again the newspapers were happy to give the matter coverage. In 1879, A. Baker, the Superintendent of the Fire Brigade, asked that the Superintendent of Mains give full pressure at fires and practice meetings "without first waiting to see the size of the blaze."[138] Hydraulic Engineer Brown in

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137 H.E. 271/83.

138 C.P.W. 1769/79.

turn aggravated the delicate situation by criticizing the nature of the Fire Brigade's equipment. Baker in turn retaliated saying he had had no trouble with other officers of the Hydraulic Engineer's Department in the past and reserved the right to judge the best type of hose. A running battle ensued between the two men in the pages of The Register in December 1879. Eventually Brown declared his willingness to assist the Brigade, but stated that he would not consent to "inconvenience the public to enable the Brigade to practise."[139]

In early 1880 an incident took place which made the Department look quite foolish. On January 14 a fire, which had its beginnings in the campfire of a Waterworks survey party in the Mitcham area, resulted in the landowner claiming compensation. The case went to Court and the man won his case. In fact the inquest found that proper provision had not been taken and the Jury urged that all Government camp parties be instructed to carry out the provisions of the Bush Fire Act.[140] After that little episode the Department could only swallow its pride and relations with the Brigade undoubtedly improved. Assistant Engineer Hull arranged that the code of fire signals at the Police Station and at the offices of the Superintendents of Fire Brigade and Mains would be practised Mondays and Thursdays to ensure that the telephone connections were in good working order.[141]

Relations with other Government Departments were generally peaceful and co-operative, although if ever the Department had large overdue accounts on its books, such organizations were usually the culprits. The Botanical Gardens and Zoo were the worst offenders - they did not pay for a four-year period. Still, some Departments got their own back by querying the charges made by Waterworks men for certain small jobs . . . and often

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[139] C.P.W. 2049/79.

[140] C.P.W. 106/80.

[141] H.E. 98/80.

there were unintentional overcharges. Sometimes matters of authority created problems. For example, Sewers Inspector Smith wrote to the Hydraulic Engineer:

> The vexed question as to the right or otherwise of Inspectors under your contract to examine work on Government buildings where a Clerk of Works from the Architect in Chief's Department has charge of the job, is continually cropping up.[142]

Such problems were never allowed to get out of hand. The increasing attacks on the Service from the outside and declining prestige ensured that Departments would co-operate with others in the same position.

Finally, a supportive relationship with the Central Board of Health ensured that the Department did not lack for moral support. That body wholeheartedly approved the "Rules and Regulations" for connection of house drains with sewers as prepared by Department. In its annual report it consistently praised the Sewage Farm, and the implementation and character of sewerage works constructed under the Hydraulic Engineer. As for the quality of water supplies, the President of the Board himself undertook regular analyses according to criteria set forth by the United Kingdom Rivers Pollution Commission. He consistently reported that the water was safe and the quality good, despite criticism to the contrary.

In fact it was the Board, through careful direction and co-operation, which ensured that the question of pollution of the Torrens and Torrens watershed would gradually be accepted by the Department as an important area of responsibility. In 1880 it organized a thorough inspection of the region above the Torrens weir by its own officer, in co-operation with an officer (as requested) from the Hydraulic Engineer's Department. As a result the Board issued numerous notices for removal of closets, stock-yards (etc.) from borders of various streams . . . and then prevailed

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[142] H.E. 2196/81.

upon the Government to appoint the police officer in the district to report to the Board and to check infringements. (The Police trooper stationed at Gumeracha received £26 p.a. in addition to his ordinary salary for his efforts.) After Mestayer's arrival, the Department was urged to appoint its own Watershed Inspector. This came about after a visit in July 1883 by Ayliffe, Dr. Paterson and Rymill to the Commissioner of Waterworks, urging him to appoint a full-time patroller.

In August 1883, L. Von der Borch was appointed. However, his powers under the Waterworks Act in such matters were limited. The Central Board of Health then offered to use its powers (under Public Health Act No. 56 of 1876, section 6) in cases where Borch's hands were tied. In 1887 the Board appointed Von der Borch as its Inspector as well, so prosecutions were facilitated more smoothly and successfully - and he could now use Health Act powers to curb the building of cesspits on premises situated within the Torrens watershed. At times the Department itself upset the desired effect - for example, the Hope Valley Reservoir keeper in 1886 let 1,600 sheep into the Reservoir enclosure to control a particular weed. However, when the Board drew the Hydraulic Engineer's attention to the situation he immediately ordered the ground to be thoroughly cleansed and recommended that no animals be admitted in future. Courtesy and co-operation remained the keynote.

The Department then, was not seen in any consistent light in the 1880's. Its public contact was much greater than in any previous decade and there was little time, money or personnel to be spared on niceties. Still it managed to be associated with few public outcries. The ironic outcome of the period was that the Department's name was phased out of existence and its personnel merged with the Engineer-in-Chief's Department . . . so in a sense it would not have mattered what kind of public image it had accumulated!

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The eighties then were years of fluctuation and uncertainty. Insight and inadequacy co-existed in a period which was flanked by the great strides of the seventies and the real depression of the nineties. Whenever forward-looking approaches were taken, their effects were hampered by the fear, and increasing reality, of economic malaise.

The effects on Government provision of sewerage, and particularly water conservation facilities, were far-reaching. Politicians and public alike had the insight to see that water conservation was the most important means of developing the Colony's expanses and potential. And yet the machinery successive Governments provided to supervise the work was inadequate - the Hydraulic Engineer and Conservator of Water's Departments often overlapped in jurisdiction, the Water Conservation Act remained virtually unused by a public baffled by its intricacies, and more importantly, unable to bind themselves financially; country water schemes created under the guarantee system virtually all failed to prove their viability without Departmental intervention. Money was thus wasted in one of the few areas of Government initiative. Eventually in 1888, that initiative was nullified by the amalgamation and subordination of the Hydraulic Engineer's and Water Conservator's Departments under the Engineer-in-Chief's Department, no investigation having been made into the feasibility of co-existence. All past insights and ideals were subordinated in the cause of saving money.

There was insight enough to see the need to support the local manufacturing industry and provide work for the increasing numbers of unemployed. And yet in reality it was the Departmental finances which bore the brunt of such endeavours, at a time when balanced budgets and remunerative works were important criteria of achievement.

There was insight enough to appreciate the wisdom of employing competent Hydraulic Engineers to mastermind the work of implementing the sewerage system and providing further water supplies. Yet again, in

reality, this insight faded as three successive and competent Hydraulic Engineers were allowed to pass through the Colony. Each was seen as being less adequate than his predecessor, and was paid accordingly despite the steadily increasing workload. The Colony was decreasingly prepared to pay for expertise.

There was insight enough into the state of the morale of the Civil Service to eventually create a Royal Commission - even if most people viewed it as a vehicle for further retrenchment. The trimming of the Civil Service proved to be an increasingly cathartic exercise, despite the fact that the Departments were not blatantly wasting money or accumulating empires. Sadly enough, it was never realized that this savage pruning was in direct opposition to the success of new challenges like artesian boring, water conservation techniques and irrigation, which required a stable group of personnel, constantly learning, experimenting and accumulating expertise about the Colony's peculiar problems and how best they could be handled. Likewise the challenge of extending drainage systems to country towns was lost for want of finance and personnel, despite a decided flurry of interest arising from the implementation of Adelaide's sewerage system.

Inevitably the public image of Departments like the Hydraulic Engineer's suffered as potential achievements were increasingly thwarted by economic realities. Yet a steady core of officers and an ever-changing support staff ensured that new horizons were tackled by both Hydraulic Engineer and Conservator's Departments in the period. Adelaide's sewerage system was implemented successfully, country areas were provided with comparatively reliable (if not viable) water supply schemes as never before and the outback individual was rewarded for his perseverance with tapped artesian water supplies. Morale may have steadily declined but a spirit of initiative was never quite lost. There was always a new system, a new way to be tried.

CHAPTER V: REALITIES, 1889-1902

In the nineties there was no denying the reality of the depression and years of drought. They ensured that past policies would be reviewed and watchful care taken in the provision of public works. Each served the other - the depression ensured an accepting mentality and a more than adequate workforce for the implementation of numerous, necessary water schemes, both large and small. The saving gospel of water conservation, in particular, was at its height, and much was expected of those who were responsible for its practical dissemination.

POLITICS:

For years Hydraulic Engineer Mestayer had advocated an additional water storage to meet Adelaide's water supply and drainage needs, but ironically it was only when his position and department were abolished that Parliament began to seriously consider the matter. A Royal Commission was mooted in late 1888 and reported on September 18, 1889, under the irrelevant title of the Barossa Water Commission. In fact, it examined many alternatives prepared by the former Hydraulic Engineer's Department but presented by the Engineer-in-Chief - namely, the Barossa scheme (damming the South Para River), four schemes using Sixth Creek or Torrens waters, expanding the Hope Valley scheme, storage of water near Reynella from the Onkaparinga, and on Onkaparinga-Happy Valley scheme. The Commission reported in favour of a reservoir at Happy Valley, for it possessed advantages of a larger area of watershed, higher standard of purity of water, and less of a problem of riparian rights when compared with the other schemes. Only J. Warren dissented, having been won over to the Barossa scheme by its original mentor, James Martin. (Martin first advocated such a scheme in 1865.)

Meanwhile the two successive Commissioners of Public Works in that one-year, Cockburn ministry - J.H. Howe and T. ("Old Works") Burgoyne - battled with the new and ambiguous sub-department organisation under the Engineer-in-Chief, which had been bequeathed them by the first Playford ministry.

1890 brought the matter of an increased water supply to a head. A second Playford Government attempted to introduce a Happy Valley Reservoir Bill but was thwarted by factions in favour of particular schemes examined by the Commission. There was a feeling abroad that the Engineer-in-Chief, Moncrieff, possessed limited irrigation and hydraulic engineering knowledge. Before long all sides were calling for "the services of a really eminent man in connection with large water conservation schemes" and Oswald Brown's name was accorded due reverence. Sir T.E. Smith declared: "We have no man here who would compare with Mr. O. Brown,"[1] and men on all sides claimed they would bow to the advice of such an expert. Accordingly a motion was passed calling for the services of an expert to examine and report on the various water conservation schemes in the colony. Oswald Brown was promptly engaged. Such was his status, though he had been absent from the Colony for nearly a decade.

Other aspects of the 1890 session revealed a widespread distrust of the competency of waterworks and water conservation officials. The Loan Bill allotment of a further £205,000 towards the Beetaloo Waterworks brought cries of "bad engineering with no planning made for future demand"[2] and renewed calls for the services of an expert. Holder's December 23 motion for the creation of a Standing Committee of Members of both Houses

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[1] 1890 Parliamentary Debates; House of Assembly, December 11 (Happy Valley Reservoir Bill).

[2] 1890 Parliamentary Debates; House of Assembly, December 16 (Loan Bill).

on Public Works was yet another response, although it was not successful. Last, but no least, the Report of the Royal Commission on the Water Conservation Department confirmed fears that past water conservation approaches had had little success. It reported "the absence of, and . . . failure to, carry out a pre-arranged sequence of the works to be done," the poor choice of bore sites and costly results of such, the limited usage of the diamond drill (costly acquirements of Parliamentary motions) and so forth.

The lesson was clear. Henceforth Parliament could not afford to remain oblivious to and ignore the specific workings of Departments concerned with water conservation works. Parliament must be constantly involved, watchful and responsible for the implementation of policies so vital to South Australia's future. This realization was to bear fruition with a frenzy in the decade which followed. Never before or after were there to be so many Royal Commissions, Select Committees and inquiries (by both Houses) into the administration and implementation of water conservation policies - in fact there were sixteen or so in ten years - nor did Parliament hesitate to dictate specific courses of action. The evolution of political parties in the decade aided this concerted interest by ensuring that Governments of longer life and greater stability were increasingly the order of the day.

At the same time the politicians began to face the reality that the inadequacies of the Civil Service and its demoralised spirit were largely created by the application of piecemeal, roughshod policies in the past. However, the depression ensured that little could or would be done for another ten years.

The Fifth Progress Report of the Civil Service Commission, which dealt with the Department of Public Works, was released in 1890. It was naturally biassed towards finding ways and means of saving money rather than rearranging and classifying according to fixed principles. The 1888 amalgamation of Departments under the Engineer-in-Chief pleased

the Commissioners greatly for it meant an annual saving of money, despite inconclusive evidence as to the exact amount. They went on to praise the Accountant's Branch of the Engineer in Chief's Department for its excellent system of checks; gave instances of the lack of general supervision in the Sanitary Engineer's Department; suggested that rate collectors be dispensed with and rates made payable at suburban post offices and head office, and so on. Where past water conservation efforts was concerned they decided that "political influence rather than professional knowledge seems in too many cases to have controlled the operation of the Department"[3] - and went on to suggest that most borings be executed by private contract in future. They suggested the eventual phasing out of district inspectors by placing completed works in the hands of Local Government or similar bodies. They recommended the removal of mechanical work from the Waterworks Yard (Kent Town) to the Islington Workshops and the closure of the Sewers Yard. Furthermore, they suggested that the Government discourage day work in preference for contract labour, for "there must be some very strong reasons, which are not apparent on the surface, when men like Mr. Mais and Mr. Moncrieff consider the system should not be continued."[4]

All in all then, the Commissioners recommended savings to the effect of £6,305 and increases to the effect of £645. The few recommendations made concerning status and pay added to, rather than allayed, the general disatisfaction. They recommended salary increases to a number of competent junior officers (clerks) in the Revenue Department and to the Superintendents at Mount Gambier and Gawler only. Their rationale was based on competency rather than on principles of equal payment for parallel work,

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[3] P.P. No. 30 of 1890: Fifth Progress Report of Civil Service Commission, p. xii (point 43).

[4] Ibid., p. xvi (point 59).

or re-organization of tasks to equalize loads. Finally, they were so impressed with C. Jobson (Resident Engineer, Beetaloo) that they suggested he be made Assistant Engineer for Waterworks, (with a salary increase of £250 p.a.), and given charge of a consolidation of sub-Departments of Waterworks, Drainage, Water Conservation and Sanitation. Jones would be transferred elsewhere; Bayer would retain charge of the sewers, but would be answerable to Jobson.

Naturally many officers within the extended Engineer-in-Chief's Department were appalled. Ironically it was not one of their own number who made the most heated retaliatory attack, but dear old J.D. Woods, the first Manager of the Waterworks Department who had been sacked on charges of improper conduct (without recourse) 30 years before. He was commissioned by the Civil Service Association of South Australia to review the work of the Civil Service Commission but when his report was completed they declined to take the responsibility of publishing it. So Woods published it himself. Naturally it was not an impartial piece of work but it did highlight the many inconsistencies and irrelevances which the Commission had perpetrated.

In his criticism of the Fifth Progress report Woods pointed to the discussion and diffusive questioning, the accumulation of foreign matter and want of order in reporting by the Commissioners. He dwelt on the shallow criticisms made by them, such as their statement that "we do not regard this, [the Sanitary Engineer's Department], as a well conducted office." In this particular case, he claimed, Bayer had no opportunity to reply to complaints made by subordinate officers before the Commission - and, to make matters worse, it was recommended that he be reduced in salary and status and made subordinate to an officer who had no experience whatever in sanitary engineering. He concluded that "mistakes of this kind are not calculated to inspire much confidence in the justice or

wisdom of such proposals as have been placed on record."[5] Already, he claimed, (pointing to evidence given by former Engineer-in-Chief Mais), many of the best men in the Public Works Department had resigned from the Service in recent years.

But the depression remained a convenient excuse for matters to be left in abeyance. In fact 1893 brought the Kingston Ministry's decision to reduce all Civil Service salaries above £150 p.a. by certain percentages.

The daily paid employees of the Department tasted a measure of success when in 1891, Cabinet decided that a 48-hour week would be extended to all daily paids.[6] No doubt the serious spate of strikes throughout Australia and the consequent crippling effects on production were a strong incentive to such action. Still, one victory was no cause for complacency. Throughout the nineties the Liberal-Labor alliance in Government was regularly brought to task about the treatment of men on Public Works. Insecurity and uneasiness remained the lot of Departmental official and worker alike.

Meanwhile Parliament ensured that Departmental officials would be more than fully occupied. Oswald Brown returned to South Australia and in May 1891 reported on proposed Waterworks schemes. Where Adelaide's supply was concerned he reported in favour of the Happy Valley scheme. He judged the Beetaloo Waterworks to be "incomplete and inefficient and the services rendered very inferior to what they should be,"[7] and suggested the laying and enlargement of mains made of steel. Wilmington Spring Creek Waterworks were certain of "a successful future" while the Port Augusta Waterworks also received his blessing given that certain measures were adopted for increasing the storage capacity. For most

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[5] The Civil Service of South Australia - A Review; Adelaide, 1890, p. 61.

[6] C.P.W.: 622/91.

[7] P.P. No. 65 of 1891: Brown's Report on Adelaide's Water Supply (etc.)

Parliamentarians such confirmation and assurances were more than enough. The Onkaparinga Waterworks Bill, providing for the construction of the Happy Valley Reservoir, easily passed both houses. Commissioner of Public Works Ben Rounsevell used to occasion to hail Brown's report as a "masterpiece"; others subordinated personal considerations in the light of such "talent and skill" and the minority (Downer et al) remained steadfastly in favour of the Barossa Waterworks proposal. Engineer-in-Chief (Moncrieff) firmly denied a report that analyses of water furnished to Brown from the Barossa were inaccurately and unfairly taken in comparison with samples from the Happy Valley and Millbrook scheme.[8] In reality there was virtually no choice in the matter . . . the year ending June 1892 was one of the driest on record and at one stage Adelaide's reserves (in her two reservoirs) were down to 30 day's supply.

In the same way a Bill to authorise the construction of Waterworks near Wilmington, (to serve the first district constituted under provisions of the 1886 Water Conservation Act), received the quick go-ahead. There was no detrimental debate for the point was made that Brown had reported favourably. Likewise a site for a new reservoir at Port Augusta was promptly surveyed. In fact when the waterworks lines of the Public Purposes Loan Bill were being discussed in the 1892 session, politicians queried why more money had not been allowed for waterworks.

The same enthusiasm was applied to the development of the interior, although the track record of Parliamentary involvement in the area had little to show in the way of successes. A bore was put down at Croydon on the Adelaide Plains at a resolution of the House of Assembly, December 5, 1889, and continued Departmentally after a further resolution by the House on September 3, 1891. By 1893, when boring ended, a moderate

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[8] P.P. No. 109 of 1891: Report (etc.) re Water Supply.

supply of water had been obtained at a cost of £4,500. Likewise four bores had been put down by the Austral-American Boring Company in the vicinity of Lakes Frome and Mulyungarie. The water was salt in all cases, and the cost a huge £14,000. Commissioner of Public Works Laurie Grayson gracefully absolved the Department by reporting: "The result of these borings is no reflection on the Department as they were not consulted in the matter, Parliament having decided that the work should be done."[9]

But Parliament was determined to be involved. A Select Committee was formed to report on the valuations which the Government Valuator (Botting) had made of Happy Valley land needed for major new waterworks after a large landowner (Tolley) cried "injustice". The majority of Committee members reported that an over-valuation had been made, and nothing was gained by the exercise. Likewise when South Australia's first irrigation colony (Renmark) demanded relief from its problems and the Chaffey Brothers, a Select Committee was formed to evaluate the need for an Irrigation Trusts Bill. And again in 1893, a Select Committee investigated the Wilmington Waterworks after ratepayers had given a vote of no-confidence in their Board's powers of rating.

Possible irrigation schemes also provoked considerable interest and discussion. Derry and Sando's bid to lease land at Mannum for irrigation purposes was successful. Even incredible requests were contemplated. Caleb Heritage asked for the lease of the whole of the Murray scrub flats from Renmark down, claiming that if granted, this would deflect the movement of colonists to Paraguay to found a Communistic colony. His group promised to throw a weir across the Murray, at their own cost, for irrigation purposes and were confident that 250,000 people would be settled on the land in ten years.[10] But it was the Lake Bonney

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[9] Report of Commissioner of Public Works for 1891-'92, p. X.

[10] P.P. No. 129 of 1893: Details of Correspondence between Caleb Heritage and Commissioner of Public Works Secretary (J. Mann).

Irrigation settlement which gained the most credence. A Bill passed both Houses in 1899 after the Engineer-in-Chief had reported vaguely in its favour. Some felt it would help solve the unemployment problem, while others feared the Government wished to run the settlement on communistic lines. The Legislative Council, as usual, imagined all sorts of evils, and included new clauses such as one prohibiting the sale of intoxicating liquor till a poll was taken on the question.

Meanwhile the Engineer-in-Chief was finding that Parliament was less than enthusiastic about any initiatives his Department might wish to take. On several occasions Hancock introduced a motion in the House urging the separation of the Waterworks Department from the Engineer-in-Chief's Department. Others, like Howe, "regretted that the Engineer-in-Chief was forced to hold so many offices and to be such a Pooh-Bah,"[11] and urged that the Waterworks Department be placed under an experienced Hydraulic Engineer. When poor Moncrieff urged the collection of information with a view to a comprehensive scheme of water conservation throughout the Province, successive Governments gave him little attention.[12] He could see quite clearly the need to prevent further "isolated, expensive, non-paying schemes." Eventually, after two years' haggling and after spending only £90 on examination of possible schemes the Engineer-in-Chief finally obtained permission to place £1000 on the Sub-estimates for 1894/95 for the purpose.

On the other hand, Parliament was only too interested in any wrong moves which officers like the Engineer-in-Chief might make. A dispute between Moncrieff and Messrs. Wishart, contractors of the Clarendon Weir, provoked debate. The trouble began in 1894 when the Resident Engineer

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[11] Parliamentary Debates of 1893: Public Purposes Loan Debate, House of Assembly, Dec. 18.

[12] C.P.W. 669/1892.

(Mann) objected to some of the stones quarried by the contractors for the hearting of the weir because they contained serious flaws. Moncrieff was not impressed with the pace of work either. Ultimately the Department took over the works, used marble in place of stone, and solicitors settled the amount owing the contractors.

1894 also brought other more important considerations to a head - namely, the question of utilising the waters of the Murray. During the year the Commissioners appointed in 1887 to inquire into the subject and to achieve a united conference with New South Wales and Victoria, admitted defeat. They begged to be relieved of their responsibilities for they had not been able to get New South Wales to begin to come to the party. As never before South Australians saw the reality of their situation - the importance of having a fair share of such an important resource and the earnest struggle which lay ahead if that goal was to be achieved. However, beyond appearances by Moncrieff and Jones before the Commissioners in 1889 and 1890 concerning possible locking schemes, Departmental opinion was ignored by politicians confident in their own perspectives. Thus South Australian delegates to the 1897-'98 Adelaide and Melbourne sessions of the Federal Convention, during which the matter exploded, were led by a lawyer. Eventually the dispute between the colonies narrowed down to a question of which was to be of prime importance, irrigation or navigation. South Australia hopelessly held out for navigation but providentially, section 100 of the Australian Constitution was to allow for the co-existence of all claims.[13]

The year 1902 saw New South Wales, South Australia and Victoria agree to the establishment of a Royal Commission to report on the allotment of waters of the Murray, and the best method of conservation and distribution,

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[13] See D.I. Wright's "River Murray - A Continuing Debate," Journal of Royal Australian Historical Society, Sept. 1975, Vol. 61 Pt. 3 pp. 165-189, for a more complete picture of the struggle.

both for irrigation and navigation. When the Commission reported there was a serious division between the New South Wales and Victorian Commissioners and their South Australian colleague, who still subordinated all considerations to navigation. Indeed his dissent "appeared blatantly political rather than scientific"[14] as enough information had been accumulated about the diversions actually being made, the state of the river trade and other matters to prove the primacy of irrigation and conservation. At least there was no shame on South Australian Government engineers, for they had been largely left out of the proceedings during the decade. Quite likely their contribution and involvement - which were ultimately so necessary in the actual sharing of the water - could have encouraged a saner, more scientific approach much earlier.

The Engineer-in-Chief's handling of sewerage works in the same decade provoked little interference from Parliament. A motion was carried in 1894 ordering Moncrieff to examine the desirability of removing or extending the sewage farm, both to increase revenue therefrom and to handle increasing sewage loads. He, in turn, reported against any attempt to take the responsibility of the farm from the Department by leasing it as a whole, and claimed that any attempt to remove the farm would become a costly exercise. Bayer put his opinion about removal of the farm even more succinctly when he wrote: "There is no more necessity for doing so than for shifting the General Post Office."[15] Act No. 662 of 1892 created even less fuss - it provoked no debate and simply enabled the Governor to declare as a drainage area any portion of the province outside the defined Adelaide drainage area. In this way future extensions to places like Glenelg were provided for.

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[14] Ibid., p. 172.

[15] C.P.W. 523/93.

But involvement remained the general rule of the politicians throughout the decade. In 1896 irrigation schemes returned to the fore of Parliamentary interest. A Select Committee recommended, and Parliament approved, further monetary aid to the Renmark Irrigation Trust for urgent works. As well, the Government presented one of the largest proposals ever to impound water for irrigation purposes. The promoters, J.H. Packard and C.L. Lutz, planned to construct a dam on the South Para River and thereby irrigate much of the Gawler Plains. The Engineer-in-Chief expressed the opinion that the promoters' estimate was not detailed enough for him to give a positive certificate in the scheme's favour. Still, Parliament went ahead, debated the issue, voted against the Government undertaking the work and agreed to pay two percent interest on the capital cost for a period of seven years. Some Members of Parliament such as Griffiths supported the Engineer-in-Chief's stand. He commented that "when he first looked at them, /the plans of the scheme/, he thought one was Professor Watson's diagrams of strangulated hernia and the other of suprapublic lithotomy!"[16] Still, any fears which may have troubled such men were eased in 1897 when the Government concession lapsed - the promoters had simply failed to raise £400,000 in England to finance the scheme.

In two other ways in the 1896 session Parliament proved its wariness of the achievements of the Engineer-in-Chief's Department. Firstly, a Pastoral Act was passed, which handed control of water supplies on public stock reserves and within pastoral country to the Crown Lands Department. Thus, on July 1, 1897, 152 water supplies were handed over after having been under the control of the Department of the Conservator of Water since 1892.[17] The initiation of this change lay with the Surveyor-General and the Conservator of Water (Jones) was not pleased. He argued that his

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[16] Parliamentary Debates of 1896: House of Assembly, Dec. 10. Debate on Gawler Plains Irrigation Bill.

[17] E.O. 2100/92.

Department had accumulated engineering skill and knowledge of water supplies in outlying country and had provided a satisfactory service to the public. Furthermore, he felt justified in adding that "the reason so many unsuccessful bores . . . have been put down is because we have been forced to undertake bores and well against the expressed adverse opinion of the officers of the Department."[18] He and the Surveyor General had clashed over the Nullabor Plain Borings and the Bower Bore (amongst others), and much time and money had been wasted. As well, many a time the Commissioner of Public Works had over-ridden his misgivings - Lake Phillipson Bore and a bore site near Cowell being prime examples - only to see them later confirmed.

Secondly, 1896 saw a Royal Commission grow out of a Legislative Council Select Committee on the Beetaloo Waterworks, its task being to report on the construction and administration of the works. The supervision of the Engineer-in-Chief's Department was thus under scrutiny. The Commission reported favourably as to the necessity for the scheme, but decried the extra expense incurred by the enlargement of the original scheme to meet urgent requirements and the convenience of consumers. They readily attached blame to the Department, saying: "The scheme was designed and executed by officials who had not received the benefit of experience in works of a similar nature and it is not surprising that mistakes were made."[19] Still, they reported themselves satisfied that the cast iron pipes made by the Department at the Glanville Way and Works Shops since 1895 were cheaper than those available from local or interstate manufacturers or suppliers. The only recommendations to come out of the report concerned the system of rating, the suggestion being that the

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[18] C.L. 459/97.

[19] P.P. No. 76 of 1896: Report of Royal Commission on Beetaloo Waterworks.

construction rate be decreased and the scale of rates in townships be reduced on buildings of a certain value.

But the reality of drought in the areas served by the Beetaloo Waterworks put paid to any hope of reducing rates. In fact the price of water was raised to 6s./1,000 gallons in an effort to discourage waste, and Parliament was forced to consider the Bundaleer Waterworks scheme as a supplementary measure. Commissioner of Public Works J.G. Jenkins even had to confess that the guru, Oswald Brown, was guilty of a mistaken assumption when he had reckoned upon 20 inches perannum as the minimum rainfall of the Beetaloo catchment.[20] Thus, the one (former) Departmental official who had achieved a high reputation in the eyes of the politicians, began his fall from favour. The unsuitability of steel pipes in the Beetaloo district, as recommended by him on his visit in 1892, clinched his demise . . . and confirmed the politicians' belief that they themselves must play a vigilant role in any decision making concerning large schemes.

Thus an attempt by the Kingston Government to get the Bundaleer Waterworks scheme started was thwarted by the emergence of yet another Royal Commission. The nine Commissioners managed to disagree amongst themselves on most aspects of the scheme. One dissented entirely from recommending the scheme; three others suggested that fresh surveys be made with a view to the adoption of a smaller scheme; the remaining five recommended the construction of the Reservoir and the laying of mains to connect with Beetaloo, at an expenditure not exceeding £350,000. Motions for acceptance of the Report proved to be successful in the House of Assembly but doomed to failure in the Legislative Council.

Both Houses were in fact more keen to approve schemes which would store water for irrigation blocks at Pekina Creek, Morgan, Baroota and

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[20] Public Works Report, year ending June 30, 1897: Report by Commissioner of Public Works p. iv.

Parachilna. Such places had been included in a memorandum prepared and tabled by the Engineer-in-Chief on possible Water Conservation schemes. But while Moncrieff specifically listed twenty possible schemes, eight deep well bores and two large storage reservoirs for development of the interior, he stressed that they were "suggestive only and pointed out possibilities."[21]

The 1898 session however, saw the Legislative Council about-turn and accept, if reluctantly, the recommendations of the Bundaleer Commission. The continuing drought had won them over. In fact both Houses showed no qualms about passing the huge sum of £775,000 for water conservation schemes - the biggest individual item of expenditure in the Loan Bill for 1898-'99. This included provision for the Bundaleer scheme and for a new Waterworks scheme for Gawler. The idea of allotting £225,000 for the latter provoked little or no discussion. This was no reflection of Parliamentary faith in Moncrieff and his Department. Indeed the same session saw questions asked about his qualifications as a hydraulic engineer. Rather it had to do with the fact that the scheme would use South Para River waters, conserved in a reservoir in Yettie Valley. Variations on such a scheme had been advocated by many a politician (and Barossa Valley locals) for years, and now, because Gawler's existing water supply was polluted, it was the most obvious alternative. All agreed that the town was too important to neglect.

The Bundaleer Waterworks provided fuel for fire in the 1899 session — this time not to denigrate Departmental management but rather to embarrass the supposedly Labor-oriented Kingston Government. The works were noticeably unpopular with workmen, and McGregor, in the Legislative Council, used this knowledge to urge a vote of censure upon the Government for their treatment of the working classes. A long debate ensued, during which

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[21] P.P. No. 58 of 1897: Report by Engineer-in-Chief on Water Conservation.

details of poor living conditions, abusive gangers and bullying by Resident Engineer Mann, were bandied about.

The Bundaleer Waterworks remained topical that year for another reason. On June 3, five men died and three were injuried as a result of a cave-in. The Kingston Government reacted promptly by bringing in the Assistant Chief Engineer of the Victorian Water Supply Department (Mr. Checci) to investigate the matter. His extremely technical report, absolving everyone and anyone, angered many and their discontent found expression in the House of Assembly on July 12. Brooker's motion to place on record appreciation of the bravery shown by men at the accident was eventually withdrawn, but not before it had sparked off a telling debate. He claimed that "heros and heroines were not always to be found on the battlefield but in the industrial world."[22] Other Labor men went further and accused the officers in charge of neglect. Price denied the "cheapness" of the Government works while Roberts commented: "Here were three forces, the rains, the blasting and a powerful engine working and yet it was admitted in evidence that no extra precautions were taken to prevent the accident. . . ."[23] In turn, the Commissioner of Public Works (Jenkins) claimed that Parliament would be setting a bad precedent by referring to specific cases, and Archibald agreed that "they should not encourage sensationalism." Eventually Brooker withdrew his motion and the matter of class distinction was conveniently shelved.

However, the issue of Departmental bungling over Bundaleer was revived in 1900 and this time the Holder ministry was in power. The Engineer-in-Chief was, as usual, the target of criticism. During the Loan Bill debates Grainger spoke of the Engineer-in-Chief as "a good

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[22] Parliamentary Debates of 1899: Brooker's motion on the Bundaleer accident, July 12, House of Assembly.

[23] Ibid.

railway engineer, and had plenty of work to occupy him in that Department . . . /but/ was utterly incompetent as a hydraulic engineer."[24] Handyside and Copley agreed that Moncrieff was "not to be trusted" and that he was "guilty of terrible muddling in connection with Bundaleer."[25] Eventually a Select Committee of the House of Assembly was organised to examine the charges against officers having supervision of that scheme. The Commitee reported[26] that the disinclination of men to work at Bundaleer was not due to harsh treatment or cruelty on the part of officials. Rather they felt that the employment of workmen through the Labour Bureau - re-opened in 1897 - had been a contributing cause of disaffection as the Resident Engineer (Mann) was forced to constantly weed out and classify new arrivals. This mode of selection and the temporary employment of many farmers in the district accounted for the large turnover in connection with the scheme. The fact remained however, that many navvies were too afraid to come before the Commission to give evidence. Those who did appear all bore witness to some degree of harassment and the lack of concern shown for the general welfare of the workmen.

The 1900 session also saw the Holder Government repeal the special Act under which the Wilmington Waterworks were constructed - a measure promised by the former Government. In future the Government would not advance money to local people for such schemes. At last Parliament recognized the fact that the direct copying of the local Waterworks Board idea from Victorian legislation had been an abject failure. South Australian communities, in their reluctance (or inability) to take advantage

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[24] Parliamentary Debates of 1900: House of Assembly debate on Loan Bill, Nov. 27.

[25] Ibid.

[26] P.P. No. 146 of 1900: Report of Select Committee of House of Assembly on Bundaleer Waterworks Officers.

of the scheme, had inadvertantly saved the State much money. Only Wilmington and Lobethal Waterworks Districts had tried and fallen; whereas in Victoria hundreds of thousands of pounds had been lost on a multitude of such districts. Still, in the same session, the Final Report of the Royal Commission on Renmark and Murray River settlements revealed that South Australia had been guilty of serious mistakes in other directions. Quite simply the Commissioners reported that too many village settlements had been established while many of the unemployed placed in them had proved incapable of working the land.

1901 brought the Jenkins Government to power in an end-of century conservative backlash. The United Labor Party lost five seats in the 1902 elections, after promoting such manifestos as a "minimum wage of seven shillings a day for all adult males employed by the State or on State contracts". But useful, and much needed changes were already in the wind, and the Jenkins Government did nothing to prevent them from reaching fruition.

The investigations of a second Royal Commission into the Civil Service, appointed in 1898, proved moderately useful to the Service, even if they did only reiterate the findings of the 1888-1891 Commission. The Civil Service Act of 1900 provided for a temporary Public Service Board to classify the service. John Gardiner, (Secretary to the Commissioner of Public Works), was elected the first service representative. The Board completed its work in May 1902, and henceforth the Service was classified according to work value into five divisions - Clerical Professional, Non-Clerical, Educational and Railways. A division was made between the higher, responsible positions requiring aptitude and administrative capacity, where fitness and qualifications would rule in promotion, and the lower positions requiring little scope for individuality and entailing more routine, where seniority should rule. As well, a Public Service Superannuation Act of 1902 added weight to the hopes for the future.

Other factors were militating towards a better provision of Government services in the field of Waterworks and Sewers. The dissatisfaction with Moncrieff's real or supposed abilities as a hydraulic engineer was increasing in Parliamentary circles. The 1901 House of Assembly debate on the Bundaleer Reticulation Bill saw former Commissioner of Public Works Rounsevell confirm this lack of confidence, and this time, an alternative was suggested. Rounsevell pointed to the Happy Valley Works which had been supervised by Sanitary Engineer (Bayer) without a mistake. Here was a man, he said, who should have been in charge of the State's water conservation works.[27] As well, former Commissioner of Public Works Catt felt compelled to comment. He pointed out that he had adopted a widespread system of gauging of streams when in office in 1887, only to see the Department abandon them under the Engineer-in-Chief's reign. The Bundaleer gaugings were quite simply not what they should have been.[28] As well another accident at the Bundaleer Waterworks on November 9, 1901 could not but reflect poorly on the Engineer-in-Chief's image. A ganger was killed and an Inspector lost an arm. Departmental regulations for use of explosives had apparently been ignored by responsible officers.

The disaffection spread. The Engineer-in-Chief's Department was seen for what it was - a collection of extensive, cumbersome administrative arrangements. It was time to face reality. The opportunity came when the Conservator of Water, J.W. Jones, applied for position of Secretary to the Commissioner of Public Works and Chairman of the Supply and Tender Board. Commissioner of Public Works Foster promptly abolished the position of Conservator of Water and appointed Jones as his secretary. At the same time he recommended that Bayer be appointed Hydraulic Engineer at £750

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[27] Parliamentary Debates of 1901: Bundaleer Waterworks Bill Debate, House of Assembly, Dec. 12.

[28] Parliamentary Debates of 1902: Bundaleer Waterworks Bill Debate, House of Assembly, Sept. 9.

per annum to take charge of Sewers and to take over the Adelaide and country water districts from the Engineer-in-Chief; the Supervising Surveyor (Graham Stewart) would have charge of outside water districts androads; and finally the Engineer-in-Chief's salary would revert to the amount recommended prior to amalgamation of the Departments, (namely £1,000/p.a.).[29] Cabinet promptly approved these recommendations and none of the parties involved questioned the new arrangement, least of all the politicians.

Before the 1902 Parliamentary session had ended a Sewers Act Amendment Act had been passed to the effect that henceforth all land and premises used by Government or its officers, (and State Schools), would be subject to assessment and rating. As well a Bill to provide for reticulation of the Barossa Water District, (the region served by the new Barossa Reservoir), easily passed both houses. Finally, there was a warning - in the form of a Select Committee of the Legislative Council on the Bundaleer, Port Augusta and Barossa schemes - that Parliament still questioned the ability and integrity of Departmental officials. Indeed the enquiry was extended to Royal Commission status in January 1903 and did little to encourage the officials of the resurrected Hydraulic Engineer's Department.

The realities of the nineties - consistent drought, all-pervading depression, and a poor track record in the development of water resources - were thus too far-reaching to be denied. The politicians responded with energy and enthusiasm. They took an intense, if not always rational involvement in the field of water conservation, as never before. It was invoked as the cure-all, the saving gospel. Unfortunately, the implanting of the message, in practice, was not always successful.

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[29] C.P.W. 788/02.

ORGANIZATION:

The new organization which emerged in 1888 headed by the Engineer-in-Chief, faced the future with little optimism. The reality of their situation was open for all to see - staff numbers had been cut back; an increasing volume of projects had to be dealt with; there was no sign of any privileges or reforms in the Service; and limited finance considerably lessened the chances of displaying inventiveness and talent.

The amalgamation of Water Conservation, Hydraulic Engineer and Engineer-in-Chief's Departments proved immediately successful in the sense that a number of officers were retrenched. Men like J.G. Ashton, the Chief Clerk and Accountant of the Hydraulic Engineer's Department, lost their jobs, and in their place officers like John Gardiner, (Chief Accountant now for all activities under the Engineer-in-Chief's Department), received heavier workloads. But a confused structure was the most serious outcome of the amalgamation. The functions of the Conservator of Water and Sanitary Engineer became loosely separated within the Engineer-in-Chief's Department. As well, a vague delineation of responsibility with the Railways Board added to the confusion - the Engineer-in-Chief kept the accounts for railways construction but the Commissioners paid them. Some officers of the Department who were engaged exclusively on railways work were not covered by railways regulations which guaranteed certain rights re overtime payments and leave of absence. The Engineer-in-Chief took his orders for railway construction from the Commissioners, for Public Works construction from the Commissioner of Public Works and for marine construction from the Treasurer.

To ensure some kind of systematic control of all the sub-branches, superintending officers were required to forward monthly reports to the Commissioner of Public Works. As well, a cost estimate of every work had to be made before the order was issued and prices in the estimates were now checked by a Surveyor of Quantities. Then the Accountant would issue a debit order before any work was started. All

expenditure in this large Department were thereby supposedly brought under control. In 1890 the Royal Commission into the Civil Service reported that it would be only too happy to see the system of checks applied to other Departments. The Commissioners of Audit in their 1890-'91 Report also stressed that the internal checks were good, although lack of staff prevented them from examining the whole of the books in detail.

The actual Department was divided into ten subdivisions or Departments. The Chief Clerk's Branch managed the correspondence of all the Branches; the Chief Accountant's Branch controlled the revenue and expenditure of all branches; the Drawing Office Branch undertook the preparation of drawings and specifications for work under all Branches; the Superintending Surveyor's Branch made surveys for all branches and was responsible for carrying out River Murray improvements; the Railways Branch controlled the maintenance of completed lines and the construction of new lines; the Sanitary Engineer's Branch was responsible for the Adelaide Waterworks and sewerage works; the Conservator of Water's Branch controlled development of the interior, country water districts, and irrigation; the Harbors and Jetties Branch undertook repairs to jetties, light-houses and harbor dredging operations; the Road and Bridges Branch controlled construction and repair of roads outside district council areas; finally, the Defences and Military Roads Branch controlled the construction of coastal forts, and the maintenance of Military Road and the gunboat "Protector." What a mixed household it was!

Such was the magnitude of the supervisory task which faced Engineer-in-Chief Moncrieff. Despite the fact that he had no qualifications as a hydraulic engineer, he was not slow to initiate or recommend important administrative changes in the region of Waterworks and Water Conservation where they were obviously needed. For example, he ensured a more efficient Water Conservation Branch by dividing the Colony into three districts, each under an Inspector. Complete lists were prepared

of works needing supervision in the districts, and in practice reports were also forwarded on the condition of roads therein. As well, a system of reporting was instituted to bring the branch in line with others - henceforth officers were required to report on a monthly form all maintenance and construction works in their district. Stock sheets of Plant, Tools and Stores were printed and put into use as were debit order forms, paylist forms, time-sheets, and 'Return of Telegrams' forms.

Moncrieff left the appointment of Inspectors to the Conservator of Water. But he personally urged successive Governments to formulate definite policies regarding the development of the interior if the Water Conservation Branch were to be of any value at all.[30] Governments did not always listen. For example, only in 1901 did a Commissioner of Public Works recommend a trip by the Conservator (and Inspector Herman) to Victoria to aid selection of the most effective deep well boring plant which could be procured - after a fifteen year period of trial and error in the use of such equipment!

Moncrieff also supported the recommendations of Bayer, the Sanitary Engineer, concerning the proposed amalgamation of the Sewers Yard with the Waterworks Yard in 1889.[31] The Railways Commissioner had apparently expressed a desire to take over the Sewers Yard at Thebarton for Public Works Store purposes. At the same time T. Colebatch, (Superintendent of Waterworks and Manager of the Sewage Farm), had just been appointed Public Works Store-keeper under the newly emergent Supply and Tender Board, so it was necessary to appoint someone in his stead. Bayer recommended that Negus, (the current Manager of the Sewers Yard and resident Inspector of Works), be appointed Manager of united Yards at Kent Town; that R. Gunner, (the Foreman of the Mechanical Shops), be Assistant Superintendent of

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[30] C.P.W. 343/89.

[31] E.O. 2632/89.

Waterworks and Sewers and Foreman of the Mechanical Shop; and finally that Goss, (the Assistant Storekeeper and Clerk), be appointed Storekeeper and Accountant for Waterworks and Sewers. Moncrieff appreciated the savings to be made and supported these recommendations. However J. Howe, the Commissioner of Public Works, managed to upset matters by pointing out that Gunner, as the most Senior Officer, should be promoted to the position of Superintendent of the amalgamated offices. Bayer remained faithful to his sewer colleagues - anyway Gunner did not have sufficient knowledge of sewers to take charge of their construction and maintenance. Moncrieff supported his claim, informing the Commissioner that Negus had been Gunner's superior in the Service for twelve years according to clause 22 of Civil Service Act which defined seniority.

In the end no amalgamation eventuated. The Chief Storekeeper decided he would not need the storage facilities of the Sewers Yard and the Commissioner of Public Works recommended that Negus remain in charge there. Gunner took possession of the house at Kent Town (but paid his own fuel and light) and became Superintendent of Mains.

Bayer's idea for more efficient management of the Sewage Farm had more success. In future the Manager was charged 5% interest on the working capital, and a rental of 12 shillings/acre p.a. - and was exempted from the control of the Supply and Tender Board in the matter of supplies. Bedford Hack - formerly Inspecting Ranger, Warden of Goldfields and Government Arbitrator - was the first Manager to work under the system. Despite locust and grasshopper plagues, falling prices of produce and livestock, storm damage, expenditure on farm extensions, loss of trees (which died through being lopped at the advice of an expert), Hack was able to make a good profit in most years. His policy of letting the garden and abolishing horse breeding was successful . . . by the end of the period regular leases were being entered into with companies like the Adelaide Co-operative Society for grazing cows (etc.), animals were de-pastured for small owners and large quantities of produce were being sold.

Some recommendations arising from the Report of the Civil Service Commission on the Public Works Department were also acted upon in the cause of increased efficiency. The Comptroller of Stores was replaced by the Supply and Tender Board and Moncrieff gained an added workload in his capacity as Chairman of that body. He eventually resigned from that position in 1899 for that very reason but a direct say in the State's store-ordering and purchasing policies was not lost. Instead the Chairmanship was handed over to the secretary of the Public Works Department. As well, the Commissioner's recommendation that operations in Government Workshops be confined to repairs and renewals was implemented in a number of ways. Tenders were called for work as much as possible - for example, water meters were now manufactured in the Colony by A.W. Dobbie and his article began to replace the Kent Town workshop product. The Sewers Yard at Thebarton was effectively closed despite the early haggling over seniority, and its work was let by contract wherever practicable. Only in 1900 when money flowed more freely again and whole new areas were being sewered did the Sewers Yard re-emerge as a separate establishment. The notion that all such activities be centralized at Islington (with Railways activities) was bandied about but was never taken seriously.

Nor thankfully, was the Commissioner's recommendation that Chris Jobson be placed as Head of a consolidation of Sub-Departments of Waterworks, Drainage, Water Conservation and Sanitation. Certainly he possessed leadership qualities but his comparative youth, and inexperience in sewers work, were ready targets for criticism by older and more experienced men. Their jealousy was understandable, for too often promotions in the Service had been made with little regard of sensibilities and seniority. Such untimely elevation of Jobson did him little good. He was the natural choice for the new position of Resident Engineer of all town and country mains in the North (stationed at Crystal Brook), for his supervision of

the Beetaloo project had earned him the respect of his workmen and the locals. Instead, T.A. Hicks, (who had begun his career as a Sewers Clerk in 1879), was given the job and a short-lived dispute flared up between the two men over the position. Jobson resigned, (or was most likely dismissed[32]), and the matter ended. The year 1891 thus saw some important and unnecessary losses of personnel - John Bailes, (the Foreman of Boring) and others also left - as the quest for efficiency took its toll.

Finally the Sanitary Engineer's Branch adopted the Royal Commission's recommendations concerning meter reading. McGeorge, the man who had held the meter reading contract since 1882, was given the position of Chief meter reader in 1891 and two readers were employed on a daily rate under him. As well, meter reading was henceforth done bi-monthly instead of monthly. McGeorge was required to send in meter reports to Head Office no later than 11 a.m. every Monday with lists of meters requiring attention. The Engineer-in-Chief soon reported that the "arrangement proved satisfactory and economical,"[33] which was no doubt the case - meter reading by contract had cost the Government £864 the year before the change in system.

Any other new systems implemented in the Sanitary Engineer's and Conservator's Branches in the period were largely brought about by sheer necessity. A smoke-testing gang began work on August 13, 1888, to test for any defects in sewer connections. Their work revealed a high percentage of bad connections, certainly a poor reflection on the Sewer Inspectors who had issued certificates in all these cases of defective work. Still, out of this came F. Fairweather's improved system of reporting in the office and of issuing notices of defects, and by 1902 two

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[32] See E.O. 1846/90.

[33] Public Works Report for year ending June 30, 1891; Engineer-in-Chief's Departmental Report: (See No. 6, Sanitary Engineer's Branch).

smoke testing gangs were employed to ensure the early detection of any problems.

Pollution control also demanded a consistent, if limited share of staff and expenditure resources. It was Moncrieff's idea to have a thorough inspection made of the Torrens watershed above the Gorge, along the lines of the first one made in 1881. He demanded that the report "be very complete".[34] Hullett, (the demoted Port Augusta Superintendent), along with an officer of the Central Board of Health, made the inspection and as a result specific instructions for the first time ever were issued to Patroller Von der Borch for the abatement of nuisances.[35] Henceforth he was required to visit every place four times a year and was in effect issued with a job specification - a list of ten pointed instructions prepared by Bayer. Still, his powers as Inspector for Local Boards of Health in his patrol-region remained more important, for the Crown Solicitor decided that a proposed form notifying an owner/occupier of water pollution should be axed, as the Commissioner of Waterworks could not delegate his opinion in such a way. The Central Board of Health remained unimpressed with such arrangements and would have been even more outspoken had they been aware that Moncrieff and Bayer thought Hullett's reports made "a great fuss about very little in many cases."[36]

Again in 1896 Hullett was required to make a detailed investigation of the pollution problem - this time in the Onkaparinga watershed. He made 26 (fortnightly) reports during that year, and as usual accompanied each case with a little drawing detailing the layout of the farm/property in question, any nuisance, (where applicable), and its relationship to and

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[34] See C.P.W. 627/89: This comment to be found on outside of docket.

[35] See E.O. 4482/89.

[36] Ibid.

distance from any watercourse(s). Von der Borch was given the Onkaparinga watershed to patrol, as well as the Torrens watershed, from then on. He was supposedly assisted by two officers but most of their time was effectively taken up by their normal jobs as caretakers of the weirs. For a time A. Mueller acted as a Patroller of the High levels Watershed but his services appear to have been dispensed with some time late in the century.

At times the Engineer-in-Chief called Von der Borch to task for the unsatisfactory state of certain premises brought to his notice, or for not visiting others. In 1900 he was issued with a statement of premises on the Onkaparinga Watershed denoted "A" and "B" in an attempt to ensure that he would visit some places more regularly than others. But such spasmodic interest was not good enough. In 1902 a public outcry concerning the quality of Adelaide's water supply resulted in the Government appointment of a Water Supply Enquiry Board. That body clearly revealed, (amongst other findings), the inadequate system of pollution control undertaken by the Department to date.

A more successful arrangement to emerge in the period was the development of pipe-making facilities at the Glanville Way and Works Shop. In 1894 the Engineer-in-Chief recommended that the Department manufacture its own two to six inch cast iron pipes Departmentally and the Kingston Government readily approved of the establishment of a foundry. The Commissioner of Audit made a special report on the experiment in his 1895-96 Report. He was distressed at the accounts at Glanville which were kept on a very imperfect and irregular system - in fact the works were a sub-Department of Railways at this stage and Waterworks goods manufactured there were only a minor amount of the total output of goods. By 1900 he ensured that the divided system of accounts was replaced by an adequate system of bookkeeping.

The Commissioner was happy enough with the concept of manufacturing pipes at Glanville. In fact, from a comparison with contract prices for pipes he concluded that Government-produced pipes were "a means of effecting a very great saving."[37] He went further: "It shows conclusively that good workmen can be obtained and do good work under the superintendence of Government Officers; and that, in the present case at least, there is no force in the common sneer at what is misnamed 'the Government stroke.'"

Understandably then it was Commissioner E. Cooke who rejected the Departmental recommendation of a certain private tender for steel pipes, (for the Barossa and Bundaleer projects), in favour of Departmentally-made cast iron pipes. He took suggestions and recommendations for a new vertical plant to undertake the work to the Supply and Tender Board, and they supported him. By 1904 he was able to report that the acceptance of Glanville's tender for the Bundaleer and Barossa Waterworks had paid off - the cost was £8,881 less than the closest tender. He reported that another contractor might have been less pliant, that a direct saving had been made to the extent of the quantities taken, and a substantial profit had been made by the works.[38]

But few other arrangements would prove to be as successful. From 1892 onwards the Water Conservator's Branch became responsible for the collection of revenue from, and leasing of all water supplies in the Interior. Then in 1898, the management and revenue-collection responsibilities to do with supplies on stock routes outside Hundreds reverted to the Surveyor-General's Department - but to complicate matters, the Water Conservator's Branch still did all the necessary maintenance work, on requisition from their new managers.

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[37] P.P. No. 4 of 1896: Report of Commissioner of Audit for 1895-'96. See 'Special Report No. 2 on Manufacture of Cast Iron Pipes etc. at Glanville.'

[38] P.P. No. 4 of 1904: Report of Commissioner of Audit for 1903-'04.

The sampling of water supplies throughout the Colony was instituted on a more regular basis, only to be dogged by problems at the analysis end of the system. The Commissioner of Public Works upset matters by instructing that the Customs and Marine Department Analyst would do the work in future. The Conservator promptly protested against the work being taken away from the Government Analyst at the School of Mines, (which had been founded in 1889). Perhaps the Commissioner of Public Works did not want to know that samples of water were often "below standard organic purity."[39] Such was the impression gained by G.A. Goyder, Registrar of the School of Mines.

Anyway for a time duplicate samples were taken and duplicate analyses made; then in 1898 the Engineer-in-Chief decided once and for all in favour of the Customs and Marine Analyst.[40] In 1901 another task was added to the repertoire of the Engineer-in-Chief's Department when the Commissioner of Public Works ordered the Department to collect drain instalment repayments in connection with the South Eastern drainage Works. In this way management services were added to the advisory and construction functions the Department was already undertaking in relation to the Works.

By the end of the century then, tensions were beginning to reach surface-level in this large organisation with its motley of bedfellows and increasing range of responsibilities. There was still little effort made to delegate authority - each Sub-Department remained virtually dependent on the signature of the Engineer-in-Chief. The Commissioner of Public Works set an example when he gave the Engineer-in-Chief authority to sign sewer agreements and the power to grant concessions for water for stock and irrigation purposes.[41] But Moncrieff, in turn, failed to put

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[39] E.O. 1763/1896.

[40] C.P.W. 1002/98.

[41] E.O. 461/91.

the same trust in the Heads of his Sub-Departments. In 1900 Resident Engineers were given permission to authorize special leave without pay, but many other petty decisions were still forwarded regularly to Head Office. For example, when a man at Mount Gambier walked two miles out of his way after 10.00 p.m. to report a burst main, the matter of the usual reward had to be deferred until Superintendent Fairweather obtained Head Office approval. The man got his five shillings in the end.[42]

Still, when complaints did reach the surface, (as the depression waned), they were couched in terms of insufficient staff rather than in terms of an inadequate Departmental structure. There was concrete evidence to be had in support of such claims - for example by the end of the century the large and increasing amount of correspondence received dealing with defective water services revealed that skeleton maintenance staff were simply unable to keep up with their work.[43] Other officers such as W. Wright stated quite simply that they were "unable to cope with water conservation work with the present staff."[44] The Northern Resident Engineer was not afraid to give the same response in reply to queries by the Commissioner of Public Works.[45]

There was indeed much ground to be made up. The depression had brought with it dismissals, the consistent rejection of claims for salary increases, a standstill in the improvement of working conditions and in general, a low state of morale.

Virtually all the Sub-Departments of the Engineer-in-Chief's Department remained clustered in the one building in Victoria Square and

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[42] E.O. 1197/96.

[43] E.O. 2196/98.

[44] E.O. 1922/98.

[45] C.P.W. 269/01.

throughout the State little money was spent in the decade on improved accommodation except in instances of absolute necessity. For example, in 1900 the Resident Engineer at Beetaloo reported that the Waterworks House at Port Pirie was collapsing and dangerous for occupation. Only then did the Commissioner of Public Works approve new living and office accommodation.

The numbers of draftsmen employed fluctuated widely from year to year according to the number of projects in hand. In 1893 the crunch came with percentage salary cuts and Resident Engineers were asked to list employees who could be dismissed. For example, by the end of that year the Superintendent at Kapunda had been removed and Cato was the only man left at the depot. Overtime was allowed only in exceptional cases and the travelling allowances of the Water Conservation Inspectors were reduced to payment on a daily rate. At Port Augusta Superintendent Johnstone died in 1894 and Sykes was appointed in his place at a reduced salary. Orders were issued that seniors were to be given preference in all such transfers and retrenchments.

Some hope returned in 1895 with the payment of small increases in salary. However, in 1896 the positions of Waterworks Inspector were abolished and their work was henceforth performed by turncocks. As well working conditions were deteriorating, if anything. Camels ridden of necessity in the Interior were becoming more and more mangy as there was no money to repair and replace decaying saddles. Engineer-in-Chief Moncrieff even refused turncock E. Trapmann's request to have his bicycle re-tyred, (despite the favourable recommendations of Superintendent Gunner and the Sanitary Engineer), on the grounds that this would "form a precedent and be abused in after years."[46] However, he suggested that the

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[46] E.O. 1232/96.

man's use of his own bicycle for work purposes and the small amount he subsequently spent in tram fares, "should be borne in mind when any improvement in his position /was/ possible."[47]

In 1900 a number of Junior Clerks were taken on and typewriters appeared on the scene - even if they were shared by a number of Departments. The next year saw all officers in the Service being granted a full hour for lunch. But such liberalism did not extend to salary increases. Turncocks, for example, strongly appealed against reductions in their salaries in that year but to no avail. And again, retrenchment was the order of the day when the Department was forced to abolish its system of rate collection. Not only were Rate Collectors dispensed with, but the Chief Clerk (J. Mullins), the Waterworks Valuator, (W.T. Cooper, who had entered the Civil Service in 1853), and a number of others were pensioned off at the same time.

The only recourse Departmental officials had in the period was membership of the Public Service Association - and in particular, assisting the drawing-up of submissions by that body to the two Royal Commissions on Civil Service which sat at the beginning and end of the decade. Some were even members of the Public Service Association Council - in fact, a Waterworks Department official, (S. Randell, Pettit and J. Bee to name a few), invariably held the position of Hon. Treasurer, and Jasper Bee also spent a term as President.

On the surface, however, it was the workmen who were more likely to achieve change through solidarity. The year 1895 saw a successful deputation to the Engineer-in-Chief about the wage deal offered to men on the new water main in King William Street. In 1900 the then Commissioner of Public

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[47] E.O. 1232/1896.

Works gave instructions that in future all work marked off by a boiler-maker was to be punched by a boilermaker, after a deputation from the Boilermaker's Association had raised the issue of the Department employing other than skilled men to do the work of skilled mechanics.[48] Government employees did not yet have their own tribunals so any gain made was significant.

To his credit Engineer-in-Chief Moncrieff early saw the need to equalize working conditions and allowances of the workmen (daily-paids) in the many Sub-Departments under him. In April 1890 he classified all such men and allowed them the same allowance when sent away from home on a job, as delineated in Railway Circular No. 118. Workmen in the Waterworks Branch began to work by the hour instead of by the quarter day, and by having a three-quarter hour instead of an hour lunch-break, were able to leave one hour earlier on Saturdays.[49] The introduction of the 48-hour week in 1891 was a further improvement and ensured that labourers - like those on the Sewage Farm - would no longer have to put in a ten or eleven hour day (51-hour week) to retain their jobs.

But retrenchment came to daily paids as well as officers, particularly 1892 onwards as the depression set in and Government policies restricted workshops to maintenance work. The number of hands at Kent Town fluctuated unevenly, while at country depots like Gawler, the fitter and labourers were forced to go on half time. In March 1892 when 50 men were placed on sewer relief work they averaged 4/9 a day, at a time when the usual labourer's rates were about 7/- a day. A few were even worse off - the Afghan's wages at Lake Harry Bore were reduced to 4/- per day.

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[48] See C.P.W. 719/00.

[49] E.O. 4048/90.

In some areas however, Departmental employment was seen to be preferable to private employment despite the difference in pay. For example, J.J. Sara, Charge Hand at Glanville Way and Works Shops, (and a former employee of Fulton & Co.), gave evidence before the 1896 Royal Commission on Beetaloo Waterworks to that effect. He pointed out that the pipes produced at Glanville were cheaper, and although wages paid by Fulton & Co. were slightly higher, the men were better satisfied under the Government. They were on day work and took time to make the pipes properly. As a result the percentage of waste was only 4½%.[50] This image was enhanced when in 1902 the Commissioner of Public Works decided that in future youths were to be trained in each of the seven trades undertaken at Glanville. They were to be treated as apprentices and to receive a certificate after five years if judged proficient.[51]

It must not be forgotten that the Department also determined the working conditions of the thousands of men who worked on four major reservoir projects in the period - namely, the completion of Beetaloo scheme, the Happy Valley Reservoir, the Bundaleer Reservoir and the Barossa Reservoir. To a certain extent these projects were seen as important means of alleviating unemployment, and the Department, as the major employer in all cases, had an unfettered say in the selection of men employed and whether they would be offered day work or piece work. Only in 1898, with the effective revamping of the Labour Bureau was the Department virtually required to take what they were sent.

The Beetaloo project was completed in 1890. Little or no dissatisfaction had been expressed by the men during the course of the work - most were farmers anyway, and were only too happy to have work to tide

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[50] See P.P. No. 76 of 1896: Report of Royal Commission on Beetaloo Waterworks. See Synopsis of Evidence for Sara's comments.

[51] See C.P.W. 719/00 and E.O. 1686/02.

them over. Resident Engineer Jobson remained a popular boss and many of his innovations for the comfort of his men were to reappear as established practice on subsequent public works projects. Maintenance camps grew out of the scheme and were established adjacent to the towns, the men thus remaining a race apart. Still, they knew the value of having a job. Only in 1901, with the growing awareness of the solidarity of labour did they tentatively request some improvement in working conditions. The Wokurna maintenance camp men asked that the time taken to walk to work be included in their paid work hours. The request was refused and there was as yet, no means of recourse.

The Happy Valley Reservoir project was immediately popular with workmen for reasons other than sheer economic necessity. In early 1892 when the first batch of men travelled to the site in Mitchell's four-horse vans, some were men who had thrown up their jobs to get on the works. From then on the Department attempted to make sure that only those who were married and had been unable to get employment would be given preference. Charlie Bayer, the Sanitary Engineer, was given charge of the project while the Resident Engineer was a reluctant C.S. Mann - in fact he was promised a return to railway work upon completion of the project.[52] He was promptly housed in one of the houses purchased by the Department and connected to Head Office by telephone. At the height of the project in 1894 an average of 580 men were employed on the project, and most lived in the camps.

Trouble arose early through contractors Carter and Gummow specifically, and petty contractors in general, failing to pay their workmen. In Carter and Gummow's case, a warning was given by the Department against working the men more than eight hours a day and any attempt to bring in

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[52] See E.O. 1153/1896: Perhaps his appointment as Resident Engineer at Bundaleer helps to explain why that project was not carried out so smoothly - he was peeved at having to go there.

cheaper labour. To ensure payment of workmen the Department in future inserted clauses in contracts to that effect. Meanwhile threepence in the pound was deducted from the men's wages for medical attendance and a chapel in the vicinity (purchased by the Department) was rented to the Bible Christians and Education Department for provision of their services.

The Chief Inspector of the Central Board of Health furnished regular reports of the sanitary conditions of the camps, and it was usually only the private camp which aroused his dissatisfaction. There were few cases of typhoid, but accidents were common and there were even a number of single deaths from mishaps. For example, a Peter O'Donahue died from an accident on July 20, 1896 in which there was a premature explosion of dynamite in the tunnel beneath the No. 2 Shaft. The City Coroner found that no blame could be attached to anyone! In fact hearsay has it that it was common Departmental practice to break a stick of gelignite in two, light it and use it as a torch in the tunnel works.*

By 1893 the unfairness of pay and conditions provoked many workmen into writing to the newspapers. For example, a man wrote to The Observer, April 22, 1893 on the subject of "Work and Wages at Happy Valley" and that conservative paper was even moved to print it. The man wrote of doing well on piecework rates by hard work and long hours, but when he asked for day work he only received 5/- per day. With winter in sight and the prospect of wet weather limiting the possible days to be worked, he wrote:

> How are we going to live? I have 6/- per week rent to pay in Adelaide, and a wife and four children to provide for. It costs me 16/- per fortnight to live out here, with 2/- coach fare each pay, so I leave you readers to imagine how the navvies are going to manage this winter. All the Staff engineers, surveyors, clerks, gangers (etc.) are comfortably housed and provided for. Let anyone go and look at their houses - all rent free.

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* As told to Don Ide, (and his father), by A.J. Green who was a cadet Engineer on the Happy Valley Works.

He went on to note that such officers had all their wood cut up for them, but if workmen took a share it meant dismissal.[53]

In 1894, some desperate groups even went on strike, a mechanism still relatively unheard of on Government works. August brought the decision by Jenkins, the Commissioner of Public Works, to reduce Carter's payment for two horse teams from 14/- to 12/- a day. The twenty-five carters immediately went to see him; he maintained they had been cheating the Government by carting less than they should, and they in turn refused to work. In this case, and in December when the Government had trouble with teamsters, it was the Engineer-in-Chief who intervened and settled matters amicably for both sides.

The Bundaleer Works was the project of the decade which was the least popular with workmen - and, as we have seen, it therefore provoked the most interest in Parliament. C.S. Mann was again the Resident Engineer, and he brought at least 60 men from the Happy Valley Scheme with him. By the end of 1898 the site had begun to take on the shape of a town - a telephone line had been connected to the house used by the Resident Engineer; three butchers, three bakers and three cool-drink sellers attended to the men's needs; a shoemaker, draper and Doctor's surgery provided other services; the police station consisted of three marquees and a yard; tents were pitched in five neat lines; a cricket club had been formed and the ubiquitous Salvation Army zealot was making his weary trip on a bicycle every Thursday from Jamestown. In 1899 a married men's camp emerged; several boarding houses began operation and a galvanized iron Institute was erected (and used as a schoolroom during the day).

But outward appearances belied the fact that life was not all rosy for the workmen. The sale of liquor was not allowed on the site and the

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[53] See The Adelaide Observer of April 22, 1893.

nearest pub was a good nine miles away - to some this was a dreadful situation. Worse than that, men had to cook their own meals after a hard day's work. As well, the quality of the water was poor and overhead protection was lacking in the water closets. Rain and burning sun, in turn, made sittings unbearable. The men paid sixpence per week for the rent of their tents and the same for a wood supply - only in 1900 did the Department begin to take rent of tents as purchase money. Few eventually ended up owning their tents, although the highest average number employed reached 500 at one stage.

Medical services were not all they were meant to be. Fifty-one cases of typhoid fever from the camp were admitted to the Jamestown Hospital, although Doctor Bennett reported that, "from a sanitary point of view, all is done that can be done for the preservation of good health in the camp."[54] He reported that "if the camp residents were individually as careful of the sanitary conditions of their tents, and exercised as much care in boiling drinking water as they collectively are good hearted and generous in subscribing money to help any of their number who fall on evil times, then Bundaleer would probably be classed as one of the healthiest rural districts."[55] But doctors did not always attend the camps regularly and in late 1902 the men petitioned (through the M.P. Price) for a medical man to be made available at Spalding. Bayer dismissed their request with the statement that medical attendance was adequate.[56]

Worse than that, precautions taken to prevent accidents were negligible. The May 1899 accident in which five were killed and three were injured had been preceded by two warning falls - but no extra precautions were taken to timber the cutting. The Department was very

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[54] C.P.W. 112/02.

[55] Ibid.

[56] C.P.W. 1252/02.

fair in its treatment of the injured — for example a 38 year old man named Wheeler, whose legs were permanently affected by compound fractures, received all he asked for — namely, employment as a Foreman carpenter at Bundaleer at 10/- per day plus settlement of £150 as compensation for the accident.[57] However, another accident in November 1901, in which a ganger was killed and an Inspector lost an arm, proved that there had been no tightening of safety procedures in the interim. The accident was caused through the explosion of gunpowder, dynamite and detonators which the Inspector was holding in a keg. He, a responsible officer, had ignored clause six of Departmental regulations for use of explosives — that is, "no explosives other than those required for immediate use are to be allowed within a hundred yards of the site of any proposed blast on the surface — and a man was killed as a result. Only in November 1900 had such regulations been issued for the guidance of employees using explosives and one can only assume that there had been no consistent effort to ensure that they were heeded.

In 1902 the Department attempted to tighten up arrangements by making certain persons, usually Superintendents/men-in-charge, the only "duly-authorized persons" to use explosives. But other moves militated against any co-ordinated safety programme. For example, in early 1902 when Moncrieff asked the Commissioner of Public Works for permission to stage the usual short (St. John's) course of lectures on "First Aid to the Wounded" at major public works, C.S. Mann and J.W. Jones expressed decided disinterest. Mann, the Resident Engineer, claimed that the distribution of the works at Bundaleer made it hard to get officers and gangers together for such a course, while the Conservator felt that the cost of a fee to a medical officer for lectures and the hire of horses and traps, would not warrant it.[58]

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[57] C.P.W. 1182/99.

[58] C.P.W. 64/02.

Again it was the Engineer-in-Chief, Moncrieff, who displayed the most concern that fair wages would be paid to the men. It was his recommendation to raise the pay of two-horse teams which induced a better supply of drays, although the Government was forced to buy eighteen teams of its own for carting purposes. Then in 1902 he suggested that stone-breaking pay - true relief work - be increased by sixpence per yard, as most men could not earn 6/- a day at the old rate. The Commissioner of Public Works approved such recommendations — recommendations which confirm Moncrieff's interest in the welfare of his men. At its peak period, in 1902, the Department was responsible for an average of 500 men.

The men on the Bundaleer project and Barossa project did share some perks with the officers. All got cheap fares at Easter time and all shared a number of holidays arising from certain unique events — firstly, the Duke of York's visit on July 9 and 10, 1901, and secondly, Coronation Day June 26, 1902. Such were the limits of equality.

The Barossa project had its beginnings in 1899, four months behind Bundaleer, and was much more popular with workmen from the outset. Its Resident Engineer, O.H. Rogers, had a better name than C.S. Mann, and certainly it was closer to the centre of things. Rogers supported any fair request from the men such as their petition for a change in working hours to achieve an earlier finish. This was implemented in May 1901 and the men were able to end their working week at 11.00 a.m. on Saturdays. Safety procedures were no better - individual men were killed in a number of isolated incidents and reports of accidents flowed steadily to Head Office.[59] The worst one took place on September 9, 1899 in the open cut when one ganger (Dunstan) died from an explosion and three were seriously injured.

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[59] See G.R.G. 53/Series 32: Index to letters sent by Resident Engineer, Gawler Waterworks, 1899-02. Accidents are a regular topic of correspondence.

Although their lives were still very much controlled by the Department, the Barossa scheme realized some innovations for the comfort of the workers. The men bought their tents, stretchers, shovels, horse shoes (etc.) at cost price. Better still, they were given the choice of living in tents or in specially designed galvanized iron huts. These huts had iron frameworks and roofs, and their walls were made of canvas. They were no more pleasant in the heat of summer or cold of winter than a tent, but they did include stretchers fitted with wire mattresses, a decided improvement on no mattress at all. Finally, the men were given permission to organise their own dances in the local Institute one night a week.

THE PRODUCT:

The physical output of the Engineer-in-Chief's Department in the years 1888 to 1902 was bound to be substantial simply because the Department was a conglomerate of many Sub-Departments covering a wide variety of activities. Never before and never again would so many disparate functions be loosely bonded together under an Engineer-in-Chief.

Yet it was the Sub-Departments common to the strain of this thesis - namely, those concerned with Waterworks, Water Conservation and Sewerage - which flourished, despite the apparent anonymity of being blanketed under the Engineer-in-Chief's banner. In fact their very efficiency and productivity, despite administrative arrangements, ensured that the Hydraulic Engineer's Department would re-emerge in 1902.

For the Sanitary Engineer's Branch there was the constant task of extending water and sewerage mains as required in the Adelaide area. In the late 1890's new mains were laid from Thorndon Park Reservoir to Eastwood and main sewers were extended through Parkside and Eastwood. By 1892 deep drainage had been extended to Norwood, most of the work being done by the Department as one of the two contractors for excavating

and filling trenches threw up his contract. Many new water services were laid on or old ones renewed as house connections to sewers were made in Norwood and Kensington, then Goodwood and Hyde Park.

As the decade wore on and water supplies to high levels became inadequate the Kensington Pumping Station had to be regularly operated on a double shift. In 1895 the water supply was so inadequate at Malvern and Semaphore that additional mains were laid to Unley, Glen Osmond and Malvern. Semaphore had to wait until water became available from the Happy Valley Reservoir. That project was to be the Department's answer to many problems, in particular the extending drainage system and the dangerously low summer storage of water.

January 1892 saw preparatory work being undertaken by the Department at the site of the proposed Reservoir. Road construction helped to relieve the labour market, then demolition of much of the township of Flagstaff Hill - several houses, cottages, farmsteads, Happy Valley public school and the police station - was taken in hand. A cemetery on the site of the proposed outer slope of the embankment demanded further attention. Disinterment of the bodies and their re-instatement at another site was necessary.

The first contract went to Mr. W.N. Hedges of Mount Barker, for sinking shafts along the line of the inlet tunnel. He soon abandoned the work and Carter, Gummow and Co. obtained the contract in his stead. Influxes of water necessitated much continuous pumping especially when strong artesian springs were encountered. Only the fixing of a powerful Worthington pump enabled operations to go ahead. The tunnel was completed in August 1896. Meanwhile J.T. Leahy carried on the work of driving the outlet tunnel. The water menace was not so bad but the tunnel had to be cement-concrete lined. The contractors for the Clarendon Weir, J. Wishart & Son, were impeded by floods, but they blamed their unsatisfactory progress on an inability to secure the specified stone. The Department

then took over the work, found an excellent facing stone in marble from Macclesfield and completed the culvert, bridges and concrete foundations for the steel main to convey the water to the Inlet Tunnel. H.B. Hawke & Co. supplied intake valves, scour valves, strainers and other ironwork and May Bros. of Gawler supplied and erected the 72" pipes to the Inlet Tunnel and associated cast iron chairs.

The Department's involvement was not limited to playing saviour when contracts failed. Its officers planned and guided all work and carried out the Departmental construction of the Reservoir embankment. For example, surveyor J.H.O. Eaton was responsible for the initial underground alignment and levels of the Inlet Tunnel and G.E.H. Ayliffe for the surface alignment using plummets several pounds in weight suspended on piano wire in each shaft. It was quite a feat - indeed, when the three mile tunnel was completed, the two parties working from both ends met and found the deviation to be less than one inch. C. Pollitt, a draftsman, specially designed and supervised workshop production of twenty hydraulic slide rules. They proved invaluable on the Happy Valley project and well into the twentieth century.

The earthen embankment of the Reservoir, (of selected earth with a clay puddle core), was started in 1892 and the last stone of the paving was laid on the inner slope of the embankment on February 1st, 1897. At the height of the work four locomotives and 83 trucks were used to transport material. Water was first admitted to the Reservoir in August 1896 and Adelaide thereby gained a storage with a capacity over three times as great as that of Thorndon Park and Hope Valley combined. As well a scour tunnel and contour drain (around the Reservoir) provided a protective barrier against inflows of water from the local catchment in which there were established farms and houses. In fact, this scheme was the first in which the Department allowed land for the establishment of filter beds. However, the relatively high-quality water of the Onkaparinga was the

excuse for not proceeding with them.[60] All in all the total cost of the Happy Valley project was £509,000.

The first trunk main from the Reservoir to King William Street, Adelaide, was mild steel rivetted in nature and was manufactured by Mephan Ferguson. When the water was first turned on in October 1896 the pressure throughout the City was immediately increased from 40 lbs to 73 lbs to the square inch. In the following year work began on a reducing tank at Darlington, and by late 1898 a new main had been laid from the tank along Military Road to Semaphore. The pipes, again manufactured by Mephan Ferguson, were experimental in nature - they were the first double locking bar mild steel pipes to be made in South Australia and the first of their kind to be used by the Department for water supply purposes. At last Jervois Bridge could be opened for shipping purpose without interfering with the water supply to the Le Fevre Peninsula side of the Port River.

In its last few years of existence, the Sanitary Engineer's Branch developed a new outlet in order that the low-lying areas of Brompton, Hindmarsh, Carrondown (etc.) could be sewered. As well houses were being connected in Prospect, Evandale, Maylands and Croydon. Sanitary Engineer Bayer did not stop at conventional possibilities. A letter received in 1899 from a representative of the patentees of the new Septic Tank System set his investigations into action.[61] He gained as much information as possible from the author in Melbourne and wrote to the Sydney Metropolitan Board of Works about their experiments at Rockwood with the system. The Board's Chief Engineer co-operated and the Department was thus saved the time and expense of conducting its own experiments from scratch.

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[60] Only in recent years did the Department sell off this land specially acquired last century for filter beds, but never used for any purpose.

[61] E.O. 2775/99.

As the century drew to a close the one area suffering from poor pressure - the high levels of Adelaide - was accorded some relief. In 1899 contracts were let to the Australian Implement Company for supplying and fixing powerful Worthington Pumps and new boiler at Kensington Pumping Station, and for the erection of a chimney stack and additions to the existing engine and boiler house. As well new mains replaced the old pumping mains.

Meanwhile, the Branch of the Conservator of Water, with control of development of the Interior, country water districts and irrigation, was making its presence felt far and wide. In 1889 extensive surveying and investigation was undertaken in order that the Conservator, J.W. Jones, could report fully on a possible Lake Bonney Irrigation scheme. As well he gave a paper to the Royal Commission on the Utilisation of the River Murray waters, urging that settlement be reached with New South Wales and Victoria.

But completion of the Beetaloo scheme was the branch's main concern. For more than two months work stopped pending the arrival of a second contract of cement ~~to arrive~~ from Alsen's Portland Cement Company in Hamburg. However, the headworks were completed in 1890 and visiting former Hydraulic Engineer, O. Brown, pronounced them to be well executed. Two small cracks appeared in the Reservoir but Engineer-in-Chief (Moncrieff) and Brown both reported no danger and little loss of water. Neither could give any conclusive opinion as to the origin of the cracks. Service Reservoirs at Barunga and Paskeville were completed and mainlaying continued by contract as well as Departmentally. By 1891 eighteen townships in the Beetaloo district had been reticulated.

O. Brown's visit ensured that a system of large steel mains would be implemented and the Beetaloo system thereby expanded. In fact it resulted in a system which served country and towns from Port Pirie to Paskeville. By 1896 there were over 500 miles of main fed from Beetaloo Reservoir.

Meanwhile an additional storage reservoir was built at Stirling, another at Nectar Brook for Port Augusta's needs, and a new main laid across the Gulf to Port Augusta West. These projects were by no means minor efforts. The Nectar Brook Reservoir, for example, involved 100 men and 20 teams. A new bore and well ensured a better supply at Gawler and a reservoir and mains were constructed for the Lobethal Water Conservancy Board; a Reservoir was completed at Quorn to be filled from Ingaree and Mount Arden Creeks. Murray Bridge and Renmark Town were provided with pumping schemes and tanks of sufficient elevation to give good pressure. Orroroo gained a supply from local springs, and Hammond water district a small supply by gravitation. As well, numerous minor alterations and additions were made to many other country waterworks, regardless of whether they were specifically under Departmental management or not.

Disturbing features of the Gawler Water Supply and Beetaloo system were by 1897 demanding Departmental intervention. Beetaloo Reservoir had proved incapable of supplyingthe enormous area dependent upon it except in favourable seasons. In fact the Department was forced to resort to measures such as pumping brackish water from River Broughton to country lands and the Peninsula towns. The construction of the Bundaleer Reservoir was mooted as the solution, acting as an adjunct to the Beetaloo system.

Gawler's public water supply was pronounced to be dangerously contaminated and increasingly saline after the Department had arranged for a detailed analysis. The only alternative was to look for another supply - and what better than a reservoir in Yettie Valley to hold South Para water. Thus, for the first time ever the Department was responsible for the construction of two major reservoir projects at the same time.

The Bundaleer Reservoir project began in 1898. The actual reservoir to the North West of Spalding was a conventional earthern dam, fed by Bundaleer, Baderloo and Freshwater Creeks, and the River Broughton through many miles of concrete lined channels. The intake channel to bring in

Freshwater Creek and Broughton River waters was essentially an afterthought and brought the cost to £483,600. The dam was puddled with a clay core, similar to Happy Valley Reservoir, and excellent clay and other materials were found on the spot for all purposes. Both steel pipes, (from Mephan Ferguson's plant), and cast-iron pipes, (from the Government's Glanville Workshops), were employed when reticulation began - firstly, in the connection with the Beetaloo system and then in a system of trunk and reticulation mains and services reaching Redhill, Balaklava, Snowtown, Brinkworth and south of Port Wakefield and adjacent Hundreds.

The Gawler, (or Barossa), Waterworks were started in February 1899 and again were a Departmental enterprise. The actual reservoir, eight miles from Gawler in the valley of Yettie Creek, was essentially an experiment. It was built on a new principle - that is, on a curve against the pressure of the water it was to impound. At the time, at 94 feet, it was the highest arched concrete dam in Australia and it also aroused the interest of bodies overseas such as the Institution of Civil Engineers, London. A new principle was also used when the proportioning of cement, sand, metal and water was done by weight and mixed by hand using long rakes. In turn a 'flying fox' carried the concrete from the mixing shed to the gullet. Time and money were saved - the works were completed well within the estimate of £225,000. By January 1902 the locking-bar steel main connecting the reservoir with the Gawler tank had been laid and was supplying waters to the town in place of the well and pump system. Also, extensions to country lands to the south-west and north-west of Gawler were well underway.

But the Department's responsibilities in the irrigation field also accelerated as the decade progressed. In 1894 the Conservator was requested to inspect the progress of, and give advice to the village settlement experiments on the Murray, although they did not come under the jurisdiction of the Commissioner of Public Works. He reported, then

managed to persuade the Commissioner of Crown Lands to appoint an Inspector of Village Settlements to undertake such work in the future. But there were still the Water Districts and Renmark Irrigation Trust to supervise and various proposals for irrigation schemes from individuals and groups to investigate - namely, Derry, Long and Sando's Mannum Irrigation Colony, Baldina Creek Irrigation scheme, Packard and Lutz's Gawler Plains Irrigation scheme, Kanyaka Creek Irrigation scheme and the Pekina Creek Irrigation scheme. Most of these got no further than the drawing board.

Finally, there was continuouswork to be had developing and supervising works in the Interior, despite Government policy to let as much work by contract and lease as many supplies as possible. At the height of its control of works in the Interior the Department was managing 535 water conservation works within Hundreds and on stock routes and over half were leased.

The major well borings of the period took place in the vicinity of Lake Frome, on the Nullabor Plains and in the Northern Territory River Herbert country. Whenever possible the Conservator investigated his theories re the extent of South Australia's artesian and sub-artesian basins. As well stock routes were developed in all directions - Hawker to the eastern boundary, Marree to Birdsville, Port Augusta to Warburton Ranges, Coward to Parakylia, Oodnadatta to Charlotte Waters, Farina to Haddon and Farina to Innamincka. The major contractors were the Austral-American Boring Company, Kauffmann & Co., J. Bailes, A.R. Johnston and the Intercolonial Boring Company, but in numerous cases the Department was forced to step in and confirm successes or failures. Finally, there were wells and bores along the telegraph line to Darwin to be kept in repair or extended, and Telegraph Department repairing parties in turn, acted as supervisors for such contracts.

Then too, the Conservator's Branch was responsible for assessing numerous applications for water supplies, and determining the nature of assistance granted to promising regions. Thus, for example, the policy developed of building numerous stone cemented tanks in new Hundreds for the storage of rainwater. The West Coast, in particular, benefited by this move. As well numerous supplies in the form of tanks, wells or reservoirs were provided for small populations such as the Wadnaminga goldfields, the Mutooroo Mines and the Tarcoola Goldfields. Another policy was to undertake investigatory borings and sink wells at the request of District Councils and townships - places like Cowell, Cleve, Pinnaroo, Booleroo Centre, Maitland, Franklin Harbour, to name a few, were partially supplied with water by these means. In fact, from 1895 onwards, all Government boring was done by the Engineer-in-Chief's Department only.[62]

The nineties were certainly the heyday of water conservation activity both in terms of the variety and sheer number of projects attempted. The work of other Sub-Departments of the Engineer-in-Chief's Department was much less spectacular and productive. In 1893 the task of extending the South Eastern drainage system was entrusted to the Engineer-in-Chief's Department. It inherited from the Surveyor-General's Department a programme of draining the inland flats by improving the flow of water along natural watercourses. In essence a north-west to south-east trending drainage pattern had evolved, with negligible benefits. The outfalls were too far away and "consequently the fall of the drains was too gradual to produce a moderate flow, let alone a rapid evacuation of floodwater from the high rainfall areas of the south."[63]

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[62] C.P.W. 1313/95.

[63] See Michael William's article, "The Historical Geography of an Artificial Drainage System: the Lower South East of South Australia." Australian Geographical Studies, p. 96. (v.11, Oct. 1964, p.p. 87-102)

Still, the Department constructed the Major Baker's Range Drain in 1897 according to the same pattern and its effect was beneficial. Most of the excavation work was done by petty contract using scoops, drays and barrows. Maintenance work on completed drains was entirely in the hands of local District Councils who were also in a position to request advances for, and construct, District drains with the approval of the Commissioner of Public Works. The South Eastern Drainage Amendment Act of 1900 ushered in a new period which was supposed to take the onus of financial responsibility away from the Government. Still, the Department had to investigate and construct new drains on receipt of a petition from a majority of landowners. By 1903 the Mount Hope Drain was under investigation.

Little time or money was spent in the period on roads outside District Councils - in fact, it was usually one of the Conservator's Inspectors who supervised any such works in his travels. Where River Murray improvements were concerned, the activity was similarly subdued.[64] The S.S. Industry removed snags and spurs and a barrage was placed across Craggs Creek.

As for the rest of the Sub-Departments - Railways, Harbors and Jetties, Defences and Military Roads - their story belongs elsewhere. The common factor in this period was their sharing of a label and a head - the Engineer-in-Chief's Department.

THE PUBLIC:

The reality of the depression ensured that civil servant, worker and public alike would share, to varying degrees, the struggle for survival. The Department was often an unwitting accomplice to the desperate behaviour of the hopeless and the desolate. Between 1894 and

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[64] The limited number of notes accorded to River Murray Improvements for the period in G.R.G. 53/120 : Vol. II : Notes on Waterworks Sewers, Harbors and Jetties confirms this.

1899, numerous premature, newly born and aborted babies arrived at the Sewage Farm via the main sewer and were tossed up by the straining wheel.[65] As well the Reservoirs provided sheltered and practical spots for a number of successful suicides.

But for most people the nineties were a time for co-operation, sharing and searching for solutions. Many ideas were bandied about — some advocated the extension of the Sewage Farm using surplus labour;[66] others, like Mrs. Zadow, (Head of the Working Women's Trades Union), suggested that public baths could be set up in the suburbs with the triple purpose of providing cheap baths for the poor, water (second hand) for unemployed laundresses and for flushing proposed extensions of the deep drainage system.[67] Most agreed that the Government and its agencies should act to alleviate the effects of the depression - the large water-works projects and attempted implementation of irrigation schemes and Village communities were unquestionably accepted as moves in the right direction.

The Engineer-in-Chief's Department was seen to be one of the most important Government agencies because of its potential as an employer, a potential it realized by temporarily employing thousands of men on large Waterworks and minor water conservation and sewer projects. Some even gave up other jobs to work on such schemes. In other ways it was seen to be sharing out opportunities and easing the burden. The extent of its operations meant that the volume and variety of tenders called for increased significantly. Tenders for cartage of goods, repairs to troughs, chaff, meat and bread supplies and so forth, were required all over the Colony. Relevant notices were placed in Post Offices so the chances of successful tendering were open to all.

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[65] See City Coroner's Police Reports 2/12/94, 1/1/96, May 1896, and January-February 1897.

[66] The Advertiser June 2, 1893.

[67] The Observer Feb. 17, 1894.

As well, rates and charges were alleviated where people were found to be in destitute circumstances. Their names were added to a List of Destitute Persons, which unfortunately acted as a social stigma at the same time as it was a blessing. Extensions of time to make rates payments were provided en masse as the depression and drought took their toll. In the Beetaloo Water District alone 350 extensions were granted in 1897 and a record 650 in 1898. In return, and ostensibly in an effort to keep maintenance costs down, the Department urged children, police, and post office employees in the district to report any bursts in mains.

But if the depression fostered a necessary co-operation it also fostered calls for the sharing of the load. Hence the decade saw pleas for nationalisation of water resources and waterworks schemes, assimilation of rates and equal rights to facilities as never before. They had some effect. The guarantee required in all extensions of main was reduced from 12½ to 8% p.a. from January 1, 1889, a move initiated by former Hydraulic Engineer Mestayer; then in 1896 personal guarantees were abolished and interest on guarantee mains were further reduced to five percent. Some assimilation of rates was granted in city, high level and suburban water districts, while certain clusters of country towns - Crystal Brook, Port Germein and Port Augusta, and Mount Gambier and Gawler - were placed on a parallel footing. Vigilance and Water Supply Committees emerged in a number of country areas as locals moved to ensure that attention would be drawn to their particular requirements.

The cries for nationalisation of public water supply schemes were always loudest when major projects were under consideration. For example, the Beetaloo Royal Commission in its travels to towns in the proposed Water District, was repeatedly informed that the scheme would benefit the whole country, so the general public should bear a proportion of any loss. In 1902 one of the largest and most representative deputations from country water districts waited on Premier Jenkins to urge a revision in rating from 4d. to 2d. per acre, but more importantly, they asked for

nationalisation, with equalisation of the burdens.[68] A uniform rate and assessment throughout the State was their aim. The Engineer-in-Chief privately scorned such hopes. He commented that such notions were "so far outside the limit of practical politics that . . . I do not feel it necessary to make any remarks."[69]

There is certainly little evidence to suggest that people feared intervention by, or indeed the monopoly of, Government in the area of water conservation. The two major experiments at community-run water districts under the Water Conservation Act both failed during the decade - and were promptly taken over by the Department. Wilmington Water District was proclaimed on December 26, 1889 and soon made application for a loan . . . in fact by 1892, the total advances made at the advice of the Conservator or Engineer-in-Chief had grown to £10,000. The Board of Management was presented with more than financial problems in mid 1893 when flooding and washaways caused severe damage. All its members promptly retired again, and the Conservator was forced to step in and report on the situation. Finally, when ratepayers failed to form another Board to accept full responsibility, the Department had no option but to abolish the district. In 1894 the first assessment was made and notices issued. Only one individual, a former Board member, alleged bungling, interference and an unwillingness by the Department to relieve the ratepayers of financial problems in order to make the water district a success.[70] For the rest, people were happy to be relieved of the failings associated with the scheme.

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[68] C.P.W. 209/02.

[69] Ibid.

[70] See Letter to Editor, The Advertiser 24/7/93 and E.O. 3627/93.

Lobethal Water District likewise ran into problems. For a start there were petitions for and counter petitions against the proclamation of the Water Conservation District, but interests connected with the South Australian Woollen Factory Co. Ltd. held sway. For a time all went well — the Board put the matter of letting the Reservoir contract in the Engineer-in-Chief's hands and the Government was only too willing to advance monies and buy land for the catchment area.

Then in 1892 the Board began to make complaints about the quality of the Reservoir water. In the following year its Secretary resigned, the Government had to be approached for monetary assistance, and complaints were made about the Department's method of calculating interest on the money advanced for clearing and reticulation. The year 1894 brought problems with the Woollen Company's account, two more Board members resigned and a ratepayer's meeting resolved that the Board should rate the whole district. The Conservator recommended against a further loan to the Board and some ratepayers in the district protested against the Board's efforts to borrow such money. The continual absence of the Governor's representative from the Board's meetings did little to help matters.

By 1897 the financial position demanded urgent attention. Ratepayers urged the Government to wipe off accumulated arrears of interest, reduce the rate of interest and grant a gift of money to lay down larger pipes and enlarge the Reservoir. The Engineer-in-Chief in turn recommended that the Board be suspended. Cabinet readily agreed and from January 1, 1898 onwards all properties abutting on the main were rated at 2/- in the pound on annual value.

Again there was unwillingness by the Board to accept financial responsibility in the face of local opposition and pressures - and again successive Governments had treated the problems with the short term solution of inadequate loans. The two factors combined to ensure another takeover by the Department.

Time and again the Department were forced to recommend Departmental management and the locals, in turn, invariably saw the advantages that such control would bring - namely, relief from accumulated financial problems, an end to petty squabbling within the community and the upgrading and supervision of the water supply in question. Thus, besides taking over the Wilmington and Lobethal districts, the Department included Nectar Brook and Mundallio, Crystal Brook, Tea Tree Gully, Orroroo, (during the time it took to put works in order), Morgan, Palmer, Woolshed Flat and Peak Springs waterworks in its sphere of interest. The primacy of the central Government and its agencies as against successful administration by local organisations - a development peculiar to South Australia - was reiterated by communities only too ready to be bailed out of their problems.

The only danger in such a set-up was that the Department could be apathetic in its dealings with, and unwilling to listen to, the needs of communities under its control. Such was the criticism levelled at the Department by two areas which had long been under its management - namely Port Augusta and Port Pirie.

For Port Augusta people the years of drought simply highlighted the inadequate state of existing arrangements. A large public meeting was held on December 27, 1895, only to be repeated on November 13 of the following year as nothing had been gained. Speakers emphatically denounced the apathy of the Department. In Port Augusta itself the Davenport Reservoir was commonly known as "The Bottomless Pit." Yet the people had no objections to management by the Department - this was made quite clear in evidence given by landowners Pryor, Adamson and Grunicke (and others) before the 1902 Select Committee of the Legislative Council on Waterworks. Indeed, Port Augusta was one of the Department's most unprofitable ventures, so locals were not ready to advocate local control. What they did object to was the fact that there was no reserve to fall back on in time of

drought. The Department would not utilize such remedies as that of taking floodwaters into existing Reservoirs and yet it compelled payment for water it could not supply consistently.

Deputations, a series of public meetings and the reduction of spring water supplies in 1897 beyond any previous record, combined to ensure that the Department did construct an extra storage - the Nectar Brook Reservoir. But it, too, became dry in its first few seasons and the assurance from long and lanky Superintendent Sykes that there was "ample storage if rain came" was deemed a futile excuse for the Department's unwillingness to implement remedies before the crisis. Likewise a quick day-trip by the Sanitary Engineer to the town to assess the situation in October 1902 left local Councillors seething - they had been given virtually no warning of his trip and Bayer's comment that they "might be worse off" only added salt to the wounds.[71]

Likewise Port Pirie people were convinced that "there is not, and never was, any need for Port Pirie to be short of water if only a little common sense had been available in the Waterworks Department."[72] Throughout the decade local J.P., N. Simons, had consistently proposed ways of utilizing Baroota Creek waters and springs. When at last the Department was forced to implement this supply many concluded that "unless any scheme had been hatched under the supervision of the Department it was likely to be looked on as no good and merely a fad."[73] But again, there was no talk of rejecting Departmental management. Indeed, during a visit by the Conservator and Resident Engineer T.A. Hicks in July 1898, local officials were only too ready to agree that "a Government expert should

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[71] Port Augusta Dispatch, October 17, 1902.

[72] The Register, March 21, 1900: "Water Supply on Flinders Ranges".

[73] The Register, July 7, 1898: "Port Pirie Water Supply".

be the best authority in the matter" and that the matter was best left "entirely in the hands of the Department if they can give . . . assurance."[74] Although Simons got little direct praise from the Department the locals were pleased to see that the Governor, at least, acknowledged his efforts by forwarding him a copy of his father's poems. The Governor was Lord Tennyson and his father the eminent English Poet.

The run of dry years and associated complaints did in fact create something of a defensive attitude within the Department. In 1892 Cabinet approved the Engineer-in-Chief's recommendation that a free water supply for building purposes be discontinued. Between 1896 and 1899 it was forced to introduce intermittent periods of restriction on garden watering in the Adelaide Water District, and the high level areas were hardest hit of all. The same years saw the imposition of severe increases in water prices in the Beetaloo Water District to ensure that the limited supplies there would hold out. In fact, by 1898 the water supply to the southern towns in the district were cut completely and Port Pirie alone remained supplied because of its industrial status.

Naturally the Department was a target for much criticism and in turn the Engineer-in-Chief became very careful about drafting memos to newspapers about the state of water supplies. He went further when he issued a directive insisting that in future, Departmental information should not be given to outsiders.[75] It was quite likely observed all down the line, if the following case is any example. When a reporter of the Port Pirie Advocate questioned McClintock, the foreman in charge of an emergency well-boring at the town, about the prospects of the venture, he found him to be "as close as an oyster." In fact "he prefers all press information

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[74] The Register, July 9, 1898: "Our water supply".

[75] E.O. 5182/98.

to be sifted through the Adelaide office" wrote the reporter.[76]

The newspapers did have bones to pick with the Department, but by the end of the century they were rallying support for the plight of public servants in general. In 1897 The Register was even prepared to state that the Civil Service was thoroughly shorn of any privileges that it might have possessed.[77] "Beetaloo Blunders" continued to aggravate conservative and liberal press alike and the Bundaleer scheme replaced it in the latter 1890's as the "costly bungle". Yet only in the field of developmental water conservation were officers of the Department seen to "have given cause for disappointment" and only then because the "Department /Was/ not allowed to practice continuity in its schemes or follow a course of action systematically."[78] Moncrieff, Bayer and Jones remained uncontroversial figures throughout the period and the rearrangement of the Departments in 1902 received only the slightest attention.

It was in fact the large reservoir projects completed by the Department during the decade which did most for its public image. They received the most favourable press coverage of all. At various stages the Happy Valley Works were visited by representatives of the City Council, Suburban Corporations, South Australian Cement Company, Chamber of Manufacturers and so on, and all were given guided tours by Sanitary Engineer Bayer. Some visitors, such as members of the Architects and Builders Association, were prepared to take on the Happy Valley Cricket Club, which was earning itself quite a reputation. The 1894 decision to set aside ground for picnic parties gave many groups and families the opportunity to appreciate the works and it early proved to be a popular spot.

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[76] Port Pirie Advocate, April 18, 1898. Article entitled "The Bore, Water struck at 420 feet."

[77] The Register, August 12, 1897.

[78] The Observer's leading article "Public Works and Water Conservation" Dec. 12, 1896.

On July 27, 1895, the Department organized an official party to watch the firing of the last shot which would remove the final barrier of rock in the outlet tunnel. One of the Leahy Bros., the contractors, did the honours, and newspaper reporters were on hand to note the proceedings. After the event, we are told, toasts were drunk, and apparently tongues were loosened as well. Messrs. Mann, Reed andthe two Leahys broke into song, and Charlie Bayer followed with a "clever ventriloquial effort".[79]

By June 1896, the papers had nothing but praise for the achievement. The opening of the Inlet Tunnel provoked cries of "a great engineering success" and of "convincing proof of the skills of the Civil Servants who have directed the work".[80] The opening ceremony on August 7 was accorded a lengthy coverage. Nearly 300 people responded to the invitation and N.S. Davidson, (Inspector General of Public Works in Victoria), was a special guest. His Excellency the Governor pronounced the works open and local school children burst into a well-rehearsed "Song of Australia". The Engineer-in-Chief followed with a speech which revealed "a pardonable pride in the efficiency of the Department."[81] It also revealed a man of sensitivity, for he did not forget to remember the relatives of those workmen who had met with fatal accidents.

The newspapers displayed the same readiness to record the progress of the Bundaleer and Barossa schemes. When Bundaleer was dogged by a number of serious accidents, the papers readily promoted the establishment of a "Bundaleer Accident Fund" in Adelaide to assist the victims. The Barossa Waterworks were less controversial and closer to home. It was

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[79] The Observer, July 27, 1895 gives these details.

[80] The Observer, June 13, 1896.

[81] The Observer, August 15, 1896.

described as a "model camp" because of its general tidiness and the various innovations made in living conditions. Again any visitors to the site — such as members of the South Australian Institute of Surveyors and students of the School of Mines — were accorded every attention, this time by the Resident Engineer, O. Rogers, and the papers readily acknowledged this courtesy.

Where relations with Corporations and District Councils were concerned there was only one major area in which consistent antagonism prevailed - namely, the Department's handling of pollution issues.

The Central Board of Health continued its watchdog role of the previous decade. In 1889 a combined inspection of the Torrens watershed by officers of the Board and the Hydraulic Engineer's Department revealed "shocking conditions" which stirred the Department to some degree of action. But the Board's Inspectors continued to regularly report contaminating conditions as the decade wore on . . . and nothing came of the suggestion that the sanitary control of the watershed be placed in the hands of the Central Board of Health through the introduction of a Bill to that effect.[82]

In 1902 the City Corporation at last felt compelled to act. Its Medical Officer, (Borthwick), reported a large number of random typhoid cases between 1899 and 1901 whose origin it was impossible to trace; Ballantyne and Mitton, (two Inspectors employed by the City Corporation), had just produced particularly damaging reports on the cleanliness of the watershed areas after completing detailed inspections of them; and finally, public complaints about the taste, odour and colour of the water supply were being received by City Corporation, newspapers and Sanitary Engineer's Department at Kent Town as never before. The adequacy of Departmental supervision was the issue at stake.

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[82] See C.S.O. 1361/89, E.O. 4015/89, E.O. 4482/89.

Lewis Cohen, the then Mayor of Adelaide was successful in his bid to have the pollution of the watersheds investigated. The Government readily granted a Board of Inquiry[83] in March 1902 and its members were Cohen, Engineer-in-Chief (Moncrieff) and Chairman, Dr. W. Ramsey Smith. They proceeded to hold 25 sittings and examine 24 witnesses - the Sanitary Engineer Bayer most thoroughly, and the Government Geologist, Government Analyst, members and employees of the Central Board of Health, Doctors, Professors and others much less intensely. In fact, Engineer-in-Chief (Moncrieff) gave a fine display of open mindedness throughout, and it was Bayer who was left to account for the adequacy of Departmental inspection. Cohen in particular, questioned him lengthily and was able to show that the Sanitary Engineer was quite hazy as to where the powers of his patroller and of the Local Boards of Health began and ended.[84] Rather grudgingly he was forced to concede that better arrangements could be made, as were in fact suggested by the Engineer-in-Chief as far back as 1892.[85] It became clear, as well, that the City Council had not bothered to forward reports made by its Inspectors (on the pollution of the watersheds) to Bayer to aid his assessment of the situation.[86] Co-operation had obviously been dismal all round. The Inquiry simply provided the venue for some civilized mud-slinging!

The Adelaide Water Supply Inquiry Board was interestingly enough, no isolated phenomenon. Similar investigations had been taking place in America and England. In particular a Board of Inquiry in England in 1901

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[83] C.S.O. 275/02.

[84] See Books of Evidence of Water Supply Inquiry Board of 1902: (They are in E.W.S. Department's possession.) In particular, questions and answers Nos. 73-75.

[85] Ibid: See questions and answers Nos. 467-469.

[86] Ibid: Questions and answers Nos. 546-555.

imposed far-reaching conditions for the protection of the water supply of London - and witnesses and Board members at the Adelaide Inquiry were not slow to quote its findings and recommendations. When the Board reported in February 1903 many of its recommendations were far-reaching.[87] They suggested that the Government introduce a Bill to place sanitary control of the watersheds under the Central Board of Health (in line with the October, 1889 resolution of that body); they recommended a far-reaching and explicit "Watersheds Protection Act" and compulsory purchase of any premises which by virtue of their position could not but pollute water in the creeks; they advocated the continuation of regular chemical analyses and the implementation of regular bacteriological and biological microscopical examinations of reservoir and tap waters; and finally they recommended the institution of laboratory experiments to determine if any form of filtration or water treatment would free Adelaide's water of its objectionable features. Quite masterly! And yet, the report was almost immediately forgotten. Not even one or two of those major recommendations was implemented. Reality had been faced, and in turn denied.

Other local government bodies in country areas were expressing similar concern. Only after the Port Pirie Corporation passed a resolution concerning the "impure conditions of water supplied to Port Pirie"[88] did the Conservator have a filter placed between Nelshaby Reservoir and the town. In 1900 that same body complained about the effect of the rabbit menace on the Beetaloo catchment area - the lessee of part of the catchment area was leaving poisoned rabbits unburied. But in fact, the official lessee was the Conservator of Forests, for in 1891 the Commissioner of

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[87] P.P. No. 65 of 1903: Report of Adelaide Water Supply Inquiry Board.

[88] E.O. 177/97.

Waterworks had agreed to lease the area for grazing purposes only, in perpetuity, at an annual rental of one peppercorn![89]

Likewise, the District Council of Port Germein drew the Department's attention to the desirability of fencing the Baroota Creek water reserve with wire netting to prevent pollution of the water supply by innumerable dead rabbits.[90] Hicks, the Resident Engineer, in turn claimed that no fence would be necessary if the Council would only get the lessee to bury or remove the carcasses. The Council retorted with the statement that such action would be impossible to police. Eventually the Conservator of Water intervened by recommending wire netting to show that the Department was prepared to act. However, he noted: "But this is not enough. Either the Department or the Board of Health must require the occupiers of land to remove the dead rabbits by burning or otherwise."[91] The overlap of powers remained and the powers were limited. The Waterworks Department could act under Section 62 of the Waterworks Act of 1882 and Local Boards could act under Sections 46, 75, 90 and 91 of Health Act of 1898. No wonder such cases only aggravated tempers on both sides!

There were a number of lesser matters which created tension between the Department and particular Corporations. The City Corporation was none too pleased to have all troughs and fountains, (taken over by the Department in 1881), handed back just when strict economy was the order of the day.[92] From 1894 onwards it was forced to pay for all repairs to water troughs, drinking fountains and new services thereto. Then in 1900 free water for any purpose whatsoever was denied to all suburban and country local government authorities - only the City and Port Adelaide Corporations retained free supplies for public purposes, as laid down in the original

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[89] E.O. 1791/91.

[90] C.P.W. 81/02.

[91] Ibid.

[92] E.O. 5542/94.

Acts. In that same year the City and Thebarton Corporations became distressed about another matter. They earnestly petitioned Parliament against the proposed renewal of the lease of the Sewer Yards at Thebarton on the grounds that the "public is shut out of land specially reserved for use of the public."[93] But the Department felt there was every reason to use the site, and so the Commissioner of Public Works promised the Corporations that the ground would be beautified. In due course the Department erected a new picket fence and planted a cypressus hedge. The Corporations had to be content.

For the rest of the time Councils and Corporations were content to display their displeasure by organising memorials for reductions in rates. Some, like Gawler Corporation went one step further in an attempt to win the local power play. In 1893 they staked their claim for compensation for land on which the waterworks were built by erecting a fence through the Pumping Station Yard and keeping Waterworks men off the reclaimed portion. But the Crown Solicitor and Attorney General ruled that the land belonged to the Commissioner of Waterworks and the Department's men promptly pulled down the fence. The Corporation also cut down a tree on the Waterworks land but the Department naturally could do little about its fate. An ironic twist was that they were only too ready to urge Departmental supervision of the irrigation scheme proposed by Packard and Lutz. It never eventuated.

Relations between the Department and Fire Brigade were far from healthy. In 1888 a new and somewhat bombastic Superintendent, (Booker), urged the Fire Brigade Board to complain about the inadequacy of the water supply to the city area for fire fighting. He suggested specific sites for additional pillar hydrants and the laying of larger mains. Sanitary

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[93] See Petitions Nos. 43 and 49, Parliamentary Papers of 1900.

Engineer Bayer in turn made some token alteration in Vincent Street, Port Adelaide, but refused to go to the expense of following up Booker's suggestions regarding the city area.[94]

The next major scene of conflict was Port Pirie, for hydrants had been erected there in 1898. In that same year Booker registered his disgust at the lack of water pressure and the Department retaliated in turn. The Resident Engineer complained that Fire Brigade employees closed a fireplug too rapidly and thereby increased the pressure of water to such an extent that a main burst in Florence Street. This, he claimed, also happened after most fires had been fought. Booker declined responsibility but was rapped over the knuckles by his Board, who had received a warning from an irate Commissioner of Public Works - if the men did not exercise greater care in closing the valves they would be forbidden to use them except in the case of fire.[95] Booker remembered the insults and bided his time. The Fire Underwriter's Association gave him some moral support when they expressed dissatisfaction with the fireplugs at Pirie.

Relations with other Departments in the period were on the whole amicable, for if ever there was a time for co-operation and support amongst civil servants, it was during the depression. Moncrieff's position as dual head of so many Departments did much to ensure the co-operation of Railways and other Sub-Departments. Indeed, public waterworks schemes at Morgan, Murray Bridge, Quorn and Gladstone were only possible because acceptable agreements had been reached between the Railways Commissioner, the relative District Councils, and the Waterworks Department.

At times there was hostility in dealings with the Superintendent of Public Buildings. Naturally, spheres of interest often overlapped, as

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[94] C.P.W. 689/88.

[95] E.O. 4124/97 and C.S.O. 976/97.

when Superintendent Gunner drew Bayer's attention to the fact that the state of water in mains of most Government buildings and institutions was apalling and the health of inmates in danger. He blamed the Superintendent of Public Buildings "who either does not consider it necessary or objects to the amount of water being consumed that is necessary for this purpose, /namely, flushing and scouring/, and consequently charged to his Department."[96] Bayer, in turn, wrote to the Superintendent of Public Buildings, drew attention to obsolete fire plugs at the Lunatic Asylum and mentioned that he had a sample of the mains water which looked "more like a bottle of chutney than anything else."[97] Regular flushing was eventually implemented but the Clerk of Works, (Adelaide District), in the Public Buildings Department recommended against the expense of laying larger mains and resetting fire plugs. No doubt his Department was annoyed that all State and Government buildings were subject to assessment and rating for sewerage purposes as from 1902 - just so the Hydraulic Engineer's bookkeeping would look healthier on paper.

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The period 1888 to 1902 then, was anything but easy and lighthearted for South Australians. The realities of drought and depression pervaded all else. Honesty, co-operation, and above all, a spirit of resourcefulness were needed as never before. State services like water supply, water conservation and sewerage were a prime target for imaginative politicians and citizens alike, for they appeared to solve many problems at the one stroke - unemployment, water shortages, development of the Colony's rural potential and so on.

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[96] E.O. 4329/93.

[97] Ibid.

For the politicians it was time to face the realization that the Colony's problems demanded responsible intervention. Thus, where questions of irrigation, water conservation and waterworks were concerned, they involved themselves in the investigation and decision-making processes as never before. They organized Royal Commissions, Select Committees, visiting experts, experimental bores, relief works and their own River Murray utilization policies - often with scant regard of Departmental Heads and Departmental recommendations. In fact the period saw sixteen relevant Royal Commissions, Select Committees and inquiries into water supply, irrigation and the civil service alone . . . not to mention those to do with South-East Drainage, Railways and other matters impinging on the Engineer-in-Chief's Department. They found that stable alliances in Parliament - the advent of political parties - provided for longer Governments and smoother implementation and control of such policies. As well, the Legislative Council showed that if it was going to co-operate about anything in the decade it would be on matters of water conservation and waterworks construction.

Then there was the steady realisation that the State's workmen deserved some protection from the hardships of depression - adequate wages, working conditions, compensation and the availability of employment were discussed in Parliament as never before. The alliances on such issues were predictable, but the depression remained an excuse for failure to implement many of them. Likewise there was a growing realisation that the State's civil servants deserved some security and a say in arrangements. Again the politicians investigated via Royal Commissions and the solutions were far from radical - a classification of all civil servants was achieved and the eventual re-organisation of some Departmental structures, such as the breaking up of the massive, unwieldly, Engineer-in-Chief's Department.

The Engineer-in-Chief's Department was directly affected by or involved in these efforts to grapple with realities. But it was headed by a capable administrator in the shape of A.B. Moncrieff, even if the conglomerate of functions he supervised did not sit well together. They managed remarkably well, largely because the years of depression and drought determined priorities which no-one could question. The Superintending Surveyor's Branch, Sanitary Engineer's Branch and Conservator of Water's Branch proved their capabilities as they continuously and urgently examined, implemented and extended projects to avoid disaster. For them constant vigilance was the key to facing reality.

The public of the period was an only too-willing recipient of such services and projects for survival. They showed themselves to be little interested in local attempts at organization. The ever-spiralling demand for Departmental intervention, advice and services was a confirmation of their trust in the fairness and credibility of central control. It was no blind trust - there were areas of Departmental operations which were obviously lax and insensitive and warranted criticism. The apparent lack of concern for the safety of men on large Public Works projects and the lackadaisical control of major watersheds were two such failings.

The Colony weathered the misfortunes of the nineties. Public waterworks and water conservation schemes played a major role in this survival process — the completion of four major reservoirs, numerous individual country water supply schemes and hundreds of water conservation works in the interior speak for themselves. The failures - many irrigation schemes on paper and a number of Water Conservation Districts in practice, the abandoned bores, the long periods of water restrictions in some areas - were the products of over-zealous intervention, experimentation and urgency. Certainly the Colony faced statehood and the twentieth century armed with a wealth of experience in the art of survival.

CHAPTER VI: CONFLICTS : 1902-1924

The Departments concerned with water resources, sewers and engineering in the years 1902 to 1924 found themselves involved in, or affected by, a series of conflicts - conflicts created by the emergence of distinct political parties, stronger unions, the worst drought years ever seen in South Australia, new systems and advances in the hands of old public servants, and some by confrontation with irate sections of the community. Many were resolved, if only temporarily. All left their mark ...

POLITICS:

The century opened calmly enough with the Jenkins administration still in power. The Public Service Association was placated by the Public Service Superannuation Act passed at the end of 1902; the Hydraulic Engineer's successful septic tank experiment at Gawler Railway Station and a favourable poll of ratepayers ensured the easy Parliamentary passage of an Act designed to sewer Glenelg; and South Australia's representative had held his ground at the Inter-State Royal Commission on the River Murray. In fact the South Australian Parliament showed its determination to act on the Murray question by passing a Murray Barrage Act - the site of which, (across Mundoo channel, Boundary Creek and the channels between Reedy Island and Pelican Point) had originally been suggested by Water Conservation Department officials in 1887.

But other moves by the Jenkins Government were soon to provoke the seeds of conflict. In 1903 a Legislative Council Select Committee of the previous session was elevated to the status of a Royal Commission with the task of reporting on the Bundaleer, Port Augusta, Barossa and other works.[1] Some new and interesting information came to light, such

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[1] P.P. no 23 of 1903: Report of Waterworks Commission.

as the report of a Public Works Officer (J. Bakewell) who had just returned from a trip investigating water conservation and irrigation in India. Ultimately some of the findings of the Commission - the smallness of metropolitan mains, the defective water supply to shipping at Port Adelaide and the inadequacy of Port Augusta's water supply - prompted remedial action by the Hydraulic Engineer's Department.

The major findings were in effect an indictment of the value, design and execution of all the major water works projects of the previous decade. The Barossa dam was criticized for its smallness, concrete wall and arch principle and for not being placed on a nearby site as originally suggested by J. Martin. The Bundaleer scheme was labelled "a great mistake" as estimates of the annual water supply able to be stored had never been realized - yet the Commissioners recommended consideration of two schemes for an increased supply to Port Augusta from the River Broughton, in the very same catchment area. The Beetaloo and Port Augusta schemes were criticized on account of the expense involved, but, in the next breath, the construction of a dam across Pekina Creek and large reserviors to store water for irrigation purposes were advocated. Likewise criticism was generated at the Glanville pipe works, the cost of boring in South Australia and the Departmental practice of building dams off-stream. Interstate and overseas information was used to argue against these peculiarly South Australian practices. Although four of the eight Commissioners dissented from one or more of the findings the damage was done. Commissioner of Public Works, Foster, was left to lamely affirm his "full confidence in the ability and integrity of the officers of the Department concerned ..."[2]

Other conflicts were brewing. In early 1904, A.B. Moncrieff, the

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[2] P.P. no 29 of 1903: Report of Public Works Department for year ending June 30, 1903, p. 7.

Engineer-in-Chief and Chairman of the Public Service Association, headed a deputation to Premier Jenkins primarily concerned with the Public Officers Retirement Act passed in 1903. He urged the Government to retain some of the 70 year old officers thereby affected for an additional twelve months to permit members time to apply for the positions to be rendered vacant. He also urged that the Government grant leave of absence to Provisional and Temporary Officers, as well as those on the fixed list as many of them were not entitled to retiring allowances. Another point remained in dispute - namely, whether or not a daily paid man was a "provisional" and "temporary" servant and thereby entitled to long service leave. Jenkins declined to alter the existing policies.

Later in 1904 Jenkins resigned and R. Butler took over a ministry which was becoming more conservative. His administration ran an economy drive which won little support from retrenched public servants and unemployed day labourers. Even those "pro" and temporary officers in the Engineer-in-Chief and Hydraulic Engineer's Departments who were entitled to increases for 1903-1904 under the Departmental classification, did not receive them. Little wonder then that the mid-1905 election brought an alternative Government to power. In fact Labor Party numbers in Parliament increased from five to fifteen and after negotiations with Peake's band of Liberals, Thomas Price became Premier of a coalition Government, and Commissioner of Public Works to boot.

There were four major changes to Departmental arrangements and programmes during the four year reign of the coalition Government. A cautious Public Works programme was undertaken - it included boring for water in the new Hundreds ahead of settlers; the acquisition of a vertical pipe plant from England for the Glanville shops, (Superintendent W. Slade died on his way back with it); the beginnings of a major new drain-construction scheme in the South-East to be executed by the Engineer-in-

Chief's Department; and the inception of an Irrigation and Reclamation Department under the Commissioner of Crown Lands. The concept of a minimum wage of seven shillings a day was applied to the Civil Service and all daily paids working for the Government. Conflict lay in other directions.

It was the River Murray question which largely occupied the energies of the Government. In fact it was the one issue on which the Opposition ranks, (led by R. Butler), gave their full support. From 1904 onwards, the Government had engaged the services of P.McM.Glynn, Isaacs and Sir Josiah Symon to prepare a legal case against the upper States. However, a negotiated settlement was uppermost in Price's mind. A string of Conferences were held between 1903 to 1908 and a series of bills was introduced into the various State legislatures to ratify the agreements reached at them. In S.A. The Murray River Waters Bill never got beyond its second reading in either the 1907 or 1908 sessions. As soon as the bills struck trouble in the Victorian Government, (where the fear was that too much water would be conceded to S.A.), the South Australian politicians backed down. Still, both Governement and Opposition were pleased to see each other co-operating over the issue. No-one seemed to mind that the debates relied heavily on lyrical inspiration rather than factual information. Price even quoted from Isaiah:

> ... for in the wilderness shall waters break out and streams in the desert. And the parched ground shall become a pool, and the thirsty land springs of water! There shall be grass with reeds and rushes and a highway shall be there, and a way.[3]

But if there was a way, it was not apparent in 1908. Rather, South Australian anger reached a peak when the Bent Government in Victoria not only failed to have the Bill ratified, but referred the matter to a

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[3] Parliamentary Debates of 1907: House of Assembly, July 25 debate on Murray River Waters Bill.

Select Committee. A Royal Commission emerged out of that Select Committee and its report of March 1910 revealed a further stiffening of the Victorian attitude. It argued again that irrigation, rather than navigation, had to be paramount, with Victoria and New South Wales sharing four-fifths of the water and South Australia taking the remainder. The South Australians countered with their own report, the result of an investigation carried out by the former Victorian Engineer-in-Chief, Stuart Murray, of all people. South Australia's own Engineer-in-Chief, Moncrieff, had apparently lost his right to hold an opinion on the matter when he "very respectfully suggest[ed] that the whole question of apportionment [was] one of compromise, and the sufficiency or otherwise of the quantity ... a matter of policy".[4] Anyway, he was appointed Railways Commissioner in June 1909, and Graham Stewart, (former Superintending Surveyor), became the first Australian-born Engineer-in-chief in his stead.

Stuart Murray's 1910 Report,[5] commissioned by the 1909 Peake Government, saw no opposition between irrigation and navigation. In that same year the Verran Labor Government came to power, unrestrained by coalition, after having defeated the first concerted effort by the three Liberal/Conservative parties to pool candidates and resources. The Verran Government was, if anything, firmer in the South Australian resolve to win the Murray conflict at any cost. The recommendations of the Victorian Royal Commission were definitely unacceptable, and instead, the Government easily pushed through a Murray Works Construction Act, enabling it to proceed alone. Finance was limited to the cost of building one navigation weir and lock and the Lake Victoria Works. Verran proposed to send the Engineer-in-Chief to England to find a Locks Engineer, but some members urged the Government

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[4] See P.P. no 93 of 1908: 'Quantity of Water Available for S.A. after locking ...'

[5] P.P. no 29 of 1910

to let Stewart get on with the first lock and not lose time waiting for an expert. Panic was in the air.

While Stewart was off on his jaunt the South Australian Government tried once again the old game of negotiation. This time, January 1911, at a conference of Premiers in Melbourne, some progress was made. New South Wales and Victoria agreed to give permission to South Australia to construct, use and enjoy storage works at Lake Victoria, and, more importantly, the conference instructed the Engineers of the three States to make specific recommendations by December 1911 to form a basis for a permanent settlement between them.

Accordingly, extensive investigations were undertaken and at last the engineers reported on July 24, 1913. In the House of Assembly on September 2 Smeaton praised the stand taken by the Engineer-in-Chief, Stewart, at the Conference of Engineers, saying that"a weaker man would have given way before the very peculiar views expressed by the engineers of the other States". State chauvinism was still alive and well. However in April 1914, a conference between the Premiers and Prime Minister (Joseph Cook), largely brought about by the good offices of P. McM. Glynn, (a South Australian Minister in the Federal Cabinet), achieved basic agreement.

The document signed provided for a Commission of four Members, one representing each Government, to administer the River Murray Waters Agreement thereafter. The agreement of all four members was necessary before action could be taken. The main part of the Agreement provided for construction of storages on the upper Murray and at Lake Victoria as well as for locking of the Murray to Echuca, and the Murrumbidgee to Hay. Works on the Murray up stream to Wentworth were South Australia's province and they were to begin as soon as possible. The State was also allocated a monthly provision for domestic and stock use, losses by

evaporation in Lake Victoria and in lockage, and 67000 acre feet per month for nine months for irrigation purposes - a total of 1,254,000 acre feet in all. How vital this reasonable compromise would be to South Australia's future!

But the existence of the Agreement did not automatically mean the absence of serious conflict among the participating States. Murray waters did not, as is often thought, flow smoothly and freely between 1914 and the Chowilla crisis of the late 1960's.[6] To begin with ratifying Acts were not passed until late in 1915 and did not become effective until January, 1917. In South Australia the Engineer-in-Chief's Department began the construction of lock and weir No. 1 even before the Agreement came into operation. As well, its plans for Lake Victoria and the overall scheme of locks were only approved by the River Murray Commission at the end of 1918.

The Engineer-in-Chief's visit overseas led to the employment of Captain E.N. Johnston of the U.S. Army Corps of Engineers, to design and prepare all lock/weir plans, report on possible improvements to the Murray Mouth region and on the best site for a harbour to serve the River Murray Valley. In actual fact all but one of the lock sites he chose were utilized. Even crusty old river Captain and Parliamentarian Ritchie had to admit he was impressed with the man's grasp of the situation.[7] Johnston in turn recommended the American Engineer, R.C. Cutting (who had experience on the construction of locks on the River Ohio) as the best man to take charge of the actual lock construction work. He was hired.

However, by 1918 New South Wales and Victoria had only just selected the site for the upper Murray storage, and as late as May 1919, had not

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[6]This theory is clearly spelt out by D.I. WRIGHT IN his "River Murray - A Continuing Debate" article in Journal of Australasian Historical Society, Sept. 1975, Vol. 61, pt. 3, p.p. 165-184.

[7]Parliamentary Debates of 1913: See Aug. 19, House of Assembly debate on Lake Victoria Agreement Bill.

had any plans approved by the River Murray Commission. By May, 1920, although work had started on the Hume Dam and Torrumbarry Weir, the Commonwealth Government was eager to push on more quickly with post-war development. At conferences in May and July, 1920 it gained consent for a number of important amendments - the Commonwealth would pay a quarter of the total cost; the River Murray Commission would become the constructing authority instead of the States, with power to construct and initiate works and to control employment on Murray projects; the agreement of three, rather than all four Members of the River Murray Commission would be sufficient to allow action to proceed. Unfortunately the New South Wales Parliament refused to ratify this last element.

The early twenties saw growing hostility in New South Wales and Victoria towards the Agreement. Both States were anxious to delete all works which did not aid irrigation. Certainly new border railways had made navigation even less necessary than before. As well both desired to implement sections 45 to 51 of the Agreement. Such action would have limited the volume of water to be passed down to South Australia, even though the various works were hardly begun, let alone finished. They wished also to discuss the enlargement and adaptation of the Hume Dam for hydro-electric power works.

This made for bitter argument and incessant conflict at a conference held in Melbourne in May, 1923. The Commonwealth firmly supported South Australia in refusing to allow any clear departure from the terms of the main agreement. However, they eventually conceded that works for irrigation, or for irrigation and navigation jointly, should take precedence over those purely for navigation. But they did insist on an extended period of time after implementation of the Agreement before sections 45 to 51 could be implemented, and South Australia given a reduced volume of water. The upper States refused to give greater control to the River Murray Commission,

(so all State Governments continued their own construction works), and all agreed that the Commonwealth Government should pay a full quarter share of the cost of the scheme. Ratifying Acts were passed by the various parliaments and again serious conflicts had been resolved by the skin of their teeth.

Meanwhile back in South Australia there were conflicts arising which directly concerned the performance of Departmental officials. A poll of landowners in the South-East, taken as required by the 1908 South-Eastern Drainage Scheme Act, gave endorsement to a scheme prepared by Engineer-in-Chief Moncrieff. However, it was the Superintending Surveyor, Graham Stewart, who sat on the Drainage Assessment Board and when he became Engineer-in-Chief in 1909 his opinions on the subject of new drains for the South-East were seen to conflict with the proposals advocated by Moncrieff. He instigated a careful preliminary survey which revealed the inadequacy of Moncrieff's original survey and led him to recommend new positions for the proposed drains. The Government accepted his recommendations despite the increased cost involved and Parliament likewise "submitted to expert departmental knowledge"[8] when it passed the enabling Act in 1910. In the South East itself conflicts relating to the implementation and administration of the scheme were not to be solved so fortuitously.

The Verran Labor Government of 1910-1912 was dogged by conflict throughout its existence, particularly when it moved to implement policies on labour issues. For example, the many battles against the intransigent Legislative Council over worker's compensation and industrial arbitration proved futile, but they were genuine attempts to give heed to the claims of unified working men. The Australian Workers' Union and the growing United Labourer's Union, (the voice of Public Works labourers, railway

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[8] Parliamentary Debates of 1910: A.H. Peake's comment, Nov. 30 House of Assembly Debate on South Eastern Drainage Scheme.

navvies and the like), saw little reason to avoid conflict. As such, these years saw the emergence of employer-employee conflict and the use of the strike to ensure attention to claims as never before. Public Works Departments were regularly affected, come Labor or Liberal Governments to power. Just how Governments and Departmental officials reacted to their workmen was henceforth an important element in the success of the task at hand.

In 1912 the Liberal Union was successful at the polls and Labor's short reign was over. Unfortunately, neither the new (Peake) administration nor certain Departmental officials were prepared to learn the art of avoiding conflict with Government labourers. Commissioner of Public Works, (R. Butler), let it be known that the men on the Deep Drainage Scheme at Port Adelaide were doing twenty to twenty-five percent more work than they had done in the Verran Government's time.[9] Engineer-in-charge of the Works, E. Bradley allowed Butler to use two of his regular reports (with subjective comment) to support his assertions in the House of Assembly and in the press. Hydraulic Engineer Bayer did not disassociate himself from such statements and as such permanently damaged his future dealings with many of the men and their Unions.

Meanwhile, the Hydraulic Engineer's Department was increasingly in the spotlight for other reasons. The Murray Flats and Higher Levels Water Supply Royal Commission of 1910-12 approved Departmental recommendations for an additional Metropolitan supply and a Reservoir at Mount Crawford, but also criticised the Department for its slowness in implementing recent technological innovations. Bayer firmly and consistently expressed doubts about the implementation of wood pipes, but the Commission still recommended that they be employed as far as possible in the future. Money could be

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[9] The Advertiser, Sept. 11, 1912.

saved by using them and that was that. As well the Commission urged Bayer to experiment with different kinds of concrete pipes and the use of excavating machinery instead of manual labour for trench digging. Bayer and his Department were beginning to look as if they were behind the times.

Still, the Millbrook Reservoir Act of 1912 easily passed both Houses and to many "it was gratifying to know that Bayer recommended the adoption of the scheme".[10] In actual fact Bayer issued warnings that the quality of the water in the new storage may not be the best for domestic purposes. His £648,300 estimate for the Mount Crawford (Warren Reservoir) scheme was double that of the Millbrook Reservoir estimate. This did not even daunt the Peake Government which saw railways and water conservation as keys to the development and settlement of the country.

Some Parliamentarians were not so readily placated. Vaughan questioned the cost and asserted that "if the Hydraulic Engineer had been alive to the new methods of digging trenches ... the cost of reticulation would have been markedly less"[11] on earlier large reticulation projects. Goode decried the fact that they had "no check upon the Departmental estimates"[12] for the scheme.

But criticism of the Department was soon put aside in favour of the serious business of choosing a name for the Reservoir. "Warren" eventually ousted"Mount Crawford", honoring the Liberal M.L.C. who led fellow Royal Commissioners to the site he discovered on the Para River above the Barossa Reservoir. Luckily, Warren's fellow Liberals outnumbered the Opposition vote and he was thus the first South Australian politician to leave his name to posterity in this way. Yet it was the Queensland

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[10] Parliamentary Debates of 1912: House of Assembly, Aug. 27; Comment by Butler during debate on Millbrook Bill.

[11] Ibid. House of Assembly, Sept. 19, 1912: Debate on Warren Reservoir Bill.

[12] Ibid. House of Assembly, Oct. 1, 1912: Debate on Warren Reservoir Bill.

Premier who held the future of these two major Reservoirs projects in his hands, for Peake was forced to obtain a large, temporary loan from his Government for the purpose.

More serious issues were soon at stake. While the Peake Government was particularly active in the provision of country water supply schemes, retrenchments in the Public Service, economic distress and worsening unemployment were collectively doing little for its public image. But whatever chance the Government had of redeeming itself was doomed - and South Australia's future very nearly with it - by a drought the like of which the State had not seen for 25 years. The Reservoirs were barely touched by the poor winter rains of 1913 and 1914. Accusations flew back and forth. In the thick of the conflict were Bayer and his Department — the natural target for vilification.

During the 1914 session of Parliament a motion was urgently passed to effect the construction of a Reservoir at Baroota Creek to augment the Beetaloo supply to Port Pirie. If anything Bayer's integrity was over-emphasized throughout the discussion. Butler, the Commissioner of Public Works, confessed he was "getting to be a little anxious" about Bayer and his sleepless nights and urged members "to be a little lenient with him".[13] Later Southwood brought up Bayer's long-standing opposition to the construction of the Ullabidinie-Yeldulknie dams — their completion vindicated his fears — and Vaughan suggested that the Peake Government had succumbed to party pressure when it gave them the go-ahead.[14] The Opposition (predictably) railled against the Government rather than the Hydraulic Engineer's Department for not doing enough during the crisis. Butler was forced to admit that "there is no Honourable Member in the House, or any

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[13] Parliamentary Debates of 1914: House of Assembly, Oct. 21 Resolution for Baroota.

[14] Ibid. See Loan Estimates discussion, Nov. 10 House of Assembly.

man outside who gets such a lot of letters of a threatening nature signed anonymously"[15] as he personally was receiving.

While engineers of the Department implemented urgent measures politicians bandied about any solutions which came to mind. Bayer and Stewart were even called upon to give the approximate cost of laying a water main 280 miles from Parachilna Creek to Minnipa Hill. Their reply of £1,840,000 reinforced the stupidity of the question. Others suggested that the Schmidt and Mansfield "water-finders" be utilized by the Hydraulic Engineer's Department even though the Government Geologist, (L.K. Ward), had warned the public of their unreliability. Some were closer to the realms of possibility - Vaughan suggested impounding the waters of the Myponga Creek, and Anstey, the tapping of the Murray to supplement Adelaide's water supplies. The usual course of action open to politicians was also tried. A motion for a Select Committee to enquire into the whole question of water supply was lost, but many agreed with Blundell that "the Hydraulic Engineer's Department had not shown that enterprise or progress as such an important Department demands".[16]

The Peake Government predictably suffered a marked decline in popularity. To offset this, the Premier sought Public Service votes at the 1915 elections with the rather negative promise that the Government, if returned, would not reduce salaries and would introduce a Public Service Bill when finances permitted. The Labor Opposition immediately promised to introduce a Bill, (without reservation), and to re-employ retrenched employees if they gained office. For the first time the Public Service was overtly an election issue. But the popular resentment against the drought and the war were enough to sway any scales. The Vaughan Labor Government came to power and set out to enact a great volume of legislation.

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[15] Ibid. See Loan Estimates discussion, Nov. 10, House of Assembly for this statement by Butler.

[16] Parliamentary Debates of 1914: House of Assembly Oct. 28: Blundell's words, debate on motion for a Select Committee on Water Supply.

Much of it affected the Hydraulic Engineer's and Engineer-in-Chief's Departments. An Industrial Arbitration Bill was attempted in a bid to extend the system to all Government employees. However the Legislative Council blocked the provisions relating to manual-workers so the Government was forced to carry out its pledges by an administrative act. Henceforth workers would be subject to any current Wage Board determinations and Court Awards, and agreements would be made with relevant Unions. A Public Service Act was passed as promised and though it was a somewhat doctrinaire application of interstate principles the South Australian Service was at least brought into line with those of the Commonwealth and other States. A public servant called the Public Service Commissioner was appointed under the Act with powers to inspect Departments and reclassify officers with the aid of the Reclassification Board. The powers of Heads and Ministers - to order, fire and reclassify at will - were henceforth (supposedly) made subject to the Commissioner's authority. As well, the conditions of leave, sick leave and retirement were made uniform in all Departments.

Other Acts dealt specifically with Departmental matters. The Water Conservation Act Amendment Act of 1915 was purely a measure to tidy up the existing machinery and as such provoked no dissent. However, an Adelaide Sewers Act Further Amendment Bill foundered in the Legislative Council right at the very end of the session. Members there dismissed it as a measure divesting drastic powers in the hands of the Commissioner of Sewers. Annual payments were, they argued, too hard on small property owners used to half-yearly payments and still suffering from the drought and war. Likewise the Opposition in the House of Assembly took exception to the Waterworks Act Further Amendment Bill on the grounds that the levying of a rate up to six pence an acre within two miles from the main would only impose an unnecessary burden on the producers of the State. The useful

provisions in both Bills were ignored ... for example, the practice of the Hydraulic Engineer's Department of sending rates notices out by post to the outlying areas of many country water districts remained illegal under the existing law.

But this Labor Government, this "enemy of the producers" was responsible for introducing a Bill in 1916 to ratify the construction of the costliest and most far-reaching country waterworks scheme to date. Actually, the First Report of what was to be many reports of a Royal Commission into the State's Water Supply situation, strongly recommended the scheme - the Tod River Waterworks - as the means of developing the existing and future potential of the vast farming lands of Eyre Peninsula. The Bill passed both Houses easily and no-one questioned the estimated cost of £1,495,000.

The other nine reports of the Royal Commission were not so free of tension or conflict. The second Progress Report dealt with the Murray Lands Supply. Evidence taken brought to light a source of conflict between the Director of Irrigation and the Hydraulic Engineer. The Director advocated amalgamation of the existing irrigation set-up in the Murray region with any proposed reticulation scheme undertaken by the Hydraulic Engineer's Department. Both Bayer and Stewart, (the Engineer-in-Chief), firmly refuted the motion that this would achieve greater efficiency and economy. No amalgamation was effected but the Moorook Waterworks Scheme, as recommended by Bayer, was promptly ratified in Parliament.

The third Progress Report dealt with the Mount Gambier supply and revealed evidence of the continuing tension between inhabitants and the Hydraulic Engineer's Department. The Commissioners recommended that new pumping plant be provided but for the time being ignored the expressed dissatisfaction with the rating system. J. Bee, (former Accountant of the Hydraulic Engineer's Department), took the opportunity to deride "the

impression [that] has grown up in Parliamentary circles that water is a necessity and the question whether the supply pays or not is of small consideration".[17]

This conflict between the Department's bookkeepers and successive Governments over annual losses received further attention in the Seventh Progress Report which dealt with "The Rating System". The Commissioners tabulated the eight different schemes of rating and twenty different tariffs for water in existence, and recommended in their stead three main schemes of rating - one applying to the metropolitan area, one applying to country towns and one applying to country districts exclusive of towns. Where country towns were concerned they recommended that rating be based on the unimproved value of the land and that the Land Taxation Department assessment be adopted for the purpose. Most of the officials of Hydraulic Engineer's Department who gave evidence expressed little interest in the matter of determining the fairest basis of assessment. All they wanted was a system which was simple to implement. The existing system appeared to them as fair as any.[18] Their strong representation that the price of excess water be raised in both metropolitan and country areas was well received. In fact, it was one of the few recommendations to be implemented. All the major recommendations were pigeon-holed.

The other Reports of the Royal Commission covered limited areas of interest. One advocated increasing the capacity of the Baroota Creek Reservoir; two reports recommended further investigations into the feasibility of providing Peterborough with a permanent water supply; the Sixth report suggested that the Spring Creek - Mount Remarkable scheme, as outlined by the Hydraulic Engineer, be constructed; and finally, the Eighth Report decided that in the absence of desired information, no recommend-

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[17] See p. 15 of Minutes of Evidence; P.P. no. 51 of 1917 - Third Progress Report (Mount Gambier Supply) of Water Supply Royal Commission.

[18] See evidence given by Bayer and W. Carter; P.P. no. 50 of 1918 - Seventh Progress Report of Royal Commission on Water Supply.

ation could be made about the Murray Flats Supply. Finally, the Tenth Report drew particular attention to the need for an improvement in the financial position of South Australia's waterworks and recommended a more extensive use of concrete pipes and accurate meters by the Hydraulic Engineer's Department.

In the midst of this costly, extended exercise in verbosity the Peake Liberal Government came to power. It passed Acts to bring the methodology of Sewers accounts into line with other loan undertakings and to abolish the South-East Drainage Management Board, which, for all practical purposes, had been defunct for some time. As well, a Railway Inquiry Commission highlighted problem areas in existing administrative arrangements - such as the intermixture of staff from the Engineer-in-Chief, Hydraulic Engineer and Chief Engineer's Departments who worked on each others projects according to little rhyme or reason.[19] Likewise it was left to the Railways Select Committee and Wheat Commission to discover that the Murtho and Paringa area needed a water scheme.

It was thus beginning to appear to the politicians that Hydraulic Engineer Bayer and his Department were not on the ball. Reidy, (as Mount Gambier's M.P. perhaps not the fairest judge), put it this way:

> The Hydraulic Engineer appears to be prejudiced against any new method, [the case under discussion being concrete pipes], and he simply wants to go on in the old way, because that is the only way he understands.[20]

Likewise, Commissioner of Public Works J. Bice claimed he was besieged with complaints about works not being carried out promptly by the Department, especially those on the West Coast.[21] He conveniently ignored the fact that his Government limited the men at the Glanville Pipe Works to a

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[19] See P.P. no. 23 of 1918: Railway Inquiry Commission; Third Report, p.p. 19-20.

[20] Parliamentary Debates of 1919: House of Assembly, August 13 - Reidy's comment during debate on Paringa Waterworks Bill.

[21] Parliamentary Debates of 1919: House of Assembly, Nov. 19, Bice's Comment during discussion of O'Flaherty's motion on water supplies of Murray Flats, Eyre Peninsula and east of Murray.

four-day week, and hence the level of pipe production. Jobbing moulders went out on strike from December, 1918, because the Government refused to pay Wages Board rates. As well, shortages caused by the war were naturally limiting progress.

Criticism of the Engineer-in-Chief's Department was much less vocal. The death of Engineer-in-Chief Graham Stewart in May, 1918, provoked no response in Parliament. Stewart had no peaceful preparation for death. His workload was prodigious - he was Engineer-in-Chief, Chairman of the South-Eastern Drainage Assessment Board and of the Bulk Handling of Wheat Board and South Australia's Commissioner on the River Murray Commission. As well, there was the anguish of losing his only two sons in the war. He died of heart failure, and his brother, John Stewart, became Engineer-in-Chief, (and J.H.O. Eaton, River Murray Commissioner), in his place. Both had already been in the Service 41 and 32 years respectively.

The Barwell Government's term of office from 1920 to 1924 saw continuing intense interest in matters relating to water supply. The Spring Creek and Mount Remarkable Waterworks Act was passed in 1920 although the scheme was barely off the ground by 1924. The Waterworks Amendment Act of 1921 gave the Commissioner of Waterworks power to sell water by measure together with, or in substitution for, levying rates. It also allowed for the imposition of an annual meter rent, the collection of rates once a year, and power to rate all persons benefiting from a main extension even though only one person may have signed the agreement for it.

During the debates many argued for a flat rate throughout the State for mains water, but a clause to that effect was knocked out by the Legislative Council. Still, in response to the discontent expressed about the numerous existing scales of rating, the Government did introduce alterations as from January 1, 1922. From that date, only four different scales were applied - one scale for the Adelaide Water District, one for

towns, one for Mundallio and Nector Brook country lands, and one for all other country lands. In 1923 the Government pushed through an Act to provide waterworks for Blackwood and Belair, obtained Parliamentary approval for a scheme to supply Strathalbyn and amended the Water Conservation Act to allow for rating of land accessible to Government-owned tanks or dams.

Conflicts involving the Hydraulic Engineer's and Engineer-in-Chief's Departments continued to invite Parliamentary comment. Government members frequently pointed to the delays on projects such as Baroota Reservoir and the Tod Reservoir scheme as being indicative of Departmental ineptitude. Opposition Members of Parliament in turn urged the Government to assist the Department by developing the Glanville pipe works facilities and creating a Government concrete pipe plant. During the debates on the 1921 Waterworks Amendment Act Tossell called the Hydraulic Engineer "a law unto himself" while Anthoney added: "It's common knowledge that a happy feeling does not exist in the Works Department".[22] Later, Butler and Butterfield called for the establishment of a Parliamentary Public Works Standing Committee.[23]

In the midst of all this the Government gave vent to a long-term conflict when in May 1923, it appointed a Royal Commission into certain aspects of the South-East Drainage system of the State. For years the work of the Engineer-in-Chief's Department in the area had been a bone of contention. Now three, non-politician Commissioners would require the Department to prove that the Scheme drains, as completed, were properly and efficiently carried out.

The Legislative Council dwelt on other shortcomings. Jelley called for a Select Committee to investigate more effective means of disposing of Adelaide's sewage after a spate of complaints had been received about

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[22] Parliamentary Debates of 1921: House of Assembly, Sept. 1 and Sept. 29 respectively.

[23] Parliamentary Debates of 1923: House of Assembly, Nov. 28 debate on Blackwood and Belair Waterworks Bill.

odours from the Sewage Farm. The Chief Secretary, J.G. Bice, opposed the motion but a Committee was formed and its major recommendation was to call for a more exhaustive inquiry. Bayer, the Hydraulic Engineer, declined to be involved in these investigations into possible alternatives to the Sewage Farm. A year later, in 1922, W. Mills moved for a Select Committee to look into all aspects of water conservation. He felt that the Engineer-in-Chief's Department "should advance with the times and look for and find the latest and best methods of conserving water ..."[24] Jelley took the opportunity to add the sewerage system to the scope of the inquiry; McCallum confirmed that "members are in absolute disagreement with the attitude of officers in this particular [the Hydraulic Engineer's] Department"[25]; and Mills pointed out that the issue of divided control alone - Railways, Hydraulic Engineer's and Engineer-in-Chief's Departments all dealt with water matters - necessitated a searching inquiry.

The Select Committee reported in December 1923 after holding five meetings and examining five witnesses. Again their major recommendation was that a more exhaustive inquiry be undertaken. The evidence taken, however, did reveal that there was discontent in the ranks of the Hydraulic Engineer's Department and room for administrative re-organisation and more creative leadership. Bayer's evidence confirmed his intractable conservatism - he claimed he was not hampered by the divided control in water conservation matters; he could not suggest anything that would improve efficiency or effect economies in the Department and seemed content that management of the Department had changed little in his 21 years as Hydraulic Engineer.[26] The Deputy Hydraulic Engineer, Hicks, gave the

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[24] Parliamentary Debates of 1922: Legislative Council, Nov. 8. See Mill's motion for a Select Committee.

[25] Ibid. See Nov. 29 debate on motion for McCallum's words.

[26] P.P. no. 61 of 1923: Report of Select Committee of Legislative Council on Water Supply of S.A. See p.p. 8-9 of evidence.

same kind of appraisal - he pointed out the limited success of trenching machinery and was of the opinion that the Department had nothing to learn from interstate.[27] W.J. Carter, the Revenue Accountant, (with 45 years service behind him), also stressed that there was "nothing in the Department that was bad, maladministered or neglected".[28] Still, he admitted that the two adding machines in his Branch had effected an improvement and confirmed that the Department was undermanned and that Heads of Branches and the Hydraulic Engineer did not all meet together for united conferences.

Lesser officers, however, had a more forceful story to tell as summed up by E.R. Hicks' words that "officers throughout the Department are suffering".[29] He spoke against the expense of administering the guarantee system, and against the use of meters; he decried the inadequacy of the Hydraulic Engineer's salary and pointed to officers in large private firms getting better salaries than comparable officers in the Department. Finally, he suggested that the Works Department be taken away from political control, like the Railways had been. The Department was tired of frequent changes of Ministers, the height of absurdity being that officials still had to obtain Ministerial approval for laying two chains of main at £20 total cost. C.H. Allen, Draughtsman in Charge in the Hydraulic Engineer's Department, also called for the separation of the Department from political control. And he went further — he called for better renumeration, and increased opportunities for advancement to attract more, better-qualified men to the staff.[30]

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[27] Ibid. p.p. 10-12.

[28] Ibid. p.p. 20-.

[29] Ibid. p. 12.

[30] Ibid. p. 20.

Such conflicts were brewing on a wider scale. The Public Service was unsettled and in want of direction. The Barwell Government had no intention of fully accepting the idea of an independent personnel authority — as such, S. Weir, the first Public Service Commissioner, was given "no clear plan of Public Service administration to be firm about".[31] In fact, in 1921 the Government appointed a Royal Commission to investigate the Public Service and to suggest economies, a move which showed little confidence in the Commissioner and his staff. The Commissioners — P. Whitington and T. Gill — presented two reports then resigned after affirming Price Weir's stand that the Service was not overmanned, especially in Departments like the Hydraulic Engineer's and Engineer-in-Chief's.

The Public Service Association had little confidence in Price Weir for other reasons. The Superannuation scheme, for example, compared most unfavourably with interstate schemes. Price Weir incurred the cynicism of the service when he failed to support a vigorous Public Service Association campaign for a new fund based on increased contributions from the Government.

By 1924 then, conflicts were snowballing into dangerous proportions. The Hydraulic Engineer's and Engineer-in-Chief's Departments were hampered by old, and often overlapping, administrative arrangements, conservative leadership, and by a general dissatisfaction with conditions, classifications and opportunities in the South Australian Public Service. But important changes were in the offing. The Barwell Government began to cook its own goose when, in early 1924, it introduced a bill to amend the Industrial Code Act ... in practice the legislation would have meant exclusion of daily and weekly paid employees from access to the Industrial Court. The

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[31] See G.N. Hawker's article "S.A.'s First Public Service Commissioner" in Public Administration (Sydney), Vol. XXVI, June 1967, no. 2.

Labour Opposition attacked the measure, ensured that it was thrown out, and made it an issue in the 1924 election. The Labor Party won.

The new Government promised relief and a re-consideration of Public Service problems. Along with this expression of interest something else happened to intimate that change was in the wind for the Hydraulic Engineer's Department. Tired old Charlie Bayer, the Hydraulic Engineer, died in office on September 12, 1924 after 42 years in the service, and 22 years as head of the Department. His term of office speaks for itself — no Head of any South Australian Department concerned with water supply matters before or after him could match his number of years at the helm.

ORGANISATION:

In 1902 the Hydraulic Engineer's and Engineer-in-Chief's Departments emerged with separate identities. But simply doing away with the unwieldy organisational arrangements of the past was to prove no guarantee against conflict in the future.

To begin with, both Departments were subject to functional changes in the years 1902 to 1924. In 1909 the construction and maintenance of railway lines was taken over by the South Australian Railways and in the following year on October 1, the Glanville Way and Works shops were transferred from the Railway Commissioner's control to the Hydraulic Engineer's Department, as had been consistently advocated by the Commissioner of Audit. By 1913 all railway work was being done at the Islington Workshops.

Under the River Murray Waters Agreement the Engineer-in-Chief's Department became the constructing authority in the State for the River Murray Commission beginning with work on Lock 1 at Blanchetown in 1914. In that same year the South Australian Harbors Board was established and absorbed the functions associated with harbors and jetties. For some time prior to that move the Marine staff had "felt the unsatisfactory manner

in which recommendations and suggestions received attention at the hands of the Engineer-in-Chief".[32] Finally, in 1919, Cabinet decided that the inspection and supervision of water conservation work on travelling stock routes should be transferred from the Lands and Survey Department to the Water Conservation branch of the Engineer-in-Chief's Department.[33]

But in the midst of these changes the emergent Hydraulic Engineer's Department and Engineer-in-Chief's Department retained quite separate identities. What complicated the set-up, and created in-built conflict, was the fact that the Departments continued to share survey, drafting and clerical services. From the beginning, in 1902, Bayer and Moncrieff agreed that the Revenue Accountant and his officers would be answerable to the Hydraulic Engineer, the Expenditure Accountant would be under the Engineer-in-Chief and all other officers in the clerical branch, survey branch and drawing office would still be officers in the Engineer-in-Chief's Department. However, the services of the latter group would be utilized by both the Engineer-in-Chief and Hydraulic Engineer.[34]

Financial limitations imposed by the Government of the day hampered the development of more independent arrangements. Thus, shared-draftsmen, for example, could not take annual leave till both Heads decided that neither required their services in the immediate future. Needless to say, draftsmen were invariably forced to postpone their leave for successive years, especially in the period 1903 to 1910.[35] Only in the immediate pre-World War I years, when the rapid increase in Waterworks projects and the shortage of qualified staff made necessary the employment of any comers from interstate and overseas, did these shared-employees begin to

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[32] See The Register, June 18, 1910.

[33] L & S 1702/19

[34] See CPW 813/02

[35] See GRG 53/145; Volume 3(b) - Engineer-in-Chief's Department, for specific examples.

obtain some relief. Likewise, their identification with one Department became possible in 1924 when a reorganisation of the Chief Draftsmen's Office by its new head led to the eventual withdrawal of railway officers.[36]

Meanwhile the two Departments actually shared the same office building and temporary structures to contain the overflow. On the top floor the Engineer for Railways, Hydraulic Engineer and Engineer-in-Chief all sat in different offices. Mixed in with them were the Railway Draftsmen, Hydraulic Draftsmen, the Accountants, the Specifications Room, the Surveyors, Chief Draftsmen, Plan Room and office for Inspectors of Water Conservation. In the passageway between the Hydraulic Engineer and the Deputy Hydraulic Engineer's Offices sat the clerks. Below, on the ground floor, the Rates offices and meter readers co-existed.[37] Overflow draftsmen worked in a shed structure, (previously a garage), where the Reserve Bank building now stands facing Victoria Square. It was understandably nicknamed the "kerosene store". When the temperature soared above 100°F and perspiration began to affect the tracing cloth, the draftsmen working in the buildings were allowed to go home.

Accommodation and working conditions for staff outside Head Office were certainly no worse. In various suburban areas a number of much needed residences were erected for turncocks while men stationed at Burra, Koolunga, Broughton Intake Channel, Loxton, Renmark, Tod River and Woolpunda were provided with new, if very basic Government-built cottages. Much money, however, was still being expended on rented office accommodation. For example, in 1923 a number of rooms in a Renmark house were rented as the central office of the Department's River Murray works, while the first Port Lincoln office was a room and hessioned portion of

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[36] CPW 170/24

[37] Details confirmed by Ray Ashton, (retired officer) - Interviewed Dec. 6, 1976.

the Northern Hotel's verandah. Further along in Bishop Street were the first galvanized iron workshops. At Kent Town in 1917 Superintendent Gunner saw the original house (alongside the offices facing North Terrace) knocked down and replaced by a bluestone house, this time situated well behind the offices. As well there were enlargements made to the shops and offices as required.

But perhaps the toughest working conditions were experienced by some of the field water conservation staff. Men stationed at Muloorina Depot, (a former sheep station), bred and broke-in 300 camels at the peak of its existence for the purpose of transporting plant and stores to various works. In 1924 two rooms were added to the caretaker's small house there. Lake Harry Depot was finally closed in 1918 after ten years of mutterings to that effect and the stores and buildings were transferred to Marree.

Herb Tilmouth, born and bred a bushman, joined the Water Conservation Branch in 1912 and subsequently drove three successive Inspectors of Well Boring - Herrmann, Jelley and Meth - on their rounds. At first, camel trains would carry chaff and stores ahead on the route which the Inspector and his horse teams would take. However, in Jelley's time, (1906-1918), the four-camel buggy replaced the horse team. Rations were taken on such trips — the Department provided potatoes, onions, flour, tea, sugar, jam and "tinned dog" (tinned meat) although fresh meat was obtained from stations whenever possible. Economic survival for men like Herb, (who had little chance of promotion in the outback), meant breaking in brumbies and scalping wild dogs for added income. Often the local aboriginals would barter and trade such products.[38] One had to be adept at the basic art of survival.

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[38]All these details as told to me by Herb Tilmouth during interview, Oct. 3, 1977.

Administrative re-arrangements within both Departments throughout the period were few in number. In 1910 the Port Adelaide Superintendent (Sanders) retired and the district was henceforth attached to the Adelaide Water District and supervised from Kent Town. That same year saw Cabinet create the position of Deputy Hydraulic Engineer as a means of alleviating the increasing load of work facing the Hydraulic Engineer. T. Hicks became the first to hold that position and in his place A.J. Green was appointed Resident Engineer of the Beetaloo and Bundaleer Waterworks. That particular Water District was already developing a sense of independence by having its own Head Clerk, Revenue Branch, letterhead paper and from 1911 onwards, undertaking meter repairs in its own workshops at Crystal Brook.

However, in the same year a function was lost when the Revenue Branch was transferred to Head Office. Hence forth the work of collecting rates was done under the direct supervision of the Revenue Accountant. Port Augusta and Kapunda were soon returned to the fold in the same way. Eventually, in 1918, Bayer decided that W. Ide, the Department's Valuator, and staff, should be placed under the jurisdiction of the Revenue Accountant.[39]

Thus, there was no plan of rationalization consistently applied to Departmental systems during the two decades. Some moves centralized, some decentralized ... none effected radical change.

Because there was little administrative innovation, the hierarchy of status and position remained static. Everyone knew their place and was expected to act accordingly. Drivers, for example, were lucky to be accorded more than a "hullo" or "goodbye" from the officer they were driving. Deputy Hydraulic Engineer Hicks was known for keeping his distance and not talking at all, even if he were on a long trip with his driver.[40]

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[39] H.E. 2095/18

[40] As told to me by Reg Coumbe who was himself a driver in the early 1920's.

Relations within the office were no less formal. Sixteen-year old Sam Gild, a trained Hansard Reporter, was initiated in the ways of the Engineer-in-Chief's Department in 1908. He was paraded before Engineer-in-Chief Moncrieff as a potential replacement for that officer's Secretary who was sick on leave. Sam was put on probation and his cue for entry was always the same - the Engineer-in-Chief would ring a bell. Night after night he worked back trying to decipher the terminology. It was simply understood that he had no right to ask Moncrieff to slow down or to spell out the engineering terms, and neither did the Engineer-in-Chief see it as befitting his office to aid the boy. Still Sam became permanent after a month and Moncrieff presented him with a small wallet.[41]

But many staff members were becoming tired of static arrangements, the power of the Head in all matters and the lack of opportunities for advancement. Retrenchments throughout the whole service in 1913-1914 left the Hydraulic Engineer's Department with depleted ranks just when the drought demanded a concerted effort of alleviation. The situation was complicated by a state-wide shortage of trained surveyors and draftsmen. Then the Government stopped the payment of automatic pay increases and payment for overtime. The war added further disruption. Nearly 200 enlisted from the Engineer-in-Chief's Department and 131 from the Hydraulic Engineer's Department. Of the 694 Government employees who enlisted during the war, 406 were from the Public Works Departments so the Hydraulic Engineer's and Engineer-in-Chief's Department were affected the most. The Departments were forced to make do with a motley assortment of temporary staff.

As the war ended and public servants returned from military service, a complicated system of retaining the services of temporary employees and

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[41] As detailed to me by Sam Gild, (who retired as Engineer for Surveys in 1963), in interview on Feb. 1, 1977.

dismissing others only added more confusion to existing conflicts. By 1920 there was still an eighteen-point order of dismissal in operation. Single and married men engaged during the war had no security whatsoever, while it was best to be a returned soldier, married with a family,[42] if one wanted to return to work.

In 1915 a packed meeting of members of the Australian Government Workers Association who worked for the Hydraulic Engineer's Department, (mainly clerks), revealed that staff were angry enough about their situation to take positive action through their Union. In this particular case the Hydraulic Engineer was undermining the existing award by making those who had been classed as casual employees into permanent hands.

The 1916 Public Service Act, although responsible for taking classification matters out of the Head's hands and placing them with an independent Board, was to make little impact of any value in Departmental affairs for many years. In fact, Bayer and Stewart were forced to take careful note of all classifications and awards issued by the Public Service Commissioner if they were to guarantee employees any justice at all. For example, in 1916 they discovered that the Railway Branch Clerks had been given pay increases and immediately requested the Minister "that our clerks be brought up to the same level or there will be transfers ..."[43] It had become a struggle to hold one's own in the face of other Departments.

Likewise, the increasing numbers of female employees in both Departments were forced to be eternally vigilant if their case for permanency was to be heard. No doubt the first female employees were office cleaners. Then in 1905, a Mrs. Brand, (probably the wife of the Captain of the S.S. Industry), was appointed by the Engineer-in-Chief's Department at a rate of 2/6 per week to read the river guages at Overland Corner.

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[42] See C.S.O. Circular no. 575, Jan. 23, 1920.

[43] See C.P.W. 1193/16

But it was Gladys Fairweather who in 1910 first entered the Service as a "glut junior clerk" at the Mt. Gambier Waterworks. Again it was a case of having "connections" - her father was Superintendent there. She was seventeen and received 10/- a week compared with male glut clerks who got 8/- a day. Agnes Mercer was the first stenographer/typiste to work in the Hydraulic Engineer's Department at Head Office. The war undoubtedly provided her with the chance of a position.

But the first permanent female appointments in the Service were only made in the early twenties. From the point of view of the Public Service Commissioner, females were employed as a means of saving money.[44] Thus three female stenographer/typistes were employed at the Kent Town Water-works Yard in 1922. Only when one of them resigned to take up a Federal Government position with a better salary did Superintendent Gunner step in and champion their cause. He wrote: "All the returns, paysheets, accounts and such like are made out by our typistes and £2/10/0 is quite little enough for them to receive, as the work they are doing is very important ..."[45] In late 1924 he advocated strongly that the three girls' positions be made permanent. The Public Service Commissioner and Cabinet eventually approved.

Whatever good the Public Service Commissioner may have done for the Departments was in many cases overidden by political pressures. Thus, even though Hydraulic Engineer Bayer and Commissioner Price Weir were good friends - they shared coffee every morning - the number of staff employed by the Hydraulic Engineer's Department actually declined from 175 to 163 in the years 1916 to 1922. The explanation lies in the economic curtailment policies of the successive Liberal ministries of these years.

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[44] H.E. 2071/22

[45] Ibid.

In the same way Cabinet would overide service entitlements, as it did in 1920 when F. Olifent, (the Expenditure Accountant), claimed twelve months long service leave, which, in the opinion of Sir. J. Symon K.C., was owing to him. Thus in fifty years of service, Olifent had only taken eight months long service leave - and that was for the first twenty years of service.[46]

One breakthrough was made in the midst of all these tussles. Young Ray Ashton of the Hydraulic Engineer's Department gained approval for his application to attend Drawing classes at the School of Mines during working hours.[47] There was some initial horror at his forthrightness, but eventually he was given five hours off for study purposes as long as the time was made up every week. In this respect he paved the way for others in his Department, and indeed throughout the whole Public Service. Frank Ide was the first Departmental Engineer to gain his engineering degree while still working full-time. It took him eight years.

If the years 1903 to 1924 were a time of mounting conflict for Departmental staff, they were no less traumatic for workmen and daily-paids. At first they accepted long-standing treatment and conditions, but with the growth of stronger unions and the advent of more accessible Governments, there was nothing to stop them being heard. Before 1910 there were few concessions made to their existence. The Price-Peake Government brought in a minimum wage of seven shillings a day in 1907 and in 1909 extended annual holidays to workmen with two or more year's continuous service. The Hydraulic Engineer's only move was to build and introduce four cabins to act as sleeping accommodation for maintenance men patrolling mains.

1910 saw the clear beginnings of conflict. The Verran Labor Government

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[46] See E.O. 339/14

[47] HE 446/16

failed to get alleviating legislation through Parliament as it was always defeated in the Legislative Council. The Liberal Government which followed in 1912 antagonised further by legislating against strikes and insisting upon the principal of piecework as against daywork rates of pay. The drought aggravated the unemployment situation and both factors aided the return of a Labor Government to office in 1915. It rewarded its supporters by issuing a directive that, as from July 1, 1916, the rates of pay to Government workmen would be in accordance with Wages Board Determinations, (as provided by the Factories Acts of 1907-1915), Commonwealth Arbitration and State Industrial Court Awards and a schedule of rates fixed by a Conference of Heads of Construction Departments in December, 1916. These, as well as agreements with the Australian Worker's Union and A.G.W.A. governing the rates of pay for casual workmen and operating from September 22, 1915, were supposedly to cover all the rates payable to Government workmen. There was much ground to be made up, for between the years 1911 and 1916, real wages had fallen by ten percent.[48]

Where the two Departments were concerned, the new consciousness amongst workers was more often than not treated as a fearful thing. Too often officials were seen to be reacting to an angry claim or strike, rather than initiating improvements to prevent their happening. At other times political considerations overrode all else and officials and workmen were used by, and associated with, particular political stands. For both official and worker alike it meant confrontation and conflict - an aspect which in the past had been absent in their dealings with one another.

The Hydraulic Engineer's Department was put to the test in 1909 when the Trades and Labor Council complained about the filthy language used by a particular Sewers Foreman towards the men under him.[49] Then

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[48] L.E. Kiek's The History of the South Australian Labour Unions, Adelaide University, 1948 p. 135.

[49] See The Register, July 10, 1909: "A Serious Charge".

in 1910, problems consistently dogged the work on the Port Adelaide Sewage Works. Bayer agreed to pay the labourers working on the mains eight shillings a day, following a request by the United Labourers' Union, but refused to allow time for the great distances many had to travel to work. However, the Verran Labor Government came to power, granted fifteen minutes walking time from the Railway Station and time to pull sea boots on and off. Before long turncocks were claiming one or two evenings off each month - eventually they received more annual leave at the cost of wage increases, for the wages of relieving officers had to be paid.[50]

The Port Adelaide and Semaphore Deep Drainage Works saw conflict again when in 1912 Assistant Engineer E.R. Bradley enforced a rule which appeared for the first time in the 1911 version of 'Rules to be Observed by Waterworks and Sewers Employees'. He dismissed two labourers for absenting themselves for a day without first notifying the foreman. A deputation from the Government General Workers' Association, the U.L.U. and the Federated Ironworkers' Union promptly waited on the Commissioner of Public Works, (R. Butler), and asked why the new rule had been interpreted so rigidly. The old rule (prior to 1911) had simply required that if an employee was absent for a day or more he must report himself to his foreman before resuming work and declare the true cause of his absence. Butler, in reply, absolved Bradley's stand by asserting that "there will ... be discipline while I am in office".[51] Bradley's reputation as a tyrant boss was to be remembered and repaid later.*

Fuel was added to the conflict when in 1913 the Butler Government introduced piecework rates of pay instead of the flat day rate. Soon the

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*Ray Ashton confirmed the nature of Bradley's reputation in Dec. 6, 1976 interview. Also, Murrell and Hodgson affirmed the shoddy nature of work done on the Port Adelaide drainage works which had been supervised by Bradley.

[50] Daily Herald March 27, 1912, "Complaint of Turncocks".

[51] The Advertiser May 4, 1912.

Premier (and Commissioner of Public Works) was publicly quoting wages earned on various projects which he claimed were virtually all exceeding the minimum of eight shillings. Then he asserted that 20 percent more work was being done on the Deep Drainage project at Port Adelaide under the new system, citing reports by Engineer E. Bradley as the basis of his information. The U.L.U. protested vigorously, but a strike called at the Fullarton and Glenelg sewer extensions did not eventuate owing to a division in the ranks of the workers over the issue. Jobs, after all, were far from plenty. It was left to individual workmen, in letters to the newspapers, to describe the many instances when workmen were not making eight shillings a day. One such letter appeared in The Advertiser of November 11, 1913 describing the hard nature of the ground encountered by workmen on the Fullarton sewerage extensions. Workmen there did not average more than 6/6 a day and one middle-aged fellow achieved the noble sum of 3/6. "Think of it", wrote the workman, "a man in a country like this wearing his soul case out so that a small clique will be able to tell the people how much they have saved the country!"

But the Departments were acceding to Union requests in some important respects. After U.L.U. representation in 1911, stretcher and tent rent at construction camps were abolished for good and tools were henceforth provided free of charge under a receipt system. As well, the Hydraulic Engineer's Department had by 1912 developed new cabin accommodation for use of foremen and workmen on construction sites. The cabins had canvas sides, galvanized iron roofs, curtain fronts and curtain divisions inside.

By 1914 the pressure of the unemployed was so great that Commissioner of Public Works Butler ordered Bayer to place all men on the Warren and Millbrook Reservoirs and Metropolitan projects on half-time. However, it was Bayer who called the tune where wages were concerned. For example, when he saw the wages being earned by sewers men on piecework he commented:

"It's obvious from the wages the men are earning that the prices fixed for excavation and filling are too high".[52] He lowered some of the rates and the Commissioner of Public Works simply gave his approval. The following year, 1915, brought a request from the men on the Koolunga Pipe Track for increased piecework rates or a reversion to the day work system. Bayer "regretfully suggested that a secret ballot be taken amongst the men in the camp".[53] The three gangs in the Beetaloo and Bundaleer District and one on the Carpa main (West Coast) accordingly voted in favour of the day work system. The Government and Department were forced to accept the ballot and implement daily rates of pay.

Likewise the 1916 agreement, the creation of a Government Workers' Industrial Tribunal in 1919, and the emergence, in 1921, of two Boards dealing purely with Hydraulic Engineer's Department employees, failed to prevent post-war conflicts from erupting. The Barwell (Liberal) Government used its Industrial Code of 1920 to override any industrial tribunal when it so desired. For example, the mid 1920's saw forty "exasperated mechanics" at the Waterworks Yard, Kent Town, go out on strike. They had withdrawn their case from the Government Workers' Tribunal on the understanding that the Government agreed to pay them the same increase as that paid to mechanics doing a similar class of work at Islington. However, the increase had not been paid, despite repeated requests. After one day Cabinet gave in and the men went back to work. The retrenchment of one of the two sewer testing gangs and the proposed re-introduction of piecework in 1921 likewise created further problems for officials responsible for implementing Government directives.

But it was the Glanville Workshops which predictably emerged as the Hydraulic Engineer's biggest trouble spot. They came under Departmental

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[52] H.E. 195/14

[53] CPW 634/15

control in 1910, just when Unions were organizing workers to protest in a unified manner. In 1911 a number of the Glanville workmen applied for leave to attend the School of Mines. The Commissioner of Public Works and Department grudgingly acquiesced, but retrenchments beginning in 1912 meant that few men jeopordized their positions by asking for such leave. The Federated Ironworkers Association of Australia, the Amalgamated Society of Engineers and the Boilermakers and Iron Ship Builders all put in claims for increased wages for their particular members and stressed the risky and injurious nature of the jobs the men were performing. For example, the use of suction gas to dry moulds made men dizzy and forced them out into the fresh air.[54] The pipemoulders eventually enforced the payment of "dirt money", a new precedent in the State, by a strike, but the many claims for increased wages were only settled a year later. The Hydraulic Engineer implemented selective increases[55] which only served to anger all ranks concerned.

Official disinterest and unwillingness to act was highlighted further when the Port Adelaide Local Board of Health objected to the dirty and disrepaired state of privy and urinal accommodation at the Works. In 1911 the Board issued a notice giving the Department seven days to repair the accommodation after 164 ratepayers had petitioned them concerning the "disgraceful" situation.[56] In doing so, it described the water closets as "monuments of the utter disregard for the comfort of the employees on the part of those who designed them; and of the supineness and dilatoriness of the officials responsible for their continuance".[57] In response Bayer proposed that the situation would be rectified in eighteen

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[54] CPW 1508/11

[55] CPW 381/12

[56] Ibid.

[57] HE 604/15

month's time when the Works would be connected with Deep Drainage. The Board stood their ground, said they were not prepared to wait that long and forced the Department to provide the much needed extra privy accommodation.

By 1913 the Hydraulic Engineer's Department had accepted the fact that better working accommodation at Glanville was a necessity, especially if the output of cast-iron pipes was to be increased. The old moulding shop roof was raised and the building extended; a new building housed an electric overhead crane over a dipping bath; and new offices and electric plant were installed. Finally, in 1916 work began on a new dining room and bathrooms for the men but this came only after they had petitioned the Hydraulic Engineer for the facilities.[58] His ordering of priorities ensured that they would be ready for use seven years later in 1923!

There was soon further good reason to be angry. In 1917 the Glanville workmen were placed on short time for the reason that stockpiles of goods had accumulated. The plant only operated four days a week, and the men were gradually reduced to a third, but the supervisory staff remained at full strength and the clerical staff worked on a full-time basis. No wonder plumbers and sewerage contracters - complaining that the work of connecting houses was being retarded for want of necessary parts from the Hydraulic Engineer's Department - wanted to know why the Department did not put men at Glanville on full-time.[59] The shortages only intensified when jobbing moulders from the works went on strike in December, 1918, after the Labor Government refused to accord them wage increases as determined by the relevant Wages Board award. Nearly two years later, on September 6, the moulders returned after the Federated Moulder's Union Executive accepted

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[58] HE 604/15

[59] See The Register April 17, 1918: "Hydraulic Department Criticized".

an offer from the Liberal Government in office. Officials of the Hydraulic Engineer's Department had, as usual, remained inept and disinterested in promoting conciliation and arbitration.

The Engineer-in-Chief's Department did not remain immune from similar conflicts. In 1910 workmen on the Fowler's Bay roadworks went on strike when their claim for eight shillings a day was ignored. They got what they wanted. Likewise, in 1912, the Superintendent of Drainage Works in the South-East, Burchell, had difficulty obtaining men as private contractors were paying a shilling a day more. At eight shillings a day, and taking into consideration the price of food basics like bread, milk and potatoes, it was nigh on impossible for a married man to live in his tent and support his family elsewhere.[60] No wonder the U.L.U. was able to set up several new branches in the South-East. But the Department learnt its lesson quickly. By 1917, The Register was reporting that "careful provision was being made for the men's comfort and convenience".[61] They had corrugated iron huts, a meeting house with table, chairs and a fireplace; the dining rooms, kitchen and pantries were kept clean by two cooks; it cost a man no more than 14/- a week for mess; there were two shower baths for the men... and, the men were going in for vegetable and flower gardens in their spare time.

On the River Murray Works there were also lessons to be learned. Relations began amicably for the war made labour hard enough to get, let alone retain. Cabin units for the men were advanced enough to be comfortable and a mess room, kitchen and cooks were provided from the outset. As well, the Constructing Engineer, Cutting, was no fool. When floods delayed the lock work, time was spent on building workmen's cabins of Australian

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[60] See The Advertiser July 16, 1913: article headed "South-East Drainage".

[61] See The Register Jan. 15, 1917: article headed "Drainage in the South-East".

hardwood with galvanized iron roofs - and they were not too different from the cottage used by the Engineering Assistants.

It was Cutting too, who ensured that a doctor's services would be available to the men, despite the locality.[62] Engineer-in-Chief Stewart recommended that the men pay sixpence each and the Government make up the difference between that and what Dr. Nicol of Waikerie was asking. Cutting then requested that medical attendance be allowed to all married men and their families regardless of whether or not they actually lived on the camp site. This had been put to him by a deputation but he added useful suggestions of his own such as the maintenance of a permanent medicine chest at the camp. These recommendations were implemented and the only near disaster came in June, 1919 with the outbreak of an influenza epidemic. The staff camp became a temporary hospital, two nurses and an orderly were employed and only one death due to unusual complications was recorded.

In 1919 A.W.U. members on the Blanchetown Lock asked for a twenty percent rise in wages but nothing came of their demand. However, on May 5, 1920 the same men went on strike and only returned to work in November when their wages were increased from 66/- to 81/- a week. Likewise the Government was forced to end a strike on the Lake Victoria Works by granting an extra shilling per day subsist; the minimum wage thus became 17/6 per day plus the allowance.

The real issue at stake was the anomalous wages and conditions the men on the River Murray Works were receiving, depending upon whether they were working in, or covered by South Australian, Victorian or New South Wales awards. The New South Wales award was the highest so it was the natural goal of the unions. Most of the difficulties were settled by agreement between the State constructing authorities and representatives

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[62] CPW 498/15

of the labour unions. As from October 5, 1922 the New South Wales award rates were instituted and most men henceforth worked a 44-hour, instead of a 48-hour week.[63] By then it was apparent that more time was being lost by delays in receiving materials, and flooding of the river, than by industrial trouble. Only the contractors Timms and Kidman failed to adhere to the ruling and their contracts at Lake Victoria were continuously dogged by strikes.

Life at the various lock sites and at Lake Victoria thus settled down to a happy medium. The staff made no formal complaints to Head Office about their living conditions. Cottages continued to be erected for married workmen and were rented at a weekly sum depending on whether they were lined/unlined and whether they had two, three or four rooms. Families renting the two-roomed cottages lined them with hession and whitewashed the outsides, so they were just as liveable as the larger cottages. Single men were generally housed in galvanized iron unlined cabins which meant two men sharing a 9' x 11' space with no inbuilt furniture. There was always a Government mess for their meals. Doctor's services were available - some camp sites had their own permanent medical officers - but the Government refused to pay for the furnishing of any cottage hospital or for a nurse's services[64] when these became necessary. There were teachers for the children - and the inevitable sly groggers on pay nights for the fast spenders and drinkers. At times there were concerts, dances and silent movie evenings, usually organized by committees of the men.

If the years 1903 to 1924 saw the emergence of consistent conflict about the working conditions of Government employees, they also brought the beginnings of an answer to that and many Departmental problems. The

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[63] E.O. 1015/22

[64] E.O. 504/22

glories of mechanization came to the two departments in many different, if elementary forms. As we have seen, new developments came to Glanville to expand the variety and efficiency of production. In 1913 new electric machinery for driving lathes was installed at the Waterworks Shops at Kent Town.

More and more advanced pumping machinery was utilized as consistent demands for increased water supplies were received. For example, in 1906 the Border Watch proudly recorded that the Blue Lake pumping station had raised a new record of 1,638,148 gallons in one week[65] - but only ten years later a new plant was necessary to meet demands. It consisted of two parts - a suction gas producer, (the gas being manufactured from crushed coke brought from Adelaide), and an electrically driven centrifugal pump. Renmark's new pumping plant was another variation - the engine was a 45 h.p. English-made Premier and the gas for driving it was produced from mallee wood and roots by means of a Cambridge Patent Gas Producer. The level of their efficiency dictated the time a fitter or Superintendent had to spend supervising their running.

In 1912 excavator machines were used for the first time on the South-East drainage works. By 1918 the Ruston Proctor, steam navvies, Wilson cranes, portable air compressors, jackhammer drills, Priestman Crab excavators and dragline excavators were all employed there. In 1913 the Austin excavator was used for the first time on sewer trenching at Alberton and by 1920 the Department had developed and built its own tow-line dragline excavator for work on the Lake Victoria storage. Steam-driven construction equipment was used right from the beginning on all the Lock work.

As well there was equipment to aid the engineer's calculations.

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[65] See Jan. 10, 1906 edition of the Border Watch; (N.B. Today the pumps at Mt. Gambier raise the same amount in about two hours.)

Concrete made from samples of stone for Lock 9 and found above Loxton withstood a crushing load of 100,000 lbs. on a testing machine at Adelaide University in 1920. The first camera was obtained in 1908. On the administrative side the Hydraulic Engineer's Department gained its first calculating machines in the same period.

Mechanization also meant new, more efficient modes of transport. In 1904 the Government acquired its first two cars, and they were made available for hire from the Surveyor-General's Department. By 1912 six cars were to be found in the Government Garage under Colonel Price Weir. In 1909 the Departments hired their own drivers - Alfred Miller at Head office, Walter Dobson at the Barossa Waterworks and H. Hicks at Port Augusta, (on water conservation work). Motor cycles were first used for Departmental purposes in 1914. By the time the war broke out each of the major districts had one or two cars at their disposal, while a petrol mileage allowance was paid to those few engineers who had bought their own cars and were using them on Departmental work. Gradually the horses and traps and yellow maintenance carts were being phased out. In 1924 most country depots received their first lorries - the Water Conservation Branch got one for repair work; Crystal Brook got a couple Ford trucks and the West Coast had to be content with used A.E.C. lorries from the war for carting pipes (etc.). As well, two lorries were engaged to cart local limestone to the Lake Victoria Works.

But mechanization also brought problems and highlighted areas of inattention and unpreparedness. Machinery was not always reliable or particularly useful in certain situations. The Departments found Buick and Dodge cars to be more reliable than the early Model T Fords. There were many breakdowns and long waits for parts from Adelaide. Engineering Assistant Ray Ashton experienced mixed blessings when the steering of the Model T Ford he was driving to Port Lincoln in 1923, simply snapped. He

saved himself by driving into a fence. His superior (Bradley) abused him but the West Coast got its first Dodge car out of the incident.[66] Likewise numerous breakages occurred and adjustments had to be made to the first excavator on the South-East drainage works - the Type R Austin - before its performance was acceptable. When the country flooded, the ground became too soft to support the Bucyrus Dragline scraper and when rocky material was encountered in the bottom of drains the machine was again unsuitable. Hard labour and explosives still played a vital role.

Time and money were wasted because there was often no-one trained in the workings and handling of the new machines. Many back-ends of garages were run through in country depots as men struggled with the intricacies of learning to drive a truck or car. More seriously, Commissioner of Public Works Hague was forced to admit in the Public Works Report for the year ending June 30, 1920 that "apprentices are not forthcoming to meet the State's tradesmen demands". The Hydraulic Engineer's Department had certainly not adopted any consistent or regular intake of apprentices at its Kent Town or Glanville Works. Likewise, the failure of the Engineer-in-Chief's Department to train men in the new skills and developments was beginning to have an effect by the early twenties. Engineer-in-Chief Stewart reported in his section of the 1923-1924 Public Works Report that "the inability to obtain skilled operators has considerably retarded progress on the Rufus River Enlargement" at Lake Victoria.

The increasing mechanization also highlighted the Department's low-key attitude towards safety matters. The new booklet of "Rules to be observed by Waterworks and Sewers Employees" issued in 1911 only took an indirect interest in this area. Indeed, the section entitled "General Rules for Workshops" dealt more with procedure in cases where workmen

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[66] As related to me by Ashton during Dec. 6, 1976 interview.

injured the tools or machinery, than with the means of rendering tools or machines safe for the men. In that same year the Hydraulic Engineer's Department issued eighteen First-Aid boxes to its various depots but by 1916 there was still no first aid arrangement on the Millbrook Reservoir Works.[67] Good luck rather than good management ensured that both the Millbrook and Warren Resevoir projects remained free of infectious disease and fatal accidents. This record certainly looked good compared with that of the Tod River scheme and Baroota Reservoir projects which were largely undertaken by contract. Three men were buried alive at Tod River and two were seriously infured by a fall of earth at Baroota. Still, the Hydraulic Engineer's Department had no such clean record where the Glanville Works were concerned - the few accident figures available[68] indicate that one in five men had an accident per annum. They do not show the seriousness of the injuries or the numbers who left the works on doctor's advice or died because of "dust of the lungs".

The last few years before Bayer's death in 1924 saw an ominous increase in the number of internal conflicts which racked both the Hydraulic Engineer's and Engineer-in-Chief's Department. The Railway Inquiry Commission of 1918, in its third Report, pointed out that the intermixture of control and administration of the Chief Engineer for Railways, Hydraulic Engineer's and Engineer-in-Chief's Departments was as undesirable as ever. In the Correspondence Room, Specification Draftsman's room, Plan Room, Quantity Surveyor's Branch and in adjacent overflow offices, staff of two or more of the Departments could be found working together, in some cases still exclusively on work not related to the Department of their employ. Only in 1923, however, with retirement of the

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[67] Letter to Editor, The Advertiser, Dec. 26, 1916 headed "First Aid on Public Works".

[68] 1911: 68 accidents/375 employees
1914: 45 accidents/249 employees

old and appointment of a new Chief Draftsman (C. Almers) was some attempt made at regrouping to permit co-ordination between branches closely associated. Almers proposed the creation of six branches within the drawing office, saying:

> The system of administration has become confused; authority in reference to selection of suitable officers for whose work I am responsible and the disciplinary control of the same is insufficient; there is no incentive for increased efficiency.[69]

The Engineer-in-Chief, Hydraulic Engineer and Chief Engineer for Railways agreed to some reorganisation to bring work of a similar nature under one control, but they rejected alterations in the status of officers and the establishment of an "Efficiency, Investigation and Data Branch" as suggested by Almers. He soon discovered that the re-organization did not mean the provision of extra accommodation. Then the Chief Engineer upset the re-organization process by withdrawing several of his officers from the supervision of the Chief Draftsmen, and having them report direct to the Acting Chief Engineer.[70] Slowly, but surely all railway officers were withdrawn from the Chief Draftsman's control.

The Commissioner of Audit too was becoming increasingly concerned about the failings of the two Departments. He specified laxity in office procedures at Arno Bay and irregularities in the accounts of the Water Conservation District of Murat Bay, (the man responsible shot himself before the full details were known.) As well, clerks in a number of South-East Drainage offices were found to be forging signatures and falsifying paysheets. Stocktaking in that region had also fallen way behind, and Burchell (the Engineer in charge), was distinctly averse to any investigation and interference by outsiders. He was already clashing with the Engineer-in-Chief over other matters.[71] His hour of truth was to come

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[69] E.O 332/23

[70] Ibid.

[71] Eg. see E.O. 111/21

in 1925.

The Hydraulic Engineer's Department was not free from audit disatisfaction either. After years of harping on the matter, the Commissioner of audit finally got the Department to produce annual Waterworks and Sewer balance sheets in accordance with the Acts. However, by 1924 he still could not accept the balance sheets dealing with Adelaide Sewers as a true and complete statement, as many statements did not reconcile with Treasury figures. Likewise, the Waterworks Balance Sheet continued to reveal discrepancies as Departmental officers often omitted to pass schedules through the Treasury. More specifically in 1923 the Auditor reported that the bookkeeping at Mount Gambier was unsatisfactory and published the results of the first stocktaking taken at Kent Town, Mile End and Northfield Waterworks stores for seven years.[72]

The Kent Town situation was the worst. A loss of £6,009 was made on water meters as well as an "unidentified loss" of £551. Around the same time there was some rationalization of clerical services at the Yard after a clerk was found to be consistently on leave due to a nervous breakdown. A Deputy Head Clerk position was created to help the Head Clerk organize the staff of twenty.[73]

In the early twenties Bayer and Stewart attempted a few tentative moves to arrest the backslide. But the Commissioner of Public Works, in his desire for stringent economy, would have none of them. For example, a suggestion that the four rooms occupied by the Expenditure Accountant's staff be made into one large room was rejected by the Minister as he was not prepared to spend £800 on the changes suggested.[74] The antagonism

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[72] See P.P. no. 4 of 1923: First Annual Report of the Auditor-General.

[73] HE 2071/22

[74] E.O. 699/21

between Bayer and his Minister was well known[75] but the Hydraulic Engineer's desire for some improvement led him to make other recommendations. In 1922 he suggested that to cut down the amount of routine paper work, he be given the power to authorize extensions of main costing less than £100.[76] Again the Minister simply said "no".

But change and the resolution of conflict were at hand. The years 1923-1924 saw a mass of logs and claims from the A.W.U. and A.G.W.A. (and other Unions), descend on both Departments, as never before. There were also resignations of note - the Manager of the Sewage Farm after many years of service and "Ben" Ranford, the long-suffering Engineer in charge of Water Conservation works in the West, on account of ill health. Then, almost simultaneously an eager new Government came to power and Charlie Bayer died. There were mixed blessings in store.

THE PRODUCT:

From 1903 to 1910 a comparative calm pervaded the activities of the two Departments especially when compared with the frenzied Reservoir building and water conservation work of the 1888-1902 period. Before long however, the drought of 1913-1915, the marked suburban expansion, and the reaching of agreement over the Murray River question, were dictating new spheres of action.

The Engineer-in-Chief's Department retained supervision of water conservation activities and the essential task was still to determine the extent of artesian water supplies in relation to stock routes. By 1905 the Queensland-South Australian stock route (via Birdsville) was provided, at easy stages, with permanent water supplies. Other successful borings

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[75] J.H. Davis remembers this early twenties' hostility quite distinctly.

[76] CPW 151/22

reinforced the value of existing stock routes.

These years also saw the deepest well-borings ever attempted in Australia. The notorious Patchawarra Bore on the Farina to Haddon route in the extreme eastern corner of the State, was one such attempt. The contractors were the Johnston Bros. who were also responsible for most of the borings of this kind. Finally, in 1916, the bore was abandoned at a cost of £26,392 and after thirteen years of experimentation, investigation and intermittent delays.

A programme of pioneer borings in the country between the Pinaroo Hundreds and the Murray River proved of immediate value. Many were successful and new horizons were thereby provided for settlers. The work of improving and extending water supplies in the Northern Territory, especially on the overland Telegraph Line, remained a constant task and the Commonwealth Government was now footing the bill.

The West Coast became a new field of endeavour and large open excavated reservoirs, tanks and wells were the means of development. Gradually there was a shift from masonry to reinforced concrete tanks. As well the Department supervised the construction, by contract, of 200 or so rainsheds and tanks for settlers throughout the Peninsula. This work began in 1914 at the bidding of the Crown lands Department. The shortage of galvanized iron necessitated experimentation with roofs of timber and concrete but the reinforced concrete rainshed was soon abandoned when iron supplies improved.

For the rest, the Department was busy lending sets of hand-boring equipment to interested farmers, and arranging or inspecting contracts for repairs/alterations/additions to any of the 500 or so water conservation works under its control.

Roads outside the boundaries of District Councils also remained a Departmental responsibility, involving the letting, supervision and

inspection of numerous petty contracts. This work expanded rapidly from 1911 onwards, when settlers in new Hundreds began to require connections with markets via the railways system . New roads emerged all over the State, particularly in the Western District, and it was only in 1924 with the formation of a District Council at Kimba that the Department began to see some alleviation of their load in this area.

A new sphere of action was added to the engineering survey work of the Department in the form of floodwater control. In 1909 mains and a drainage reservoir were constructed at Lameroo for carrying off stormwater and by 1911 work had begun in the direction of formulating schemes to control the floodwaters of streams flowing from the Adelaide Hills to the sea - notably the Torrens and Sturt. By 1924 plans, levels and surveys had been moulded into a comprehensive scheme but all that had actually been achieved was the completion of an embankment on the Torrens near Welland. Meanwhile, Laura, Peterborough, Freeling and the area west of Bordertown were given assistance with their floodwater problems.

The Department also retained responsibility for all major construction work relating to the artificial drainage of the South-East. The first and most important of the Petition drains, (the Mount Hope Drain), was completed in 1905, and three minor Petition drains soon followed. In 1911 the Department carried out improvements and the widening and deepening of various drains, and then in 1912 began the authorized Main Scheme of Drainage which was based upon its own detailed and extensive trial surveys. Virtually by default the Department became the contractor for all the Scheme drains delineated A to M. By 1924 the Department had completed all major drains and sea outlets and only had drain extensions to complete. Drain K alone involved the erection of 70 road and 26 occupation bridges.

Thus the whole region was divided into two basic drainage areas either side of Baker's Range. To the east the drainage of the upper eastern flats and fresh water channels were caught in the Baker's Range

Drain and carried north-westwards. To the west, the long advocated system of a number of independant outfalls with generally east-west trending drains cutting back inland through the ranges, was now established with Drains M and K-L as the main arteries. The previous north-south drainage of the Western flats was broken by these new drains and reoriented towards the west.

The Engineer-in-Chief became responsible for the Renmark Irrigation Trust from 1902 onwards, when the rights of the Chaffey Bros. were revoked. This entailed a supervisory interest in the expenditure of public capital in the area - pumping machinery was improved, irrigation channels completed, assistance given in 1918 on embankment work to protect the area from inundation and later in the development of main and subsidiary channel work on the new area Block E. Meanwhile, the Irrigation and Reclamation Department emerged and the Engineer-in-Chief's Department aided its programme by driving piles at pumping station sites.

Of new and major importance were the Department's responsibilities concerning the Murray. River improvements were still regularly carried out - snags, overhanging trees and stumps were removed, landings cleared, training spurs and beacons repaired and guage boards painted - but they were soon only a minor area of activity. In anticipation of a locking scheme surveys and cross-sections of the Murray between Swan Reach and the State boundary were made from 1906 to 1909. However, in 1910 the S.S. Industry, the Government steamer, was condemned and S.S. Dispatch was hired by the Department to carry on improvements and investigatory works. By 1911 a new working steamer, the S.S. Industry, was in operation and three surveys parties and three borings parties busy determining possible lock sites.

Actual work on Lock No. 1, the William K. Randell Weir at Blanchetown, began in 1913. (Governor H. Galway laid a memorial stone in June 5, 1915.) The Government had readily accepted the Departmental

tender as it was the lowest received. Soon a temporary dam was built across the Mundoo Channel, (one mile from the Murray mouth), as the first step in the proposed system of barrages, and a quarry was opened at Mannum. Most of the necessary machinery was constructed locally - the 90' and 72' derrick boats, the dipper dredge "Manno", seven barges and the motor boat "Antigone" - but a working steamboat capable of pushing barges ahead of her, had to be imported from America. The Captain Sturt, a riverboat of plate iron, was in fact shipped out in prefabricated form to be reassembled by Departmental workmen on the river. She was a Mississippi style boat with a stern wheel 28' in diameter instead of the twin side-wheels used by most of the Australian boats at the time. Her work of pushing barges of crushed granite began in 1916.

The severe flooding of the cofferdam at Blanchetown created unfortunate delays but it was the temporary Mundoo dam which demanded urgent attention. A timber structure was built to replace the solid dam with a view to reducing the flood levels of the lakes, but even this work was hampered by high tides and the pervious nature of the rock on the bottom.

Between 1919 and 1924 the programme escalated with work beginning on the Lake Victoria storage, and Locks No. 3, 9, 5, and 2, in that order. The Lake Victoria Storage work involved one large contractor and many petty contracts, but the balance of the work, and the bulk of work on the locks, was executed Departmentally. Three 72' and three 90' derrick boats were placed into operation to cope with the load and a new quarry opened at Waikerie.

The work at Lake Victoria ensured that a natural depression on the north side of the Murray River would become a regulatory storage for South Australia's needs. This involved the construction of 32 miles of embankment. Seepage trouble under the banks were dealt with by spreading broken stone/gravel on the bottom of the slope of the bank. Much excavation - including a portion of Frenchman's Creek - had to be under-

taken to provide a channel into the storage, while Rufus River was enlarged to act as an outlet channel.

Each weir was built to consist of a lock chamber 275' x 56', a navigable pass and sluice section with an abutment. In only one case - No. 3 weir and lock - were the foundations suitable for placing the whole of the structure on rock. Generally, the structures had to be placed on wooden pile foundations driven into the sand. By 1924 the principles of construction were well established and the lock/weir programme was half way home. It was one of the first major construction jobs in Australia where everything was done by steam machinery.

In contrast with the spiralling workload of the Engineer-in-Chief's Department, the work programme of the Hydraulic Engineer's Department in the period 1902 to 1924 was consistently heavy. The first ten years or so were dominated by major sewer programmes and extensive mainlaying and reticulation in country areas. The network of mains, service reservoirs and reticulated towns in the Barossa, Beetaloo and Bundaleer districts expanded dramatically. Important measures taken include the fixing of the American "Crown" meters in farming areas, the replacement of corroded steel pipes in the Beetaloo district with larger cast iron pipes, and the construction of a main from Barossa Reservoir to supply Dry Creek and the new abbattoirs. Other country supplies demanded constant improvements — new tanks were provided for Mount Gambier, Murray Bridge and Mannum, more powerful pumping machinery installed and additional local water supply schemes, (usually in a neglected state), reverted to Departmental management. New supplies were extended to the Noarlunga Region (from Happy Valley Reservoir), to Cowell (from Ulbana Creek Reservoir) and the Pekina Creek Irrigation scheme was at last constructed.

The Glenelg sewerage scheme had its beginning in January, 1904. It comprised a trunk sewer to a pumping station on the banks of the Patawalonga Creek, a septic tank and filter beds at Glenelg and associated lucerne

plots. The treacherous nature of much of the ground made close timbering necessary and also the laying of some iron pipes on piles and in other parts earthenware pipes surrounded by cement concrete. Still, by the end of 1906 almost 900 properties had been connected. Meanwhile, the suburbs of Croydon, Croydon North, Upper Kensington, North Walkerville, North Norwood, Nailsworth, Prospect, Collinswood, Clarence Park, Frewville, Fullarton, Highbury, St. John's Wood and New Hindmarsh were all connected with sewers by 1912.

Work began on the Mile End and West Adelaide Sewerage scheme in 1909 and was largely completed by 1912. The sewage graviated to a pumping station at Cowandilla, which pumped it into a main sewer to gravitate to the Sewage Farm at Islington. Centrifugal pumps had to be kept constantly at work during the construction to cope with spring waters, and steel sheet piling imported from America to protect the excavations. Likewise construction of the Port Adelaide scheme (begun in 1909) was difficult and somewhat protracted owing to the subsoil waters. The work was tackled from both sides of the Port River, but the ground problems allied with a general shortage of water in the Adelaide water district ensured that the first houses were only connected in 1916. By 1924 the Port side had been connected, the Semaphore side was well underway and a new concrete relief sewer from the Sewage Farm in a southerly direction to Forrestville ensured that West Croydon, Welland and Keswick would also benefit.

But 1912 to 1924 saw the Department's resources reverting primarily towards waterworks construction. The money and time spent on surveys for water supplies increased dramatically as a series of drought years engulfed the State. To supplement the metropolitan supply, Millbrook Reservoir was commenced in 1913. It was the largest Reservoir ever built in South Australia at the time, and consisted of an earth bank dam fed through a tunnel almost a mile long from a weir on the River Torrens near Gumeracha. The work in connection with the Reservoir itself was done

Departmentally, as was the outlet tunnel after being abandoned by the contractor due to hardness of the ground. The embankment of the dam was raised 10½' on the original design as the works progressed. Water was turned on for the first time by Commissioner of Public Works J. Bice on July 5, 1918 and what was left of the township of Millbrook disappeared as the Reservoir filled. Advantage was taken of the construction of the new Gorge Road by the Roads and Bridges Department — the route was used for the trunk main from the Reservoir to its terminal point at Mitcham.

This trunk main was not completed until 1923 so other measures were taken to ensure an adequate Metropolitan supply. Water was pumped from six bores into the mains system and a main was laid from the Barossa Reservoir. A factory was established at Outer Harbour to produce steel pipes for a 36" main from Hope Valley to Port Adelaide but delays caused by the war meant that this was only completed in 1920. Other temporary measures were implemented and the Department still had time to lay a water main to the Torrens Island quarantine station in 1917 for the Commonwealth Government.

In the country the Warren Reservoir contract went to Atkins and Finlayson in 1914. The scheme comprised a concrete dam on the upper reaches of the South Para River near Williamstown, and a system of trunk and reticulation mains extending northwards to serve a large area of farmland and many sizeable towns in the Barossa Valley and mid-north. By the end of June 1917 the Reservoir was completed and full of water. That year also saw the completion of the Encounter Bay Scheme, another Departmental project. An earth bank dam was thrown across Hindmarsh River and reticulated supplies extended to Encounter Bay country lands, Port Victor, Port Elliott, Middleton and Goolwa.

Baroota Reservoir, near Port Germein was not so promptly executed. Atkins and Finlayson commenced this project in October 1916, but it was only in May, 1922 that the desired effect - the supplementing of Port Pirie's supply - was achieved. Faulty rock was encountered so a concrete

bottom had to be laid before proceeding with the puddle core of the earthen dam. The Contractor's inability to keep men was compounded by a mice plague, while the unearthing of bone specimens of a prehistoric skeleton during excavation added a further bizarre touch. Certainly the Reservoir's failings were not to end on completion.

Other country areas received attention. At Tailem Bend a concrete tank was erected and a supply obtained from the Railway pumping plant. Loxton was equipped with a powerful pumping station which pumped water into a new, high reinforced concrete service tank. From there it gravitated to newly reticulated country lands in the Hundreds of Bookpurnong and Gordon. The Coonatto and Willowie Springs were utilized to provide surrounding areas with a permanent water supply. At Woolpunda, on the River Murray, Department-made pumping machinery was installed in a move to provide water supplies to the Moorook country lands. The concrete tower, (at 122' one of the highest in the world), was watertight but the first reinforced concrete main laid as part of the scheme by the Hume Pipe Co. was unfortunately the complete opposite.

Eyre Peninsula was given its first sight of a permanent water supply system through the Yeldulknie scheme, which dated from 1912. By 1918 the three small concrete gravity dams on the intermittently flowing streams at Yeldulknie, Ullabidinie and Ulbana in the hilly country west of Cowell, had been linked up. This little improved their performance - one or more was empty every year and Arno Bay and Cowell were more often than not without water. The rapid distribution of mains did little to aid the situation.

Instead, it was a larger stream, the Tod River, which was tested for its ability to serve Eyre Peninsula. The Scheme, seventeen miles north of Port Lincoln, consisted of an earth embankment with puddle core on Toolillie Creek and concrete weirs on Tod River and Pillawarta Creek. The Concrete Steel Contracting Company began work on the earthen embankment in 1918 but a year later financial difficulties saw Sir Sidney Kidman taking

over the contract. The immediate task was to strip the seat of the embankment to a considerable depth to remove a large gravel seam. By 1922 Timms and Kidman had completed the Reservoir, weirs and intake channel and a great variety of lesser contracts were underway at the hands of numerous small contractors.

Soon the Adelaide Steamship Company had delivered all steel pipes and specials to Port Lincoln and they had been railed to stacking sites as required. The work of mainlaying began in 1923 with Atkins and Finlayson contracting to lay the first 70 miles of gravitation trunk main. Only in 1924 did the Department become involved in the construction when it began laying the remaining 60 miles to Minnipa. The real problems were only just beginning.

THE PUBLIC:

Both the Engineer-in-Chief's and Hydraulic Engineer's Departments had little chance of staying out of the public spotlight in the years 1903 to 1924. The involvement of the Engineer-in-Chief's Department in major new activities - the River Murray Work and a new South-Eastern Drainage Scheme - meant that it would be associated with any related areas of conflict. The Hydraulic Engineer's Department was even more hopelessly embroiled in public debate - the effects and consequences of the frightening 1913-1914 drought concerned virtually the whole of the State. To a lesser extent, the overloaded Sewage Farm became a battle ground for an increasing body of concerned citizens.

Despite consistent newspaper and public interest in matters of River Murray control and interstate agreement, the Engineer-in-Chief's Department did its best to remain tactfully behind the scenes. The year 1903 saw three petitions reach Parliament from landowners of the Lower Murray and Lakes Region against the plans prepared by the Engineer-in-Chief's Department for a Murray Barrage. Nothing came of the scheme and for a

time the issue died down.

It was the River Murray League which ensured that Parliament and the public were aware of the "enemies interstate" and the avenues open to South Australia. In 1912 Simpson Newland, (President of the League), openly accused the Department of not fulfilling its role in the struggle. He asked why information about the river had not been collected by the Department prior to Captain Johnston's visit and investigations into locking.[77] Without any prompting, Captain Johnston replied:

> I do not believe that such criticism is justified, because if this work had been undertaken before the sites had been tentatively selected by me considerable expense might have been incurred.[78]

Indeed, in all his reports he praised the cheerful, valuable and prompt aid rendered to him by the Engineer-in-Chief and his staff. Only in 1917 did the critics return to the fray - an ex-Commissioner of Crown Lands questioned the Engineer-in-Chief's appointment as River Murray Commissioner[79] and others the value of retaining the Mundoo Barrage, given its precarious state. But the correspondence was strong in Stewart's support and at least half the expressed opinion on the Barrage question favoured it being retained.

Where water conservation works were concerned the Engineer-in-Chief managed to ward off any sustained criticism by entering the arena first. In 1913 he went on record decrying the "carelessness of the public"[80] for abusing the water supplies provided by his Department on stock routes within Hundreds. However, the knowing critic was not to be fobbed off. A letter to the Editor of The Advertiser in 1915 entitled "Expenditure in

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[77] The Register, June 7, 1912.

[78] See P.P. no. 116 of 1912: Capt. Johnston's Report of the General Scheme for Improvement of the River Murray, p. 8.

[79] The Advertiser, Oct. 16, 1917.

[80] The Advertiser, June 17, 1913.

Interior" detailed the "wasteful expenditures of a reckless Department".[81] The author pointed to the Patchawara Bore, which cost over £20,000 only to be abandoned; he suggested that camel depots were "Department toys" because cartage could be got for half of what it cost by Departmental teams; he wondered why Lake Harry Depot was still not closed; and finally, he pointed to the cartage of earthenware pipes to repair Dulcaninna Bore facilities, only to find on arrival that they were useless. No-one bothered to reply to this and similar, if infrequent, letters of complaints.

The Department's actions in relation to South-East Drainage in these years were confronted with a watchdog from the outset. Past problems underlined by a succession of extremely wet seasons between 1906 and 1908 goaded local proprietors into forming the South-Eastern Drainage League in 1908. They put their case to the Government and the outcome was a Departmentally-designed system of new (Scheme) drains. With it came an administrative and assessing body called the South-Eastern Drainage Management Board, chaired by the Department's Engineer for South-Eastern Drainage, Burchell.

Mount Hope residents, in particular, were upset about the amount on which they had to pay interest and some claimed that the drain in question (Mount Hope) was not deep enough anyway.[82] The first assessment by the Management Board was issued in 1910 and this promptly brought others to the ranks of the discontented. Lucindale District Landholders got a petition together calling for the abolition of the Board on account of the expense involved in its existence, and the general feeling that the assessment it had declared was too high. They suggested that the Board's work be transferred to local District Councils. Others questioned the slowness with which the scheme was being tackled, saying that "either the

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[81] See Letter to the Editor, The Advertiser Dec. 1, 1915.

[82] See CPW 1228/07 and The Register Feb. 2, 1910.

scheme is too big for the Engineer-in-Chief and his officers, or else the whole lot of them are incapacitated for the work through a tired feeling".[83]

Still, Engineer-in-Chief Stewart's alterations to some of the proposed drains, (prepared by former Engineer-in-Chief Moncrieff), were accepted readily enough. As well, there was promise of an alleviation of the financial burden when, in 1911, the Kingston Local Court upheld an appeal by some landowners in the Baker's Range drain area that the drain had been of no benefit to them. They were exempted from paying the assessments. Many others joined in resisting the Board assessment, much to the Board's dismay. Gradually, because of its ineffectiveness, it faded out of existence.

In its place emerged the South-Eastern Drainage Assessment Board, this time chaired by the Engineer-in-Chief. His appointment was "extremely popular" according to the Millicent landowners who later expressed this sentiment on hearing of his death in 1918.[84] But the actions of others were soon speaking otherwise about Departmental involvement. The 1921 annual Drainage Conference, (held under the auspices of the South-Eastern Drainage League), asked the Government for suspension of the maintenance assessment and a separate Department to look after South-Eastern Drainage. Many individuals lengthily attacked the scheme as carried out. The Government listened and offered a solution - it would appoint a Royal Commission to investigate the success or otherwise of the scheme as implemented by the Department. From the very start however, the South-Eastern Drainage League made it distinctly clear that it was upset with the appointment of Colonel Findlater as the South-East's representative on the Royal Commission. Still, a long-standing conflict at last earned a reassessment for all concerned.

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[83] See Letter to Editor, The Advertiser Oct. 14, 1910.

[84] The Register May 17, 1918: Millicent - Correspondent's article.

The Hydraulic Engineer's Department was also embroiled in its share of conflicts - and they were no less passionate in nature.

At the turn of the century the sewerage services of the Department were still receiving favourable interest and praise. In 1903 a poll at Glenelg voted two to one in favour of implementing a scheme there. Other suburban areas were not slow in petitioning for deep drainage either. C.W. Chandler in 1907 expressed a long-standing opinion that "sanitarily, Adelaide is the cleanest city in Australia even if socially it is not".[85] Likewise, The Register saw the opening of the West Torrens pumping plant in 1911 as a means of extending "Adelaide's splendid sewerage system" and "deep drainage boon".[86]

But such extensions were leading to major problems. By the early twenties complaints about the smells from, and overloaded nature of the Sewage Farm were being heard from many different quarters. The Woodville District Council had for years been complaining on behalf of residents in the vicinity of the farm. Then in 1921 something happened at the farm which not only stopped a run of healthy annual profits but also added fuel to the opponent's fire. An outbreak of a cattle disease at the farm drew the attention of the Chief Inspector of Stock. He recommended that the grazing of dairy cows on the farm for various private dairymen be discontinued. The Hydraulic Engineer disagreed with his recommendation but was forced to implement it.

Soon the South Australian Fruit Growers Association was requesting that all vegetable growing at the farm be discontinued. The Australian Natives Association passed a resolution advocating that the Sewage Farm be removed from the metropolitan area. As well, over 700 local residents

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[85] C.W. Chandler's Darkest Adelaide, and Sidelights of City Life, Adelaide, 1907, p. 57.

[86] The Register April 8, 1911: "Deep Drainage Boon".

and workers at Islington Workshops signed a petition to the same effect. They claimed that the farm was both smelly and detrimental to health.

In 1924 matters came to a head when a deputation from Yatala South, Woodville, Prospect and Port Adelaide District Councils waited on the Commissioner of Public Works with reference to the question of dealing with the Farm. The Hydraulic Engineer had consistently expressed the opinion that occassional disagreeable odours were no reason to remove the farm, but now he was dead. So it was an opportune time for the deputation to air its grievances. The Government was new to office and there was, as yet, no replacement Hydraulic Engineer on the horizon to proffer advice. A Prospect Councillor put his case in a nutshell when he quoted a common saying in the district - "Prospect, where every prospect pleased, and only the Farm is vile".[87] Commissioner of Public Works, L. Hill, eventually agreed to take the matter further. His Government decided against a Royal Commission, and instead, an expert adviser - G. Gutteridge of the Commonwealth Department of Health - was engaged.

One other group with a grievance stood to gain from Bayer's death. In 1911 a combined deputation of the Plumber's Operative Union and Associated Master Plumbers of South Australia had waited on the Premier, urging that in future when appointing sanitary inspectors in the Hydraulic Engineer's Department, only tradesman be selected. They maintained that Bayer consistently passed over his practical men when making such appointments. In 1924 they wrote to the Commissioner of Public Works on the same theme. They admitted that they saw the Hydraulic Engineer's death as providing the "opportune" time for them to make suggestions to check "that back sliding of efficiency and status apparent of late years".[88] The

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[87] All details of complaints and deputation are to be found in C.S.O. 548/21.

[88] C.P.W. 726/24.

situation was such that anyone could get on the list of authorized plumbers; the Inspectors admitting names to the list were not practical men - many builders were on the list and should never have been there; many of the Sewers Inspectors had been non-plumbers appointed from the Kent Town yard - the current City Inspector, with many years in the trade behind him, being the only exception. The remedy, the plumbers felt, lay either in the formation of a Metropolitan Sewer Board, or in the appointment of "a Hydraulic Engineer capable of filling the position successfully, backed up by a thoroughly capable Deputy and Chief Inspector".[89]

There was little, if any, hue and cry about water supply matters in the first ten years of the century. Mount Gambier people predictably kept up their call for reductions in rating and for control of the works to be vested in the local Council. In 1909 a particularly vocal deputation swooped on the visiting Treasurer.

But elsewhere the Department was seen to be co-operating and providing as best it could. The Resident Engineer for the Beetaloo and Bundaleer Waterworks even offered to lay mains if the applicants carted their own pipes free of charge. This meant savings in time and on the cost of the guarantee payable. Even the constant petitioning by the District Councils of Tiparra and Clinton for further extensions of main in their area was rewarded. Likewise, the inhabitants of Noarlunga country lands were glad to receive a water supply from the scour tunnel of the Happy Valley Reservoir, even if the Department could not promise the purest of water. Port Wakefield people found that a deputation to Adelaide in 1909 to see the Commissioner of Public Works led to some alleviation of their problem of an undrinkable water supply. Bayer examined the matter, erected an aerator at Nantawarra and thereby considerably improved the condition

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[89] Ibid.

of water reaching the town.

By 1910 the problems facing the Department were only just beginning to snowball. Development of city suburban and country areas was reaching a new peak at the same time as the series of drier years highlighted the demand for services. The suburban area of Newstead, for example, was quite developed before the Department acknowledged the inhabitant's petition for a main. The Daily Herald put the situation this way:

> Within three miles of the Post Office, dozens of buildings are hung up for want of a water supply. It sounds impossible but it is an absolute fact.[90]

There was other unfavourable publicity. In a Supreme Court Trial a carrier was awarded £1,500 for damages incurred "through the unskillful and negligent repair of the roadway be the defendant's [the Commissioner of Waterworks] workmen".[91] This was the largest such claim ever incurred by the Department to date. People were beginning to question the competency of the services offered. Increasing periods of poor pressure, in particular, drew attention to the Department's rather haphazard method of metering houses.[92]

In the country the people of Crystal Brook were even forced to organise a deputation to the Resident Engineer, (who lived in the town), about their inadequate water supply.[93] Owen in the north-east portion of the Barossa Water District was in the invidious position of receiving a shortfall supply every summer. West Coast people began to draw public attention to their plight, while groups such as the Eudunda and Jamestown Vigilance Committees emerged to press local claims. A Higher Levels Water Supply League sought to gain Departmental attention to the needs of Blackwood,

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[90] Daily Herald Aug. 20, 1912.

[91] The Register June 19, 1913: "Carrier's Claim Against Waterworks Commissioner".

[92] For example, Editorial of The Advertiser Dec. 18, 1913.

[93] The Register June 17, 1911.

Belair and Eden Hills, only to be thwarted by gardeners at Coromandel Valley and others further down the Sturt River strongly opposed to any tampering with the summer flow of the river. In 1913 a public meeting at Port Augusta issued a strong protest against the Government's decision to discontinue supplying waters at reduced rates for stock and irrigation purposes. It was seen as "an absolute dereliction of duty" by the Department which had done "nothing ... in the way of further storage".[94]

Surprisingly, in the midst of mounting criticism, the newspapers were still meting out praise to Bayer, and his Department. Bayer was seen to be "always on the jog"[95] while the work of his Department was "second to none in the world".[96] By December, 1913, however, the tone of interest in Departmental activities had changed considerably.

As the drought got worse the Department was seen to be adopting watch-dog tactics against consumers. It pleaded with the public to watch their daily consumption and when this failed to achieve the desired effect, implemented more stringent measures. Inspectors made special patrols at irregular intervals to observe people's habits. Plunge baths were prohibited except in certain institutions. No connections to the sewerage system were allowed after November, 1914. The Department was given Ministerial permission to place bricks, half bricks or bottles in cisterns of houses where consumers did not comply with the new instructions.[97] As many meters as could be obtained were placed in metropolitan houses.

The reactions of the public were many and varied. The papers were full of editorial comment and Letters to the Editor on the subject of who

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[94] The Register Nov. 1, 1913; "Port Augusta Water Supply".

[95] The Register June 3, 1911.

[96] The Advertiser Feb. 22, 1913.

[97] CPW 1361/14

was to blame, and suggestions to alleviate the situation. Many accused the Department of lack of foresight - for example, not all properties were metered so the excess water principle seemed discriminatory and ineffective. One individual decried the lack of warning of impending peril given by the Hydraulic Engineer and concluded that no-one could even "begin to calculate what the poor and middle class have lost through not being able to supplement their diminished earnings by growing their own vegetables ..."[98] Even the Prime Minister wrote to South Australia's Chief Secretary complaining about the water shortage in the Port Augusta district, and its effect on the Commonwealth Railways.[99]

One astute individual offered the opinion that the real cause of the shortages lay in the fact that land in the watersheds was sold, springs used by owners for irrigation and land cleared for cultivation, while undergrowth and native herbage, (which hold the water and give it off), were gradually destroyed. He argued in favour of retaining watersheds in their natural state and the prevention of the diversion of spring waters from creeks.[100]

There was much advice offered all round. The Central Board of Health placed advertisements in the press urging people to boil all water used for drinking purposes while the shortages persisted. Individuals suggested that the Murray River by tapped - Western Australia had built a long pipeline, so why not South Australia?[101] As well, there were people ready to point the finger - why wouldn't Adelaide Corporation stop watering streets; why did corporate bodies persist in setting sprinklers on "feeble attempts" at greenery; and why was water allowed for working the organs of churches

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[98] Letter to the Editor, The Advertiser Feb. 9, 1915.

[99] C.S.O. 1148/14

[100] Letter to the Editor, The Register Jan. 20, 1914: "Uno".

[101] The Register Jan. 22, 1914: "Can the Murray be Tapped?"

and for the City Swimming Baths? Well into 1915 the Commissioner of Public Works' office and Hydraulic Engineer's Department were still receiving anonymous postcards citing persons who "should be watched for using too much water". Others simply reacted by tampering with meters - to such a degree that the Department was forced to issue warnings, in the press, of retaliatory action.

There was also a revival of interest in the quality of Adelaide's water supply. Various writers argued that filtration could ensure that all waters, no matter how dirty, would be utilized. Others remembered the Water Supply Enquiry of 1902 and noted that no action had been taken on any of the suggestions which came out of it.[102] Suddenly, people were interested enough again to report the existence of dead animals in Reservoir Reserves and creek watersheds.

In the midst of all this, remarkably little interest was taken in the plight of the doomed Millbrook township. Few of the landowners affected by the building of Millbrook Reservoir came out of negotiations as well as did Mrs. Amelia Symonds. She claimed that the driving of the Inlet Tunnel through her land had depleted the surface springs at the natural surface upon which she was dependent for her water supply for stock. Two arbitrators were agreed upon and an umpire appointed by consent of both parties. Finally, Mrs. Symond's contention and claims were supported; she was paid compensation for loss of the water and given certain other conveniences and concessions.[103] As well, she retained ownership of the natural surface of her land, while the Commissioner of Waterworks' title covered only a substratum of land lying beneath the surface.

One effect the crippling drought had was to open the floodgates for any and every town, district or suburban area in South Australia to

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[102] The Advertiser Oct. 2, 1914.

[103] CPW 557/16

pressure for security from similar drastic shortages in the future. The Royal Commissions on Water Supply of 1915 to 1919 provided one avenue for channelling discontent. Individuals from Murray lands, Eyre Peninsula, Mount Gambier, Port Pirie, Port Augusta, Peterborough, Wilmington to Port Germein and the Murray Flats appeared before the Commissioners with one aim in common - to demand the provision or updating of water supplies by the Government in their particular areas. As usual, only the question of rating aroused dissent, especially when the Hydraulic Engineer appeared before the Commission urging increases in the price of water. This provoked a visit by the Chamber of Manufacturers to the Commissioner of Public Works, numerous expressions of alarm by local Councils and even editorials on the subject. The Register argued that such increases would be detrimental to the public interest.[104] However, the fuss soon died down as no drastic increases were seen to be forthcoming.

Outside of the Royal Commission, appeals burgeoned in the other directions. Members of Parliament, Ministers and the Department were inundated with letters from Eyre Peninsula settlers until a start was made on the Tod River Scheme in 1919. The early twenties saw additional claims from the area. Port Lincoln Council asked for a water supply for the town; the 1923 Annual Convention of Farmers and Settler's Association called for linking of the Polda Basin with the Tod River scheme; and groups like the Cleve Progress Association and Rudall Water Committee demanded attention now that two major water supply schemes had been established on the Peninsula.

Likewise, Port Pirie people promoted the construction of Baroota Reservoir - they wished it to be named Simons Reservoir after a local who had given the Department advice on the matter. Years passed before work

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[104] The Register Editorial, "Cheap of Dear Water", May 29, 1918.

actually began on it. Editorials of the Pirie Recorder from 1919 to 1921 consistently lamented the continual delays which dogged the project. Then there were fears about the holding ability of the dam. "It may be", commented the Pirie Recorder in 1922, "that the slow rate at which the pipe track is being laid is due to the fears of the Hydraulic Engineer's Department that it may not be worth laying the pipes at all".[105]

In 1919 people in the High Levels Water Supply District of Adelaide were incensed at the enforcement of restrictions on water for garden and irrigation use. Consumers using water for making a livelihood were forced to make written application to the Hydraulic Engineer to use water for not more than two hours each week-day at approved hours. In a letter to the Editor of The Register on December 20, 1919 "Polite" wrote that "the residents of the higher levels are seething with indigation at the treatment meted out to them by the Waterworks Department". Yet when the Blackwood and Belair Waterworks scheme was authorized in 1923, a petition signed by 111 residents and market gardeners of the Upper Sturt region, was very promptly organized against it. No-one could win in such a conflict.

In parts of the Beetaloo Water District restrictions were also necessary in 1919 and 1920. There the problem of a limited intake of water into the Reservoir was compounded by the fact that leaks in the old steel mains made it difficult to fill Service Reservoirs. Letters had to be sent to the Corporation of Port Pirie and all local District Councils stressing the need for economy. They did not stop many complaints from reaching the Resident Engineer - a petition from gardeners and farmers along the Napperby main for an adequate water supply; the reports of bad smelling water at Gladstone and poor quality water at Solomontown; and consistent pleas for better pressure at Kadina, Moonta and Wallaroo.

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[105] The Pirie Recorder Aug. 15, 1922.

The Department was also seen to be inconsistent and haphazard in matters of pollution control. In 1905 a patroller was appointed to the Barossa watershed, but beyond that, and issuing the occassional notice ordering removal of a nuisance, the Department was seen to be disinterested in such matters. Licences for fishing were issued in relation to Millbrook Reservoir - only the Governor had permission to fish in any of the other Reservoirs.[106] There were other exceptions to the rule - at Christmas time Boy Scouts were given permission to swim in the Onkaparinga River. However, when a Woodside Constable asked for permission for local boys to learn to swim in the same river, the Hydraulic Engineer sent the request on to Cabinet where it was negatived.[107]

Yet, in the midst of all these grievances, the Department had one public relations "plus" in its favour - namely, the efforts of its staff. For example, in 1912 Tailem Bend people saw the water turned on "to the surprise and satisfaction of many" on November 19, while the men employed on the works were described as "the soberest lot of men that have ever worked here".[108] Likewise, the Renmark Pioneer in 1914 reported that the work on the town's new water supply system "has so far proceeded without hitch or accident and reflects great credit upon the Department, contractors and men employed on it".[109] In particular, J.C. Gunner, the Supervising Engineer, had "made himself very popular during his stay".[110] Even Mount Gambier people could not fault H.R. Gunner's work of supervising the installation of a new pumping plant there in 1923. The South Eastern Star

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[106] CPW 4730/24

[107] H.E. 4845/24

[108] The Advertiser Nov. 25, 1912.

[109] Renmark Pioneer Oct. 15, 1914.

[110] The Register Dec. 10, 1914.

commented: "The tact he exercised as Supervising Engineer has already been reported in our columns."[111]

Back in Adelaide the age-old conflict between the City Council and the Hydraulic Engineer's Department over the breaking up of streets reached a temporary solution through the good graces of the then Mayor, Frank Johnson. In 1909 he invited Hydraulic Engineer Bayer to a conference on the subject as well as representatives from gas, electric light and tram services.[112] The outcome was that Bayer agreed to supply monthly to the Council a list of streets which would be affected by proposed main laying works. As well, the Mayor, Hydraulic Engineer and representatives of the other services involved, agreed to meet at the Town Hall on the first Wednesday of each month. There they would discuss forthcoming works and arrange their programmes to fit in with one another.

Relations with the Fire Brigade, on the other hand, showed no improvement in these years. In 1907, Superintendent Booker's temper flared into action after a fire gutted Harrold Colton and Co.'s hardware premises in the city. For the first time ever a complete file in the Chief Secretary's Office was devoted to a fire and the related matter of an inadequate water supply.[113] In the past Booker had made indirect references to the question in various files, but never had he so openly criticised the mains distribution system as provided by the Hydraulic Engineer's Department. But this particular fire involved one of Adelaide's oldest and best known firms; it was one of the largest fires ever seen in Adelaide; the damage was valued at £80,000 (although this would have been greater if the powder magazine in the building had not fortunately remained intact); and Booker

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[111] The South Eastern Star Jan. 12, 1923.

[112] C.P.W. 81/09

[113] C.S.O. 268/07

had 48 men fighting it, including Governor George le Hunte who was out for his early morning ride. Water had to be obtained from North Terrace to feed the engines and the larger mains tapped in preference to the smaller mains with their hopelessly inadequate pressures. After the fire Booker pressured the Fire Brigades Board to demand a new trunk main to the City with larger distributing mains through the principal streets. The Hydraulic Engineer remained unimpressed. He steadfastly claimed that it was "questionable whether this Department should be put to the expense for fire purposes only".[114]

Booker faded out of the picture later in the same year after the Fire Brigades Board found him guilty of certain irregularities. However, his successor, Superintendent Rickwood, continued to criticize the failings of the Hydraulic Engineer's Department in the Metropolitan area and in country towns. From 1908 to 1924 the files of the Chief Secretary's Officer concerned with Brigade matters were full of complaints about inadequate water supplies, poor water pressures, and the condition of fire plugs. And there were many suggestions towards improvement. As from 1910 the Department was responsible for fixing and maintaining fireplugs and hydrants for fire purposes in towns where Fire Brigades existed.[115] Thus, in a period when increasing co-operation between the two bodies was essential, both sides declined to surmount old (and continuing) conflicts.

The emergence of town planning legislations and the appointment of a Town Planner was initially treated by a belligerent Hydraulic Engineer as an undermining of Departmental powers. Bayer demanded that the Hydraulic Engineer retain the ultimate say as to whether or not an intended subdivision was suitable for sewering. As well he asked that he be allowed

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[114] Ibid.

[115] C.S.O. 327/10

to see the plans and give approval before they came to the Town Planner. The Town Planner, Charles Reade, assured him that he would be the only person to decide whether a subdivision would meet the best requirements for sewer and water mains. However, he naturally argued that the Hydraulic Engineer's claim to approve/disapprove the complete design would only perpetuate the existing problem. Far better to have the professional Town Planner affect agreement between, and co-ordinate the differing interests. Otherwise other authorities equally affected - the Railways Commissioner, Tramways Trust and so forth - would all demand the same veto powers that Bayer was demanding for his Department.[116]

Thus, in many respects, the Department had yet to learn the value of co-operating with rather than conflicting with the aims of new and long-established organisations. Bayer's conservatism and problems such as Department insularity and inadequate communication systems tended to stand in the way of that achievement.

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As we have seen then, many of the major conflicts facing South Australia in the years 1903 to 1924, affected either or both of the Government Departments concerned with engineering and water supply matters.

The interstate struggle over the River Murray waters continued, but reached an important agreement in 1914-1915 after the Engineers had prepared the necessary fine detail. Such were the beginnings of one of the biggest challenges to face the Department in the Twentieth Century - namely, the control and utilization of the River, in co-operation with partner States, to best serve South Australia's needs.

There was conflict over important issues as distinct political

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[116] CPW 528/1919

parties emerged in the period. Both Departments, for example, were affected by any policies and legislation affecting the worker's position in South Australia. They bore the brunt of inconsistency as different Governments came and went with their respective policies. At times Departmental officials involved themselves in the conflict such that employees were only aggravated further.

The major drought of 1913-1914 created turmoil on a State-wide level. Accusations flew back and forth, and it was the Hydraulic Engineer's Department which bore the brunt of them. The conflict between the Department's desire to make the public pay adequately for services rendered and the public's call for more and better supplies grew more intense. In fact, the drought led to a burgeoning of requests and massive outlays of money, which, the politicians argued, would be indirectly repaid through increased rural production.

World War One accentuated the strain on the Department caused by the drought. The Hydraulic Engineer's and Engineer-in-Chief's Departments were the two Government Departments most affected by the war - manpower and material shortages affected expectations and performance. The marvels of mechanisation had yet to be fully embraced.

Even the creation of an independent permanent Public Service Commissioner to investigate and classify proved of little immediate value to the Departments. There were still inconsistencies, tensions and much discontent.

By the early twenties, it was quite apparent that long-established arrangements were ineffective. The irrational sharing of personnel between the two Departments, and the disregard of the need to train a steady supply of technical staff and skilled workmen, the lack of delegation of authority - these and other problems were now paying sour dividends.

Even Bayer and Stewart finally realized that changes were needed.

needed. But it was too late for them to act - for too long they had accepted past practices, denied the importance of invigorating changes and ignored the warnings inherent in past and continuing conflicts. It remained to be seen whether the death and retirement of such leaders would mean the advent of much-needed innovation and revitalization.

CHAPTER VII: INTERLUDE : 1924-1929

For the organisations concerned with engineering, water supply and sewerage, the years 1924 to 1929 were a mixed bag of tidying up past problems, accepting necessary changes and moving in new directions. In fact, under the impetus of an encroaching depression, the matter of streamlining and unifying their functions was tackled once and for all. Someone had to win. Someone had to lose.

POLITICS:

April 1924 brought the Gunn Labor Government to power thereby ending a seven year run by the Liberals. Problems which had long demanded alleviation were tackled enthusiastically.

To begin with, the flow of resignations from the Public Service needed to be stemmed. The Government pushed through legislation amending the Industrial Code Act of 1920 to give public servants the right of access to the Industrial Court. They created a Classification and Efficiency Board, (via the Public Service Amendment Act, No. 1716 of 1925), which assumed the greater portion of the Commissioner's personal powers. Fortnightly pay to officers was instituted as from July, 1924 and the Government approved of the Public Service Commissioner's recommendation that the classification of the service be amended in the direction of paying larger salaries. As well, long service leave of absence was extended to virtually all public servants as were the provisions of a Superannuation Act passed in 1926. A. Pettit, Chief Accountant in the Engineer-in-Chief's Department played as instrumental role in the detailing of these provisions.

But the Departments needed attention and morale-boosting at the administrative level, as well. The Royal Commission on South-East Drainage reported in 1925 and produced much evidence that the scheme, as

carried out by the Engineer-in-Chief's Department, had not given the satisfaction that was anticipated. Still the Commissioners concluded that "from an engineering point of view, the work has been properly and efficiently carried out", and that "large savings were effected by carrying out the scheme drains departmentally rather than by private contract".[1] But the suspension of F. Burchell, (Resident Engineer of South-East Drainage Works), after an Audit investigation simply confirmed the widespread opinion that Departmental management of the scheme left much to be desired. The Government reacted accordingly. In 1926 it altered the existing Irrigation Commission to produce an "Irrigation and Drainage Commission" with powers to construct, contract, employ, maintain drains and levy rates in the South-East. In this way the Department lost a major area of activity and suffered a concomitant loss of status.

Its boring and water conservation activities also came under investigation during the proceedings of the Legislative Council's Select Committee into Water Supply in 1924. But the Hydraulic Engineer's Department bore the brunt of attention, especially since Bayer had died and the Department was in need of direction as well as a leader. The Committee recommended an investigation into the meter system, the abolition of the guarantee system, the implementation of a rating system to produce more revenue and the appointment of a Committee to inquire into all new water supply schemes and report to the Government. The Tod River scheme lay at the root of much of this concern. On top of its high cost of construction, it was quite obvious that main-laying programmes would never bring in enough to cover even annual working expenses. As well there was the disclosure that Bayer had allowed the payment of

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[1] P.P. no. 55 of 1925: Report of Royal Commission on South-East Drainage p. XII

extras of £20,849 on Atkin's and Finlayson's tender of £57,210 - despite the fact that the contractors had run 21 weeks over the stipulated time and had left the Tod River Reservoir in a leaky state.

The sewerage activities of the Department also received a share of the attention. The Government obtained the services of G. Gutteridge (of the Commonwealth Government) to investigate the metropolitan sewerage system. This did not deter Price from moving (unsuccessfully) in the House of Assembly for the creation of a Select Committee to examine the alternatives of sewage disposal.[2] Others asked why Wilson, the Manager of the Sewage Farm, had resigned. As well, a report by F.F. Longley, an International Health Board Advisory Expert in Sanitary Engineering,[3] was disturbing in that it disclosed the defective drainage systems of the towns along the Murray and the pollution being created by them. He specifically named the Hydraulic Engineer as one of the authorities who should be concerned with making improvements - for example, by implementing "frequent and regular examinations of the various public water supplies, especially to ascertain the numbers of bacteria and the presence of bacteria which indicate sewage pollution".[4]

All this was enough to trigger the Gunn Government into action. They by-passed the obvious successor to Bayer - T. Hicks, the Deputy Hydraulic Engineer, who was already close to retirement - and advertised Australia-wide for a new Hydraulic Engineer. Thirty-five applications were received for the post and the Commissioner of Public Works (L. Hill) and Public Service Commissioner (Price Weir) even travelled to Melbourne and Sydney to interview applicants. They finally chose Herbert Bellamy, who held the post of City Engineer in Hobart and whose highest achieve-

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[2] Parliamentary Debates of 1924: House of Assembly Nov. 19 motion by Price.

[3] See P.P. No. 75 of 1924: Supplement to Premier's Report on Sanitary Conditions and Requirements of River Murray Communities.

[4] ibid. p.p. 7 and 11.

ment was a fellowship of the Royal Sanitary Institute. If anyone could lift the Department's sewerage activities from their poor-cousin status, they felt sure it would be Bellamy. He took office on March 16, 1925.

For a time support abounded for the new golden boy, even from the Opposition ranks. He could certainly be charming. The Waterworks Act Amendment Act of 1925, enabling differential rates to be levied on country lands according to the unimproved value, was received enthusiastically all round. It was also an opportunity for the Commissioner of Public Works to make mileage out of past bungles on the Tod River scheme and to praise the new Hydraulic Engineer's initiatives. Even Opposition members were in accord - Moseley explained that Bayer, "the poor old man who is dead, was stubborn" and Crosby commented that it was Bayer who had introduced the guarantee system for main applications, now seen in its true light.[5] Later, the Opposition noted with pleasure that Bellamy had recommended (with the Public Service Commissioner) a certain Departmental officer for the position of Chief Inspector of Sewers in the face of the Government's appointment of another man. This only added weight to their conviction that the appointment was a case of "spoils to the victors".[6] Anthoney's contention that E.R. Hicks, and not Bellamy deserved praise for the money-saving idea of discontinuing the water meter system in the metropolitan area, accordingly fell on deaf ears. A few years later, as dry seasons set in, all would be much less inclined to praise the man responsible.

The Government was all-ears to Bellamy initiatives. Henceforth only one Waterworks account would be issued per annum and rate collectors would only be sent in exceptional cases. The Auditor-General attested

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[5] 1925 Parliamentary Debates: House of Assembly debates on Waterworks Act Ammendment Act, Nov. 24 and Dec. 1, respectively.

[6] 1925 Parliamentary Debates: House of Assembly - see Oct. 27 discussion.

to the leniency Bayer had shown the Hume Pipe Company over their contract for reinforced concrete pipes and collars for the Moorook and Warren schemes - but Cabinet readily approved Bellamy's suggestion that the firm be allowed to replace two miles of the Moorook line with new reinforced concrete pipes jointed with steel collars. Likewise the Government readily resumed the Beetaloo water reserve lands - leased to the Forest Department since 1893 - because the Hydraulic Engineer claimed that "the letting of these lands for the grazing of cattle is, in my opinion, an objectionable practice where the various creeks flow directly into the Reservoir as they do at Beetaloo".[7] Bellamy and the Commissioner of Public Works, Hill, even took a trip to Melbourne together to investigate concrete-lined steel and cast-iron pipes.

But 1927 brought a different boss to power. The new Butler (Liberal) Government was determined above all else, to save money and make services pay. Thus it brought in and passed two Acts expressly to impose a 25 percent surcharge on all water and sewer rates, ostensibly for one year only. At the same time Butler won his battle to create a Public Works Standing Committee, via the passage of Act No. 1795. In his introductory speech he drew specific attention to a project which he claimed, had practically been approved as a small item of expenditure placed on the year's Loan Estimates. It was Bellamy's £1,200,000 new sewerage scheme for Adelaide. Butler claimed he would need much convincing about the scheme, particularly as he knew the old stalwart, Dr. Ramsay Smith, favoured a (cheaper) septic tank system.[8]

That outlook was to be the beginning of Bellamy's downfall. In 1928 he appeared before the Public Works Standing Committee, armed with

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[7] ibid. See Dec. 2 discussion.

[8] 1927 Parliamentary Debates: See Butler's comments to this effect, House of Assembly debate, Aug. 23, on Public Works Standing Committee Bill.

his scheme and the Dutch courage of a few drinks inside him.[9] His scheme was certainly far-seeing - it catered for an expanding population to the year 1975 - but predictably the Committee was not interested in such foresight when it meant a huge outlay at the present time. Members promptly asked Bellamy why his scheme could not be divided up - one area serving the South-Western suburbs and draining to Glenelg; another serving the North-Western suburbs and draining to Port Adelaide; and finally, the Adelaide area draining to the Islington Farm. Poor Bellamy was thus placed in the position of having to back-track on many of his well-rehearsed principles and conceptions. His scheme was to be broken up. Unfortunately, his pride got the better of him and he subjected the Committee to the bombastic, tactless side of his nature. The Committee, in turn, continued to dwell on any of Bellamy's recommendations which differed from those of A. Gutteridge, the Consulting Engineer, and thereby added salt to the wound. Former Commissioner of Public Works (Hill) decried the Committee's decision to postpone the drainage of eleven square miles of suburban land, but it was too late.

As well, Bellamy had to bear the brunt of criticism when the Minnipa Reservoir (on the west coast) sank on one side, causing extensive damage. True, there had only been a foreman-ganger in charge during the tank's construction, but the fact is that at the time engineers knew very little about soil behaviour anyway. Two different soils carried the structure and they acted in a way which nobody could have ascertained. Only in 1925 was Terzaghi's classic work on "Soil Mechanics" published in Germany - to be devoured and promoted in ensuing years by a Departmental officer and later university lecturer, Tom Farrent.

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[9] A number of his contemporaries suggested to me that this was the case ... he certainly liked a drink and had every reason to have a few on this particular occassion.

But the failure of the tank was sufficient reason for Commissioner of Public Works, McIntosh, to express in Parliament his qualms about Bellamy's ability. He let it be known that he was seriously considering getting expert advice from outside the Department.[10]

Thus, when J.G. Stewart formally retired as Engineer-in-Chief on December 31, 1927, at the age of 70 (after 50 years' service), the question of a re-organisation of the Engineer-in-Chief's and Hydraulic Engineer's Departments was promptly raised. However, nothing came of it and instead, the Constructing Engineer in the Department, J.H.O. Eaton, became Acting Engineer-in-Chief. He had every reason to keep out of the spotlight. South-East Drainage was no longer a responsibility. The only other major area of activity - the River Murray Works - was financially curtailed by (Federal) Loan Council decisions in the years 1927 to 1930. The Lock work was effectively curtailed and in a sense, the Commonwealth was thereby able to get back at the South Australian Government for its earlier refusal to release the Federal Government from her share of payments for maintenance of locks.[11]

On the other hand negotiations with the Federal Development and Migration Commission led to the laying of more Tod River Scheme mains and an increased workload for the Hydraulic Engineer's Department. The carrying of this additional load earned the Department no praise, for the Public Works Standing Committee suggested after the event that "mains have been approved with little regard to financial return".[12] Likewise the Committee was quick to find fault with Bellamy's estimates for improvements to the water supply system of Adelaide and the suburbs - they were not satisfied with estimates of costs for proposed service

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[10] 1927 Parliamentary Debates: House of Assembly, Nov. 24. See his comments in reply to questions re Minnipa Reservoir.

[11] See Premier 1205/26 and C.S.O. 1174/27.

[12] P.P. No. 35A of 1928: Report of Public Works Committee on Tod River Waterworks; p. IX.

reservoirs along the Millbrook main and found all his estimates to be considerably higher than prices for similar work undertaken by the Melbourne Metropolitan Board of Works.[13] Nothing could be done right.

Even Bellamy's willingness to promote the re-introduction of petty contract work at the Government's bidding earned him little praise. The Commissioner of Public Works (McIntosh) readily quoted figures in Parliament and in his Public Works Reports that he had obtained from Bellamy. The sum of £17,442 had been saved by the abolition of "walking time" payments and implementation of the practice of allowing fares or conveying men to work by Departmental lorry. As well, Bellamy claimed that the introduction of petty contract work on the Tod River Works was resulting in a saving of 30 percent on all labour items.[14]

McIntosh was more interested in tightening-up his control than placing complete trust in the Head of the Department. Thus, he asked Bellamy on a number of occassions to ensure that District Engineers communicated their recommendations direct to Head Office only, and did not discuss such matters with the public. On one occassion the Western District Engineer (Miller) was even forced to justify why he had allowed open discussion on the proposed reticulation of a certain area. Miller replied that "the main was to be a public utility for the District as a whole and considerable help was given by the opinions expressed at the meeting".[15] This action countered the factions which had developed and were pressing for routes favourable to themselves. McIntosh had to be content with the explanation.

The year 1929 again saw Bellamy in the limelight of criticism. A Water and Sewerage Rates (Surcharge) Bill drew attention to the poor

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[13] P.P. No. 34 of 1928: First Progress Report of Select Committee of Public Works on Water Supply of Adelaide and Suburbs; p. VII.

[14] C.P.W. 283/29 and see Public Works Reports of 1928 and 1929

[15] C.P.W. 526/29, also H.E. 2668/28

financial position of the State's water and sewerage schemes. During the lengthy debates, Members of Parliament like Cameron, of the Country Party, railled against the division of city and country schemes into separate departments and the unsatisfactory conditions in the Waterworks Department.[16] Likewise the Public Works Standing Committee was making no bones about the low esteem Bellamy had in their eyes. They recommended that a Consulting Engineer be appointed to work with the Department to design and supervise construction of sewage treatment plants - or alternatively that the Hydraulic Engineer, or a recommended officer, be sent overseas to look at the latest developments. The Hydraulic Engineer and his scheme were laid aside, ostensibly, for reasons such as Bellamy's limited experience in the direction of activated sludge treatment or plants.[17]

Bellamy, in turn, was annoyed at the innuendos. He denied the need for any outside assistance to design and supervise the treatment works;[18] he stressed that although he and the Public Works Committee advocated concrete-lining of all pipes, he had been unable to obtain ministerial approval to line all pipes the Department laid;[19] and he was upset when the Chairman (Reidy) inferred that the Estimating Engineer's figures he brought with him were merely guesses.[20] He became even more stubborn when R. Wilton, a fellow Departmental engineer, showed his willingness to submit schemes along lines suggested by the Committee to save money.

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[16] 1929 Parliamentary Debates: House of Assembly, debates of Nov. 13 and 20 on Water and Sewerage Rates (Surcharge) Bill.

[17] P.P. No. 33 of 1929: Second Progress Report of Public Works Standing Committee on Sewerage of Adelaide and Suburbs.

[18] ibid. See Q. 1564 and Answer: p.p. 28-30

[19] P.P. No. 34 of 1929: Public Works Standing Committee Report on Water Supply of Adelaide and Suburbs; see evidence given by Bellamy.

[20] ibid.

The Government at last made its move. Three officers were appointed — Angwin of the Engineer-in-Chief's Department, Goldbeck, (Chief Accountant of Railways) and Wainwright of the Auditor-General's Department — to examine the possible amalgamation of the Engineer-in-Chief's and Hydraulic Engineer's Departments. Because there was no representative of the Hydraulic Engineer's Department on the Committee the odds were stacked against Bellamy from its inception. As expected by the Government, the Committee soon recommended an amalgamation of the Departments and furthermore, the Public Service Commissioner recommended that Eaton be appointed Head of the new Department. Thus was born the Engineering and Water Supply Department.

The Labor men who had originally appointed Bellamy were caught by surprise. The first they knew of the proposed amalgamation was from a press release. Hill, the Leader of the Opposition, did his best for Bellamy in Parliament. He pointed out that Eaton was neither an hydraulic nor a sanitary engineer, that Bellamy at least consulted closely with his fellow officers, and that he had saved the State much money since his appointment. "Why", he asked, "have the Government put the head of a dying Department in charge of a live Department? Have members forgotten that the South-East drainage was in charge of the Engineer-in-Chief's Department? Have they forgotten the defalcation there?"[21] Hill claimed that his Government had been working towards doing away with the moribund Engineer-in-Chief's Department; placing Eaton in charge of the Harbors Board and bringing locks and weirs under that Department; placing the road works of the Engineer-in-Chief's Department in the hands of the Local Government Department and Water

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[21] 1929 Parliamentary Debates: These comments by Hill to be found in House of Assembly, Oct. 1 debate on question of amalgamation.

Conservation Works under the Hydraulic Engineer's control.

But the Government side was ready with an assortment of reasons for the changes. There would be a direct saving of several thousand pounds per annum and a number of draftsmen could be retrenched. With a little more honesty Blackwell and the Attorney General (Homburg) explained that the whole trouble lay in the fact that Bellamy was appointed by a Labor Government.[22] The Treasurer justified Eaton's appointment by saying that he was "an old public servant who has rendered particularly fine service to South Australia". In contrast there were "dozens of instances where Bellamy's estimates have not been accurate ..."[23] The Commissioner of Public Works (McIntosh) maintained that the real motive was not one of economy but to ensure that "mistakes of the past won't occur again".[24]

The re-organisation was officially made on November 1, 1929. Bellamy's appeal before the Classification and Efficiency Board - chaired by Price Weir (who had already recommended Eaton) and including Government representative Wainwright (who had been on the amalgamation committee) and Public Service representative E. Treloar (a subordinate officer of Bellamy's) - was naturally unsuccessful. However, he applied for, and got, the position of Engineer for Sewers, while Angwin became the first Engineer for Water Supply. But for the matter of a few months the changes made may have been entirely different, because April, 1930, brought the Hill Labor Government to power.

But it was too late. The Butler Government, in its dying throes, appointed A. Gutteridge as Consulting Engineer to the Department. That step and Bellamy's position could not be altered or rescinded, but what

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[22] ibid.

[23] ibid.

[24] Parliamentary Debates of 1929: House of Assembly; Oct. 25 statement by Commissioner of Public Works.

the Hill Government did do was to publicly announce its decision to send him overseas to look into sewerage developments. For Bellamy this would be a face-saver and a recompense for past injustices.

There was, however, one major hurdle to be surmounted. Bellamy's trip depended on the recommendations of the Public Works Standing Committee in relation to the proposed sewerage treatment works for Adelaide. That meant giving evidence before the Committee. It was Bellamy's undoing. Perhaps it was again too many drinks under the belt which made him appear inconsistent and bellingerent. The Committee reported that he "gave evidence in a manner that has seriously discounted the value of his first expressed opinions".[25] It was Bellamy's evidence against that given by Gutteridge. Eaton, in his reports to the Minister, made it quite clear that the latter's proposals should be adopted. In the end the Committee recommended adoption of Gutteridge's scheme and that no action be taken in the direction of sending a man overseas to look into developments.

The new Public Service Commissioner, Les Hunkin, investigated Bellamy's blunders before the Committee. However, he concluded: "Beyond a general plea as to the state of his health and family worries affecting him so greatly as to unbalance him when giving his evidence, he has not satisfactorily disposed of any one single complaint which the Public Works Standing Committee laid against him".[26] Hunkin recommended that Bellamy "not be allowed to remain in the Service" and that a cash payment be made to him, "by way of compensation for loss and expense entailed in connection with arrangements made for his trip abroad, and also by reason of the fact that we took him from a permanent

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[25] P.P. No. 33 of 1930: Third Report of Public Works Standing Committee on Sewerage of Adelaide and Suburbs, p. VII.

[26] C.P.W. 702/30

position".[27]

Bellamy resigned, as the Government had long desired, and went to Melbourne where he became Consulting Engineer to the Hume Pipe Company. That left Eaton, a more reserved and aloof person by nature, with a free rein to lead. All his immediate recommendations were readily accepted by Cabinet and the Classification and Efficiency Board.[28] But the greatest obstacle had yet to be encountered - the depression was just around the corner.

ORGANISATION:

Both the Engineer-in-Chief's and Hydraulic Engineer's Departments began the period by tackling serious problems which had developed for want of adequate supervision in the past.

In early 1925 the Assistant Expenditure Accountant of the Engineer-in-Chief's Department visited the Head Office of the South-East Drainage Works at Beachport. His purpose was to undertake the first stocktaking since 1916 and to introduce the Bin-card system. However, he found the setup there to be more critical than expected. He discovered considerable laxity in the issuing of stores; found that the Resident Engineer (Burchell) kept the keys to certain store cupboards and was using Government equipment on his farm; and noted that the store was situated three-quarters of a mile from the office, to the effect that there was no control over the times worked by men employed in the stores and the Yard by the office staff. To sum up, he reported: "There has been serious mismanagement, gross carelessness and misappropriation of Government Stores, for all of which the Resident Engineer is responsible".[29]

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[27] ibid.

[28] C.P.W. 527/29

[29] E.O. 259/25

As a result the Engineer-in-Chief temporarily suspended Burchell, who had 44 years in the Service. Moffat Anderson was appointed Acting Resident Engineer and he ensured that annual stocktaking would be taken in the future. As well, he undertook urgent repairs on a number of drains which were deteriorating badly. The police were called in and Burchell appeared before an inquiry conducted by the Public Service Commissioner at Beachport. His time for appeal for a Board of Inquiry elapsed and he was dismissed. The Crown Solicitor recommended (and Cabinet approved) that no prosecution be made against him "as lax administration in the drainage branch would make it hard to prove charges against him in a Court".[30]

The Hydraulic Engineer's Department, too, had a similar story of laxity to tell. It had its beginnings when E.J. Bradley was appointed Engineer in charge of the Tod River Waterworks scheme in the early twenties. He never wanted to go to the West Coast and as a result Bayer obliged by arranging jobs for him periodically in Adelaide. This left 26 year old Engineering Assistant, Ray Ashton, in charge in between Bradley's rare, quick trips back to the Coast. It also meant that departmental supervision of Atkins and Finlayson's contract for the Tod River Reservoir and the contract main-laying was much less than adequate.

When Bellamy arrived to become the new Hydraulic Engineer he was appalled at the time wasted by Atkins and Finlayson, the excesses they had been paid on their tendered price, and the leaky state of the Reservoir they had constructed. All had been passed by Bradley. After a quick, investigatory trip to the West Coast - much of it spent on a

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[30] ibid.

train 66 feet away from the pipeline - he called for an Inquiry by the Public Service Commissioner. It was held in early 1926 at the Harbor's Board Offices in Victoria Square.

The immediate outcome was as expected. Bradley was demoted and sent to Ceduna to inspect the production of pipes at a temporary fabrication plant. Unfortunately this move was to be fatal. Bradley had diabetes and was a heavy whisky drinker to boot. His condition did not mix well with the fumes from oxy-welding equipment at the plant. At Christmas 1927, fellow officers brought him back to Adelaide by boat, but he died on December 28. Many said the Labor crowd had thus made him pay for past tyrannical behaviour towards workmen on the Port Adelaide Drainage Works.[31] Who knows for sure?

Many other changes came to the Hydraulic Engineer's Department as a result of Bellamy's leadership. One of his immediate moves, "with the view of obtaining greater efficiency and better supervision"[32] was the organisation of the Water Districts of the State into three divisions, each headed by a District Engineer. A.J. Green, F.W. Oldham and R.G. Wilton were subsequently appointed District Engineers for the Northern, Western and South-Eastern Districts. As well, the Government approved his decision to appoint two Assistant Engineers for Sewerage in an effort to give sewerage functions the attention they had lacked in the past. J. Murrell and H. Hodgson took these positions. Hodgson was in fact the only University graduate in the Department at his entry in 1924.

But Bellamy's manipulation of personnel did not suit everyone. For a start, the Deputy Hydraulic Engineer, Hicks, resigned not long

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[31] Much of this detail told to me and confirmed by E.J. POPE and RAY ASHTON.

[32] See Hydraulic Engineer's Report in Public Works Report for year ending June 30, 1925, p. 67.

after his arrival. Then Hugh Oldham, a quietly spoken man from Western Australia who had been appointed the first Western District Engineer, resigned after less than a year in that position. He was upset that Bellamy had sent Foreman J.C. Gunner to investigate work on the Minnipa Tank. "This as far as I am concerned", Oldham wrote, "amounts to suspension of my services for that work".[33] That paved the way for Bellamy to recommend J.I. Miller, Assistant Water Engineer and protégé from Tasmania, for the position of Western District Resident Engineer. Miller got the job at the tender age of 26 and Bellamy also created a position of Superintendent (for J. Elliott) in the Western District. Elliott tendered his resignation early in 1927 and the Hydraulic Engineer then sent the competent J.C. Gunner as Foreman of Works to assist the District Engineer. The creation of ten District Foreman positions on the West Coast in 1928 did much to aid supervision of such a vast area, but the suicide of the Ungarra foreman late in the year did little to boost an already low morale.

Back in Adelaide, Gunner, the Superintendent of Waterworks, had died after a service of 47 years. William Goss replaced him as Chief Superintendent in 1925. On the sewerage side, however, Bellamy upset long-standing arrangements by elevating Hodgson (from Victoria) and Murrell, another protégé he had brought from Tasmania. J. Gow, the Resident Engineer of Sewers, resigned in 1928, and Murrell took his place at the age of 27.

Although these manipulations angered many, what Bellamy was thereby trying to achieve was important. He wanted to delegate authority, but in doing so he had to be sure that his officers were

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[33] H.E. 2642/26

competent and trustworthy. Hence his selection of well-educated and enthusiastic engineers, no matter how young. He gave them responsibility as subordinate officers had never been given before - Murrell, for example, was given the direction and supervision of the Adelaide Sewers reorganisation scheme. Likewise he readily agreed with the suggestion that the old-fashioned "Chief Draftsman" label be replaced by "Designing Engineer". Most of his protégés did prove worthy of his trust - Murrell, Hodgson and Gunner, to name a few, were to give long and vital careers to the Engineering and Water Supply Department.

On the other hand, changes of personnel in the Engineer-in-Chief's Department had much less of a dynamic impact. L. Dyke, who had been associated with the Department for 36 years and ended up Secretary, died in 1924. Young and University educated engineers were mostly to be found on the River Murray works out in the field. A few, like Angwin, remained in Head Office where the challenges were limited. When Eaton became Engineer-in-Chief there were no great changes. He, like Stewart before him, was a quiet man whose experience came not from a University education, but form years of practical application.

After a visit by a Senior Inspector from the Victorian Auditor-General's Department in 1926, the accounting practices for the River Murray Works, as carried out at the Renmark and Adelaide offices, were overhauled. For years no officers of the Accounts Branch in Head Office had visited Renmark. But henceforth regular visits were undertaken. As well, a new practice was instituted to minimise the elaborate detail and number of receipts, and generally, N.S.W., Victorian and South Australian practices were brought more fully into line over matters such as allowing for depreciation.

But few other changes in system came to the Department. Engineer-in-Chief Stewart and Hydraulic Engineer, Bellamy, agreed to end the

arrangement of a common correspondence room and from July 1, 1926, each Department handled its own correspondence separately. The Engineer-in-Chief's correspondence was tailing off anyway and by 1929 was only one-third of that received by the Hydraulic Engineer. Nor did the new arrangement stop heads of Branches - like the Accountant in the Engineer-in-Chief's Department - from tediously sorting through all the mail of his branch, every morning at his desk. No wonder his cheeky sub-ordinates nicknamed him "windy woofer".*

Bellamy on the other hand was only too ready to embrace or instigate new arrangements. He ordered the Expenditure Accountant to keep Measurement Books for all works whether executed by day labour or contract.[34] J.W. Wainwright, a Chief Investigating Officer under the Public Service Commissioner, was given free rein to investigate several branches of the Department after Bellamy had reported certain obvious areas of weakness to the Government. Wainwright's recommendations were heeded — the Accountants were ordered to adopt methods he suggested were worth implementing, such as a better system of preparing vouchers; the accounts and costing at Kent Town and Mile End depots were over-hauled as recommended and arrangements were made for a comprehensive costing of pumping operations. Wainwright was a man on the move andhis earlier work with the Department - recording expenditure under various Debit Orders and balancing monthly the Debit Order Books with the Ledger - had given him the time and experience in one of the busiest account-rendering Departments to be able to rationalise new and better practices. As State-Auditor in the late thirties he was to be a key figure in the

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*As told to me by Jack Wright on 3/10/77, who was one of the subordinates.

[34] H.E. 2174/26

State's industrial expansion.

As well, the whole of the Head Office staff of the Hydraulic Engineer's Department was at last provided with accommodation in the one building, the Revenue Branch being placed on the ground floor to facilitate relations with the public. A number of machines were purchased for office work in the Revenue and Expenditure Branches and for a number of the branch offices as a means of reducing the cost of the clerical work. They were used for issuing receipts and posting ledgers. Rate collectors were virtually abolished and in future one account per annum was rendered. By 1929 the Public Service Commissioner was claiming an annual saving of £3,000 due to the reduction in collecting staff. W.E.A. Ide, the Department's Chief Assessor, was appointed Government Valuator in 1928 as the bulk of valuations were being performed on account of the Hydraulic Engineer's Department.

Bellamy, too, was much more candid in his annual reports than the former Hydraulic Engineer or Engineer-in-Chief's had been. He included a table indicating profit and loss on the State's Waterworks for the previous ten years and never shied away from discussing the Department's problems. The first interstate conference of water supply and sewerage engineers was held in Melbourne in 1926. Bellamy attended and found it "very successful and beneficial".[35] This was in strong contrast to the attitude of former Hydraulic Engineer and Deputy Hydraulic Engineers, Bayer and Hicks, who had regularly asserted that nothing could be learned from other States. As well, he early recommended that a Plumbers Registration Board be established and in fact, in 1926 a Plumbers and Drainers Licensing Bill was drawn up to achieve the creation of a Board

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[35] See Hydraulic Engineer's Report in Public Works Report for year ending June 30, 1926.

of Examiners, regulations and granting of licences by the Department.

One area of Departmental responsibility, however, was the subject of two reports by the Auditor-General before sufficient supervision was exercised. In 1925 G.C. Gurr became the new manager of the Sewage Farm at Islington and his decision to stock sheep and install a shearing plant was approved by Bellamy. However, Sewage Farm activities tended to be ignored as the proposed new sewage treatment plants grabbed the limelight. Thus at Islington maintenance was kept down to a minimum, leaving fluming and conduits in poor repair. (The situation at Glenelg Sewage depot was also unsatisfactory - sewage remained ponded in the sandhills until it evaporated or percolated into the sea). Unfortunately, interest in maintaining adequate accounts also plummeted. In 1928 and 1929 the Auditor-General reported the "accounting records [to be] inadequate, inaccurate and unsatisfactory" and "the Manager's explanations unsatisfactory and unhelpful".[36] No scale of charges for agistment had been fixed by the Hydraulic Engineer or approved by the Minister and the Manager had bought stud sheep without authority to do so. The Auditor-General charged the state of affairs to the "the gross negligence of duty on the part of officials responsible".[37] Only then was better supervision exercised from the Adelaide office.

But there were technical innovations in both Departments which led to new arrangements and more efficient systems. Both saw the phasing out of certain modes of transport and the use of an increasing number of mechanized vehicles. Thus the Engineer-in-Chief's Department had closed its camel depot at Muloorina by 1930. Thirty or so camels had to be shot - no one would buy them anymore. The Department's use of riverboats

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[36] P.P. No. 4 of 1929: Auditor-General's Report for 1928-29; p. 44.

[37] ibid.

to transport material to lock sites steadily declined, although for most of the twenties two shifts were worked at the Morgan Wharf to handle riverboat cargo.

Bellamy gave engineering assistants, sewer inspectors and sewer draftsmen the use of cars for the first time. As well he implemented the use of trucks for maintenance instead of sewer drays in the City, and provided lorries in the Water Districts which still relied on horses. Government assistance was made available to officers if they were purchasing cars to use on their official duties. However, the petrol mileage allowance to officers using their motor cars for official purposes was steadily reduced as the years wore on. The cars owned by the Department were still far from reliable - both cars stationed at Crystal Brook regularly broke down and were out of action at the same time. The use of second grade petrol from 1928 onwards certainly did not improve matters.

Both Departments also accumulated as much new plant as possible - many items never seen before. The Engineer-in-Chief's Department obtained oxy-welding appliances, portable concrete mixers, a tractor, light guy derick and rollers for the tractor, and an Austin road grader was permanently transferred from the River Murray Works. Concrete handling plant was used by the Water Conservation Branch for the first time in 1927, and this meant a saving of £300 for every half-million gallon tank constructed. In Bellamy's time the value of plant under control of the sewerage branch alone was increased by £19,000 to a figure of £24,895.[38] Three trenching machines were reconditioned and applied to excavation work as never before, and a model 30 "Parsons" excavator was purchased. Two "backfillers" were obtained for backfilling spoil and drawing timber

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[38] See Hydraulic Engineer's Department Report in Public Works Report for year ending June 30, 1929, p. 20.

from the trenches. Pull-Shovel Crane Clamshells, steel sheet piling, Terry hammers, concrete mixers, portable pumping outfits and an air compressor were also added.

In the West, J. Wannan of the Engineer-in-Chief's Department laid 24 plots of various bitumastic products to ascertain the cheapest and most suitable type of artificial catchments for farm water supplies. Meanwhile in Adelaide manholes were periodically cleaned of silt, in order to save much dragging of sewers. Equipment was installed at the Waterworks Yard (Kent Town) for testing stopcocks. Bellamy had the manufacture of two inch cast-iron pipes at Glanville discontinued because of their limited discharging ability in reticulation systems. By 1927 all new pipes were being lined with cement by the centrifugal process, a widespread practice which obviated the task of regularly clearing out corrosion. The Chief Superintendent of Mains (W. Goss) developed a system of jointing to make the cement lining continuous. The matter of consistent leakages from steel mains in the City was followed up, and the cause found to be electrolysis. A survey was conducted with officers of the Tramways Trust and a connection made between a North Terrace steel main and the tram rails at a point opposite East Terrace. The maximum potential difference was reduced dramatically and serious leakages thereby kept in check.

One other field received Bellamy's earnest attention. He was appalled that the number of bacteriological examinations of the various water supplies made by the Department, or at the Department's instigation, were so few in number. Soon he ensured that they were being made regularly at the Government Laboratory of Bacteriology and Pathology. The results showed that the quality of Metropolitan supplies was not all that could be desired and so he attempted to impress upon the two successive Governments the desirability of obtaining the opinion of Sir Alexander

Honston, in London, about the question of sterilization by means of liquid chlorine. Eventually in 1929, a committee consisting of Dr. Ramsay Smith, (Chairman of the Central Board of Health), Dr. Cleland, (Professor of Pathology and Bacteriology), Dr. L. Bull, (Director, Government Laboratory of Bacteriology and Pathology) and the Hydraulic Engineer, met to report on the question. The first water supply to be filtered and chlorinated was the well which served Peterborough. In this way, Bellamy (with the support of his sewerage engineers) laid much of the groundwork for what was to become a new area of Departmental investigation, control and responsibility.

One direction in which little money was expended was in the provision of office accommodation. The Departments reorganized themselves at Head Office, but remained within the same buildings. Two rooms were added on to the Crystal Brook office after much prodding from the Resident Engineer. As well, a two roomed wooden building was purchased to serve as an office in Kimba. The Port Lincoln offices moved from the Northern Hotel to another unlikely spot - namely, the local gaol and police quarters, which had become vacant. Still, that was one of the first country offices to get electric lighting. The office and house of the Superintendent and the house acquired for the District Foreman at Mount Gambier were also connected when the local plant began operations in 1925. Foremen in the numerous maintenance districts were allowed three shillings a month for electric light in their offices, but if they wanted it in their residences they had to fix it themselves. By 1926 electric lighting had even come to the River Murray lock work in place of acetylene flare lamps. Telephone connections burgeoned in many of the lesser country offices and the Sewers Yard at Thebarton was finally thought worthy of a direct line to Head Office in 1926.

There were some changes in working conditions which benefited Departmental labourers, but by 1929 the worsening unemployment checked

any discontent. The Government insured its own workmen from 1924 when a Government Workmen's Insurance Scheme was established. Each Department was required to insure its own workmen under the scheme. However, there was still no consistent attempt to record and analyse the number and nature of accidents. Apparently there were no deaths by accident in the period, although there were a number of near-misses - like the case of C.A. Yates who fell 56 feet down a well at Peterborough and survived! Engineers on the lock works regularly listed accidents in their monthly reports. It did not pay to be careless - when workers damaged derricks (etc.) they were usually requested to forfeit leave.

In 1925 the Government ordered that all youths learning trades in the Governemnt Service had to be indentured via formal apprenticeship indentures.[39] Apprenticeships in the Service soon became a much sought after object, and having a relative or family friend in the Department already was usually the key to success. It was a matter of knowing what and when openings were offering. The year 1927 brought a reduction in working hours from 48 to 44 hours a week, but this was soon offset by the men's willingness to work any number of hours just to keep a job.

The Union Representatives remained a regular part of the scene, particularly Lundie, the Secretary of the Australian Workers' Union, and Nieass, Secretary of the Australian Government Workers' Association. There were no major clashes with the Departmental heads - the organizers seemed content to keep an eye on any accident compensation cases and infringements of Awards and to pressure for increases in pay to men on account of altered jobs and working conditions. Only on the Tod River Works, where the typical workman was either a problem or escaping from

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[39] C.S.O. Circular No. 660, July 28, 1925.

a problem, did a number of situations get out of hand. During the construction of the Minnipa Tank an effort was made by someone to poison the whole camp. The cook ate first and died of strychnine poisoning, hardly a fair punishment even if his meals were unpalatable! In 1927 the mainlaying gang at Wirulla went on strike after Nugget O'Dan, the ganger, sacked a man for loafing. Unfortunately that man was also the camp A.W.U. representative. The District Engineer was called in and he attempted to uphold the ganger's decision. But Nugget was in fear for his life, so instead he was spirited away by train.[40] Even the West Coast Pay Car carried a policeman as well as the driver and paymaster (Wally Goulter) on its trips. At times doing one's duty meant virtually sleeping with one's toe chained to the pay box.

When the Butler Government came to power in 1927 it brought a firmer line towards workmen. A circular was issued to the effect that the continuous service of a daily/weekly paid employee and his employment would terminate instantly if he ceased work to attend or take part in any stop-work meeting or strike.[41] As well, the petty contract system was introduced wherever possible. For a time many did earn better wages than under the day-work system, although the old and disabled naturally did worse. By 1929, however, the rates paid by the Government were steadily being reduced[42] and there was not enough work to go round. January 1928 alone saw 300 laid off in connection with the River Murray Works. The best the Departments could do was to make payment quick and easy - for example, by acceding the Union requests such as that which asked that "Pieceworkers" be given slips by the timekeepers as soon as the work

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[40] H.E. 2000/27

[41] C.S.O. Circular No. 690

[42] See G.R.G. 53/107 : Water Conservation:Record of Work Done (trenching filling etc.) by Individual employees, 1928-30. We see here, for example, the rate for trenching fall from a peak of 6/6 to less than half that figure.

was completed.[43]

THE PRODUCT

In the last five years of their existence, the load of the Engineer-in-Chief's Department was steadily alleviated while that of the Hydraulic Engineer's Department became somewhat more burdensome. For both it was a time of consolidation and reassessment rather than one of exciting, new challenges.

The Engineer-in-Chief's Department continued to issue licences to divert waters for private irrigation under the Control of Waters Act. As well, it remained involved in the unsettled question of Metropolitan Floodwaters Control. Two embankments at Grange were completed, but by the end of the period, Prospect and Yatala South District Councils had made no decision about the scheme prepared by the Department to deal with Prospect floodwaters.

From 1924 to 1927 the Department continued to supervise maintenance work in connection with scheme drains in the South East not yet handed over to the Assessment Board. Of the original Main Scheme Drains only Drain J was never started. Even after July 1927, when the South Eastern Drainage Works were handed to the Irrigation and Drainage Commission, the Department retained an interest in the area. Survey work was carried out in connection with the Benara Drainage Scheme and contour and classification surveys, (giving contours and descriptions of soils and vegetation), in relation to other areas proposed to be worth draining.

Water Conservation measures were still in demand, particularly in the Western District. Reinforced concrete tanks and reservoirs were

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[43] HE. 1887/29

provided, but the provision of rainsheds and tanks on behalf of the Advances to Settlers Board demanded the greater share of attention. Borings undertaken by the Department were few in number and generally unsuccessful. The region north and northwest of McDouall's Peak and the Quorn, Port Augusta, Pichi Richi and Kimba areas were all tackled to no avail. Only one of the Kimba borings yielded a small supply. Bores at Andado for the Commonwealth Government and bores at Pinaroo and Saltia Creek for the Hydraulic Engineer's Department were more successful. When drier years set in the Department was forced to co-operate with the Hydraulic Engineer's Department as never before. Tod River Scheme mains, for example, wereconnected up with water conservation mains in some areas to ensure maximum benefit to consumers.

Roads outside District Councils remained a Departmental responsibility. Petty contracts were increasingly given to farmers in need of work as the depression affected their livelihood. Half the money voted was spent on new roads, the other half on maintenance. Again it was the Western District which received most attention ... Important new roads were constructed in the vicinity of Maree and Lincoln Gap, the latter area because the new bridge at Port Augusta provided the catalyst for a greater volume of traffic.

The Murray Works remained an area of construction activity, although by 1929 the work had virtually tailed off. Still, Rufus River was enlarged (with the aid of Tower Dragline Excavators) and Locks two, four, five and six were tackled. By 1929 Locks and Weirs number three, nine, five, two, four and six had been completed in that order and the only work remaining at Lake Victoria Storage was the paving of some banks. A shaky start had also been made on Lock No. 7, but shortages of funds generally limited its progress.

The Hydraulic Engineer's Department was forced to adopt an

accelerated pace to implement its programme of works. The Glanville Shops were busier than ever before producing pipes to keep up with the demand. From1927 there was the added task of cement-lining all pipes up to ten inches in diameter before they left the works.

The Adelaide water supply system was thoroughly reassessed and replacement and cleaning of mains was undertaken as never before. Thousands of meters were removed in cases where excess had not registered for a three-year period.

An organized reconstruction programme began in 1928 with the enlargement of trunk mains. Supplies to Norwood, Kensington, Glenelg and Brighton were materially improved. Then work began on the construction of service reservoirs and tanks to further obviate the necessary evil of "boosting" to other suburbs. Blackwood, Belair and Eden Hills received their reticulated water supply in the period via a system of pumping from the Millbrook main at Mitcham, and a series of service tanks. Tea Tree Gully and Modbury too, were connected with Millbrook.

In the country the worst portions of wood pipes were gradually replaced by cast iron pipes. Warren Reservoir was raised by 4'6" and water supplied to Angaston by pumping. As well new steel mains connected the Warren Water District with the Beetaloo Water District such that by late 1925, Yorke Peninsula towns were receiving Warren water. At Port Augusta all existing reservoirs were lined with concrete and attempts were made to supplement the supply from borings in Saltia Creek. All the seepage from the Baroota Reservoir was utilized and a "booster" was installed at Mallala in an effort to improve supplies in portions of the Barossa Water District, Peterborough, Pinaroo and Booleroo Centre received Departmental attention, and water supplies were provided, even if they did not always run smoothly. In other country towns reticulation systems were reorganized and extended, pumping plant updated and new

concrete tanks provided.

At the same time the Tod River scheme received intensive attention. Departmental main-laying began in September 1924, although much of the filling and excavation was done by petty contract. The Adelaide Steamship Company transported all the necessary pipes and equipment to Port Lincoln where specially made cradles transferred the pipes to railway trucks. Special buggies were made for the 3' x 6' railway trucks - the train would move one buggy load, the length of ten pipes, deposit the pipes, and move on again. Then, in 1925 Hume Steel Ltd. obtained the contract for supplying 16" steel, cement-lined pipes for the sections of truck main between Minnipa and Thevenard. They were fabricated at a plant constructed at Cape Thevenard.

At the height of the reticulation work in 1928, seventy horses and between 550 and 600 men were involved. The trunk main to Thevenard was completed, and progress on reticulation mains so steady that a further 100 miles of pipe were obtained from England. By 1929 hundreds of miles of reticulation mains branched over the West Coast and 1500 services had been fixed. They included a pipeline to Port Lincoln in 1927, giving the town its first reticulated supply, and a few years later a connection with the Yeldulknie system to assist the three small reservoirs to serve their large district.

A by-pass was installed so that the leakage from Knott's Hill Reservoir could be remedied. Service Reservoirs were constructed at Minnipa and Pimbaacla - to obtain crushed granite for these the Department created its own battery and crushing plant, while sand had to be trucked a good 140 miles. By 1929 extensive repair works were necessary, especially in the case of the Minnipa tank. The seepage from the Tod River Reservoir also demanded treatment - bores were put down through the puddle core on the eastern end of the embankment and grout was forced

down under pressure to fill the large vughs that were found. By 1929 the Reservoir still had never once been filled since its construction. But hopes lay in another direction. In 1926, the Deputy Government Geologist (R.L. Jack) began his examination of the Polda Water Basin.

The Adelaide sewer system, meanwhile, was subjected to a thorough reorganization. New trunk mains were laid to serve the north-eastern suburbs, to duplicate the Bowden Division Sewer and to relieve the sewers draining the south and south-eastern suburbs. By 1929 the reorganization of the eastern suburbs sewerage systems was completed, the scheme to deal with drainage of the western suburbs was well underway, and the problem of old sewers over-flooding greatly alleviated.

1928-'29 was a record-breaking year as far as laying of sewers were concerned. Forty six miles were laid. Suburbs sewered included Glen Osmond, Burnside, Burnalta, Linden, Torrens Park, Mitcham, Ridge Park, Cowandilla, Kelinscott, Reepham and Highbury. Then too, the sewering of Victor Harbour and Port Pirie were investigated and a Victor Harbour scheme was actually finalised and submitted for approval.

THE PUBLIC

During these years the Hydraulic Engineer's Department was clearly the subject of greater press interest than the Engineer-in-Chief's Department. Bellamy, with his good looks and outgoing personality clearly outshone Stewart and Eaton, who were quiet and often unapproachable. The Hydraulic Engineer was praised for his "skilful guidance" and for having "instituted a forward movement" in the Department, resulting in "remarkable progress".[44]

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[44] See The Mail: 7/7/28 - Front page story entitled: "Water Supplies - many methods used in reticulation - largest Agricultural Scheme in World".

Where the Engineer-in-Chief's Department was concerned the accent was on programmes rather than individuals. More than 50 graziers and landowners gave an unflattering picture of the Department's efforts in the South East before the Royal Commission on South Eastern Drainage in 1924 and 1925 - thus none of the newspapers expressed any disquiet when the Department lost its control in this area. However, its locking work on the Murray was popular. In 1927, for example, when four locks had just been finished The Register described the organization undertaking the work as "splendid" and "most complete".[45]

By 1929, when austere times were affecting much of society, the papers had changed their tune. Suddenly Bellamy was seen to be the outsider when reorganization of the Department was imminent. The top priority was that "we must look after our own". Thus, on October 3, 1929 the press described Eaton's appointment as Engineer-in-Chief as "a popular selection". Only The News bore slight witness to Bellamy's situation when it discussed his appearance before the Public Service Appeal Board.[46] The anomaly was such, reported the paper, that he had to place his appeal before the Public Service Commissioner as Chairman of the Board, knowing that it was Weir who had recommended Eaton as Engineer-in-Chief.

Relations with utilities and other Departments appeared to be more relaxed in these few short years. The Fire Brigade became remarkably quiet; not one file in the Chief Secretary's office received from the Board or the Superintendent expressed the discontent of old - but then Bellamy had made it quite obvious that upgrading and reorganization of reticulation systems was now a high Departmental priority. In the country Auxiliary Fire Brigades were often instructed by local Department

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[45] See The Register, 21/9/27

[46] See The News, 25/10/29

Foreman. As well, there were opportunities for co-operation with Departments undertaking projects in the country - in 1928, for example, the Hydraulic Engineer's men did sketches and levels for a proposed school and residence at Beetaloo for the Architect-in-Chief's Department. Bellamy also successfully sought the aid of the Tramways Trust to overcome problems caused by electrolysis.

As usual the inadequacy of water supplies in certain areas raised the ire of ~~many~~ their communities. The reticulation of the southern Metropolitan suburbs left much to be desired until mains were enlarged and extended. On warm evenings whole streets were without water for hours. Water still had to be carried by rail to places like Kimba and Hawker at drought rates when necessary. A meeting at Ceduna protested that assessments were still being levied on persons within six miles of water conservation tanks, even though they were practically all dry.

But the worst affected areas were Port Augusta, Port Pirie and the Beetaloo/Bundaleer districts. Between 1924 and 1926 water was so short in Port Augusta that the Northern Resident Engineer had to periodically send Inspectors to stop the use of water on gardens. In 1927 and 1928, when the drought was at its peak, restrictions on the use of water for gardening and irrigation purposes were implemented in the Beetaloo district. At Port Pirie overhead water supplies to the wharf where ore was damped were cut off completely for a time. In mid-December 1927 Port Augusta people were without water for over a week. The Department was forced to plead for economy in the use of water - for example, it circularized all schools to that effect.

Naturally whole communities were upset. There was a Northern Areas Water Supply Vigilance Committee - blanket groups like this had never been seen before. Their correspondence with the Northern Resident Engineer retained an understanding and sympathetic note. Invariably it

was the local croquet clubs which were the most abusive! Still there was reason for discontent when communities were expected to pay surcharge rates for irregular water supplies. Port Pirie people formed a deputation in January 1928 and took their case to Adelaide. Port Pirie and Gladstone District Councils were the most vocal municipal bodies and by 1929 were harangueing the engineers and Parliamentarians alike.

In the midst of all these real and threatened shortages, the Hydraulic Engineer's Department would have only looked worse had the truth about the meter situation been exposed. In 1929 the stock of meters on hand was allowed to dwindle to fourteen in number.[47]

Small wonder then that Departmental officers in these areas made ~~the~~ positive overtures of appeasement. The Resident Engineer in the north allowed a portion of the Koolunga stables to be used as a Scout Den. Likewise he offered to do the work of installing water tanks for the septic tank system at the public school in Port Augusta. The lesson was being learned that positive community involvement was the only way to earn co-operation from the locals.

In outlying areas individuals were still forced to cart water or hire much-sought boring tools from the Engineer-in-Chief's Department. But they made sure they were heard, when necessary. Local Vigilance Committees, Progress Association and Pastoral Companies sought repairs to, and grubbing of roads in their districts and proffered suggestions for new routes. The Royal Automobile Association emerged in the period and obtained information from the Department about existing tracks and familiar landmarks to be found in areas outside of District Councils.

New problem areas were also emerging. From the Murray areas, citrus

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[47] H.E. 1166/29

growers began to make vocal their distress at the increasing salinity of the water and the damage caused by seepage in their fruit "blocks". They requested a weekly analysis of water held at Lake Victoria. In Adelaide residents of the Springfield Estate were upset to find that Departmental officers wanted to enter their land and undertake borings. They were determined to remain a high-class garden suburb - a tank in the area would only lower land values and erode that image. Parliament even had to pass a Waterworks Act Amendment Bill in 1929 to give Government officers power to enter upon lands for the purpose of making tests, trial holes (etc.) in order to see if the country was suitable for construction of a Reservoir. It was a lesson to be learned by the Department. Henceforth, in many instances, it would not just be a matter of providing a water supply. The nature of that supply and its effect on the environment would be of greater concern to some people.

The tensions generated by the depression were the hardest to handle. In the years 1924 to 1928 the Hydraulic Engineer's Department became one of the largest employers in the State through its sewer and water main-laying programmes. In both country and city its officers were regularly besieged by local Corporations and District Councils urging them to take on the local unemployed. But by 1929 the little work there was to offer had to be shared around on a rotation basis. Some had poorer chances of success under this system - for example, the Butler Government decided to limit the number of Southern Europeans employed on each contract to three men.

There were always numerous requests forthcoming. The Port Pirie Relief Committee, for example, successfully obtained permission to remove dead timber from Waterworks land. Stockowners, on the other hand, received a negative reply when they asked to be allowed to use feed growing along the Bundaleer Channel. The Departmental officer in country

areas was forced to evaluate priorities as never before.

Problems associated with the payment of rates magnified as the depression set in. By the end of 1929 alone, the Hydraulic Engineer's Department had received 200 or so requests from individuals for employment to work off their rates. It was up to the ratepayer to approach the Department and state his or her position. The policy was such that in instances where ratepayers made application for extensions of time or reported their inability to pay because of unemployment, district warrants would not be issued. At times they did slip through but if the debtor was out of work no proceedings were taken. The fact remained that all were expected to pay a surcharge on their usual water and sewerage rates, at a time when most were unable to do so.

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The years 1924 to 1929 thus brought a mixed bag of fortunes. For The Hydraulic Engineer's Department they meant a new enthusiastic leader and new directions, if only short-lived. For the Engineer-in-Chief's Department they meant a steady toning-down of activity under imperturbable leadership. For the politicians they meant new control through the formation of the Public Works Standing Committee. For the Butler Government they meant savings, reorganization and trusted leadership as obtained by their creation of the Engineering and Water Supply Department. For the public they meant an increasing want of security and a vulnerability in the face of Government policies.

By chance then, the Engineering and Water Supply Department emerged out of this interlude with a particular range of responsibilities. Its ability to survive and function affectively would be tested immediately by an all-embracing depression. The future looked grim for everybody and everything.

CHAPTER VIII: CHALLENGES: 1930-1945

The moment of truth had come. Three major challenges faced the Department within a matter of fifteen years. Firstly, the consolidation of its unity; secondly, survival through the depression, and finally, World War II. If ever there was a time for trust and co-operation between the politicans, the Department and the public, it was during these years.

POLITICS:

April, 1930 brought a Labor Government to power under L.L. Hill and a new Commissioner of Public Works in John McInnes. Before long measures were introduced in Parliament which affected the new E. & W.S. Department. A District Water Supply Bill easily passed both houses. It was an attempt to give District Councils the opportunity of taking over the maintenance and rating of water conservation works, of which the Department had hundreds under its control. Its object - to relieve the Department of expenditure on maintenance - was never achieved for District Councils naturally only took the best paying works, and many of them were handed back by 1940. A Bill was also initiated in an attempt to disband the Irrigation and Drainage Commission, but it was eventually agreed that the matter would be considered in terms of a wider land settlement policy for the South-East. Already the E. & W.S. Department was represented by Furner, Angwin and Eaton, (the Engineer-in-Chief), on an Engineering Committee appointed to assist the Commission.

There were more direct attempts to alleviate the financial situation. Again a Water and Sewerage Rates (Surcharge) Bill appeared with apologies from the Commissioner of Public Works McInnes that it had become a "hardy annual".[1] It was brought in early at the Engineer-in-Chief's request so

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[1] 1930 Parliamentary Debates: House of Assembly, debate on Water and Sewerage Rates (Surcharge) Bill, July 1.

that the Department would not have to wait till late in the year to render accounts - this practice had meant conflict with land and income taxes, and Corporation and District Council rates. As well, Parliament passed a Minister's Salaries Reduction Act slightly ahead of a measure to cut the salaries of Public Servants. Premier Hill claimed that the ten percent reduction was "against his principles" but was necessary now that Loan Works had been closed down. This directly affected the E. & W.S. Department for the great majority of its officers were paid from loans. Then on May 15, 1930 the Government decided that piecework was to be abolished in relation to daily-paids. Henceforth the little money available would be shared as equally as possible.

Many questions were asked throughout the session about the restrictions on water supply usage in the Metropolitan area. McInnes claimed that he had tried to induce the Engineer-in-Chief to lift the restrictions, but Eaton argued that it was better to have restrictions before summer to avoid a sudden summer panic. Other M.P.'s aired their views on rating, but as usual, nothing concrete was achieved. Cabinet's decision to dispense with the services of H. Bellamy (and others) in October created no interest. Even the £250 compensation paid to him drew no comment. It had all been said before.

In 1931 a measure instigated by the Department came to Parliament's notice. Loan money was available again, so the Government had no qualms about introducing the Mt. Bold Waterworks Bill. As well, there was security in the knowledge that H. Dare, (a N.S.W. Government Engineer) had reported favourably on the Department's proposal of a concrete arched dam across the Onkaparinga River. Six other schemes for augmenting the Metropolitan supply were discarded in its favour, although a flood guage was set on the Myponga Creek for future reference. The House of Assembly received the Bill well with the exception of R. Butler, the Leader of the Opposition, who quibbed that a better alternative would have been to spend the money

putting people on the land. The Legislative Council ensured adoption of an amendment binding the Engineer-in-Chief to call tenders for the project.

Eaton was forced to stand his ground throughout the whole issue. He presented three different sizes and estimates to the Parliamentary Public Works Standing Committee but firmly opposed anything short of the construction of the complete (and largest) scheme in one undertaking. Try as they would the members of the Committee could not get him to budge. In the end five voted for the total scheme, and two for a limited scheme.

During the course of construction discoveries made about the faulty pattern of the foundation rock confirmed the doubters' fears. Extra deep foundations were necessary on the southern side of the spillway; excavation work on the northern abutment had to be taken deeper than anticipated; and Dare was re-engaged to aid the work of modifying the arch design and adding gravity abutments at both ends. All this cost money and Eaton appeared before the Standing Committee in 1935 to inform members that the Department estimate had increased by 24 percent. The Committee found that the engineering difficulties encountered could not have been anticipated on data obtained from preliminary surveys.[2] However, their report quoted Adelaide University Professor Chapman - "I can see no reason why the work should not be a great success"[3] - as if to absolve the doubts which still lurked in their minds. Fortunately Chapman and Eaton were good friends.

The Committee was certainly less cordial in its judgments of other proposed Departmental schemes. Their investigations into the oft-proposed upper Wakefield Service Reservoir led them to report:

> The old cost standards have become obsolete and but for the persistence of the Committee in their examination of the schedules, it is possible that Parliament may have been furnished with unreliable data on the financial side ...4

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[2]See P.P. no. 33 of 1935: Report of Parliamentary Standing Committee on Public Works on Mount Bold Dam.

[3]Ibid. p. 20.

[4]P.P. no. 59 of 1931: Report of Parliamentary Standing Committee on Public Works on the Upper Wakefield Service Reservoir.

Likewise their assessment of the engineers' past record in relation to the Port Augusta water supply was honest, though hardly complimentary.[5] They recommended borings at two particular sites near Saltia, but only after a Committee consisting of the Department's Engineer for Surveys, the Deputy Government Geologist and a Commonwealth Railway Engineer had examined the problem. Actually Engineer-in-Chief Eaton was the author of the proposal. It was W. Mills, a Member of the Council, who came out of the exercise looking the most foolish. He suggested damming the creek flowing from Wilpena Pound. When the Committee visited the creek there was no running water in sight!

The Government was not slow to put its faith in the new Department. In fact it entrusted the organisation with additional responsibilities. A South-Eastern Drainage Board emerged to look after South-East matters, but the engineering side of the defunct Drainage and Irrigation Commission was assigned to the E. & W.S. Department. Henceforth its officers would be responsible for the construction and maintenance work on Government irrigation projects and on the South-Eastern Drainage Works. As well, despite the emergence of the Highways Department, work done outside District Council boundaries remained an E. & W.S. responsibility. The only change was that any new roads made would be paid for out of the coffers of the Highways Department.

Parliament too, could be appreciative of the Department's performance and objectives - that is, if the dearth of questions about water supplies and sewerage are any indication. Even the debate on the annual Water and Sewerage Rates (Surcharge) Bill became an occassion for the Opposition to praise the Minister and his Department for their efforts. McIntosh called the State's water system "a monument to the South Australian Parliament and

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[5] P.P. no. 33 of 1931: Report of Parliamentary Standing Committee on Public Works of the Port Augusta Water Supply.

to the men who devised the system"[6] and expressed sympathy towards those not connected to a reticulated supply. Mosely agreed with him that the little piece of garden, patches of lucerne (in some cases), and flowers for the wife were "the true pathos and sublime of human life"![7] Obviously the depression was making an impact on many a sentiment.

The 1932 debates on the same Bill brought Anthoney's suggestion that the Government appoint a Board to control waterworks and sewers to free them from political control and enable them to work on a more profitable basis. In no way was he criticizing the Department for he commented: "Every member who has had dealings with the Department will agree that it is generous in granting extensions of time and very painstaking and courteous."[8] The fact that the Department was steadily losing money lay at the heart of the issue. The annual Surcharge Act was making no headway as more and more people hit by the depression simply could not pay their rates, let alone the surcharge. Likewise, even though the Government had referred the question of the rating system to the Parliamentary Public Works Standing Committee for investigation, that body was shy of making any commitment in the face of "unrelenting opposition" from the public.

A Waterworks Act Amendment Act (No. 2077) passed easily enough in the same session. It simply made alterations recommended by the Department. For example, it gave the Department the written power, not just the implied power, as in the past, to assess parts of premises separately. The alterations which related to the rating system did not imply any radical change. A new basis of estimating the net annual value of vacant lands and of lands and premises was introduced - the annual value to be estimated at three-quarters of the gross annual rental or at five percent on the capital value of fee simple. As well, the schedule relating to lands

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[6] Parliamentary Debates of 1931: House of Assembly debate on Water and Sewerage Rates (Surcharge) Bill, July 2.

[7] Ibid.

[8] Parliamentary Debates of 1932: House of Assembly debate on Water and Sewerage Rates (Surcharge) Bill, Aug. 18.

assessed for a construction rate was altered. The Legislative Council ensured that no extra monies would be earned under the auspices of the Act. For example, it amended the Bill to the affect that the minimum rate payable in the Metropolitan area was reduced by five shillings. So much for healthy Departmental finances!

1933 brought a Liberal Government to power led by Premier R.L. Butler. Initially the continuing depression was tackled in a predictable manner. The new Government introduced, and pushed through, the annual Water and Sewerage Rates (Surcharge) Bill and gave notice of its intent to institute a system of departmental collectors to save the seven shillings spent on the issue of every warrant. As well, it legislated for the retirement of public servants at the age of 65, a move which had been on the cards for some time. However this angered the Opposition, lead by Lacey, for the Government retained the right to make exceptions to the rule. In particular the Government proposed to keep Eaton, (the Engineer-in-Chief), and A.J. Green, (the Engineer for Water Supply), in the Service because of their experience.

The Government's moves to reduce the wages of daily-paids in the Public Works Departments, (who were still on two-third's time), aroused even greater ire. The Minister of Industry in the previous Government had made an arrangement with the Australian Workers Union covering rates of pay to water and sewers men and this was registered in the Industrial Court. At the time the move had angered other unions, notably the Australian Government Workers Association. However, the new Commissioner for Public Works (Hudd) attempted to rescind the agreement and issued new, lower rates to apply from August 28, 1933. The Australian Workers Union promptly made application the Hydraulic Engineer's Board which restored the old rate. The Government, not to be beaten, made an application to the Industrial Court. Eventually a conference was called between the men and the Public Service Commissioner and a compromise was reached. Increased margins were allowed in thirteen cases of up to sixpence a week and a special margin

was allowed for men working in sewer trenches. Some lost, some gained and all still only worked two-thirds time. The Opposition ensured that such issues remained a matter of debate in Parliament.

A Bill to ratify the agreement between N.S.W., Victoria, S.A. and the Commonwealth to build barrages at the Murray mouth received a prompt passage in 1934. The Water and Sewerage Rates (Surcharge) Bill went through just as efficiently - it had become a part of the machinery. The Government placed the E. & W.S. Department and Glanville employees on full-time, a temporary pre-Christmas treat, from October 29 to December 24. But by the end of the year the widespread water shortages and the imposition of restrictions were demanding the lion's share of attention.

New approaches and directions were the mark of 1935, spurred on by an improvement in the State's financial position. The year brought J.W. Wainwright to the position of Auditor-General, and with him a strategy for the State's survival and future well-being. The key was industrialisation. The policies which he progressively sold to the Government included an important role for the E. & W.S. Department. Well organized and detailed planning of sites, cheaply priced with water, drainage and electricity, (to be provided through the co-operation of the E. & W.S. Department and the Electric Supply Company), would be the means of attracting manufacturing industries to the State. It was a major challenge for all concerned. In the past all had been geared towards primary production.

But the Department was faced with more immediate tasks in 1935. A Metropolitan Drainage Act was at last enacted after years of debate in and out of Parliament and the Department was given the task of constructing the floodwater control and diversion works. As well, Eaton and C. Johnson (the new Engineer for Water Supply) were allowed a trip to Western Australia to examine the laying of pipes above ground, a method which South Australia and other States had never tackled before. H.J. Hodgson, the Assistant Engineer for Sewerage, was awarded a Commonwealth Fund Service Fellowship in the same

year, and the Government wisely gave him a commission to investigate developments in Water and Sewage treatment. Finally, the Parliamentary Public Works Standing Committee managed to fob the issue of water rating onto a Departmental Committee. The Government paraded the Surcharge Bill for the last time - Commissioner for Public Works Hudd cleverly introduced an amendment to the effect that the surcharge, in future, would be regarded as rates.[9]

The years 1935 to 1937 brought some measures of relief to long suffering public servants and Government workmen. Salaries and full-time work in some fields were gradually restored; more students were accepted at Adelaide University from the South Australian Public Service at concession fees; and officers temporarily employed were granted all the benefits and privileges of full-time officers. Eaton finally retired after 52 years of service, but retained his position as South Australian representative on the River Murray Commission. The Deputy Engineer-in-Chief, H.T.M. Angwin, who had been groomed for the position, became Engineer-in-Chief in October 1935, just when staff numbers of the Department began to increase in line with an expanding programme of construction and maintenance works. Only draftsmen were in short-supply. Angwin was not slow to submit to the Public Works Standing Committee a strong claim for less congested accommodation for his Head Office staff.

There were still bones for the picking. Opposition leader Lacey read a petition received from 370 workmen in the Government's employ, (316 of them E. & W.S. men). They objected that deductions were made from their pay on account of wet weather and asked that they at least receive the basic living wage per week. This prompted a long and fruitless debate.[10]

Then in the next session A. Christian criticized the administration

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[9] Parliamentary Debates of 1935: House of Assembly, Sept. 12. See Hudd's amendment during debate on Water and Sewerage Rates (Surcharge) Bill.

[10] Parlaimentary Debates of 1936: House of Assembly, Aug. 12. See Lacey's motion.

of roads within the State, saying that the E. & W.S. Department treated roads outside District Councils as a "step-child" which was not wanted. He called for a stop to the overlapping E. & W.S. and Highways Department involvement in this area.[11] It would be decades before any serious move was made in that direction.

Meanwhile one of Premier Butler's most important initiatives to promote industrialization got underway in 1937. He made an agreement with the Broken Hill Proprietory Company, which was ratified by Parliament, for the establishment of a blast furnace at Whyalla. At the same time the E. & W.S. Department was asked to begin serious investigations into the possibility of utilizing the River Murray to serve Whyalla and the Northern Districts. The matter was referred to the Parliamentary Public Works Standing Committee in 1938, but they in turn awaited information from the Department which was at the time hampered by a shortage of design officers.

Meanwhile the Committee cleverly rid itself of a reference which had been on the books for ten years or so - namely, the matter of water rating. They sought the Crown Solicitor's opinion to confirm that water rating related to collecting, not the expenditure of monies voted, and therefore remained outside the Committee's jurisdiction.[12] Thus all the information collected by them in past years from the Department and public alike became superfluous.

November 1938 brought Thomas Playford to the Premiership to replace Butler who was retiring. Malcolm McIntosh too, had only just replaced Hudd as Commissioner of Public Works, although he had had three years experience in that position in a former Government. If ever there was a pair of fearless warriors, this was it! For the next couple of decades

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[11] Parliamentary Debates of 1937: House of Assembly, see Christian's address in reply speech, Aug. 18.

[12] See P.P. no. 31 of 1939: Twelfth General Report of Parliamentary Standing Committee on Public Works.

one or the other (or both) of them managed to place both obstacle and challenge in the way of the E. & W.S. Department.

The 1939 session was dominated by matters relating to the Department's sewerage activities. McInnes successfully moved that the Government consider the provision of sewerage systems for approved towns in South Australia along lines similar to those in operation in New South Wales. As well, the Select Committee of the House of Assembly on Unemployment Relief Works concluded that rendering financial assistance to Local Government authorities for the institution of sewerage works was one of the many ways employment could be fostered. Little did they know that a few months later a World War would provide all the answers to the problem. Finally, Harry Hodgson managed to achieve such wide-eyed respect from the Parliamentary Public Works Standing Committee that they "accepted his proposals [for extension of the Glenelg Sewage Treatment Works] without endeavouring to subject them to review by experts outside the Department".[13] His book on sewage and trade waste treatment had become the work on the subject in the sanitation world. The Committee was even charmed enough by the situation to list a host of eulogistic references to him in their report.

But Premier Playford was busy chasing other priorities. Late 1938 saw him in his new position out wooing the B.H.P. Company.[14] He stayed with the Directors and Managing Director (Essington Lewis) at their cottage in Whyalla, a stage set by Butler's early initiatives. As night wore on Essington Lewis and Playford found themselves on the balcony, gradually evolving the next step in Whyalla's development. The B.H.P. Company would establish a tinplate industry there, as long as it was guaranteed the Australian market and the South Australian Government could provide the

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[13] P.P. no. 55 of 1939, p. 6.

[14] The following detail is largely taken from tapes of my interview with Sir Thomas Playford on March 13, 1978.

annual, regular water supply necessary.

Playford took the matter to the Federal (Lyons) Government and a sub-committee decided that a Commonwealth Grant would be given to SouthAustralia to provide the necessary water supply - that is, as long as the State could devise some way of getting the money without other States demanding the same assistance. Playford then began negotiations with Engineer-in-Chief Angwin in an effort to reduce the high costs which a pipeline from the Murray would involve. The B.H.P. Company wanted water at a certain rate. Angwin and Playford progressively increased the capacity of the scheme to the effect that the price per 1,000 gallons gradually decreased. Playford then devised a scheme to sell water to the Commonwealth Railways at Port Augusta to meet the annual interest payment on the proposed loan. For a time Mr. Ghan would not come at the scheme - he was already getting water at a cheaper rate than that proposed - but because South Australia made some offsetting arrangements over harbour facilities at Port Augusta, a deal went through. Ghan agreed to an annual outlay of £37,500 and a debenture was drawn up.

Then Lyons died. This suspended negotiations for some time for Prime Minister Menzies was naturally preoccupied with the war situation. Eventually Playford was given the all-clear, only to find that B.H.P. Managing Director, Essington Lewis, saw no hope of developing a tinplate industry. Instead he offered to substitute shipbuilding for tinplating, as ships would be needed in the war effort. The conditions of the agreement remained the same, but Playford put in one more claim. In view of the inevitable steel shortage he asked whether the B.H.P. Company would give a special price for steel for the proposed pipeline. Essington Lewis offered three percent less than the then trade price. Even when Engineer-in-Chief Angwin and the Department decided on thicker plates, (for high pressure points), the Company agreed to provide the extra steel under the same agreement.

Playford took his achievements back to the South Australian Parliament for ratification. In 1940 the Commonwealth Water Agreement Ratification Act

and Northern Areas and Whyalla Water Supply Act were passed with much back-slapping by all concerned. Playford called the scheme "one of the most important public works ever undertaken in the State" and congratualated Angwin and his Departmental officers on their "magnificent work".[15] Jenkins accorded similar praise on behalf of the Parliamentary Public Works Standing Committee. Lacey recalled the early days of Whyalla when a water-barge ran between the town and Port Pirie, and suggested that engineers in the E. & W.S Department were "in advance of any similar engineers in Australia".[16] The only matter the Opposition quibbled about was the fact that reticulation and management of the Whyalla system would remain a B.H.P. Company responsibility.

But South Australia very nearly did not get the Morgan-Whyalla pipe-line. At that stage the State had a deplorably low quota under the Loans Council and the pipeline was going to cost well over the total programme sought for any one year. For three days Premier Playford sat with other Premiers and Commonwealth representatives and adamantly stood his ground. But he needed an extra £150,000 to get the scheme off the drawing boards. Forgan-Smith, the Queensland Labor Premier who got on well with Playford, promised the others he would try to talk some sense into the South Australian Premier during a tea-break. He listened to the facts as Playford presented them and soon the meeting resumed.

It so happened that this forthright, blunt man had a particular aversion to the Victorian Premier, Dunstan, whose style of politics he saw as being nothing short of devious. So, he very sweetly suggested that he would forego £50,000 of Queensland's money if the Commonwealth would forego £50,000 and Albert Dunstan would forego £50,000 of Victoria's

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[15] Parliamentary Debates of 1940: House of Assembly debate on Northern Areas and Whyalla Water-Supply Bill, Aug. 22.

[16] Ibid. See debate on same bill, Sept. 5, 1940.

money. Faddon, the Commonwealth Treasurer, promptly agreed as he was fed up with the proceedings. Dunstan likewise had no choice but to acquiesce in the face of poor odds. No wonder Playford stood his ground so fiercely in early 1942 when the Commonwealth Co-ordinator of Loan Works tried to get him to give Sydney's water supply needs precedence over the Morgan-Whyalla pipeline. The project had been so tortuously won in the first place!

Morgan-Whyalla pipeline aside, the Government was given power to proceed with emergency works without first having to subject them to the Parliamentary Public Works Standing Committee for approval. The E. & W.S. Department, being the largest constructing authority in the State, was thus at the beck and call of the Commonwealth Defence authorities and the State apparatus. And this was at a time when the Department was already short of trained engineering staff, and when the 44-hour, five day week had just appeared on the scene. All past priorities changed drammatically as the war effort got underway. Numerous defence works were undertaken and the sewering and reticulation of military and munitions establishments took precedence over domestic demands. Suddenly the Department was handling construction projects worth millions of pounds. By early 1942, the Department was declared a protected undertaking under the provision of the National Security (Manpower) Regulations in view of the importance of its operations.

It was inevitable then that Playford would choose the E. & W.S. Department to develop open-cut coalmining at Leigh Creek. He had been approached by the Adelaide Electric Supply Company about the matter as they feared that the State would run out of coal if the war dragged on too long. The Mines Department did the investigatory drilling but the problem of winning the coal was referred to Angwin and his Department. The Opposition in Parliament was particularly sceptical about the scheme. During lengthy debates in September and October of 1942, they likened the project to the Baroota Reservoir, which had been proceeded with by a Liberal Government

with no reports from competent authorities to back them.[17]

But Playford had assurances from the Engineer-in-Chief that equipment would be available, and had obtained priority for the project from the Allied Works Council. On Angwin's advice, construction engineer Gilbert Poole was placed in charge of the project, but Playford himself made regular monthly trips to the site to inspect his new baby. Angwin, in company with F. Harrison, (Chief Mechanical Engineer, S.A.R.), even managed a trip to Canada and the U.S.A. in 1945, no doubt only because Leigh Creek was a top Government priority. They investigated the utilization of low grade coals with respect to the future development of the field.

The last years of the war saw the completion of most of the major construction projects undertaken by the Department. The Morgan-Whyalla pipeline was completed in 1944. At the unofficial turning-on ceremony in 1943 Premier Playford managed to fell the local Police Sergeant with the first burst of water to the delight of the assembled schoolchildren. Departmental officials had warned him on no account to turn the valve off again, or else there may have been a blowout.

The construction of sewerage schemes and treatment works for defence purposes also began to tail off. In 1944 the Government rewarded Harry Hodgson for his untiring efforts in the field by appointing him to the newly created position of Engineer for Water and Sewage Treatment. J.A. Davis officially became what he had always been - Hodgson's Assistant Engineer. One of the major challenges facing the Department had at last received official recognition. But one other factor besides Hodgson's world-wide reputation stirred the Government to action in this direction. Increasing complaints from the public since 1937 about poor water quality could not be ignored. In Parliament, members were no longer simply asking

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[17] Parliamentary Debates of 1942: House of Assembly debate on Leigh Creek Coal Bill, Oct. 14.

questions about the provision of water supplies. They had begun to talk about filtration, (as their predecessors had done at the turn of the century), and to complain about the quality of individual water supplies.

The year 1945 brought talk of post-war reconstruction to Parliament. As well there was a return of the age-old challenge - how to manage limited water resources in an exceedingly dry season. For the first time ever restrictions were imposed in the Barossa and Warren Water Districts. Eventually the Morgan-Whyalla main was connected with the Warren reticulation scheme. In Parliament this ushered in a more persistent championship of the notion of taking water to Adelaide from the Murray by pipeline. Commissioner of Public Works McIntosh meanwhile removed restrictions in the Metropolitan area on the premise that, with the co-operation of the public, he could hold the position with the aid of bore-water. He was beginning to see himself as a master of the water game. This move led to much criticism and no alleviation of the situation. Restrictions had to be enforced again.

ORGANIZATION:

The first Engineer-in-Chief of the E. & W.S. Department was faced with an unenviable situation. It was his task to weld the fragments of former Departments together in the face of a depression which was creating widespread tension. J.H.O. Eaton had the maturity to grapple with the task. However he suffered from something of an inferiority complex. He had ascended the ranks in the old surveyor tradition, but now he was beginning to be surrounded by engineers with University qualifications. Where River Murray matters were concerned he was the expert, but in certain other directions he was a novice. Thus he preserved a cold exterior and refrained from displaying any camaraderie with his fellow staff. Yet at least one of his nicknames - namely "bright-eyes" - bore witness to his undoubted abilities of perception. The other, "eyebrows", simply referred to the bushy pair which dominated his physical features.

A problem which early confronted Eaton was a greater than usual turnover of personnel. Bellamy did not last long as the Engineer for Sewerage, and Eaton was loath to install John Murrell - the obvious choice - as the new head because of his youth and close association with Bellamy. But Murrell had the ability and he was eventually promoted to the position. The first Engineer for Water Supply, Angwin, likewise did not stay for long. He transferred to the Harbors Board as Chief Engineer in 1930. A.J. Green succeeded him, and thereby paved the way for old Charlie Buttfield to spend his final years as District Engineer of the Northern District. He was quite snowy-haired, an "old white horse" by this time, but he had been born and raised in the north as well as spending most of his life in the Department's service there. A.J. Green brought communication problems with him to Head Office. He was quite deaf and could use his deafness when it suited him. One wonders whether the reticent Eaton and deaf Green ever had a successful conversation!

W. Hargrave, the long-serving Inspector of the Northern District, (Water Conservation Works), and J.M. Wannan, the first District Engineer of the Western District, both died on the job in 1930. Poor "Cigarette Jimmy" Wannan had only just brought his family from Adelaide to be with him after years spent alone serving the Department on Eyre Peninsula. Still his death was something of a relief to Eaton, for the two had argued verbally and by mail ever since Wannan had been given charge of the west. His idea to centralize the Department's activities by moving the headquarters from Port Lincoln to Minnipa thus rested in peace with him. Back in Adelaide the Accountant A. Pettit retired, as did the Secretary W. Carter, and the Controller of Revenue E. Treloar, died. As well, nineteen engineering officers from the defunct Irrigation and Drainage Commission landed on the doorstep, adding to the upheaval.

But such problems paled against those created by the Government's policy of retrenchment. On the staff side many draftsmen had already lost

their jobs when the two Departments amalgamated. However when Loan Works ceased in 1930 over two-thirds of the staff were in jeopardy of losing their positions for that high proportion was still being paid out of Loan funds. Reductions in salaries by Act of Parliament and by reclassification downwards did not prevent retrenchment. Nine permanent officers went in 1930 and twentyone in 1931, not to mention the temporaries who were first to go. To have money meant security - thus, when one officer got a third in the Melbourne Cup and won a tidy amount of money he was dismissed on the assumption that he could cope without a job.[18]

There were ways of hanging on. Many officers were forced to take days off without pay while those who worked constantly made contributions to an Officers Redundant Scheme to support those on temporary discharge. At one stage in 1930 all officers took a turn at six days off without pay. For junior officers in the Department, especially in the Construction Branch, it was a matter of going where one was sent and standing down when work was short. Thus, for example, when the floods of the early thirties prevented progress on the completion of Locks 7 and 8, staff were laid off until the Murray had subsided. If officers in charge were called away to assist on work elsewhere, it was the juniors who acted in their place, minus the higher duty pay. There were no experienced officers to spare. It was easy to believe that any job was worth having.

The fight for survival by daily and weekly paids was dogged to an even greater extent by chance. Hundreds were retrenched - some with decades of service behind them - and the rest worked to the general rule of taking one unpaid week off in three. Some, like H. Tilmouth, the foreman of the Marree Depot, were forced to do pick and shovel work one week off in three or be sacked. It was a time for swallowing one's pride. The Unions were

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[18] As told to me by Jack Wright in interview with him Oct. 3, 1977.

forced to gracefully accept the desperation of their members. Glanville was closed indefinitely as from September 30, 1930, although some castings were manufactured under the contract system to keep a number of the experienced jobbing moulders in work. In August, 1932, the Works re-opened. By 1936 sewers men were still only working two-thirds time.

At times there was temporary work offering. Then men were hired through the Labour Exchange. The Department gave preference to married men and Returned Soldiers and took one third from the Adelaide Bureau, one third from the Glenelg Bureau and one third from Port Adelaide. Only on the Lock projects were there instances of young single skilled men being kept on in preference to married men who were unskilled.[19] When Commonwealth Grants came through there was main-cleaning to be done. But usually any temporary work offered by the Department was arranged in co-operation with the Unemployment Relief Council. Thus there was some clearing of reeds and silt in Reclaimed Areas; men clearing dockweed at the Sewage Farm, (in preparation for the planting of rye-grass) were paid the ration value by the Unemployment Relief Council to which the Department added 50 percent; and seventy lucky single men were clothed and booted by the Council before being sent to the Mt. Bold Reservoir site to do clearing work for two days per week at the basic wage. The Department even ran its own limited welfare scheme - supplying tobacco and other items for its workmen - in the years 1931 to 1936.

During such times of insecurity men coped as best they could. Rumour and desperation were widespread. In 1930 there was a crackdown on an unofficial practice which had long gone on at Kent Town in the men's favour - namely, the borrowing of tools and items from the Plant Store for use at home. Someone gave the tip-off to the Police in early April and what had been

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[19] CPW 353/32

"borrowing" in the past now became "alleged theft and receiving of tools and materials". But there was a leak the night before the raids and suddenly, anonymously, all sorts of items were returned to the yards at Kent Town, Burnside Park and Kensington Pumping Station. The police, however, found goods at the homes of fourteen employees and they were arrested. In the end charges against thirteen were dismissed and one lone individual, a storeman, was sentenced to twelve months imprisonment.

The Engineer-in-Chief, Eaton, reprimanded Superintendent Paddy Goss and the Head Clerk and Assistant Superintendent (Miers) was reduced in rank and salary. He also stopped the lending of tools; new plant books were prepared; proper receipts were given for plant issued and returned; and a man was temporarily appointed as a Vigilance Officer. Then, with the Government's approval, he asked the Public Service Commissioner, Hunkin, to investigate the matter.[20] Hunkin found that indistriminate borrowing from the Plant Store had gone on for some time; that Goss and Miers approved of an arrangement whereby certain men took tins of petrol as payment for use of their cars on official duties, instead of being paid upon a mileage basis at the regulation rate fixed by the Government. As a result seven men were dismissed and one retired. Mr. Goss was relieved of control of Country Water Supplies and Wilton, the Resident Engineer, took them over. J. Gunner was brought back from Port Lincoln to Kent Town to act as Deputy Superintendent, with a view to his appointment on Goss's retirement.

The shock to the morale at Kent Town was widespread. Men who had always regarded themselves as honest and hardworking had been accused of being incompetent and untrustworthy. No major defalcation had ever been associated with the Yard in the past and now suddenly they were all labelled for doing what had long been accepted.

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[20] E.W.S. 1389/30

It taught the Engineer-in-Chief a lesson too. Firm control and adequate systems were essential if the E. & W.S. Department was to become an efficient organisation. Thus, the depression years 1930 to 1934 both uncovered the weaknesses of the past and provided the opportunity for taking new directions in the future.

After the Kent Town fiasco the Accounting staff at the Yard were transferred to Head Office and methods of accounting for stores were reassessed. The Storehouse was remodelled; each Storeman was allotted definite responsibilities for certain sections; the Bin Card System of recording was instituted so that the Storemen could keep a continuous check on his stocks and be responsible for any discrepancy; and an independent check was made by a clerical officer of entries on the Bin Cards and of material in the bins. Kent Town was only the beginning. Stock books at the Sewers Yard (Thebarton) were found to be in a deplorable condition[21] and the housing of stores congested. By 1936 the Bin Card System had been extended to Hilton, Kent Town, Glanville, Crystal Brook, Mount Gambier and Theberton. Beginning in 1931 the Auditor-General directed that stocktaking be undertaken annually at all depots.

Enquiries were made into methods of timekeeping and costkeeping, the result being adoption of a standard system.[22] The new costing system was first installed at Kent Town Workshops such that the costs of different sizes of pipes and of production for each four-weekly period became ascertainable. By 1937 this "order" method of costing was successful enough to be extended to the Glanville Shops. All costs were henceforth recorded in Head Office through the medium of bookkeeping machines and the engineering staff and Works Manager were regularly supplied with details. The new system

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[21] E.W.S. 434/30

[22] E.W.S. 1400/30

revealed that previously the charges for pipes and gunmetal castings were too low and those for cast iron castings too high. As well the charging out of these castings on a weight basis was found to be inaccuarate as costs varied with different sizes.[23]

An efficient costing section at Head Office was essential. Re-organization of the accounting branches was undertaken in conjunction with the Classification and Efficiency Board in the early thirties. Branch offices were amalgamated and work co-ordinated. By 1933 the workload of the accounting staff had taken on a new complexity. There was the preparation of detailed costs of construction work for guidance of the engineers; the employment of men on two thirds time meant payment of wages continuously instead of every other week; and accounts previously checked and paid by the Public Stores Department were now wholly the E. & W.S. Department's responsibility. And yet, despite the extra work and twenty percent reduction in staff the bookkeeping and expenditure branches showed a saving of £3,000 per annum in the 1929 to 1933 period.[24]

As well as the application of detailed costing to the construction work, the engineers were ready to try another new procedure on the Mt. Bold Reservoir project. It was a trial-calculation procedure fresh from America, capable of realizing the best dimensions for any proposed dam from an engineering point of view. The engineers applied it to Mt. Bold using four calculating machines in two series of lengthy trials. In the end the time wasted probably did not justify the effort, but the Department was at least making an effort to keep abreast of new developments. It was just one more step in a reassessment of past practices.

The Revenue Branch also received an overhaul. When the Controller of the Branch died in April 1931, his position was abolished. Instead,

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[23] P.P. no. 4 of 1938: Report of Auditor-General. See section relevant to E. & W.S. Department.

[24] See P.P. no. 5 of 1933: Report of Public Service Commissioner.

four officers were placed in charge of the various branches of the revenue collecting work. They each reported directly to H. Solly who held the position of Secretary and Accountant, a combination never before placed in the hands of one man. In this way Solly and his position became just as important and as indispensable as that of the Engineer-in-Chief.

Then, officers of the Public Service Commissioner's Department in conjunction with officers of the E. & W.S. Department made a thorough investigation of the section's processes. A complete balance of the 200,000 accounts handled in the section was always twelve months behind the current work. The decision was therefore taken to install the mechanical accounting of all the financial records. This meant accounting machines and card cabinets instead of the previous loose-leaf ledgers. A staff of temporary typists were engaged for a period of six weeks such that by the first day of the financial year beginning July 1, 1934, new ledger sheets had been headed, sorted, indexed and placed in card cabinets ready for posting. A staff of officers to operate the machines were drawn from typists within the Service. Thus the hand-written work was considerably reduced and the whole system kept in balance from day to day. In 1935 further improvements were made when the old cash registers were replaced by machines of the latest model. The new machines were less arduous to operate and facilitated the handling of the public during peak periods.

There was also some rationalization of the diversity of the Department's activities. All boring equipment was handed over to the Department of Mines in 1931. This meant the transfer of a number of staff specifically concerned with the hiring and selling of boring tools and equipment. In the country a number of positions of collector and Reservoir caretaker were abolished and certain depots were given up.

A Committee on the Future Administration, Management & Working of the Sewage Farm was formed to investigate the consistently poor accounts associated with the farm. The Committee reported directly to the Public

Service Commissioner who implemented its recommendation. The Manager was dismissed and the position abolished, and instead, the position of Overseer was created and filled by the former Farm Foreman. The Timekeeper was given a clerk status, periodical advice was sought from an officer of the Agriculture Department and the collection of lease rentals was tightened up. Under this new management complaints from leaseholders, purchasers of feed, agisters of stock and the Auditor-General virtually ceased.

The Engineer-in-Chief moved to combat another deficiency. He suggested - although the groundwork had already been laid by Bellamy - that the Government establish a Committee for the preservation of catchment areas of the State's water supplies and to safeguard the quality of water supplied to the public.[25] The Government appointed such an Advisory Committee on Water Supplies Examinations in June 1931. It consisted of the Engineer-in-Chief, the Engineer for Water Supply (Green), the Professor of Pathology and Bacteriology at Adelaide University, (Dr. Cleland), the Director of the Government Laboratory of Bacteriology and Pathology, (Dr. L.B. Bull), and the Chairman of the Central Board of Health, (Dr. Southwood).

The members never met more than four or five times a year but they did introduce systems to guide Departmental action. Instructions for the guidance of patrollers of watersheds were prepared by the Committee and issued by the Department; on the Committee's recommendation arrangements were made with the Adelaide University for the systematic microscopic examination of the waters of the Metropolitan Reservoirs; under their guidance the first chemical treatment of certain Reservoir waters to achieve a greater purity was undertaken; and finally, by 1940 they were promoting a policy of preventing any further alienation of reserve land under Departmental control. The Committee remained in existence in the forties, albeit with some changes in personnel. (Indeed it was only officially disbanded two

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[25] C.S.O. 1406/30

decades later.) Its meetings were, to say the least, irregular and spasmodic but soon an eager young Branch had emerged from the ranks of the Department to attack the problems and fight for their fair share of attention in a more consistent manner.

But despite a rather intensive reassessment of many systems, the depression ensured that some makeshift mixtures of old and new principles remained. Thus, for example, Eaton retained the use of horse transport at certain country depots, and even purchased new horses on occasion, despite the efforts of former Heads to phase them out as quickly as possible. His rationale was simple - why should the Department send money out of the country for motor vehicles and petrol, and throw men out of employment "when by continuing the use of horses we provide some market for our own produce and retain the services of our employees?"[26] During construction of the Port Adelaide Sewage Treatment Works in 1933-1934 horse scoops were still used extensively to shift sand. On the other hand well points were used for the first time for dewatering the excavation site and have been used where possible ever since. When the first investigations of the Polda water basin (on the West Coast) began towards the end of the depression, the officer in charge was forced to send the monthly samples of water to Adelaide in beer bottles, kerosene tins or whatever he could obtain. There was no provision made for anything else.

Eaton's way of doing things did not please everyone and in particular it did not always please the Sewerage Branch. The new status they had achieved under Bellamy was gradually eroded. Eaton, after all, knew next to nothing about sanitary engineering and he was rather sceptical of Murrell's youth and ability to lead the Branch. Thus, for example, Murrell could never get a simple lathe for the Thebarton Shops in Eaton's time as

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[26] See letter sent by Engineer-in-Chief to the Commissiner of Public Works March 5, 1930; GRG 53/38/Vol. 17.

Engineer-in-Chief, despite repeated requests to that effect. As well it seemed that sewerage projects were invariably expected to go by the board. For example, when the Sturt Floodwaters Scheme got the go-ahead, Eaton transferred Murrell's trenching machines to the Construction engineers with little regard for his protestations and the ongoing sewerage programme. Branch Heads and the Engineer-in-Chief were simply not getting together to establish priorities and listen to each other's problems.

Young Murrell also clashed with the Chief over prevailing conceptions of efficiency. Eaton asked him to investigate the use of cars by Inspectors, his rationale being that a reversion to the use of tram cars and bikes would mean the employment of more men. Murrell and his Chief Inspector of Sewers were none too pleased at this prospect of reduced efficiency.[27] Likewise he was tired of hearing requests from the Storekeeper and representatives of oil companies that his branch purchase from all, in turn. He was happy with the petrol of the Commonwealth Oil Refineries and the Branch had been using it solely for five years. Indeed he had tests made which proved that in the aggregate some two miles per gallon per vehicle more was obtained using Commonwealth Oil Refinery petrol.[28]

In 1934, when things began to improve he was still amazed to find annoying and petty obstacles in his way. It took three months for him to obtain approval for the purchase of three, 15 cwt. trucks, only to have to wait three more months for the vehicles to materialize. Angrily he wrote: "Is this efficiency? ... The procedure of reference in this case is, to say the least, little short of an expression of lack of confidence, and as an acme of red tape it surely bears off the palm ... After nine years in the Department I must know something of its management and working. The

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[27] See Sept. 29, 1930 letter sent by the Engineer- in-Chief; GRG 53/38/Vol. 19.

[28] See March 7, 1934 letter sent by Engineer for Sewerage; GRG 53/39.

reduction in maintenance and construction costs since I have had control bears ample evidence of this."[29] He made constant suggestions to the Storekeeper about ways of improving ordering, purchasing, delivery and control of stores. Others did the same and slowly, but surely, such processes were streamlined.

But Murrell had enough independence and ingenuity to counteract inefficiencies with new systems of his own making. After years of seeing the five cars at the Thebarton Depot drive past the bowser there, (which was used for filling trucks), and travel five miles to obtain petrol at the Government Garage, he made his move. He obtained permission to stop this absurd practice. When he needed an Industrial Chemist he knew that his hopes of getting one were minimal. So, he hired a Bachelor of Science graduate (who needed a job) as a foreman - he had authority to employ daily-paid men - but used him as a Chemist. Eventually the man got a staff appointment as such. He established the precedent, (before the Water Supply Branch), of placing workmen on standby duty over the weekends in case of bursts, emergencies or complaints. For maintenance and control purposes he divided Adelaide into nine districts, each having a Leading Hand and Maintenance Man. He also ensured that no men were engaged on both construction and maintenance work - they became one or the other in the interests of increased efficiency. Finally he got the long-awaited Sanitary Plumbers Examining Board off the ground in 1933. It was comprised of the Engineer for Sewerage, the Chief Inspector of Sewers and a representative of the Operative Plumbers' Union.

The mid-thirties brought relief from financial stringencies and many changes of personnel in the Department. Eleven senior officers retired. C. Almers, the Designing Engineer and Chief Draftsman, died on the job and

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[29] See Aug. 6, 1934 letter sent by Engineer for Sewerage; GRG 53/39.

H. Hodgson, Assistant Engineer for Sewerage, went off overseas to undertake a scholarship granted by the Commonwealth Fund of New York and an honorary commission from the South Australian Government. But of most importance was the change of Departmental Head. Eaton, like most of the others retiring, had given over 50 years to Government Service. Now, H.T.M. Angwin, who had been brought back from the Harbors Board to spend a seven month stint as Deputy Engineer-in-Chief, became the new head as from October 1935.

He brought a number of important changes to the management of Departmental affairs. For one thing, he was the first academically-trained Engineer-in-Chief and had been a recipient of the Angas engineering scholarship at Adelaide University. Still, his training was in electrical engineering and his experience, like Eaton's, had been largely obtained on the River Murray works. More importantly then, what he brought to the job was a friendly disposition and a willingness to listen to all sides. His rule was benevolent despotism, for all Branch Heads still reported to him and he had the final say in all matters of importance. But he was approachable and fair in his judgements. He took an interest in all his staff, no matter how far away they were in the regions. He travelled to country depots as Eaton had rarely done and made himself known to all, something Eaton (by nature) had shied away from doing.

During his time as Engineer-in-Chief Angwin ensured that qualified engineers and other staff gained a wider outlook towards Departmental services by rotating them throughout the State. He began what was to become a distinct series of stepping stones - Head Office to Port Lincoln (Western District) to Crystal Brook (Northern District) and back to Adelaide again. Under his watchful eye District Engineers became better qualified and more widely experienced men, able to extend and update systems with a greater freedom of movement than in the immediate past.

For example, the Crystal Brook headquarters saw many changes beginning with Frank Ide's term as District Engineer. He reorganized the old

workshops, acquired more machinery and introduced the concrete-lining of pipes instead of sending them to Adelaide to be lined. Apprentices were encouraged as never before - if one can call providing an old vehicle to transport them to Port Pirie Technical School once a week encouragement!

At the same time steps were being taken to tighten up financial control in the districts. Thus new Stores Issue Books, Receipt Books, (etc.), were issued and all foremen were required to show particulars of debits in future on Stores Requisitions and Local orders.

J. Dridan succeeded Ide as District Engineer after having also followed him as District Engineer (Western). In his time a depot was at last opened at Oodnadatta to relieve the foreman at Marree of the maintenance of all roads to the N.S.W., N.T. and W.A. borders in the north. New road plant was also obtained - the first caterpillar grader arrived in 1939 and there was a changeover from kerosene to diesel tractors about the same time. At Crystal Brook Dridan urged that extensions to the workshops should be twice as big instead of half as big again as planned ... in the fuss that followed the docket was lost and the Regional Engineer got his double extension built. He also ensured that wind-driven electric lighting plants were installed at depots without them.

Dridan also did his best to foster a sense of belonging and equality within the whole region - something which had been lacking in the organizational arrangements of the past. But the war and depression had since made nonsense out of rigid formality. For example, when the Water Conservation Inspector, J.W. Coventry, retired in 1939 the Regional Engineer arranged that staff from all over the north, including Marree and Oodnadatta, attended the "retiring social" held at the Commonwealth Hotel, Port Augusta. This new-breed Regional Engineer also made a point of making himself available to all staff to discuss any problems, and in turn, accorded praise where it was due. For example, Dridan recommended a monetary bonus to R.C.H. Coumbe for his work on the construction and utilization of a pipe cutting lathe.

In the same way J. Gunner, the Chief Superintendent at the Kent Town Depot was establishing a reputation for getting things done and for his accessibility and willingness to involve himself in any of the men's problems there. A system of emergency turncocks was implemented at Kent Town under his supervision. This led to a re-arrangement of the duties of turncocks as they were no longer required to be on call at all hours. New accommodation was provided for the meter section in 1937, greatly improving the comfort and efficiency of workers there. As well, a new depot was established at a convenient site in Mile End and the Kensington Pumping Station site was sold. Plant handling soon proved to be much more efficient at the new central site.

The Sewerage Branch, too, found a greater freedom of movement under Angwin's leadership. The Engineer for Sewerage got on well with Angwin, (as did most of the staff), and of more importance, found him to be readily accessible. The Engineer-in-Chief instituted a system of monthly reports from his branch heads so that he generally knew the problems of each branch at any point in time. Murrell was given a relatively free hand - he travelled interstate and undertook a series of lectures offered by the University of Adelaide on Bacteriology. In association with a representative of the Institute of Architects and a representative of the Master Plumbers Association, he drew up new regulations for sanitary plumbing and drainage work. They were gazetted in August, 1935. As well, his branch introduced Regulations for the control of sewage and wastewaters from factories - the first ever Trade Waste regulations under the Sewerage Act. The experience of dealing with Hamilton's Ewell Winery wastes provided an important, if problematical, initiation into this new field of endeavour.

When Murrell wanted to streamline other procedures, Angwin co-operated. For example, the procedure of approving the connection of a particular premise to a sewer involved five different forms and numerous official approvals. Murrell obtained Angwin's permission that in future, approval

by the Engineer for Sewerage of the Master Plumber's tender would be taken to include approval for expenditure, thereby simplifying the procedure and saving the time of the officers concerned. Likewise, when Murrell and other branch heads had requests to make of the Classification & Efficiency Board Angwin invariably upheld their necessity and forwarded them on promptly.

Angwin was also known for his consideration of the comfort of his staff. He sought and obtained approval for female bookkeeping machine operators to take days off between Christmas and New Year every year. In 1937 he took up the cause of better Head Office accommodation, begun in 1934 when the Chief Draftsman submitted a scheme for erection of a building in the Victoria Square - Wakefield Street block. He appeared before the Parliamentary Public Works Standing Committee with weighty evidence in support of the Department's case - "the staff that is accommodated on the ground floor is crowded"; the Revenue Recovery Officer and his staff are "very congested, and in one comparatively small room there are seven or eight officers"; "if one officer catches a cold it sweeps right through the room"; "the Accountant's staff is overcrowded"; and "the drawing office on the first and second floors is overcrowded and inefficiently disposed".[30] But all the "overcrowdeds" and "congesteds" did not move the Committee or Government to action, and the Department had to be content with reshuffling in the same confined space. The Stamp Duty Department moved out but the space gained was negligible.

A number of major personnel problems faced the Department in the latter half of the thirties. Despite the fact that in 1936, 150 temporary officers were made permanent and the number paid from Loans became a minority, there was a chronic shortage of draftsmen. And this was at a time when the Department was handling a rapid and extensive expansion of construction works and investigations. All draftsmen in the Department were forced to work some

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[30] See P.P. no. 48 of 1937, pages 9-10 for Angwin's evidence.

overtime in the years 1936-7 just to keep up and many staff had to postpone annual holidays. One positive effect of this situation was that it forced the Classification and Efficiency Board to alter the regulations to overcome anomalies existing in the area of overtime.

The Department was also faced with a non-existent supply of welders when it began to recondition and re-lay the Tod River trunk mains above ground. In fact the first men to learn the trade of welding in South Australia were five E. & W.S. Department employees. They were taught by a man brought specially from Western Australia because of his experience on the Kalgoorlie above-ground pipeline.

Their first task was to cut off the old lead joints in the Tod River tunnel. But the fumes produced were so bad that the men were forced to emerge after periods of ten minutes or so. There were no masks for protection, and the Department could have spared its thoughtful provision of bottles of milk for the men so employed. It was vomitted up as quickly as it went down. The early five-flame "Linde" oxy-welding machines were not easily manipulated - in fact, the pipes actually had to be revolved when using them. Most of the welding had to be done at night as the joints expanded too much during the day.

The only individual with a more trying job than the welders was a man called Jacky Owen who had been a University lecturer in Queensland until liquor addiction took its toll. He had to go through the cement-lined pipes lying on his back on a little trolley, and cement every twelfth joint which was left open initially to allow for expansion and contraction. Although of slight build, many a time he was stuck inside.

Still there were compensations to be had in camp life, even though many of the men were only there to escape their problems and pasts. Towards the end, the camp obtained two big box radios. As regular as clockwork 200 men would come running and converge on them when the serial "Greenbottle" came on the air.

Daily and weekly-paid men with the Department soon regained the ground they had lost during the depression, and even won new territory. There was a brief strike at Kent Town Depot in April 1935 when the men learnt that the part-time system, which they had only just stopped working, was to be re-introduced. They soon established their right to full-time employment. More importantly, as from 1935, all Industrial Court Awards and Industrial Board Determinations were automatically adjusted whenever a variation of the living wage took place. All daily and weekly paid employees of the Government benefited. A new agreement was reached with the Australian Workers Union regarding conditions of employment on construction works. Finally, as from November 1, 1938, a 44 hour working week became operational.

But if all was settling down nicely under a new, benevolent Head it was to be rudely interrupted by the advent of World War II and the mobilisation it soon implied. Just as the depression had challenged the Department to adapt, survive and alter priorities, so too, the war demanded the same flexibility. What was different about this second major challenge was that this time when the numbers of staff and workmen decreased, the workload of the Department increased drammatically. During the depression, on the other hand, the Loan programme had been severely limited, and there had always been more than enough men to work on ongoing projects.

The war brought major shortages of men and materials. Paper supplies were limited, and soon both sides of paper were being utilized. Quarto was used instead of foolscap and single-space instead of double-space typed letters. The Department also made an arrangement to dispose of its waste paper to Cellulose Australia Ltd. Concrete supplies became irregular and the Department was forced to keep a constant vigilance to ensure that the Morgan-Whyalla pipeline construction continued as planned. Likewise, steel plate wasnot always forthcoming as regularly as required.

The supply of rubber goods, especially tyres, became short so retreads and recapping were the order of the day. Petrol supplies were limited and

petrol ration tickets were issued on a State-wide basis. No officers were allowed to take trips into the country without Ministerial approval. The Department approved the placing of gas producers on cars, so every 50 miles or so the driver would have to stop and pour a bag of charcoal in the works. Maintenance foremen were required to save sump oil from tractors; petrol consumption was steadily reduced at a quota set by the Petrol Conservation Committee; and all waste products were to be salvaged and recorded on specially printed cards. Shortages of firewood and crude oil led to the restoration and reconditioning of old gas and steam units in the pumping stations of the State's irrigation and reclamation areas.

But the shortages of staff and workmen proved an even more serious problem. Many officers battled with Engineer-in-Chief Angwin for permission to go off to the war. Rarely did he give in and anyway, by 1942, the Department was declared a protected undertaking under the provisions of the National Security (Manpower) Regulations. Still, over 50 permanent officers did join the fighting forces. Overtime became the rule, (without any reward), and by the end of 1940 all staff worked extended office hours. Some men were kept on after reaching 65 years of age and most of the technical staff were forced to postpone annual leave.

The war also meant serious shortages of workmen, both skilled and unskilled. Welders, meter fitters, fitters to keep the irrigation and reclamation pumping stations going, and concrete-mix men - all these the Department had to fight to keep. The mixture of men who worked on the Morgan-Whyalla pipeline indicates most clearly the necessity to take all comers. There were Italian internees on probation, delicensed Italian fishermen from Port Pirie, aboriginals, men just out of Yatala Prison, and when Darwin jail was bombed, a group of soft-core prisoners from there. They were mainly single men.

To a degree then, workmen were able to call the tune. The early war years saw men leaving Government employment to go to higher paid jobs

outside. The Government was forced to act to arrest the drift, on advice from Departmental officers. Thus pay increases were awarded and Union claims heard. For example, the men working north of Hawker and between Port Augusta and Tarcoola were granted an extra two shillings a day.

The only major strike began in September, 1941, at the Salisbury Munitions Works site and caused six week's delay in the provision of sewerage works there. Builders Labourers went on strike till the Federal Arbitration Court granted a six shillings per week increase and other concessions. A small strike by men of the Water Supply Branch in 1942 gained them payment (at current rates) for the annual leave they were denied at Christmas. Union representative Nieass was berated by Premier Playford in 1943 when men on sewer work struck for payment of a ten percent penalty rate for all "wet work". Meanwhile there were no strikes at all on the Morgan-Whyalla pipeline construction and Leigh Creek men only went out because of dwindling cigarette supplies. Unfortunately this latter group were caught in a battle royal between the Australian Workers Union and Miners' Federation for control of the field.

The Department was forced to provide free transport to and from project sites, and, on the Morgan-Whyalla pipeline, made an effort to place men in towns or closeby. All available accommodation was rented on the premise that the further the men were from the hotel the more trouble there would be. At Warnertown the camp was even established alongside the Hotel! Tent accomodation remained the norm for the rapid progress of the pipeline naturally denied any greater stability. Even at Leigh Creek many lived in a permanent tented camp, although a men's Hostel, mess accommodation, and houses for married officers and employees were eventually constructed. All the Hostel men had their own room, hot and cold showers, a billiard room and even had their beds made daily by the caterer's staff. Civilization was at last coming to construction camps!

But the war also meant new tasks and new priorities. At the beginning

of the war the Construction Branch had eight utilities, three cement mixers, and five caterpillar-pipelayers to its name. Yet before long, it was undertaking major projects - defence, Morgan-Whyalla pipeline and the Leigh Creek development - with second-hand machinery, hired trucks and any resources available. By the end of 1941 the entire sewerage construction staff were engaged exclusively on projects in connection with munition factories, aerodrome and military camps so ordinary Branch construction work was almost at a standstill. Even the employees on roadworks were expected to drop all else when an order was received from the Allied Works Council. For example, the five road gangs in the North came together to make accessible roads to the Mt. Paynter uranium mine. There were always deadlines, but invariably no-one arrived to claim or use the airstrips or access roads in question. It was said, for example, that the auxilliary aerodrome built at Tintinara was never used by the Americans because it was too far away from the local town girls.[31] At least the Department had played its part as expected.

There was also some diversion of energies to cater for the possible invasion of the State. Staff involved themselves in the Civil Defence Force, and in particular in the formation of an Engineering Branch. Its attendant organization, practices and so forth made heavy calls on their private time. In country towns officers were expected to keep up a liaison with local Civil Defence Committees. To many this involvement was at least some compensation for being denied the right to join up and serve their country directly. Men were also trained for work in connection with the Air Raid Precautions Scheme and for possible Decontamination Squads.

After a conference with the Commissioner of Police, arrangements were made to post employees as guards at vital spots. Thus men from the smoke - testing gangs were diverted to guard duty at Metropolitan pumping stations

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[31] As told to me by G.G. Poole in interview of Feb. 2, 1977.

and lockmasters were sworn in as special constables. In the country men also "guarded" all major reservoirs. The men guarding the Tod River Reservoir Embankment were only given old "breach-loaders" (powder guns) so they and others in a similar position could never have fired a shot anyway! Some employees were diverted to the task of producing charcoal at Beetaloo and Uley-Wanilla for use in charcoal burners. If ever there was a dirty job, that was it! At Kent Town Workshops the production of parts for Bren gun carriers was undertaken over and above capacity operations to keep abreast of construction demands.

What then, were the costs and gains of the war experience? On the costs side the impact on Departmental personnel was serious. Two Deputy Engineer-in-Chief's and Engineers for Water Supply died within three years of one another - C.G.F. Johnson in 1943 and R.G. Wilton in 1946. Supervising Mechanical Engineer J. McLauchlan and the Senior Engineering Surveyor, W. Corney also died on the job. Murrell and Hodgson both succumbed to serious bouts of illness. In Hodgson's case, as well as supervising and designing numerous sewerage schemes and treatment works for defence purposes in South Australia, his skills were persistently in demand elsewhere in Australia. He was seconded by the Federal Government to give advice in the Northern Territory, then by General MacArthur's organization in the Eastern States. No wonder then that he was mentally and physically incapable of accepting an Advisorship offered to him by the United Nations Organization. His chance of a lifetime was lost. Overwork took its toll from many ...

There were other costs. Departmental programmes were delayed and by the end of the war much ground had been lost in terms of main and sewer laying, investigations for new water supply and sewage treatment schemes and maintenance work. As well the upheaval in personnel meant that less energy was devoted to supervision at a time when the Department was employing many new men. Perhaps this explains the rather sudden increase in thefts of Departmental property and defalcations - before the war the

Department rarely appeared in this connection in the Auditor-General's Reports. During the war this changed as opportunities came the way of a fluctuating, inadequately supervised workforce.

But there were gains made as well. Hodgson and his assistants had proved their expertise in the heat of the moment and were rewarded with a Branch of their own. Not that that was the end of the struggle - the first Engineer for Water and Sewage Treatment had two engineers and one chemist to his name and had to virtually pinch Vote money for his Branch to survive and expand. Other areas of endeavour also earned a reassessment. Thus, Port Lincoln got new store buildings; Glanville Pipeworks got a new balanced blast cupola and a mobile tractor crane; and Kent Town Mechanical Shops were reconstructed and rearranged. Old buildings there were demolished and replaced with a modern structure with office accommodation; machinery was motorized, new items of heavy equipment, overhead cranes and improved lighting were installed and more convenient arrangements arrived at for the handling of materials.

The war also brought a reassessment of the many water conservation supplies dotted throughout the State. District Councils had begun to hand the control of such supplies back to the Department at a rather alarming rate. So a committee was formed comprising representatives of the E. & W.S. and Lands Departments - the war engendered a co-operative spirit if nothing else - to act in an advisory capacity on matters relating to the disposal, leasing, and maintenance of these supplies.[32] It produced a classification system which graded the usefulness of supplies in any one area. Thus, for example, the 360 water storages on Eyre Peninsula were investigated by the Committee and 68 were reconditioned at their recommendation. At last steps were being taken to tidy up the products of haphazard water conservation policies of past decades.

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[32] EWS 2524/41

But more importantly the Department had proved itself equal to the challenge of mobilizing for a World War. Its officers had the expertise to cope with tasks outside their normal duties; despite decreasing numbers they tackled a workload never expected of them before; and an expenditure of millions of pounds, a huge sum, went through their hands. The organization's ability to adapt and survive, without the slightest hint of toppling, was proven. No doubt if any less universally liked and respected man than Angwin had been Engineer-in-Chief, things may have been different.

THE PRODUCT:

The years 1930 to 1945 saw the Department becoming involved in many projects of a unique nature. The laying of the first major above-ground pipeline, the design and construction of the first sewage treatment works, the building of barrages, a major role in the first Metropolitan Floodwaters Scheme, the beginnings of comprehensive irrigation drainage schemes, and the development of Leigh Creek - never before had the Department been expected to focus its creative design and technical abilities on such a diverse range of projects.

Between 1929 and 1934 the Department was restrained by economic limitations. On the water supply front, the Metropolitan reconstruction policy continued with the completion of service reservoirs at Darlington and Wattle Park. A new western trunk main supplied the city via the Darlington Reservoir and the intake at Gumeracha Weir was streamlined. But inadequate supplies and pressures demanded a long-term solution so work began on the Mt. Bold Reservoir, a concrete arch dam with mass concrete abutments, on the River Onkaparinga near Clarendon. It was the first major reservoir ever to be built on-stream by the Department. Meanwhile money was made available for a programme of extensive main-cleaning as a means of providing some employment.

In the country, the Upper Wakefield Service Reservoir brought a better

supply to part of the Warren Water District, and a water supply was extended to Robertstown. The West Coast situation demanded constant attention. Minnipa Tank was repaired and Pimbaacla Service Tank completed under contract. A de-aerator plant was installed on the Tod River scheme to offset corrosion by reducing the oxygen content of pumped water. But every year the repairs necessary to holes caused by external corrosion on the Tod trunk mains increased. Tanks and rainsheds were still being built in the west for settlers under State Bank grants. A committee investigation, meanwhile, led to two new successful borings (with attached pumping plants) which boosted Port Augusta's supplies.

The Sewerage Branch made a start on the Glenelg Sewage Treatment Works in 1931 after years of investigation and delays. The works were situated at the site of the septic tank and filter beds which had served Glenelg since 1904. The new plant was placed in commission on December 5, 1933, and purified the sewage by an air diffusion process, ensuring a highly satisfactory effluent for discharge to the sea. The works operated by automatic control, including the electric plant at Cowandilla, which also acted as a chlorinating agent. Reepham - the first sewage injector plant in the State - was also in operation by this time, the Department having built the ejector and machinery chambers itself.

A serious break in the Semaphore main sewer at Ethelton diverted attention to the deterioration of concrete by hydrogen sulphide gas. A thorough investigation was inaugurated to ascertain any similarly-induced weaknesses in Port Adelaide and Semaphore sewers generally. Meanwhile sewers were being laid in suburbs attached to the Glenelg Drainage Area and by 1934 Grange and Henley Beach were serviced.

The severe 1931 floods inaugurated a steady programme of restoration and reconstruction of embankments at reclaimed areas and of those breached at the Lake Victoria Storage Works. As well the rehabilitation of all pumping plants in reclaimed and irrigated areas was completed and new plant

installed in a number of places. Work began on Lock 8 in 1931 and was finished by 1935 together with Lock 7, the other lock beyond the South Australian border. In November, 1934, the first construction plant was dispatched to Goolwa to begin a series of barrages at the Murray mouth.

The years 1934 to 1939 required an accelerated pace from the Department to keep up with the demands of upsurges in the industrial and building fields in particular. Twenty-four borings were put down in the Metropolitan Area in an effort to cope with the general water shortage. Sixteen bores were equipped and temporarily connected with the metropolitan water supply system. But by June 11, 1937, Mt. Bold Reservoir was completed, better late than never. Population growth in the Blackwood and Belair areas demanded action, and extra tanks and pumping plant were provided.

In the country the reticulation system of the Barossa Water District was reorganized and replacement of the original Gawler mains began. The Stockport area was reticulated once Bailey's Hill Service Reservoir was completed, while the inception of Paskeville Service Reservoir No. 2 meant that water could be released from the Warren Water District into the Northern District. Reticulation of further Hundreds on the West Coast came to a halt when the Tod River scheme became stretched to the limit. A channel was built to take in an additional catchment area. Meanwhile work began on the reconditioning - concrete lining and relaying of the continuously welded pipes above ground - of the 20" trunk main. Streaky Bay and Gibson's Peninsula were given supplies from the Robinson Basin via crude oil pumping stations and tanks. Pumping plant was likewise installed at Kimba to attempt a regular supply from the Roora Reservoirs. The first services were laid in the town in expectation.

New or improved supplies were also provided in many other locations. The Loxton and Mannum supplies were improved by the installation of new pumping machinery and suction wells, while at Mt. Gambier the gas electric plant was duplicated. Both Bordertown and Naracoorte got their first regular

supplies from bore and water tower schemes. Kingscote, on Kangaroo Island, was given water pumped from Cygnet River into storage tanks, while water from the Angas River was diverted by a concrete weir to an earthen reservoir to serve the town of Strathalbyn. Boring and grouting operations were undertaken on the bank and southern sides of the Baroota Reservoir in an effort to make it watertight.

In 1935 a start was made on both the Metropolitan Floodwaters Scheme and a comprehensive irrigation and drainage scheme for draining the whole of Eastern Nookamka and the western portion of the Berri area. Much of the design work and the complete supervision of the Metropolitan scheme was in the Department's hands, although in practice much contract work was involved. Still, the Department did all the necessary clearing and enlarging along Brownhill, Sturt and Keswick Creeks and excavated a new channel from the Breakout Creek junction with the River Torrens. This involved continuous work by dragline excavators and the manual filling of light railway trucking.

The Nookamka drainage system was completed in 1939 and much time was spent aiding locals with the design and layout of new internal block drains. The electrification of reclamation pumping plants also received attention, but crude oil plants remained the standard. Of the 46 pumping plants maintained by the Department in irrigation and reclamation areas before the war, 25 were crude oil, five were gas, nine were steam, five were diesel and only two were electrically operated. By 1939 pumping plants were installed at all locks to assist in the beautification of surrounding areas, and war was being waged on water hyacinth, recently proclaimed a noxious weed.

Water conservation activity was mainly confined to repair work in these years, although the odd catchment and tank was erected and windmills were attached to bores. In the west and north road gangs operated widely, while in the southern district any work going went to petty contractors. An extensive construction programme was waged on the Port Augusta-Kimba, Port Augusta-Whyalla, Port-Augusta-Iron Knob roads and new roads provided

in various Hundreds. In the north the grading of the Terowie-Cockburn road to a width of 50 feet was a never-ending task until the Highways Department took it over in 1939.

The Sewerage Branch managed to catch up much ground lost during the depression. Between 1934 and 1938 Albert Park, Queensbury, Woodville, Birkenhead and Royal Park were sewered. This meant that practically all suburbs except the sparsely settled ones were serviced. Such an achievement was largely made possible by the commissioning of the Port Adelaide Sewage Treatment Works on March 29, 1935, and the Queensbury Pumping Station in July, 1934. The pumping of sewage to the Islington Farm from the original (1916) Port Adelaide Pumping Station ceased. Instead the action shifted three-quarters of a mile away to "The Pinery" where the treatment plant was sited. The new works were based on the same principle as the Glenelg Sewage Treatment Works, but incorporated the latest pretreatment methods. In fact, Port Adelaide was one of the first two plants in the world to adopt pretreatment employing two-stage sedimentation with natural flocculation interposed between the stages.

More ejector stations were steadily inaugurated and dragging operations became an established maintenance function by the mid-thirties. Chlorine was applied to sewers via dosage plants to check odours. In 1939 a small treatment plant was designed to cater for sewage from the South Coast District Hospital at Victor Harbour. Much survey and design work was expended on sewerage schemes for Renmark, Naracoorte and Victor Harbour, although nothing came of them immediately.

1939-1940 saw the completion of the Metropolitan Floodwaters Scheme and Murray Barrages, and the diversion of energies towards defence works. The five barrages - Goolwa (the largest), Mundoo, Boundary Creek, Ewe Island and Tauwitcherie Channels - were put to the test during the 1944-1945 drought. As required, they proved themselves capable of preventing the ingress of sea water at the Murray mouth during periods of low river and of

maintaining the freshness of Lakes Alexandrina and Albert. The credibility of a pipeline to Adelaide from the Murray was thus assured.

For the Department the war meant undertaking projects at numerous military camps, air force and munitions establishments. Sewerage systems were provided at Woodside and Oakbank Military Camps and at the Keswick Military Barracks. Surveys were undertaken and water and sewerage services provided at Port Pirie, Mallala, Mt. Breckan and Parafield Aerodromes; Tintinara Aerodrome was graded; concrete paving and roadworks were provided at Birkenhead Naval Depot; grading was done at Fort Largs and protective works carried out at the Port Adelaide Rifle Range.

Finsbury Munitions Works and Hendon Small Arms Ammunition Factory demanded considerable attention. An overhead tank, internal water supply system, and sewerage system complete with treatment works capable of dealing with sewage and trade wastes, were installed at Finsbury. A water supply scheme, sewage and trade wastes scheme, steam pipe trenches, concrete roads and stormwater drains were all provided by the Department at the Hendon factory. Meanwhile in the country any necessary roadworks were constructed, and magazine sites, replenishing centres and inland fuel storage depots were laid out. At Loveday two internment camps were set up and water and drainage services provided.

Perhaps the most important defence project involving the Department was the complex undertaken in the Salisbury-Smithfield area. Departmental officials surveyed the layout of the Salisbury Explosives Factory and magazine areas, and provided mounds, an extensive stormwater drainage scheme and a sewage treatment plant. At Smithfield Munitions Depot twelve miles of light railway were laid and bag mounds were erected around magazines. In fact a very comprehensive internal reticulation scheme was provided for the whole of the Salisbury-Smithfield area. A new thirteen mile long trunk main was laid from the Barossa system to a point just north of the Munitions Works to ensure that all requirements would be met.

But there were more urgent projects to be undertaken if the State's future was to be assured. The Morgan-Whyalla pipeline was such a project. The section between Baroota Reservoir and Whyalla was completed first, in order to dispense with a reliance on ships carrying water, and to meet industrial requirements occasioned by the war. The rest of this continuously welded steel pipeline, varying in diameter from 750 mm to 525 mm, was completed by 1944. The scheme involves four electrically operated pumping stations beginning at Morgan and 27 concrete storage tanks along the route. It was wholly designed by the Department and all fittings and fabricated parts, with the exception of a few special valves, were manufactured departmentally. It was a daring but necessary experiment and the Department pulled it off in wartime. Just in time, too, for pipeline water averted a disaster of the first magnitude in the drought stricken north in 1944-1945. In fact the areas served by the Barossa and Warren Reservoirs were also augmented by a connection with the pipeline.

Increased metropolitan needs during the war also demanded action. Trunk mains were accordingly laid and relaid to ensure improved supplies to industrial and private consumers on Le Fevre Peninsula and to shipping at Port Adelaide, Osborne and Outer Harbour. Tanks and service reservoirs were built to improve the water supply of the higher level suburbs, and a scheme later inaugurated to improve the trunk distribution system of all the southern and eastern suburbs.

Port Pirie received attention. A new service tank and connecting main, and an extensive programme of pipe lining and renewals was undertaken. On the West Coast work at last began in 1945 on the utilization of the Uley-Wanilla sub-artesian basin as the best available means of augmenting the Tod River system. A camp was established at Wudinna and the first stage of the project - reconditioning of 33 miles of Tod River trunk main between Kyancutta and Minnipa - was put into operation.

Where the Department's ongoing sewerage programme was concerned, the

overloaded treatment plant at Glenelg was a major priority. Extensions and enlargement works were started early in the war, but only by 1945 had all equipment been received and the plant become fully operational. The plant was a major step forward in many ways - it was the largest sewage treatment plant in Australia at the time giving complete treatment; gases given off during the sludge digestion process provided 96 percent of power requirements; the sludge elutriation and vaccuum filtration plant installed for dewatering of digested sludge was the first of its kind in Australia; and it included provision for the separate treatment of distillery waste from a local winery. With the passage of the innocuous plant effluent into the sea, the use of the disposal area north of the treatment works was discontinued.

Unfortunately the obnoxious conditions existing in the low-lying areas to the north of the Islington Sewage Farm were not so easily dispelled. But an extension of the effluent channel to North Arm Creek in this period did alleviate the problem of surplus waters. The Department meanwhile obliged various public bodies who could not obtain contractors to make sewer extensions, by undertaking them itself. The South Australian Railways, Government Departments and local governing bodies benefited in this way. By 1945 the Port Adelaide Sewage Treatment Works were taxed to the limit in winter and the necessary enlargement works were started.

Work commenced on an Upper Murray Comprehensive Drainage Scheme in 1943, beginning in the Berri region. The principle involved was the collection of seepage water in collecting sumps and drains from where it would be pumped to collecting basins, and in turn, to the river flats. Glossop town received a water supply during this period of interest in the region. At Port Lincoln Departmental officers were still giving advice and supervising extensions to the local Freezing Works for the Produce Department. Departmental road gangs meanwhile graded a road between Whyalla and Iron

Knob, made new roads beyond Iron Knob and then concentrated in the north on defence-priority roads and airstrips.

At the end of the war there was still one major on-going project needing constant reassessment and further development. The task of winning the shallow coal at the northern rim of the Telford Basin at Leigh Creek was tackled by the Department from 1943. It was to be a unique exercise. A creek was necessarily diverted from its course across the open cut and various protection works undertaken; urgent investigations sought and found a reliable water supply in the form of water pumped from two bores at Sliding Rock 25 miles away; and the tented camp and donkey team were gradually superseded by a well designed town with all amenities. The tasks at hand thus varied from making bricks in a hired plant, implementing a sewage treatment works, and planting trees, to the production of coal to satisfy the market. And all this had to be achieved promptly in the harsh conditions of the far north. Like all the other unique challenges which came the Department's way in the years 1930-1945 it was embraced and mastered within obvious limitations.

THE PUBLIC:

In a period when the Department was spreading itself thin to cope with a wide range of projects and challenges it was only natural that something would have to suffer. Unfortunately it was too often good public relations. The public expected the attention given in the past regardless of the limitations imposed by the depression, resurgence and war. The Department, in turn, did little to enlighten the people about the additional tasks and problems which came its way. The secrecy demanded by war only confounded the issue.

For many, the Department became associated with the imposition of water restrictions. People in areas which had never been subjected to them before naturally saw this action as an expression of failure. In fact in

1930 Engineer-in-Chief Eaton set a precedent by imposing water restrictions in the Metropolitan area before summer set in. Exaggerated pictures, like the one in the evening News of October 27 showing a leakage from Hope Valley Reservoir, only added to the picture of doom. Washing of cars and vehicles was prohibited till August 1931. On hot days in summer residents between Prospect and Main North Road could not even get enough pressure to fill lavatory cisterns, so the early restrictions seemed a pointless exercise. Some ships were even forced to go to the Eastern States to pick up a water supply, the pressures available at Port Adelaide were so poor.

Only in April 1932 were the restrictions imposed on parts of the Northern District withdrawn, after five continuous years of being in operation. But places like Mount Barker, Tweedvale (Lobethal), Peterborough and the Moseley Water Conservation District continued to suffer periodically. Between October 1936 and September 1937 restrictions came again to the Northern Districts and permits to draw certain quantities were issued to people whose livelihood was affected. Likewise people in the Yeldulknie Water District on the West Coast were familiar with the meaning of the word restriction.

Then the severity of the Metropolitan water shortage, and the non-completion of Mt. Bold Reservoir saw restrictions imposed on a none-too-pleased Metropolitan public in 1934. Hand watering was instituted in May; in July Executive Council approved a special By-Law providing for a £20 fine for anyone infringing water restrictions and only in January 1935 did life return to normal.

During this time of near-crisis the Minister of Works and his Department could not always hide their anxiety from the public eye. Additional inspectors were engaged to patrol and police the restrictions. 'Stickers' were printed and forwarded to hotels, cafes, clubs, and large blocks of offices with the request that they be placed above wash basins and in public lavatories. McIntosh, the Commissioner of Public Works, urged economy in the use of plunge baths and requested large premises to discontinue the

the operation of automatic flushing devices in toilets - Parliament House for one took notice and did its flushing at longer intervals at his instigation! As well an employee of the Department temporarily became its first public relations officer. He visited industrial concerns, factories, hotels and schools to preach the message of water conservation. Even after the crisis had passed in 1936 the Department was still issuing posters urging people to "stop wasting water and save money".

Naturally the public voiced their discontent about the situation. Letters flooded to the papers sarcastically pointing to the Departmental policy of the late twenties of removing meters from thousands of houses in order to save money. Now the Department was frantically fixing them everywhere as fast as they could be obtained. The Advertiser editorial of June 20, 1934 saw this past omission as "the ground for a widespread grievance" and later argued that "the Mt. Bold project was too long delayed" as well.[33] Western suburbanites were particularly upset that they had to use bore water temporarily injected into the system by the Department.

Ten years later it was time to play the tactical game again. In February 1943 restrictions were imposed on hand watering in the Eastern Suburbs. Then in January 1944 Premier Playford even began to publicly urge a reduction of consumption by 33 percent or Adelaide would suffer restrictions October saw restrictions imposed in the Barossa and Warren Water Districts for the first time ever, but still the Commissioner of Public Works (McIntosh was talking of "voluntary water cuts" to Adelaideians. All to no avail. Between November 1944 and February 1946 partial or full restrictions were placed into operation.

To many the restrictions and shortages proved that the Department was out of touch with reality. Beginning in the early thirties a constant stream of letters reached the newspapers urging the pumping of water to

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[33] The Advertiser, July 9, 1939: "Water and the Weather".

Adelaide from the Murray. A City Council Alderman called McEwin and Herbert Rymill, in particular, urged this course of action, to be undertaken preferably by a permanent Water Board.[34] Most writers like H.P. Shakes did not deny the Department its right to exist, but claimed that "it is regrettable that opinions of out-siders are not taken seriously".[35] The comment by retiring Engineer for Water Supply A.J. Green that "we must use Murray water eventually" was thus eagerly siezed upon. E.R. Hicks, (a former employee of the Department), W. Rice (Mayor of Gawler), R. Melrose and Moseley, along with McEwin and Rymill, kept the matter alive in the thirties and early forties in the columns of the newspapers, as if their earnestness would be the key to its implementation. One Mount Gambier individual suggested that the Department take Blue Lake water to Adelaide[36] but no doubt fellow south-easterners soon put his priorities straight for he never wrote again.

There were other failings which people saw as indicative of a deterioration in Departmental control. By the early thirties main bursts had become so frequent that it only took one court case - involving damage to the Ruthven Mansions in Pulteney Street through the bursting of a main - to highlight the matter. The Superintendent of Waterworks, Mr. Goss, freely told the papers that "no extra men have been put on, but the Department had sometimes to cope with twelve burst mains in a day".[37]

Another matter raised the public ire to a degree and persistency which could only reflect badly on the Department. The December-January heat wave of 1931-1932 brought a stream of complaints about the unpalatable and odorous water from Hope Valley Reservoir. The newly formed Committee on

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[34] See, for example, Letter to Editor, The Advertiser March 13, 1935.

[35] Letter to the Editor: The Advertiser Oct. 9, 1934.

[36] Letter to the Editor: The Advertiser March 21, 1934.

[37] The Advertiser August 4, 1932.

Water Supplies Examinations investigated and moved the Department to dose both the Hope Valley and Millbrook Reservoirs with copper sulphate to destroy the problem-causing algae. In 1934 the Director of the Waite Agricultural Institute, the Government Geologist and the Committee were all forced to make public comment to allay widespread fears about the dangers of the bore water which was supplementing the Metropolitan system.

In 1937-1938 the copper sulphate treatment was again applied to Hope Valley water. This time people were not slow to urge the implementation of filtration. The Adelaide City Council, in particular, took the cause to heart on the advice of its Public Health Committee. But as one News editorial pointed out,[38] the City Medical Officer was a member of that committee, and a member of the Departmental advisory Committee on Water Supply Examinations, each of which was taking an opposite view about the necessity for filtration. But various local Boards of Health, the lessee of the City Baths, the Thebarton Progressive Association and a number of chemists also registered their disgust and eventually the Commissioner of Public Works was forced to reply. Adelaide's water supply was "satisfactory" and a filtration plant would cost £300,000.[39] The matter rested there, the war no doubt helping to divert attention in other directions.

Well might the public have bucked had they known that there was Departmental expertise capable of, and enthusiastic about, water treatment. Harry Hodgson, on his return from overseas studies in 1937, established a small experimental filtration plant at Hope Valley and showed that good, clear water could be produced. As well he spelled out methods of improving water quality without necessarily fully treating it. But he was a new breed, multi-disciplinary engineer with little hope of converting fellow Departmental engineers of the orthodox water supply tradition to the idea that

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[38] The News editorial Feb. 15, 1939.

[39] The Advertiser Jan. 25, 1939.

the quality of water was just as important as the quantity provided.

Rather, the stock reply given to the public tended to be "just be happy that you have water". Or, as Port Augusta District Superintendent C.C. Harpur would say to any woman who rang up complaining of dirty water - "Well Madam, I don't know why you should be complaining. I don't know of any other Department or Government body that supplies you with water and topdressing for your lawns at the same time!"

Little wonder that the local governing bodies of Kadina, Moonta and Wallaroo complained when a period of water shortage drew to a close - it meant they would lose the clearer waters of the Warren Reservoir and had to accept the less appetizing waters of the Beetaloo and Bundaleer Reservoirs.

But on the whole, country people were more concerned about the regularity of a water supply than with its quality. After 25 years of agitation, the majority of Strathalbyn ratepayers voted positively in a 1935 poll for the implementation of a Departmental water supply. In 1923 they had rejected a Departmental scheme but now the attractions of a reticulated supply overrode all other considerations. In 1932 mallee farmers petitioned the Government to defer a policy of prodding District Councils to take over local water conservation supplies. They could see the value of Departmental control and maintenance at a time when assured water supplies were essential for economic survival. Meanwhile on the West Coast, people on land not yet serviced by the Tod Scheme kept up a large and steady flow of applications to the Department requesting connection.

The inadequacy of existing supplies was a ready drawcard to protest meetings. Huge meetings were held in Port Pirie and Kadina in late 1936 to protest against restrictions imposed yet again in northern areas. Councils represented included Port Pirie, Moonta, Kadina, Bute, Port Wakefield, Ardrossan, Balaklava, Snowtown, Paskeville, Alford, Clinton and Port Broughton Vigilance Associations, Agricultural Bureaux, show societies, shipping interests and trade's associations were also represented. Never before,

and never again would the anger be so vocal and so well-organised - the Morgan-Whyalla pipeline has seen to that. Still, Clare, Laura, Jamestown, Caltowie and Quorn people remained vocal about their needs in the forties. To them the pipeline was so near and yet so far.

Water quality was by no means an important issue to many of the people who were assured of a regular water supply. The few Departmental initiatives taken to minimize contamination of public waters in fact created discontent in some quarters. For example, when the Department moved to resume 364 acres above the Gumeracha weir - on the recommendation of the Advisory Committee on Water Supplies Examinations - the Gumeracha District Progress Association got up in arms. In a deputation to the Minister of Employment they argued that the land should be used for closer settlement instead of for afforestation.[40]

One area of Departmental activity which, as usual, sparked off some discontent, was that of rating. However, there was virtually no adverse publicity about the way rates were collected during the depression years. The Department was seen to accept many requests for extended periods to pay rates, sometimes to the extent of three years. Likewise monthly instalments were accepted in cases where the annual rates owing could not be outlayed in one lump sum. Ratepayers were not charged sewer rates in areas where mains had been recently laid but there were no houses yet connected. Some could not cope and tampered with their meters in desperation, only to be hauled before the courts. At least one Departmental officer was reprimanded for recommending that outstanding amounts owing be written off "without having made proper attempts to collect".[41]

However the surcharge and any suggestion that rates might increase always drew an angry response from certain quarters. The Public Works

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[40] The Advertiser Sept. 15, 1933.

[41] See P.P. no. 5 of 1930: Report of Public Service Commissioner.

Parliamentary Standing Committee investigation into the rating system in the early thirties only added fuel to the fire. On one hand the Committee reported, after an interstate visit, that the Adelaide Water District rate return of 10.88 percent (in 1930) was one of the best-paying sums in the Commonwealth. On the other hand, the Committee's attempts to make country towns aware of the serious drift of their returns - by sending each local governing body a return showing the balance sheets of all State Water supply schemes for the previous five years - met with "negligible results".[42] A couple of Councils suggested certain amendments but the majority simply protested against any increase in rates.

It was probably no coincidence that the most active campaigns against the surcharge came in 1933, the height of the depression. In April of that year the Lord Mayor convened a Conference at which fifteen municipal districts and district Councils were represented, to discuss possible action in relation to the 25 percent water surcharge. However, by 1934 the united front was beginning to be eroded. For example, the Unley City Council rejected a motion moved by a Councillor to support the local government bodies opposed to the surcharge. As one member put it, they should "let the Government govern the country without pinpricking it continuously".[43]

However, when an E. & W.S. Department Committee suggested in 1935 that the 25 percent surcharge be dropped and the general rate increased by 20 percent, forces joined again and the Suburban, Municipal and District Councils Association organized a deputation. They had limited public support, if the lack of letters to the newspapers on the subject are any indication. As was no doubt intended, people had become used to the extra outlay on rates after years of paying a surcharge. Even in the late thirties, when assessments

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[42] See P.P. no. 31 of 1932: Fifth General Report of the Parliamentary Public Works Select Committee; p. 6.

[43] The Advertiser August 7, 1934.

were naturally rising with an upturn in prosperity, only the Goodwood South Progress Association launched an emphatic protest. They accused the Department of raising assessments when property values had not reached anything like the pre-depression levels.

One other area in which Engineer-in-Chief Eaton managed to raise the hackles of Municipal Councils was that of the proposed Metropolitan Floodwaters Scheme. When a 1934 Conference of eastern suburban Councils met, and unanimously opposed the Government scheme as prepared by the Department, Eaton made one of his rare comments to the press. He said that the outcome hadn't surprised him; the eastern suburbs had opposed such schemes all along, and if Parliament approved the plan they'd have to fall in line.[44] The Councils, led by the Kensington-Norwood lobby did not appreciate this statement and unanimously agreed to write to the Commissioner of Public Works drawing attention to Eaton's breach of his position as a public servant. They got some of their own back when the Government agreed to bring in an expert to investigate the Department's scheme. But the expert, H. Dare from N.S.W., declined to make any major alterations and the work at last went ahead. This pleased groups like the Western Suburban Unemployed Workers Association, if no-one else.

The sewerage activities of the Department likewise earned their fair share of criticism. However, positive steps were taken to improve some areas of notably poor communication in the past. In 1934 the Sewerage Branch circularized Metropolitan Councils asking them (yet again) to inform the Department whenever any road-surfacing operations were in progress. However, only when this requirement was embodied in the new Sewerage Regulations of 1935 was co-operation ensured. Even then the Brighton District Council and Department exchanged reams of correspondence before an understanding was reached. Likewise the new regulations did away with

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[44] The Advertiser July 31, 1934

many of the disputes between Councils and the Department as to liability for t expense involved in raising inspection opening covers to the levels of made roads and footpaths.

When redrafting the sewer regulations the Sewerage Branch invited the co-operation of the Associated Master Plumbers and S.A. Institute of Architects through the formation of an Advisory Board. In this way a better feeling was engendered between all concerned. Contractors could now tender on a uniform basis in all districts; all plumbers and drainers would be officially registered; and unsuitable plumbing fittings and fixtures could be phased out. It was no fault of the Department's that the President of the Master Plumbers' Association had to be rapped over the knuckles in 1939 for carrying out work contrary to the Regulations.

But in other matters the Department only took positive action after the event. In the early thirties sewer smells provoked a consistent stream of letters from the public. The fact of the matter was that no effective ventilation system had ever been installed. Vent shafts were non-existent or were erected haphazardly and unsystematically. The Department was forced to examine the problem, and in doing so, the lives of two men were lost in the Hindmarsh relief sewer in 1931. This only drew further attention to the issue. Even Archbishop Killain could no longer live with his local odours and he contacted the Department accordingly.[45] The Department was forced to show a little more enthusiasm. It set about erecting many extra vents along the routes of most of the trunk sewers, and before long was chlorinating the sewage to ensure even more effective control of odours.

The overloaded state of both the Glenelg Treatment Works and the Islington Sewage Farm were natural magnets for attention. For years during the winter months the Department had no alternative but to discharge crude sewage down the effluent channel from the Sewage Farm. Then in 1936 an

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[45] EWS 2468/31

outbreak of typhoid fever appeared in the suburbs and the newspapers promptly reported that one girl had got it from eating green vegetables from the Sewage Farm.[46] People began to put two and two together despite the fact that the Central Board of Health investigated and could in no way attribute the cause of the outbreak to the farm.[47] Anyway, there was no vegetable growing being undertaken there by the Department. The practice had been given up sixteen years before and now only three private individuals leased plots for the purpose. But accusations flew thick and fast and a ban was soon placed on the removal of any vegetables from the farm.

Likewise, by the end of the thirties the Henley and Grange Councils and Local Boards of Health were regularly complaining about the state of the Glenelg Sewage Treatment Works. Very heavy seepages through the sandhills and along Military Road were an obvious indication of the overloaded state of the works. Partially treated sewage was at times, by necessity, discharged to the lagoons and these bred a bad mosquito nuisance. Then when the new extensions to the plant were announced the Department had to prove to the Henley and Grange Councils - by extensive experimentation and many earnest reassurances - that the effluent to be discharged to the sea would not produce any objectionable conditions along the shoreline. All the same a Foreshore Vigilance Committee appointed itself watchdog just in case.

There was one favourable sign on the horizon. Some country towns began to actively seek Departmental assistance to plan and implement local sewerage schemes. In Renmark, Victor Harbour and Naracoorte the need for such systems was accepted and Departmental planning for each reached advanced stages. But nothing came of them. The Government had other priorities, the Department was consistently short of technical staff and the war accentuated these two problems.

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[46] See The Advertiser Jan. 10, 1930 and Jan. 17, 1936.

[47] EWS 208/36

Relations with the Fire Brigade and fire-fighting bodies were generally co-operative throughout the period, despite the problems created by poor pressures in certain regions. Mid-January 1939 brought the most trying test of all. Two all-time records for a consistent heat wave and water consumption were established in a week. To make matters worse a series of devastating bush fires spread through the Adelaide Hills. Gunner, the Metropolitan Water Supply Superintendent, did not get to bed for three consecutive nights in his efforts to regulate and ensure supplies. The Sewerage Branch promptly made some of its employees available to fight the bushfires and for two days the E. & W.S. Department force did just that. Unfortunately this civic-minded action did little to placate a public distressed by the heat and water shortages. In fact the Departmental fire-fighters only made the newspapers when one of the lorries rushing them to the fire overturned and eight of their number were injured.[48] Again in 1942 organized units from the Department battled Hill's fires. (Since then the E.F.S. organization has emerged to fulfill a permanent role in such regions,)

The war aggravated matters. In 1942 a deputation made its way to the Premier to urge an improved water supply for firefighting. The Chief Officer of the S.A. Fire Brigade (Whyte) went on record to express his particular concern about the inadequacy of water supplies and main sizes in industrial Hindmarsh. But in fact it took a serious fire in the area in 1943 to ensure that actual monetary provision would be made available for improvement work. No wonder the Chief Fire Officer warmly commended the proposed new Metropolitan trunk main system in his evidence to the Public Works Parliamentary Standing Committee in 1944.

Still, in many respects, the E. & W.S. Department was making a fine name for itself. Engineer-in-Chief Eaton was a recipient of an Imperial Service Order and the Russell Memorial Medal, the highest Australian

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[48] The Advertiser Jan. 14, 1939

Engineering honor awarded. Professor Chapman of Adelaide University was the only other South Australian to hold the latter award at the time. Likewise H. Hodgson's attainment of a Commonwealth Fund Service Fellowship and his mastery of the field of sewage and trade waste treatment added much to the Department's prestige. On returning from his overseas studies the newspapers hailed him as "the expert".[49] His book was to remain a world-wide standard reference work for many years to follow. In the country the fact that Regional Engineers were staying on for longer periods meant greater opportunities for involvement in local communities. J. Dridan, for example, began a tradition that the District Engineer would serve time on the Board of the Crystal Brook hospital.

In 1935 a Liaison Committee was established in the reclamation areas of the State, involving Departmental personnel and settlers. Frequent reports of water quality and forecasts of river conditions were thus regularly discussed and settlers notified by word of mouth and through the press when necessary.

Relations between Adelaide University and the Department were co-operative and mutually advantageous - no doubt Eaton's friendship with Professor Chapman and the transfer of officers R.C. Robin and T. Farrent to University employment ensured excellent contacts.

The fostering of the local meter-making industry by the Department also produced mutual benefits. On the one hand the Department had a say in the design of the meters it required; on the other, it was prepared to co-operate, as when it actually returned 850 meters to the contractors in 1940 to enable them to fulfill an interstate contract.

From 1937 onwards the Commissioner of Public Works arranged that reports were prepared for the press, from time to time, on the progress of Departmental activities. This was an important step towards keeping the

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[49] The Advertiser March 23, 1937

public in touch. But perhaps even more valuable was McIntosh's obvious pride in the Department's activities. As Commissioner of Public Works he used any and every opportunity to draw attention to its programmes and achievements - he urged the public to "let the Department know of any water pressure difficulties";[50] he expressed pride in the State's huge water schemes;[51] he praised Hodgson for his recently-published treatise;[52] and in relation to the Morgan-Whyalla pipeline he recorded Angwin's "excellent service" and the "exceptional" vision and judgment of the Department's Engineer for Water Supply, C. Johnson.[53]

There were even some Departmental achievements which gained Australia-wide praise. The progress made on the Murray Barrages was applauded and the works described as the "Murray engineering triumph" on completion.[54] The Victorian Royal Commission inquiring into the activities of the State Rivers and Water Supply Commission, visited Adelaide in 1937, "having heard of the excellence of the South Australian Waterworks accounts".[55] After examining the Department's accountancy system a Member of the Commission reported it to be "unquestionably excellent ... particularly [was] the cost accounting so up-to-date".[56] The Commissioners agreed that Government Departments throughout Australia had a great deal to learn from the E. & W.S. Department's system.

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[50] The News Feb. 16, 1939

[51] The News May 30, 1939

[52] The Advertiser Nov. 9, 1939

[53] The Advertiser Oct. 29, 1943 and The Advertiser April 1, 1944

[54] The Advertiser Aug. 6, 1937 and The Advertiser April 12, 1939

[55] The Advertiser July 27, 1937

[56] Ibid

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Man's ability to meet his challenges is never assured. In the period 1930-1945 the men and women of the E. & W.S. Department met with and mastered an extraordinary number of major challenges, despite limitations on personnel, time and finance.

During the depression the Department established a reputation for fairness and service, despite staff cutbacks and the background overhauling of many of its processes. Then it co-operated in the processes of re-orienting the South Australian economy towards an industrial base. Finally, it not only survived World War II - it actively undertook defence works, constructed its first major above-ground pipeline, managed the Leigh Creek exercise and reverted attention to normal responsibilities whenever possible. It had met whatever major task the Government had thrown its way and flexed its muscles as never before.

There were casualties. In many areas the Department had no hope of living up to public expectations. There were never really enough trained, skilled engineers to go around so that level of staff tended to suffer, mentally and physically, more than others. It remained to be seen whether the ground lost could be made up in post-war years.

CHAPTER IX: UPSURGE : 1946-1965

World War II, which had arrested the State's development and ongoing programmes, was over. Now there was no holding back. Suddenly the State was caught up in a series of spectacular, though unplanned upsurges - in population, industrial expansion, primary production, wage levels, consumerism and general expectations. The pressure on the E. & W.S. Department intensified. Coping with wartime requirements was but a foretaste of things to come.

POLITICS:

In the political arena Premier Playford and his men continued to dominate. A "Playmander" - the structuring of electoral boundaries in a favourable manner - made sure that this would be the case. But certainly there were few politicians in the opposition ranks who could hold a card to the Premier. His passion for the development of South Australia could not be faulted but his priorities in achieving that ongoing aim were not always acceptable to the Opposition and sections of the public. However, the Government's policies which related to the provision of water supply and sewerage services - as implemented by the E. & W.S. Department - were rarely subject to the Opposition's dissent. It appeared that the Government was doing its utmost to keep pace with demands in these areas.

Playford spelt out his priorities in 1946. He appeared before the Public Works Parliamentary Standing Committee with the pronouncement that capital expenditure on country water supply schemes would be justified if it could be shown that the indirect benefit to the community arising from increased production would compensate for the direct loss.[1] This gave the Committee more leeway. No longer would a strict return of four percent on capital be required. As well, during the Parliamentary session Commissioner

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[1] See P.P. no. 65 of 1946: Report of Parliamentary Standing Committee on Public Works on the Laura Water Supply.

of Public Works McIntosh made it quite clear that there would be no main relaying on a major scale to improve water quality while others were without water supplies altogether. This would only be "robbing Peter to pay Paul", a comment often reiterated by him in Parliament as the years wore on.

Likewise the Government indicated their intention to sewer country towns when, in 1946, they passed a Sewerage Act Amendment Bill for the purpose. The Opposition was happy enough about the move. As Richards, the Opposition Leader put it — "we have some wonderful officers"[2] in the Department, quite capable of implementing tailored schemes. The Government made it clear that the programme was not an urgent priority. The Department was short of skilled engineers and anyway, the National Works Committee had not yet actually made the necessary capital available. Still, all sides were happy to see the proposition reach the starting baseline. For too long all sides had talked about the matter with interest, only to shy away when specific financial proposals were presented.

The Government's enthusiasm to reticulate did not always take into account the Department's priorities and the current limitations on its efficiency. For example, Premier Playford actually went out and sold an extensive reticulation scheme to Yorke Peninsula - he arranged and spoke at a series of meetings at various towns - at a time when the shortage of steel plate and cement was one of the major problems facing the Department. Still, the engineers prepared alternate schemes and warned that implementation would mean a heavy annual loss to the State.

Likewise Playford altered priorities when he placed the construction of the Woomera pipeline in the Department's hands. Actually South Australia was the Commonwealth's last resort in its search for a rocket range site - General Levitts had virtually travelled every State trying to sell the proposition. However, Playford was enthusiastic. He had the land and would

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[2] Parliamentary Debates of 1946: House of Assembly debate on Sewerage Act Amendment Bill, Nov. 5.

provide water for a town of 3,000 without any bother. Only then did he take the matter up with the Engineer-in-Chief Angwin. What's more he promised the Commonwealth that the pipeline from Port Augusta to Woomera would be finished by June 30, 1949, six months ahead of schedule, to meet their urgent demands.

General Levitts bet Playford that it could not be done. It was, in fact, completed two days early. Something had to suffer in the process - the Department was forced to temporarily divert pipes from the scheme to supply Farrell's Flat, Clare and intervening lands. But Playford had won his bet and the Commonwealth accordingly treated the E. & W.S. staff involved to a dinner at the South Australian Hotel.

Parliament did not even bat an eyelid at this sidetracking by Playford. One Member, Riches, saw that pastoral properties along the pipeline would be served and was happy. But gradually Parliamentarians became aware of delays in their districts created by shortages of technical staff and materials. In 1948 a Loans for Water Conservation Act easily passed both Houses for it was seen as a means of aiding the landowner outside the ambit of possible water supply extensions to improve his position. The Act provided that the Engineer-in-Chief had to be satisfied with the proposed Water Conservation Works from the viewpoint of their productive potential. Beyond that, the Department would not have to be involved.

But as matters turned out it was very much involved. The Premier's policy that a poor, direct financial return would not be a bar to a project, assured a steady stream of applications. True, the Government did its best to aid implementation by fostering migrant-workers and importing both steel and pipes, largely from English mills. But the necessary numbers of workmen and technical staff simply could not be obtained.

As if to indicate the stress to which his Department was being subjected Engineer-in-Chief Angwin died on the job in 1949. At the time he was also Chairman of the Electricity Trust and a Commissioner of the Harbors

Board. Parliament was shocked, and this was accentuated when a number of top senior public servants in other Departments died in the same year. McIntosh, the Commissioner of Public Works summed up the widespread regret at Angwin's death when he said: "I am glad to have it on record that Angwin was so well regarded here. I have not met a finer man ..."[3]

But talk of burdens being carried by public servants soon faded. There was a new Engineer-in-Chief to be had in Julian Dridan and the metropolitan water supply was again in dire straights. The Department had the Mannum-Adelaide pipeline in hand as well as the South Para Reservoir, when suddenly, in early 1952, Loan funds were severely curtailed. The South Para project suffered while the Department did its best to push on with the pipeline from Mannum.

These consecutive years of uncertain finances eventually drew comment from Departmental ranks. The 1953-1954 Annual Report commented on "the concurrent execution of too many works, with too great a spreading of the available resources and a consequent unsatisfactory rate of progress in each undertaking".[4] It also pointed to the loss of workmen, engineers and draftsmen to more lucrative employment as the Department was allowed to pay no more than Award rates. Finally it suggested that a way "be found to stabilize capital expenditure over a period of years, thus facilitating the planning, and execution of an orderly construction programme".[5]

Meanwhile in Parliament the Opposition was arguing along the same lines. During the debate on the Waterworks Act Amendment Bill - designed to give the Minister of Works power to fix rates on country lands instead of by Act - Opposition leader O'Halloran claimed that water rates should have been

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[3] Parliamentary Debates of 1949: House of Assembly, Loan Estimates discussion, Sept. 27.

[4] EWS 3072/54

[5] Ibid

increased years before.[6] "This Government," he said, "has pushed ahead with all sorts of projects regardless of costs ... and these have added to the value of land they have helped to develop."[7] But there was no way the Opposition could scrutinize projects more closely. Motions for the establishment of a Public Accounts Committee were always negatived.

Still the Opposition agreed to co-operate over the issue of sewering country towns. In fact it was O'Halloran's idea that a non-party Committee of the House investigate the matter during the Parliamentary recess. The outcome was the Sewerage Act Amendment Act of 1955. It spelt out new minimum rates to be levied on sewered properties and a general rate of not more than 2/6 in the pound. But a number of Members were not happy with the economics of country sewerage and called for Government assistance for the alternative installation of septic tank systems. The Government side vetoed a clause to this effect on the grounds that E. & W.S. officers Dridan, Murrell and Hodgson had reported against septic tanks when a safer, universal system of sewerage was available. Once again the matter rested. As Parliamentarian J. Clark put it - in Cecil Rhode's dying words - "So little done, so much to do."[8]

Eventually, in 1958, the Government did act by appointing an Advisory Committee on Sewerage consisting of the Department's Engineer for Sewerage, (Murrell), Doctors J. McCartney and G. McQueen and Prof. J. Cleland. They were essentially covering the same ground as that which had been negotiated between the E. & W.S. and the various District Councils for decades. But what they did do was to visit 60 towns and determine an order of priority for sewering. Only then, in 1959, did money at last appear on the Estimates to tackle the first urgent projects.

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[6] Parliamentary Debates of 1954: House of Assembly debate on Waterworks Act Amendment Bill, Nov. 23.

[7] Ibid.

[8] Parliamentary Debates of 1955: House of Assembly debate on Sewerage Act Amendment Bill, Nov. 9.

The economics of the State provision of water supply and sewerage facilities in a rapidly expanding metropolitan area, were also demanding a reassessment. In 1955 a ten-year involvement by Murrell, the Department's Engineer for Sewerage, on the Appeals Committee appointed under the original Town Planning Act, began to bear fruit. In that year an amendment to the Town Planning Act at last gained the Engineer-in-Chief the right to certify to the Town Planning Committee that land could or could not be advantageously and economically sewered and reticulated with water. In fact, Murrell was Acting Town Planner for ten months before Stuart Hart arrived in 1956 to take up the permanent position.

But all the enthusiasm in the world was not enough to move conservative forces in Parliament on side. The Town Planning Committee, for example, drew up an Act which required subdividers to pay for water supply, sewerage, guttering and so forth. But it was amended to such a degree in Parliament that subdividers were effectively relieved of providing any of these facilities. The best the Committee could do was to canvass Local Councils, urging them to make provision of facilities a pre-requisite of subdivision, or to use their right to veto the proposed subdivision if necessary.

Meanwhile Dridan, the Engineer-in-Chief, clung steadfastly to his right of veto. The State, however, was still obliged to incur heavy losses in providing water and sewerage facilities in "spot" areas as widespread speculative land subdivision took place in areas from Gawler to Sellicks Beach. In 1960 the tide began to turn. The developers, Reid Murray Developments (S.A.) Pty. Ltd., approached the Department seeking a financial arrangement to overcome Dridan's decision that Para Hills was unable to be economically serviced. Negotiations reached an agreement - aided by the newly formed Departmental Water and Sewerage Co-ordinating Committee - that the Company would advance free of interest the full cost of providing water and sewerage reticulation and services within the area and the Company would be reimbursed £250 for each dwelling unit within five years. This became one of the first planned servicings of an area in that water supply and

sewerage facilities were constructed before roads. Other subdividers were required to act along the same lines. Henceforth purchasers of houses had water supply and sewerage services from the outset, an adequate return was assured on Government funds expended, and compact development was encouraged.

But other matters were diverting Playford's attention and gaining Opposition support at the same time. One such issue was the proposed diversion of the Snowy waters under the Snowy Mountains Scheme. Because the State was not a party to the agreement Playford felt that South Australia's rights were being endangered. The E. & W.S. Department warned that drought conditions two years in a row would be disastrous for South Australia. The Premier therefore decided to take a strong line with the Commonwealth. Eventually, in April 1958, he was forced to take out a High Court writ to stop the relevant Commonwealth legislation from being ratified. Victoria and N.S.W. had already passed Acts ratifying the Snowy Agreement but Playford's writ succeeded in holding up acquisition notices.

But the battle was over once Prime Minister Menzies had been brought on side. Despite Senator Spooner's advice, Menzies was prepared to hear the other side. In late November, 1957, Playford received an invitation to Cooma, which he accepted on certain conditions, one being that he could bring Dridan, the Engineer-in-Chief with him. At the meeting, with the aid of a few pointed questions from Playford, it became quite obvious that the Snowy representatives could not be sure about the practical benefits South Australia would gain. Furthermore they had not devised any means of book-keeping the waters involved. Menzies then lost his affability and stormed off to his plane. On the way back to Canberra the Prime Minister sat in the front seat, Playford halfway down the plane, and Spooner in the back seat.

But it was a turning point in more ways than one. By the end of 1958 South Australia was assured of the right to a share of all the water in the Murray available for distribution, including the quantities diverted to it from the Snowy scheme, in the proportion specified in the River Murray

Waters Agreement. The River Murray Waters Agreement was altered to this effect. As well, not long after when Playford came to Menzies with some rough calculations for a dam at Chowilla - prepared by the E. & W.S. Department - he was assured of a listening ear. In fact he was assured of financial support if the dam proved to be a feasible proposition.

Back in South Australia the Playford Government was praised by all sides, including the Opposition, for its successful fight to gain justice for South Australia in relation to the Snowy Mountains Scheme. When in March 1960, Playford announced the Government's intention of building a storage near the Victorian border "to ensure that Victoria and New South Wales did not deny South Australia use of the River Murray by 1970",[9] everyone clucked in approval again. But not until September, 1961 did the River Murray Commission recommend the scheme and in doing so, made it clear that the storage would have to be built under River Murray Commission control.

It took some time to bring the other parties to the agreement. But the Commonwealth promised to provide N.S.W. with a loan to cover its quarter of the cost and agreement was reached in November, 1962. New South Wales agreed that while Chowilla was under construction and filling, it would allow Victoria and South Australia to share the water held, above a minimum figure reserved for its own use, in the Medindee Lakes storage. South Australia, with its over-committed water resources, breathed a sigh of relief.

An Act to ratify the agreement made with the Commonwealth and States concerning Chowilla had a smooth passage in the 1963-1964 Parliamentary Session. All agreed that here was South Australia's opportunity for continued development. Pearson, the Commissioner of Public Works, thanked Engineer-in-Chief Dridan and the Premier for their work towards the achievement. He went further: "I believe that when the history of South Australia is finally written the writer will conclude that no more important or timely

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[9] The Murray Pioneer March 10, 1960.

piece of legislation than this has been introduced in this House."[10] Hopes were indeed high! Unfortunately the passing of time was to prove such words laughable.

A number of other issues were raised in Parliament which related to the Department. In 1959 Opposition leader O'Halloran again moved for the establishment of a Public Accounts Committee, citing projects undertaken by the Department as examples of inefficiency. Playford rushed to the Department's defence with details of increases in costs of labour and materials, and claimed that the Department always resubmitted projects to the Public Works Standing Committee if any major technical or financial alterations were necessary, and that Committee had yet to completely reject any of the cases the Department placed before it. The motion was negatived by two votes.

In 1962 a measure to regularize practices long carried out by gentleman's agreement between the Department and Local Government bodies, was enacted in a Waterworks Act Amendment Act. The first version of the Bill was decidedly unpopular, but a conference of representatives of the Municipal Association Public Utilities Advisory Co-ordinating Committee and the Department came to agreement. In future when E. & W.S. mains had to be altered because of roadworks, local Councils and the Department would share the cost. Henceforth the law would enforce that co-operation which gentlemen's agreements had not always guaranteed.

The early sixties brought a distinct revival of interest in matters of water conservation. Parliamentarians were talking and asking about techniques such as desalination and ways of promoting conservation. Steele Hall's cause, for example, was the usage of effluent from the Bolivar Sewage Treatment Works then under construction. F. Walsh took the line that methods of assessment and rating should be reassessed in the direction of making

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[10] Parliamentary Debates of 1963-1964: House of Assembly. Second reading of River Murray Waters Act Amendment Bill, Oct. 29, 1963.

people more careful about the water they used. Others zealously maintained that rating and assessment increases were regular enough to act as a deterrent.

In fact the Department's power to make its own assessment for water and sewerage rates came under scrutiny when a Committee of Enquiry was appointed to report on assessments for Land Tax, Council rates, Water Rates and Probate. It reported in 1964, recommending that a Central Valuing authority - a Valuer-General - be given the task of making all these assessments.[11] The Committee pointed out that they had received no criticism of the work of valuers employed by the Department, and that the Land Tax and E. & W.S. Department assessing branches would form the nucleus of the Valuer-General's Department.[12]

Another issue relevant to the Department was partially resolved in 1964. R. Millhouse got off his hobby-horse of promoting the sewering of Blackwood, Belair and Eden Hills long enough to successfully move for the appointment of a Select Committee into the Fluoridation of Water Supplies. The Engineer for Water and Sewage Treatment, H. Hodgson, had reported extensively and favourably on the matter ten years before, and now another, more recent Departmental report had come to hand. Hodgson appeared before the Committee along with other influential witnesses in favour of fluoridation. Arguments that fluoridation was objectionable on religious or ethical grounds (or both) were in the minority. The Select Committee ultimately recommended, at Millhouse's casting vote, that fluoride be added to the water supplies of the State. In fact, it had already been added to Port Lincoln's water supply on an experimental basis by the Department with favourable results. But it was to be some years before certain Parliamentarians let the bogey of "mass medication" die.

In fact the Government shelved the issue for the time being. It was

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[11] See P.P. no. 86 of 1964.

[12] Ibid. p. 18

1965 and time for an election. Apparently the public also thought it was time for a change. Playford stood before them for the last time.

ORGANIZATION:

The upsurge in activity expected of the Department in the years 1946 to 1965 naturally brought with it major problems. On the one hand the Department was subject to pressures outside its control which it had little chance of alleviating. On the other there was no time to plan structural changes in line with expanding functions, staff and technology. Any organizational weaknesses tended to be accentuated as the Department tackled a load it was not always ready to carry.

Yet by the end of the period the Department was beginning to outgrow its provincialism and was tackling deep-seated problems head on. That it was able to do so was a measure of its adaptability and increasing sophistication - qualities necessary in a modern organization.

One of the major problems confronting the Department in the immediate post war years was the shortage of materials and plant. Until the mid-fifties shortages of steel, coke, pig iron, coal, charcoal, brass, copper, lead, zinc and concrete all delayed the construction programme to one degree or another. Earthenware, cast iron, steel and concrete piping, in particular, were never available in the quantities desired. The shortage of coal and power restrictions meant that the Glanville foundry could not run at full steam. Limited petrol supplies - the Petrol Conservation Committee was still handing out quotas - further hampered operations.

For a time little new machinery was obtainable. Much Departmental transport had outlived a useful economic life. Even the use of ex-army vehicles, like Diamond T. Trucks, was only a temporary expedient. Time and reliability were becoming the essence as the construction programme accelerated.

There were solutions to the quandary. Where inventiveness was to be

found there was an answer. In the early fifties the Department began to remake pipes removed from the old Tod River Trunk mains into as-new pipes. In the northern region staff dealt with the irregular flooding of the Cooper Creek by building a ferry at the Crystal Brook workshops out of old 24" pipes from the original Bundaleer trunk main. The ferry was transported north for use everytime the creek flooded. Likewise R. Coumbe's experimentation with altitude valves on the Morgan-Whyalla pipeline paid dividends. His control system was implemented at a time when relevant aids were not yet available. Engineer George Brooks invented a side-boom excavator, and later, Foreman J.H. South of the Sewerage Branch developed Tele-Alarm equipment for installation in Sewerage Pumping Stations. In these ways savings were made and the immediate problem alleviated.

As from 1950, large amounts of money were made available for the purchase of plant and equipment. The Engineer for Construction, (G.G. Poole), and the Engineer for Design, (W.M. Anderson), went to England to secure plant which could not be obtained in Australia. Dragline excavators, tractors and well-point de-watering equipment, - much of it second hand as that was all that was offering - was brought back to give impetus to the largest construction programmed ever tackled by the Department. Semi-trailers also appeared on the scene, thereby ensuring a quicker and more reliable means of transporting materials and equipment to project sites and country depots. For example, the Departmental organisation on the West Coast no longer had to rely solely on the sailing of the Minnipa. By the end of the fifties the Department even possessed a number of cranes.

Even the Department's road gangs began to benefit, although if any of the Branches were short of money it was the road equipment funds which were encroached upon first. Heavy patrol graders, bulldozers, and special machinery to cope with sand and clay conditions were obtained, and in 1958 the Department began to equip its gangs and Road Superintendent with wirelesses, working on the Flying Doctor network. Only the Northern gangs witnessed these developments - the Southern Unit was disbanded when the

District Council of Coonalpyn Downs was formed in 1958 and the Western units were taken over by the Highways Department in 1959.

Increasing mechanization and the use of new time-saving systems and materials proved to be the Department's best means of coping with shortages. The use of asbestos pipes, rubber joints, plastic interiors for meters, P.V.C. lining of sewers, full scale radio telephone communications, aerial surveying, computer studies and the mechanization of all sewer dragging gangs - all these and more were phased in as technology and finances made them available. In no other period of its history had the Department absorbed so many rapid innovations in so short a period of time.

But the Department still needed men, and many of them if it was to keep abreast of its construction programmes. Finding enough men, and keeping them, proved to be one of the major problems facing the Department in these years. From 1946 until well into the fifties the Department could have done with - and indeed, advertised widely for - 900 to 1,000 more men for construction projects, let alone maintenance programmes which were running a sorry second place.

Quite frankly the Department had little to offer. Jobs were plentiful and trench-digging promised little excitement or variation. The Department was only allowed to pay award rates, whereas private employers were paying that little bit more to attract the cream of men available. To keep its experienced, skilled and reliable men the Department was forced to offer regular paid overtime.

The Department had to be content with what it got. On the irrigation scheme work at Berri and Glossop immediately after the war, horses were still being used to drag concrete carts along and men were expected to dig trenches up to 20 feet deep by hand. Many of those employed (and some of the staff) were alcoholics who were only there because the local wineries could more than adequately cater for their needs. Mix them with an assortment of Displaced Persons, as was done, and one had what was known as a

"rough camp". The same misfits were to be found working on the Loxton Land Settlement Scheme. The camp again consisted of a row of tents for the men, a row of offices, and a row of ex-Loveday Interment Camp galvanized iron sheds which served as staff quarters.

Likewise the Tod Trunk main relaying programme on the West Coast was dogged by employment problems. There were three camps, Yaninee and Wanilla being slightly more civilized than Murdinga as they possessed a resident policeman. Many of the men were drinkers and ex-criminals. Periodically the Department had difficulty obtaining skilled welders, so work had to stop temporarily and men had to be specially trained.

Standard issue to each man was an old army bed, a hessian bag (or pallias) filled with straw for a mattress, a chipped enamel pannikin, a knife, fork and spoon, a wash-up dish and a two-gallon iron bucket. The men lived in ex-army tents, some with flooring and two men shared a hurricane lamp. At first the Department issued coupons for food and blankets, but even when rationing was lifted the caterers showed little more imagination. Many of the supplies came in bulk - second grade bulk tea, bulk porridge, meatballs, blueboiler peas and mutton. The sauce bottle was most popular!

The Department was forced to accept the problems inherent in such camps - caterers not turning up, gambling, drinking, training the unskilled - or have none at all. At times matters very nearly got out of hand. At Murdinga camp an ex-criminal from N.S.W. managed to call a strike by threatening those who did not join in with a pick-handle. Hence the pick-handle became known as the "Murdinga Bat" on the West Coast. Later, after a drinking spree, the same man set a "scab" alight with kerosene. He soon faded out of the picture with a two-year gaol sentence. Naturally such places were no drawcard for anyone selective in their choice of employment.

The men of Leigh Creek used the threat of the strike as a means of improving their position. In August 1947 the Department agreed to instal a refrigerator van so that better meat could be eaten more regularly. A

month later the men threatened to strike if the caterer was not given notice by the Department. Their claim was reinforced when 42 men at the field were treated for poisoning after eating an evening meal at the mess. Managerial staff were relieved when the control of the field and its problems were handed over to the Electricity Trust of South Australia in February 1948. In particular, the struggle between the Australian Workers Union and the Miner's Federation for control of the men promised no easy solution.

The years 1948-1949 brought migrants (particularly Balt labour) to South Australia and a partial solution to the Department's problem. They saved the day as Australian-born labourers were virtually unobtainable. But they too, soon left the Department when the agreed period of employment was over. By 1950, 868 displaced persons remained out of a total allocation to the Department of 1,450, and this figure steadily declined as the fifties wore on.

The migrant labour force was not without its problems. There was no system in operation which determined what positions individuals were suited to before they were allotted. Thus the Department found it had a mixture of professionals and people with trades and technical qualifications working as labourers. Many obviously did not want to dig trenches forever. As well, the migrants had to be housed, so the Department had to fully equip and supervize camps at Hendon, Bedford Park and at Kopi and Murdinga on the West Coast. Many had their families with them. There were problems of communication - interpreters had to be found, and volunteer teachers obtained to teach them English. Eventually, the Education Department co-operated to ensure regular, systematic classes. In the construction camp situation food preferences tended to clash and cause problems. Thus, for example, at Kopi the cooks were alternatively Italian and Australian, depending on who complained loudest. The camp ate meatballs and spaghetti, then mutton, meatballs and spaghetti, then mutton ...

The Department was eventually forced to act if it wished to retain

any workers at all. By 1953 officers had arranged a "housing to employees scheme" in co-operation with the South Australian Housing Trust. Houses were built for employees in the metropolitan area and in turn their labour was guaranteed. One hundred and eighty were tied to their jobs in this way until the curtailment of loan expenditure - which dogged activities throughout the fifties - prevented the scheme expanding further.

But improvements were also being made in working conditions to attract and keep workers. The Sewerage Branch began to outfit mobile sheds as dinner rooms for theirsewer construction gangs. By 1953 the Construction Branch had standardized living quarters and camp amenities to the satisfaction of the two relevant Unions. Refrigerators were provided, even if the first ones were rather dangerous, ex-Army, blade-revolving models run by kerosene. Contract food catering appeared in 1950 and a Catering Supervisor ensured that the standard of meals could only rise. At one stage there were ten operating messes dotted over the State. Air coolers were provided in dining rooms and water-born sewerage systems at camps of any permanency. By 1954 all men were out of tents and in cubicles, and the first caravans were being acquired.

There were other positive influences. Employees such asforemen and timekeepers were brought under the Public Service Act and given the benefits and securities which that entailed. On the individual level, officers like Eric Pope, (Resident Engineer at the new Marden Depot), met their men more than half-way. Many of the migrants working under him were Italian so he made it his business to learn the Italian language. It was this kind of effort and understanding which ensured contented employees.

There were still a few odd strikes when claims were ignored. In 1954 the Moulder's Union placed a ban on "would-be" machine moulders in the Jobbing Moulding Section at Glanville, and a year later, a number of minor strikes occurred on the South Para Reservoir and Salisbury Sewerage projects. At South Para the dissatisfaction was with poor shift work conditions,

while the Salisbury men asked for transport to and from the project site in Government time, or an increased travelling allowance. The relevant Boards granted their requests. By 1958 the Department agreed that moulders at Glanville should be relieved of labouring work to leave them free to mould and cast continually. There was nothing to be gained by confrontation - the Department was already short of men in all these areas.

Just as the Department's expanding programme required large numbers of labourers, so too, it needed proportionate increases in the numbers of professional, technical and clerical staff. Again this was easier said than done. Despite the advent of a five day, 37½-hour working week the Department was losing promising young clerical staff to Commonwealth Government positions and technical and engineering staff to private employers. Both offered better pay and conditions than the South Australian Public Service, and in particular, the Department, could offer.

In the fifties even juniors were hard to come by. As for graduates from Adelaide University and the Institute of Technology, so many employers were vying for their services that they could pick and choose at leisure. The Department facilitated trips by final year students to construction project sites, and even laid on free lunches, but still the response was poor. Widespread advertising interstate and overseas only returned a few comers.

The Department thus remained understaffed and worked its dedicated officers hard in an effort to cope. Formal applications from engineers and Superintendents for overtime pay were often ignored - or extra holidays were offered in lieu when they obviously could not be taken. Many must have thought twice about their positions - for example, the Superintendent at Belair had to manually start the pumps every morning before 5.00 a.m., and would invariably be still on the job at 10.00 p.m. trying to ensure a fair water supply to a region undergoing a population explosion. In the Northern Region when the Morgan-Whyalla pipeline No. 1 was overdrawn, staff were end-

lessly travelling to keep track of levels, putting in boosters and balancing supplies. The same tireless effort was demanded from officers all over the State.

The top men were sometimes placated by a trip overseas. In this period more officers than ever before were allowed away on fact-finding or representative excursions. Poole and Anderson went looking for machinery in 1950; Beaney and Battyre investigated the design and construction of large concrete dams in America; Hodgson studied developments in sewage and trade wastes treatment, water quality, fluoridation, garbage recycling, and the use of brackish water and seawater. Engineer-in-Chief Dridan represented the Commonwealth Government at the 1953 meeting of the International Labour Office at Geneva and investigated developments in the U.K. and U.S.A.; and H. Kimber was a delegate to the Duke of Edinburgh Study Conference, Oxford, and won a Commonwealth Fund Fellowship to study the latest developments in the water supply field in the U.S.A.

As well as poor levels of pay, Departmental accommodation and working conditions were no recipe for a contented staff. For example, at Port Lincoln the old offices (a former goal) were filled to overflowing. Clerical staff worked in the cells area, the dungeons were used as the Records room and a cubicle was erected in the compound to house a number of typistes in a bid to relieve the congestion. Likewise Head Office in Adelaide was simply growing more and more congested. In 1955 the basement was converted from storerooms to offices in an effort to contain growing numbers of staff. The Chief Revenue Officer (Lance Mitchell) and staff were the unlucky recipients of this "honour". The taller people tended to suffer most in the "dungeons". In this way a building built 80 years before to accommodate 250 workers was managing to carry over 500 people.

But there were ways of coping besides resigning or transferring. Geoff Gunner at Kent Town used his cunning when the Public Service Commissioner would not, or could not, replace one of his typistes who had left. He

found a girl himself, hired her as a "youth labourer" and put her on a typiste's work. Others became more involved in the Public Service Association and fought for better conditions through its channels. For example, the engineer Hugh Kimber was President in the late fifties, and for one thing, established a P.S.A. Northern Regional Group at Crystal Brook, a Department stronghold.

By the early sixties a number of alleviating factors had come into play. On the one hand, June 1961 saw a successful outcome to the national Professional Engineer's Case. Substantial increases were awarded, a national minimum salary for professional engineers was established, and State instrumentalities became bound respondents to the award. Henceforth engineers would at least receive adequate remuneration for their efforts. South Australian Public Service salaries had for too long been much lower than their counterparts interstate.

An improvement in accommodation was also in sight. A portion of the Head Office staff moved into a new building in Victoria Place in 1961 and work began on a multi-storey building in the same block to house further staff. The people at Port Lincoln got new, shared, offices although an argument over the linoleum managed to delay entry for a good year.

But the Department's major problem demanded more than haphazard improvement. The structural arrangements of the organization needed a complete overhaul if good men were to be attracted to its ranks.

On September 12, 1949, when Engineer-in-Chief Angwin died suddenly, all in the Department felt the loss of their leader. But Julian Dridan, as Inspecting Engineer then Deputy Engineer-in-Chief, had in a sense, been groomed for the position. He was successful above five other applicants - including a number of Branch Heads - for the job of Chief, and in doing so, perpetuated the tradition that the Head of Department was usually a man trained in the River Murray Works - water supply field. No doubt to placate any ill-feeling he chose the gentlemanly and reliable Moffat Anderson as his

Deputy.

What Dridan inherited was a potentially dictatorial structure. At the top sat the Chief, with a Deputy to sort out much of the paperwork, and below him a large and increasing number of Branch Heads all vying for his attention. There was little or no delegation - the structure saw to that - and the Branch Heads were expected to report directly to the man at the top.[13] Past Heads of Department had managed to run things smoothly enough by giving everyone equal consideration. Dridan, by nature, was also a fair man. But he also happened to be in the box seat at a time when the Department was expanding at an unprecedented rate. The struggle for survival and a goodly proportion of the kitty meant that the Chief, with his ultimate say, was the target of entreaties by ever-zealous Branch Heads.

Thus, at a time when the Branches should have been fully co-operating with one another to keep abreast of themammoth task at hand, they were instead tending towards insularity, even enpire-building in some cases. The Construction Branch, in particular, emerged with a new importance. Gilbert Poole, Engineer for Construction from 1948, was a dynamic leader who earned the respect and loyalty of those under him. But he had little patience with other Heads (and even the Engineer-in-Chief) when he wanted things done his way. He was blunt and forthright and tended to disown those who left his branch. Only Billy Bates - District Engineer then Inspecting Engineer - had the drive and the effrontery to match Poole and make him see another point of view.

Poole had his own efficient way of doing things. He cut out paper work such as weekly reports and instituted regular internal Construction Branch newsletters. In 1953 when restrictions on finance had begun to replace labour and material shortages as a major problem, he instituted

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[13] Retired Engineering University Lecturer, Tom Farrent, expressed the opinion that in the fifties, his fellow staff and students looked upon the E. & W.S. Department as a frustrating place to be because of the administrative set-up, lack of delegation etc.

internal monthly budgetary control meetings. Resident engineers on the various construction projects were expected to keep within the bounds of a strict budget.

The Water and Sewage Treatment Branch, on the other hand, was still fighting to achieve that status which the well-established branches possessed. At the end of the war the Branch got its first true laboratory at the Glenelg Sewage Treatment works but had to struggle to equip and staff it. Slowly but surely it took over the tasks associated with the testing of water quality - these had been the responsibility of miscellaneous bodies outside the Department in the past. As well, it tackled numerous water, sewage and trade waste treatment problems through detailed research projects and experiments.

The Water Supply Branch - the traditional engineers - were often the hardest to convince. Relations were wary and offence was very easily taken. For example, the Water Supply Branch was none too pleased when the Water and Sewage Treatment people failed to inform Reservoir Keepers of their intention to treat reservoir waters with copper sulphate. At times too, the effects of such processes only aggravated matters. In the fifties, for example, the first dose of copper sulphate placed in Bundaleer Reservoir managed to kill off the redfin fish, allowing the glaxias to multipy to such an extent that they were blocking up meters, valves and taps. In fact there were over100 blocked meters a day in Port Pirie for some time. The Water and Sewage Treatment Branch dealt with the problem by dosing the waters with 17 tons of copper sulphate. That killed everything. It also created a pollution problem. Ducks and shags converged at the Reservoir till every last dead fish had been cleaned up.

The Planning and Development Branch - which grew out of the position of Project and Investigating Engineer created by Dridan in 1952 - was struggling against even greater odds. It remained a small branch, a voice in the wilderness. Many of its reports were ignored by other branches. Meanwhile

the Design Branch was struggling to keep up with the numerous projects at hand. Staff shortages were the crux of the problem. Understandably then, the criticism levelled against it by other branches - that its personnel sometimes failed to visit the construction site in question - had a ring of truth.

Each Branch developed its own back-up services with little regard to the others. A Water and Sewage Treatment Works Depot was created. The Sassafras Construction Depot, in particular, underwent rapid expansion and development. Additional workshops, store and office buildings were added as required by each Branch. Thebarton Sewerage Yard was completely reorganized and the Kent Town Workshops moved towards planned production. The emergence of separate Southern and Central Water Districts in 1961 also meant further expansion of regional workshop facilities. By 1965 there were seven major Departmental workshops in operation, each zealously guarded and fully equipped by the relevant Branch running it.

But Dridan was as much an administrator as he was an engineer. He could be directed towards the problem areas and was prepared to act. At first he initiated a system of monthly conferences of Branch Heads. This obviously was not enough. Then, in the late fifties, there were a number of changes in the ranks of the senior personnel. The Accountant Jim Slade, for one, was promoted to the position of Head of the Public Buildings Department. Newcomers joined the Department, bringing with them new ideas and approaches. Dridan proved to be a good listener. It was time to put the house in better order.

One new staff member, Jack Wright, tackled the Accounts Branch. He was abrasive and hardly endearing in manner but he could direct people and get things done. A uniform timekeeping system was developed and less detailed, time-consuming costing practices were phased in in the workshops. In this way some uniformity was beginning to come to Branch practices. Punch card machines were phased in to make the handling of Water and Sewerage rates

more efficient and the Department was the first in the South Australian Service to have its own Investigating Accountant.

To determine the morale of his Branch, Wright had all the staff fill in a questionaire. The four sub-branches in Accounts were certainly not always working as a co-ordinated team. One girl's reply was an "aspro", and the general level of contentment expressed by others was not high. So the Branch embarked on something of a morale building programme. A darts club and a fishing club were formed. By providing car parking facilities on some unwanted Government land close to city offices, money was obtained to buy boats and even a holiday house on Yorke Peninsula. Things were beginning to look up.

In 1958 Arch. Ayliffe, the Secretary, retired and Wright was the successful applicant for his position. He promptly moved his office next door to Dridan's. Gradually they worked towards wider solutions to Departmental problems. Wright's resolve was strengthened in 1959. In that year he became the first South Australian public servant to undertake a three-month course at the Mt. Eliza Administrative Staff College in Frankston, Victoria. During his time there the E. & W.S. Department was held up as an example of an organisation which displayed a notoriously high quota of aspects of bad management and poor administration. In particular, the fact that too many people reported to the man at the top was seen as a major fault.

Back in the Department moves were made to encourage the Branches to co-operate and work together. The Plant and Safety Advisory Committee was formed and brought together the Deputy Engineer-in-Chief, Secretary and a number of Branch Heads. Dridan had appointed a Safety Officer in 1958 but he was mainly answerable to the Department of Labour and Industry. The Committee moved to standardize safety ideas in workshops, the ways plant should be handled, controlled and branded, and the supervision and stock-taking of plant stores. For example, a system of regular maintenance of machinery and plant was instituted. No longer could inadequate maintenance

be classed as a significant factor in the accident rate.

Then a Water and Sewerage Co-ordinating Committee emerged to co-ordinate the servicing of new areas. Again branches were forced together, sometimes in very fiery meetings, to work out co-operative programmes. (Eventually the Mains Extension Branch, under Norm Cox, grew out of this Committee.) Likewise a Budget and Finance Committee brought all heads together in regular round-table conference to allocate Loan monies, determine priorities and to reallocate when necessary. They were forced to listen to each others problems, even if the largest and strongest did tend to win more often. The placing of Budget Finance officers within each branch and the advent of a more flexible arrangement with the Treasury ensured a healthier approach all round.

The early sixties also saw moves afoot to fully develop the skills, experiences and potential of staff members, including newcomers. The position of Engineer for Staff Development was created in 1962 and was filled by J.A. Davis. Undergraduates on studentships and draftsmen on certificate courses were encouraged, and posted in various positions to gain experience; graduates were given, as far as possible, consecutive periods in Design, Construction and Operations, and draftsmen were given opportunity to gain a wider drafting experience. In 1964 the Department got its first Personnel Officer and induction and special courses were created to meet the special needs of groups within and joining the Department. New draftsmen, for example, were given a special course of instruction on Departmental works and procedures.

Likewise the apprentice training activities of the Department received a reassessment. The facilities at the Sassafras Depot were expanded, while a specialised apprentice training centre was established at the Kent Town Workshops. As from 1964, all first year apprentices were given twelve months intensive training before joining a particular workshop.

But Dridan, to his credit, was prepared to go a few steps further. In

1962, at his instigation, a firm of Management Consultants (P.A. Management) was engaged to work with Departmental officers and a Public Service Board investigator, to investigate the engineering divisions of the Department. They reported in much detail, recommending new methods of assessment and planning, and suggesting areas where a reorganization was long overdue. A restructuring into divisions followed.

Then Dridan called for a review of the top level management of the Department. He, and those near him, could see what was needed. But it was a question of prophets having no honour in their own country. Again the Consultants came in and again the Department began to feed them information. By 1965 major, and longawaited changes to the top-level management were in the wind. The Department had successfully recognized and tackled its major deficiencies head-on.

THE PRODUCT:

For South Australia, the two decades following the war were years of dramatic population and economic growth. Playford's particular vision of the State's development included a key role for the Department - certainly more important than that of Departments dealing with health, social welfare and education - and he trusted it with ever increasing budgets.

The Department was expected to do its utmost to provide water supplies to communities in country and city without the benefits of reticulated supplies. At the same time it had to meet the requirements of existing consumers. Heavy war time requirements in the Metropolitan Area alone had the effect of advancing the rate of consumption by sixteen years.[14] Dramatic steps were necessary in order to meet new, ongoing and future commitments.

In 1946 rehabilitation works on the Metropolitan system took priority. A new trunk main from Happy Valley Reservoir greatly improved the situation

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[14]Dridan's evidence before Parliamentary Standing Committee on Public Works. See P.P. no. 36 of 1948.

in the southern suburbs. On the West Coast, where there were no more suitable catchments for reservoirs, the Tod River system was stretched to its limits. Thorough investigations led to exploitation of the Uley-Wanilla Basin, an underground source of water 24 km morth-west of Port Lincoln. Work began on the sinking of nine bores, the provision of electrical pumping plants, station and power supplies and on the laying of an East Coast Main. Along the Morgan-Whyalla pipeline the galvaniting of all pipes - a special protective coating - was completed while damage occasioned by floods demanded special attention. Alterations were effected to make the pipeline independent of road bridges.

In 1947-1948 the Department constructed a number of branch pipelines off the Morgan-Whyalla mains. One was carried from Port Augusta to Woomera. Laura and surrounding country lands, Jamestown and Peterborough and belatedly, Farrell's Flat, Clare and intervening country lands were also provided with linkages to the main system. Further north Leigh Creek was granted a more reliable supply in the shape of the Aroona Reservoir.

From December 1948 onwards the bulk of Port Lincoln's water was being supplied by the Uley-Wanilla basin. The town's reticulation was reorganized. Tumby Bay was reticulated for the first time and the East Coast Main crept northwards. By the early fifties the Tod River pumping station had been converted from gas to electric, a new pumping station had been erected, and the related power lines carried where necessary. Assistance rendered to the Electricity Trust of South Australia in constructing the Kirton Point power station ensured that electric power supplies would be immediately available.

By the early fifties the Department had a record number of ongoing projects on its hands, the majority being new water supply schemes. A scheme to reticulate Yorke Peninsula was in hand. The Bundaleer trunk main between Bundaleer Reservoir and Clinton Reservoir was enlarged, as were the dimensions of the Paskeville Service Reservoir. Tanks were built and an extensive mainlaying and town-reticulation programme commenced. Not far away in County Buxton work began, by contract, on the construction of seventeen concrete

tanks for water conservation purposes. They were eventually completed in 1957.

But the greatest, ongoing feat was the concurrent construction of the South Para Reservoir and the first pipeline from the Murray to Adelaide. Work on the Mannum-Adelaide pipeline began in 1949 and the pumping section was completed in 1954, just in time to offset the effects of a dry winter. In fact during the summer of 1954-1955 Adelaide was the only capital city in Australia where no restrictions were enforced. This was only made possible by discharging Murray water at a point near Birdwood into Angas Creek, down which it flowed to the Torrens and hence to Millbrook and Hope Valley Reservoirs. What this new lifeline also achieved was a rise in pressures in areas long suffering from low pressure. The result? In one year, 1954-1955, the total consumption increased by 20 percent and the consumption per capita shot up by 16.4 percent.

This intended "backstop to the Reservoirs" became a 60 km pipeline along which four pumping stations push water to a summit storage near Tungkillo. From there it gravitates to a terminal storage near Highbury. In January, 1955 a branch main was commissioned to carry water from the pipeline to Warren Reservoir for distribution to lower northern country areas and another to carry water to the Onkaparinga River for distribution to Metropolitan areas through Mt. Bold and Happy Valley Reservoirs. For the Onkaparinga Valley and its towns - Mount Barker, Nairne, Aldgate, Littlehampton, Oakbank, Charleston, Woodside and Balhannah - this meant regular reticulated supplies for the first time ever.

The South Para Reservoir project remained in the shadow of the Mannum-Adelaide pipeline even though it was to be the largest reservoir in South Australia. After ten years of stop-go construction, it was completed in 1958. It is sited at the confluence of Malcolm Creek and Victoria Creek with South Para River, downstream of the Warren Reservoir. In fact, the site had been considered by the proponents of an ill-fated irrigation scheme

venture back in 1894. The embankment is of consolidated crushed rock. Water was initially released from it to aid the Barossa Reservoir; then the completion of the Grand Junction Trunk main ensured that the rapidly developing northern areas of Adelaide would be served.

In the meantime the benefits of a reticulated water supply were made available to more country areas. Auburn, Jamestown-Caltowie, Radium Hill, Pt. McDonnell, Meningie, Milang, Cleve, Swan Reach, Lameroo, Karoonda, Parilla, Towitta, Warooka and Geranium were all serviced for the first time. As well supplies at Murray Bridge, Loxton and Goolwa-Middleton were improved and extended. A special effort was made to meet the requirements of the new Uranium Treatment Works at Port Pirie. Elsewhere systems were overhauled and town pumping plants converted to electricity where possible. In the Warren, Bundaleer, Beetaloo and Baroota Districts, in particular, cement lining operations by contract were generated in an effort to relieve heavy maintenance programmes.

By the late fifties chlorination equipment and stationshad been installed at all Metropolitan Reservoirs and at an increasing number of country water supplies. As well sterilization of new and cement lined mains began in late 1958. Cathodic protection of particular mains was undertaken when necessary.

The repid expansion of the Metropolitan area continued. New trunk mains were laid, and the development of the Salisbury-Elizabeth areas demanded particular attention. The Salisbury trunk main was completed by 1956. In 1958 a contract was let for the Myponga Reservoir, a concrete arch structure on the Myponga River to be connected to the Happy Valley Reservoir. By 1962 it was finished and its waters were fed to the Metropolitan Area. Meantime Mt. Bold dam was raised. In 1963 the Clarendon pumping station was completed as part of a scheme to develop the Onkaparinga River as a source of supply for Blackwood, Belair and Eden Hills. Finally, a high level trunk main was brought from the Mannum-Adelaide pipeline to Wattle Park Service Reservoir

and major alterations were made to the Happy Valley tunnel system to provide a greater throughput of water to the city.

The Myponga Reservoir also benefitied those country areas to its south. Mains extended to Myponga, Yankalilla and Normanville, and considerable areas of farmland. Further south the Strathalbyn-Milang scheme - to serve farmlands between the towns and to supplement Strathalbyn's supply - was completed by 1965 as was the Encounter Bay Augmentation Scheme. Millicent, Tintinara, Penola and Kingston were provided with reticulated schemes. Finally, a start was made on the Tailem Bend-Keith pipeline, to serve Keith and farmlands between the Hume Highway and the coast.

Another major pipeline project was begun in 1963 - namely, the duplication of the Morgan-Whyalla pipeline to meet the industrial expansion of Whyalla and increasing demands en route. A saving of 44 miles was envisaged by making a seven-mile submarine crossing of the pipeline under Spencer Gulf. Meanwhile Appila and Booleroo Centre were attached to the original pipeline, Truro and Melrose were reticulated, Orroroo's supply revamped and schemes provided in the Hundreds of Burdett-Ettrick and in the Eden Valley-Springton region. The Warren trunk main was at last replaced and a camp was established at the proposed Chowilla dam site in expectation of things to come.

Emergency action was necessary in the early sixties to guarantee supplie on the West Coast. The Lincoln Basin, south of Port Lincoln, had been investigated sufficiently for emergency exploitation in 1960. Water was promptly delivered to Port Lincoln and henceforth the town was entirely supplied from the source. (Actually the overflow from the basin can be seen in the form of springs between low and high tide levels, and it was from one of these springs that Flinders watered his ships when he "discovered" and named Port Lincoln.) As well, 1962 saw the Polda Basin supply reassessed and utilized. A pumping station was built at the old trench and a pipeline carried water to a point near the Lock Booster station where it was pumped into the Tod Trunk Main. In 1964 Elliston was granted a supply from a bore east of the town.

By 1965 then, the proportion of the population receiving water by State reticulation schemes was the highest of all the Australian states. Over 40 towns and country regions were reticulated in these two decades alone. As well the Department had kept abreast of the Metropolitan suburban expansion to a degree which no other State capitals could match. At the end of World War II, 67 percent of water services in the State were metered. by 1965, 97.3 percent were metered. The Department had served Playford's priority well.

The sewerage activities of the Department in the years 1946-1965 were no less spectacular. In 1947 the total length of sewers laid in the Metropolitan area topped the 1,000 mile mark, but in less than 20 years that figure had doubled. As with the provision of water supply services, the policy adopted was one of taking sewerage to group housing schemes first so that the greatest numbers could be catered for.

Immediately after the war the Department set about reassessing plans of proposed country sewerage schemes and detailing plans for a modern sewage treatment works to replace the Islington Sewage Farm. But major extensions to the Port Adelaide Sewage Treatment Works were imperative as the suburbs it served were developing drammatically. In 1954 the No. 2 plant was put into operation and modifications made in 1960 gave increased capacity in certain units. After the collapse of the concrete gravity main under Port River, Ethelton pumping station was inaugurated to pump sewage from the LeFevre Peninsula direct to the treatment works.

There were many problems in the same vein - inflows of sand and water, and the deterioration and collapse of concrete sewers year after year. But there was little money for replacement programmes. Even the constant heavy pollution of the northern waterways, (including Port River), by Sewage Farm outflows was consistently ignored. The best the Department could do with the finance available was to consistently modify and perfect the proposed treatment works, and to keep up with the sewering of rapidly developing areas.

More ejector stations and new pumping machinery were added as required.

Meanwhile the fifties saw the Department undertaking an increasing number of small projects for particular bodies. The Architect-in-Chief's Department was a ready customer. Designs for small sewage treatment plants were provided, and the completed works at schools, hospitals and some gaols throughout the State were inspected. The schools and hospital at Port Lincoln were the first happy customers. Then in 1955 the Woods and Forests Department asked for help, and the Department began to prepare designs for proposed timber towns in the South East.

In 1956 work began on the duplication of the Glenelg Sewage Treatment Works and six years later they were in operation. To the north of Adelaide the Salisbury Sewage Treatment Works - constructed by the Department during the war - were acquired from the Commonwealth Authorities in 1956. The Long Range Weapons Centre, and more importantly, the expanding Salisbury and Elizabeth areas, were soon utilizing its facilities to the full. To the south a temporary treatment plant was inaugurated in 1961 to receive the sewage of rapid, adjacent housing developments. In the same year the Parafield Treatment Works, another wartime venture, were taken over to deal with the sewage of the Para Hills region. The key word and action was 'temporary' - temporary pumping stations and temporary sewage treatment works. The marked increase in sewer construction by the mid sixties demanded such a solution. And it paid off - by 1965 Adelaide was close to 100 percent sewered while no other Australian city had more than 75 percent of its population served by sewerage.

One major, and permanent, solution was at hand. In 1961 work began on what was to be Adelaide's largest Sewage Treatment Works. It had been a good 40 years earlier that the replacement of the Sewage Farm was first mooted. Now, after years of investigation, design and research, the Bolivar Sewage Treatment Works were to eventuate. Perhaps it is just as well that they were so long delayed, for the new works were designed to cater for the

sewage and trade wastes of a population of 600,000. And if necessary the works could be expanded further. By 1965 partial operation of the works had begun. Sewage from Salisbury and Elizabeth was diverted for primary treatment from December 8, 1964. As well, Stages II and III of the scheme and the Adelaide-Bolivar Trunk sewer were well underway.

By 1965 seven country towns were fully or partially sewered. Different priorities and limited finances had hempered a greater rate of success. At least schemes for Naracoorte, Nangwarry, Mt. Burr, Port Lincoln, Mount Gambier Angaston, Myponga, Gumeracha, Lobethal and Whyalla were no longer just drawing-board exercises.

In the irrigation and drainage field too, the Department had an ever-increasing role to play. Immediately after the war a start was made on the Loxton Irrigation Project to provide an irrigable 7,000 acres for Returned Servicemen. As well, the original portion of the Berri Comprehensive Drainage Scheme was completed and work commenced on similar schemes for Nookamka, Northern Loveday and Cobdogla. These, and the Cooltong division of Chaffey, were completed by 1955.

Where the lower Murray reclaimed areas were concerned much of the fifties was spent steadily converting pumping plants to electricity. This meant construction of new pumping stations in some cases. As well, domestic water supplies were revamped or extended when necessary although administration of them remained with the Lands Department.

By 1960 internal block drain-making and seepage investigations in the Upper Murray were the major priority. Cooltong, Ral Ral and Loxton Comprehensive Drainage Schemes were completed by 1965, as was the new Waikerie Pumping Station. The Department continued to give assistance to bodies like the Renmark Irrigation Trust, and Tatiara Drainage Trust when required.

Likewise the Department still had responsibilities in relation to the Metropolitan Floodwaters Scheme. This mainly involved maintenance work until work began on the South Western Suburbs Drainage Scheme in the mid-sixties.

Then the Department was given the task of constructing and maintaining the River Sturt control works as well. This meant building a flood control dam on the River Sturt, in fact the first double curvature arched concrete dam in South Australia.

The River Murray Works demanded attention beyond that of the usual maintenance programme. The gradual mechanization of lock cranes and lock gates at the Barrages was tackled. Then the record 1956 flood diverted all energies to protective and rehabilitation works. A protective works programme was organized by the Engineer-in-Chief and approved by the Government. Departmental employees worked alongside army personnel to construct numerous rows of sandbags. Later, the Lake Victoria Inlet Enlargement Works were completed under Departmental supervision and in 1962 a start was made on a major maintenance and rehabilitation programme on the locks and weirs.

The Department still looked after many Main and District roads and roads outside District Council Boundaries although these were gradually becoming the responsibility of the Highways Department. Many new roads were still being made - the Tale Mine Road for the Mines Department; roads for the Commonwealth Government in the Woomera Rocket Range area; a road from McDonald's Hill Siding to Radium Hill; new roads to serve stations west of Oodnadatta, radiating from the Broken Hill road in the North-East; a main road between Blinman and Hawker; 200 miles of new road from Murnpeowie to Innamincka; and a new road from Gidgealpa to the Strzlecki Crossing. As well, all roads in the north were regularly maintained, causeways constructed, grids provided and airstrips regraded when necessary.

In the southern region many miles of access roads to newly developed areas were constructed. The East-West highway in the Western region always demanded considerable attention as did the Penong-Eucla Road. District roads in the Whyalla-Port Augusta-Kimba-Lincoln Gap-Cowell regions were regularly graded and rubble coated when necessary.

The Department undertook a major programme on behalf of the South-

Eastern Drainage Board, beginning in 1948. The plan was to drain 400,000 acres of the Western Division, or those flats west of Baker's Range. Seven main drainage systems were created, each with their own outfalls. All the necessary bridges were provided and much regrading and widening work was done on the old drains. In 1960 work began on the draining of 730,000 acres of floodable land in the Eastern division - that is, east of Baker's Range. The pattern of the drains in the South-East was approaching its final form.

There were also numerous smaller projects undertaken for miscellaneous bodies. Supervision of the evolving Port Lincoln Freezing Works continued well into the fifties. Many works were undertaken for the Architect-in-Chief and Lands Departments besides the major projects already mentioned. The Department, for example, did much of the layout and roadworks for the new Mount Gambier Hospital. In the same area land was levelled for the Central Forestry Mill and the contract for its construction was supervised. When the Patawalonga Basin was created the Department was responsible for the design and supervision of the regulator and lock structure. Finally, Departmental officers regularly played an indirect role in other projects through their presence on specific Committees.

THE PUBLIC:

The years 1946-1965 saw the Department grappling with the task of pleasing a rapidly increasing population. For much of the time staff were battling to provide and keep the basic services going. Naturally the social niceties tended to suffer. As well, a number of new issues relevant to Departmental functions and responsibilities were creating conflict in the public arena. Still, there were times when the Department was seen to be making special positive efforts to increase public awareness and to lend assistance. In the absence of any policies and mechanisms to contain discontent, this was better than nothing.

The sewerage functions of the Department tended to stay out of the news

more than its water supply responsibilities. Any protests tended to be confined to a particular area. Encounter Bay residents were upset in the early fifties that a scheme designed to sewer Victor Harbour proposed to discharge raw sewage into the sea off "the Bluff". Their Progress Association hired a solicitor in readiness for battle, but the Department managed to prepare a number of alternative schemes which it placed before the Public Works Parliamentary Standing Committee in 1957. The people's "sentimental" objections were accepted - a petition of protest signed by 628 residents proved their resolution - and "the Bluff" alternative was discarded.

When the proposal to dispose sewage sludge from the Glenelg Sewage Treatment Works into the sea was under discussion in 1956, it brought a rash of protestors to the fore. The Managing Director of Wooltana Industries Ltd. opposed it as his Company had taken the sludge for the past twelve years, processed it, and sold the product as an effective soil fertilizer. The North Shore Patawalonga Progress Association and the Health Officer of the Port Adelaide Council objected on the grounds that the health of people living in foreshore suburbs could be affected. But the Department was granted permission to go ahead with its plans. In 1961 the Port Adelaide Council and Seaside Councils Committee again objected to this practice of "sewage-dumping". But no ill-affects could be produced in evidence and the matter rested there.

There were also regular protests from people in suburban areas and country towns who felt their claims for sewerage were being ignored. In the Metropolitan Area they tended to come from low-lying or higher-level regions which were comparatively expensive to sewer. The agitation of the Ottaway Progressive Committee finally paid dividends and Ottaway-Rosewater were sewered in the early fifties. But it had taken 20 years of protest. The Blackwood-Belair people watched bitterly as suburb after suburb were sewered ahead of them, particularly when new areas like Salisbury and Elizabeth received immediate attention. Still it was such new areas which would later subsidize the more expensive sewering of the high-level suburbs. The long-

settled areas of Fulham Gardens, Henley East and South, and Grange were annoyed to find that only when effluent from overloaded septic tank systems recirculated through their house plumbing were their claims for attention heeded. In 1963 the newspapers carried numerous letters from the region on this topic.

But it was the widespread shortages of water and associated restrictions which elicited the most consistent outcry. The years 1947 to 1955 proved particularly embarrassing for the Department. In 1947 a number of buildings burned down "owing to lack of water";[15] The News reported that a Hawthorndene mother was forced to wash her baby in water from the ice chest drip tray[16] during an acute shortage; and later, 100 families at Cowandilla were seen to be without water for a couple of days.[17]

In the midst of this turmoil Engineer-in-Chief Angwin collapsed and died in Grenfell Street at the age of 61. The Housewives Association had warned the Government back in 1946, when Angwin had been appointed the first Chairman of E.T.S.A., that his responsibilities were too heavy.[18] Now, in September 1949, the Premier, public and newspapers paid him tribute. He had commanded wide respect. His funeral procession was the longest seen in Adelaide for many years, and, (despite the water shortage), over 350 floral tributes were raised in his honour.

Less than a month later water restrictions were approved and a rationing plan inaugurated dividing the Metropolitan Area into zones. Garden watering was allowed on different days, at fixed hours, on a roster basis. Again in 1950, 1951, 1952 and 1953 restrictions were imposed in the Metropolitan area and in numerous country areas. In the middle of it Dridan

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[15] See The Advertiser April 21 and 22, 1947

[16] The News Jan. 21, 1948

[17] The News Oct. 26, 1948

[18] The News Aug. 31, 1946

became Engineer-in-Chief. He decided to share his concern with the public. He pleaded with people to conserve water; he wrote articles; he publicly answered Letters to the Editor and he told people that five-minute showers and a cup of water for teeth brushing were sufficient! On the other hand Commissioner of Public Works McIntosh was trying hard to convince people that there was a distinction between "regulation" and "restriction" of water usage.

In some country areas the personal touch did not work. December 1951 saw a protest meeting at Mount Gambier directing attention to the inadequacy of the town water supply. The Department was represented by its Engineer for Water Supply, who raised the bristles of those present and was consequently heckled throughout most of the proceedings. The town's butcher jumped up, and called the engineer's bluff by offering to find the labour needed to relay the main from the Blue Lake Reservoir to the centre of the town. The offer was accepted and 320 men volunteered to do the work on weekends. The local newspaper, The Border-Watch, meanwhile kept an extremely critical eye on Departmental activity in the region.

In 1953 suburban Mayors and Council officials were publicly condemning water pressures as the "worst in history" and the Australian Government Worker's Association agreed. The newspapers were using Adelaide's water supply problem as an indication of the imperative need for town planning.[20] The Sunday Mail even put a special reporter on Adelaide's worrying water supply position. By the end of 1954 it was only the public response to radio broadcasts urging "save water" which was averting the possibility of no water at all in many suburbs.

But in March 1955 the tide turned. The Mannum-Adelaide pipeline became operational and it was Dridan who was praised for his "tireless advocacy

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[19] The Advertiser: Editorial Oct. 30, 1953

[20] The Sunday Mail Oct. 31, 1953

[of the scheme] over the past ten years".[21] In May the Chief Fire Officer paid public tribute to the Department for the supply of water maintained at a blaze.[22] Again in the 1957-1958 summer Adelaide was seen to be the only mainland capital city not subject to restrictions. The completion of the pipeline from South Para Reservoir to the city in record time was described as "public service at its best".[23]

In the country the northern areas and Yorke Peninsula were still regularly subjected to water restrictions, although the duplication of the Morgan-Whyalla pipeline was in sight.

But in other areas there seemed to be no end in sight to the endless carting of water. Water was regularly hauled from Woomera to supply Andamooka's needs. The people of Kimba were even more incensed. They were tired of seeing dams built, only to collapse. Since 1959 they had been subject to restrictions almost continuously and supplied by means of tankers from Iron Knob. The feeling was so strong that Departmental officials never stayed a night in the town if they had business in the region. Yet Jack Haines, the local Superintendent, persevered. He worked hard, went on Committees and earned the locals' respect. But then he was one of them - a West Coaster and an ex-farmer.

The filtration issue also managed to provoke intense public interest periodically. In 1946 Adelaide City Councillor Lloyd renewed his fight against "filthy" city water and a News editorial argued that cost shouldn't rule filtration out.[24] The installation of chlorination plants throughout the State showed that the Department was aware of water quality problems and allayed some fears. But when it became known that Governor Willoughby

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[21] The Sunday Mail April 2, 1955

[22] The News May 2, 1955

[23] The News: Editorial Dec. 13, 1958

[24] The News: Editorial Oct. 23, 1946

Norrie went fishing in Millbrook Reservoir by special permission, criticism flowed freely. Councillor Lloyd, at the head of it, complained that no-one should be allowed to fish or congregate on catchment areas.[25]

The South Australian Piscatorial Council thought otherwise - they renewed their call for access to Reservoirs for amateur fishermen. The matter reached a high-point in 1958 when the new Commissioner of Public Works, Pearson, rejected their request on Departmental advice. Numerous letters to the newspapers followed, very few being in favour of the Department's stand. Others made quite valid points - for example, that catchment areas were more at risk of pollution from unsewered townships and piggeries than from the possible effects of a few anglers.

The advent of the Mannum-Adelaide pipeline produced another burst of pro-filtration support. A meeting of women's organizations addressed by Councillor Lloyd in May 1953, resolved to ask the Government to instal water filters before the Murray water was pumped into mains. This provoked the Mannum District Council Clerk to affirm his preference for unfiltered Murray water as against Adelaide reservoir water, and the Chairman of the Whyalla Town Commission to state that Whyalla people were drinking unfiltered Murray water with no resulting ill-effect.[26] The fact that the Department had actually bought and set aside land at Mannum for a treatment works was not made public.

In August 1957 a number of "horrified" people wrote letters to the newspapers to inform their fellow citizens that sheep were allowed to graze in the South Para Catchment Area. Dridan commented in turn, in an attempt to justify the Department's stand. He basically argued that removing animals and people from the catchment areas would mean a huge loss of production and a blow to the State's economy. A number of letters in reply proved that not

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[25] Adelaide Truth Jan. 31, 1948

[26] The Sunday Mail May 23, 1953

all were happy with his line of reasoning or with the protective measures undertaken by the Department. They urged the installation of modern treatment works as the only true answer to the problem. In less than six years Departmental engineers were seen to give urgent evidence to the Public Works Parliamentary Standing Committee on the pollution danger to Adelaide's water supply from "disturbing" sewerage conditions at Lobethal and Gumeracha.

In 1964 a South Australian hotelier made news when he arranged to bring Melbourne water to South Australia to serve with spirits. The Wine and Spirit Merchant's Association of South Australia then appealed to hoteliers to serve rainwater whenever possible. An Advertiser editorial agreed, saying "thank goodness for tanks"[27] while The News was happy in the knowledge that "at least we've got plenty of water".[28] The Department put in its bit with the claim that Adelaide's water had greater health-giving properties than Melbourne water. Water quality had indeed become a regular topic of conversation in the State.

To fluoridate or not to fluoridate - that was another issue which alternatively caught and lost the public eye. But it did come to a resolution of sorts. As early as 1955 the first Gallup Polls were taken to determine the public feeling on fluoridation. Then in 1956 Hodgson's report on the matter was released. But many of his fellow officers remained undecided about which Department - E. & W.S. or Public Health - should be handling its implementation. Meanwhile the public wrote a rash of letters to the newspapers at the end of 1956, then the matter died a temporary death.

An international seminar on dental health staged by the World Health Organization at Adelaide University in February 1959 set the debate rolling again. The anti-fluoridation camp lined up behind Sir Stanton Hicks and again the predictable arguments poured into the newspapers. In September 1960 Engineer-in-Chief Dridan went on record to say that fluoridation would

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[27] The Advertiser: Editorial Feb. 27, 1964

[28] The News: Editorial Feb. 26, 1964

come eventually, and Dental School personnel promptly backed him up. Increasing numbers of professionals spoke out in favour and eventually Pearson, the Commissioner of Public Works, announced the formation of an inter-Departmental Committee to examine costs. Opposing forces promptly mobilized themselves into an Anti-Fluoridation League. The newspapers kept the matter alive by printing results of every Gallup Poll available and reporting any instances interstate or internationally of its implementation. By 1964 both The News and The Advertiser were convinced that it was in the public interest and were asking "why is the Government hesitating?"[29]

Beginning in 1960 the question of rating began to draw increasing attention. In that year when the Department made a new assessment the number of appeals jumped from 50 (in 1959) to over 500. Predictably the Mount Gambier people were the most horrified of all. The Chambers of Commerce in the South East and the South East Local Government Association began to make regular appeals for reductions in water rates in country areas. Engineer-in-Chief Dridan even went on television to discuss the question of alternative forms of rating. Meanwhile, the Department softened the blow by allowing ratepayers an extra two months to pay their sewerage bills, and made a pre-Christmas announcement that rates could henceforth be paid by instalments.

But in other places the Engineer-in-Chief was making it quite clear that the public should be paying more for the services rendered and water used. In a paper on "The Urban Usesof Water" given to the National Symposium on Water Resources, Use and Management in 1963, he showed quite clearly that, by raising the annual water rate without also proportionally adjusting the prices charged for water consumed, water authorities were defeating their own ends. In Adelaide in 1946 the owner of a particular property was able to use 96,000 gallons before paying for excess water, but in 1963, given the same property, the ratepayer could use 192,000 gallons without paying excess.

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[29] See The Advertiser editorial July 26, 1963 and The News editorials March 4, 1964 and April 1, 1964.

As well, he pointed out that water was becoming a relatively cheap commodity - the price of excess water had risen by 100 to 120 percent during the past 25 years, but in the same period the price of bread had risen by 200 percent and meat by 300 percent.

Problems associated with the Murray River also tended to be increasingly in the spotlight - and they usually cast some aspersions on Departmental management in the area. Throughout the fifties MacGillivray, M.P., publicly alleged that the saline state of the water was associated with "repeated and disastrous bungling"[30] by the E.&.W.S. Department in its control of the locks. In early 1954 a Board of Enquiry into the absence of the lockmaster at Lock 5 from his duties without authority - thereby allowing a three foot drop in river levels which damaged sheet-piling at Renmark powerhouse and delayed an irrigation - only added fuel to the fire. The Lockmaster in his evidence claimed there was blundering every year over the release of water from Lake Victoria into the Murray. He was demoted. But a deputation led by the President of the Murray Citrus Growers Co-operative Association also alleged unsatisfactory control of River Murray levels. They claimed there had been a thirty year error in the design of Lock 4. Ten years later in 1965, sudden rapid falls at Renmark, then Waikerie, again provoked the cry that for too long growers had "suffered the effects of city control".[31]

Only the roadwork activities of the Department seemed to achieve a consistently favourable press. The Department was credited with turning the road between Port Augusta to the Northern Territory border "from a track into something like a real road".[32] Of Jack Whitford, the Superintendent in charge of roadworks in the north, The Advertiser wrote: "When his grey departmental utility pulls up to a sheep station or a workman's shack, there

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[30] The News Feb. 20, 1953

[31] Letter to Editor The News Jan. 7, 1965

[32] The Advertiser May 12, 1956

is always a big welcome for 'the man who brings us roads'."[33] Later, when it became clear that the Highways Department would probably take over the roads outside district councils from the Department the newspaper reaffirmed that "the work of the E. & W.S. is highly regarded".[34]

Relations with the Adelaide University's Department of Engineering remained most cordial throughout the period - but then, the E. & W.S. relied heavily on the availability of the University's Soils Testing Unit and had every reason to encourage graduates to join its own depleted ranks.

On the other hand relations with the various country and city local government organizations were far from always being co-operative. At Mount Gambier the Department could always rely on the local council to create a fuss or fail to inform them when breaking-up roads. But then the Department did not have the best of representatives on the spot to promote a better feeling - one Superintendent was a drinker, and for his successor, the position was effectively a downgrading. On the other hand Reg Baker, the Superintendent at Port Augusta, put in years on the local Council, as did Jack Whitford and Murray Kipling at Quorn. These contacts encouraged peaceful relations. Co-operation and respect worked both ways.

In the Metropolitan area it was the South Australian Municipal Association which made the first moves towards solution of age old problems. After a fire engine raced to a blaze in 1958 and could not get water from the fireplug because it had been buried during a recent road repair job, the Association decided to act. It called a meeting of councils and public utility representatives (including the E. & W.S.) to seek a solution. The Public Utilities Advisory Co-ordinating Committee was formed. After a number of years of haggling, agreement was reached in 1962 as to the type of information each required of the other, the extent of each body's

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[33] Ibid.

[34] The Advertiser: Editorial Aug. 7, 1961

responsibility and the amount of notice to be given, The Waterworks Act Amendment Act of 1962 ensured that co-operation between the E. & W.S. Department and local Government authorities became legally binding.

Despite a heavy workload, there were many areas in which the Department was seen to be making a special effort in these years. In 1946 and 1947 Departmental men battled severe fruit fly outbreaks in the southern suburbs for weeks on end. A huge 43,500 man-hours were lost at a time when labour could be ill-spared. During the construction of the Mannum-Adelaide pipeline and South Para Reservoir, units were established and made available to fight fires when necessary. In 1955 the task of fighting the Rendelshan peat fires in the South-East also went to the Department.

In the north Departmental road gangs aided the making of a number of movie pictures. The year 1950 saw the men making rain for certain sequences of "Kangaroo" being filmed at Port Augusta. Later, in 1957, others carted generators over the Flinders Ranges during the shooting of "Robbery Under Arms". As well, when Premier Playford offered Lake Eyre to Donald Campbell for his "Bluebird" speed attempts, it was E. & W.S. men who made the access road to, and causeway on the Lake.

Back in Adelaide the Department prepared exhibits for the 1947 Royal Adelaide Exhibition and won itself a certificate of merit and a gold medal. This led to the creation of floats, and special displays for the occasional Royal Show. The early sixties saw a more regular, concerted effort in this direction. In 1961 the Engineer for Construction (Poole) began to invite the public to the sites of major public works under construction. Never before had this been encouraged. As well the Department undertook its fair share of miscellaneous tasks. In 1954 the Survey Branch prepared a plans and marked out the oval at the Showgrounds for the Schools Demonstration in honour of the Queen's visit. Obscure and unappreciated many of these efforts may have been, but they were positive steps towards accessability which the Department had never taken before.

The introduction of two-way radio communications in vehicles probably did the most to promote a better public feeling towards the Department. Complaints were potentially serviced quicker. The Water and Sewage Treatment Branch also realized the value of the personal appearance very early in its career. For example, they adopted a policy of sending trained laboratory people to investigate consumer complaints whenever practicable. As well the early sixties saw the first effluent water from the Glenelg Sewage Treatment Works made available for public use. West Beach Recreation Reserve, nearby golf clubs and Adelaide Airport were the first to benefit. The Department had successfully marketed a product!

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The years 1946-1965 can, as no other in South Australia's history, be labelled years of "upsurge". Playford and his men ensured, through their "development" policies, that this upsurge would be catered for in particular ways. The work of the Engineering and Water Supply Department, for example, came in the 'top priority' category, not that the finance, materials or labour were always available to fulfil the task. As well, the organization of the Department was a relic of the past, and tended at times to militate against a unified approach. But the Department managed its task in spite of it. At first the tide seemed to be against the Department - the public had poor pressures, severe water shortages, and unsewered properties to prove it. Gradually, however, the Department managed to get closer to the movement of the upsurge, and even began to anticipate some of its direction. Then it was time to look to the home front and to work through problem areas which had developed.

CHAPTER 10: NEW DIRECTIONS, 1965 -

In 1965 a new Government came to power in South Australia with interests and ideals quite distinct from those of its predecessor. Concurrently the management of the Engineering and Water Supply Department had taken on a new form and managers with different priorities were beginning to be heard. There was every indication that steps would be taken in new directions....

POLITICS:

The 1965 State elections brought the defeat of the 25 year old Playford L.C.L. Government, and the formation of the first A.L.P. ministry since the defeat of the Richard's Government in 1933. Frank Walsh became Premier, and two years later, was succeeded by Don Dunstan.

The Government immediately set about implementing altered priorities, some directly, others indirectly affecting the E. & W.S. Department. Substantial wage increases were granted to public servants and daily paid employees and the concept of equal pay for women was adopted. The policy of preference to unionists in filling Government jobs was inaugurated and the old Industrial Boards covering weekly paids were revamped as Conciliation Committees.

The new Cabinet varied the conditions under which water supplies and sewerage would be provided for subdivision and group building projects. Henceforth all subdividers and group builders were required to enter into agreements with the E. & W.S. Department such that a ten percent return on the cost would be assured. This was designed to relieve the Department's budget and allow it every chance of keeping pace with demand. The Planning and Development Act of 1966-'67 simply extended this concept of planning and controlling future development although the Legislative Council dampened much of its original thrust by extensively altering and amending. The

Government increased the prices of rebate and excess water, but at the same time pushed through legislation to allow for the quarterly payment of rates, the first State to do so.

There was one issue which overtly had the support of all sides - namely, the building of the Chowilla Dam. In the years immediately prior to 1967 the project was seen to be secure and therefore worthy of little debate. But 1967 brought a drought year, the opening of tenders and a computer reassessment of the benefits of Chowilla by the River Murray Commission. Together they combined to throw politician and public servant together in a confused game of survival of the fittest.[1] Ultimately the security of the State's water supply requirements was not to be found in the Chowilla Dam, but in another direction. Unfortunately, it was to be years before all sides admitted that matters had turned out for the best.

In 1966 when tenders were opened it became apparent that from an original estimate of $28 million, the tender price had risen to $68 million. The project was referred back to the River Murray Commission which decided then to reassess the old estimates and investigate further the worrying problems of salinity and evaporation. By August 1967 the Commission decided that a reconsideration of alternative sites was imperative, and asked South Australia to run down expenditure on Chowilla as rapidly as possible. This was entirely within the rights of its charter. A new tool, the computer, set to work on a programme of reassessment. . . .

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[1]The following two references provided an invaluable guide to the events surrounding the Chowilla-Dartmouth issue: R.R.J. Taylor's B.A. Honours thesis (Adelaide University) 1973: Chowilla Dam - The Failure of Parliament. D.I. Wright's "Politics, Psychology and Water: Chowilla" in Australian Journal of Politics & History, Dec. 1974, pps. 370-379. As well my interview with former Director and Engineer in Chief Beaney was important.

But the politicians in Adelaide were not content to wait and see. All sides dogmatically avowed their support for Chowilla, and resorted (again) to the argument that South Australia was being "done down" by the eastern States. In the South Australian Parliament some of the irritation was focussed on the new Engineer-in-Chief of the Department, H. Beaney. During a successful Government motion to extend the regulations under the Control of Waters Act to downstream from Mannum, a former Minister of Works, Pearson, inferred that Beaney lacked experience and should not have been swayed by the opinions of the River Murray Commission. Yet if Beaney had resisted at that August River Murray Commission meeting, he would have created the first dispute in the Commission's history to have gone to arbitration.

Beaney's position was far from enviable. When he promoted the idea of voluntary water restrictions by the public to his Minister (Hutchens), he stuck his neck out even further. As 1967 drew to a close the drought was getting worse, but a number of Departmental officers assured Beaney that imposed restrictions were unnecessary. Only after an extensive public campaign and months of anxious waiting and watching did this prove to be the case. The severe drought and related high Murray salinity levels only reinforced the cry for Chowilla.

Premier Dunstan, playing out his tactical game, even went so far as to attempt to override the professional opinion of the State's River Murray Commissioner, Beaney. An election was due and Dunstan had no desire to appear to accept anything which unduly delayed Chowilla. The first report by the Technical Committee (of the River Murray Commission) was published Departmentally in early March, 1968. It suggested that the Dartmouth site, on the Mitta Mitta River above the Hume Reservoir, had distinct advantages when compared with Chowilla. But Dunstan chose to ignore the report, publicly announced that he had instructed Beaney to vote for Chowilla at the coming River Murray Commission meeting, and

thereby reinforced the fiction that Chowilla was South Australia's best hope. As well, he actually served an instruction on Beaney demanding that he oppose any decision which postponed Chowilla as a major project.

Beaney never took the Government's instruction to the River Murray Commission. Before he was forced to bow to its intent, the Dunstan Government was defeated at the polls by the Liberal and Country League. The new Premier, Hall, reversed the instruction once he had seen the report and the advantages of the Dartmouth site. But despite the River Murray Commission's decision to make a detailed investigation of Dartmouth, the Hall Government still publicly committed itself to Chowilla. In fact it published a pamphlet outlining fourteen points which supposedly favoured Chowilla. The Chowilla Dam Promotion Committee headed by former Engineer-in-Chief Dridan also entered the arena, while the Labor Opposition never lost an opportunity to draw attention to the Government's handling of the matter.

Meanwhile, attention temporarily diverted to the issue of fluoridation. In July 1968, Premier Hall announced the Government's decision to go ahead and fluoridate South Australia's water supplies. This brought criticism from both sides of both houses. Mrs. Byrne (A.L.P.) moved for a referendum, then Stan Evans (L.C.L.) proposed an amendment to the effect that the House approved the Government's actions. The amended motion eventually passed 21-16 with two Government and three Opposition members crossing the floor. In the Legislative Council Geddes (L.C.L.) sought a halt to fluoridation till Parliamentary approval was given. Following considerable debate his motion was lost on the casting vote of the President. The E. & W.S. Department had gained a new function and an additional responsibility.

But rarely was the Chowilla-Dartmouth issue lost from view. In early 1969 the River Murray Commission reported in favour of Dartmouth and formally abandoned Chowilla. Agitation reached fever pitch - ex-Premier Playford

said that unless Chowilla was built South Australia was doomed; Dunstan, (Leader of the Opposition), said that the technical report was technically biassed; and the Speaker Stott, began to call for both to be built simultaneously. Only Premier Hall reacted sensibly. He subjected Director and Engineer-in-Chief Beaney to two lengthy periods of questioning before the full Cabinet, and, being unable to fault the results of the River Murray Commission's 260 computer studies, he seized on the Commission's recommendation for an increased allocation of water to South Australia. At the March 7 Conference of Commonwealth and State Ministers, Hall gained an increase of 1.5 million acre feet for South Australia in return for agreement to Dartmouth.

But the matter did not rest there. Dunstan had invested too many hours in the game to give up then. Stott, the Independent Member for the Upper Murray electorate of Ridley, was also Speaker in a House evenly divided between Government and Opposition. He held the balance of power. It was his casting vote which the Labor men set out to ensnare. They did this by supporting Stott's two-dam policy, a policy he had adopted in a futile attempt to satisfy both the Upper Murray people and the Hall Government. They even provided him with the semantics to suit his predicament - 'contemporaneous' instead of 'simultaneous' dam building did away with any economic objection by the Liberals. Millhouse promptly pointed out that there was no practical distinction between the two words.

But it didn't matter - Stott had taken the bait. Late April 1970 saw the Government once again attempting to ratify Dartmouth. This time Stott moved that the two dams be built contemporaneously, and his amendments were carried 20-18 on party lines. Hall withdrew the Bill and Parliament closed. Dunstan had forced an election as intended. Never before in South Australia's history had a 'water issue' been used to corner a Government in this way.

Hall promised that he would ratify Dartmouth and filter Adelaide's water supply if re-elected. As well he gave the "go-ahead" to an inquiry into Water Rating Systems. Always he emphasized water issues more strongly than Dunstan. But they had little bearing on the result. The recent electoral redistribution played the greatest role. The advantage of the "Playmander" was lost for good. Dunstan went into office.

The new Premier demanded that the other States agree to the 'future consideration' of Chowilla before Dartmouth began. But these exhortations fell on deaf ears. On August 19, 1971 Dunstan admitted defeat and introduced a Bill into the Assembly to ratify the Dartmouth agreement - the terms were the same as those of the L.C.L. Bill of 1970 which Labor had opposed to bring down the Hall Government. Then it was not until March 30, 1972 that the four Governments proclaimed their ratifying legislation to enable diversion works to begin immediately, with a start promised on the main dam within the next financial year.

The Dunstan Government had apparently learnt a lesson. In the years that followed it listened to and implemented major new policy directions largely advised by the E. & W.S. Department. An able, likeable Minister of Works in the shape of Des Corcoran ensured a co-operative relationship. Likewise a return to government with an assured mandate to a go full-term meant the stability to see major new intitiatives through. Only when economic stringencies tightened their hold as the seventies progressed were priorities more strictly delineated and re-ordered. Still, the general direction remained the Department's making. The expertise it had accumulated was a force in itself.

Where the water rating issue was concerned the Government kept the report of the Sangster Committee Enquiry on Water Rating Systems quiet, but had the Department evaluate the findings. The Evaluating Committee agreed with the concept of service charge plus payment for all water used,

but suggested certain scales of its own. Yet the Government did not implement this radical change - nor is there any evidence to suggest that many Departmental officials looked with favour upon it. Some felt very strongly about the concept, true, but theirs was a personal crusade. The Government did legislate to implement three of the Sangster Committee's recommendations to the effect that stepped rating was eliminated from scales of water rates and uniform rates were applied throughout Country Water Districts. A severe rise in unimproved land values saw the Department, with Government approval, change over from unimproved land value - based assessments to a flat rate per hectare assessment. This meant that country lands ratepayers moved closer to a "pay-for-use" system.

The Government also allowed pensioners remission of 60 percent of their annual rates payable. Then when very steep increases in water and sewer rates raised an outcry - a direct result of levying rates on re-assessed, inflated property values - the Government decided to adopt the New Zealand valuation equalization system on the advice of the Valuer-General's and E. & W.S. Departments. The new system was introduced as from July 1, 1975, and meant that the amount payable annually for rates was henceforth a reflection of the market value of properties and sensitive to wage and cost-of-living variations. This seemed to placate the Opposition, except when increases in the price of water were periodically announced by the Government.

The major concept which the E. & W.S. Department successfully sold to Government and Opposition alike throughout the seventies was that of State-wide water resource management. Intensive investigations by the Department into water pollution problems in the Adelaide watersheds led initially to a regulation being formulated under the Planning and Development Act. This gave the Director of Planning power to refuse approval of plans of subdivisions (etc.) in respect of land within the watershed if, in the Director and Engineer-in-Chief's opinion, that approval would lead to pollution of the public water supply.

Then in 1971, the years of hard work by Departmental officers culminated in the passage of the Waterworks Act Amendment Act (Pollution). Henceforth the emphasis would be on the preventive aspects of pollution control rather than merely implementing remedies after the event.

Unfortunately, as far as the River Murray is concerned, that emphasis has yet to be realised. Throughout the seventies the Department has consistently urged the desirability of investing the responsibility for measurement and management of the water quality of the river with the River Murray Commission. Successive South Australian Governments have enthusiastically supported the concept. It is the tardiness of N.S.W. and Victoria which has kept the matter at a stalemate. Meanwhile salinity, turbidity, plant nutrients, sewage disposal, pesticides and herbicides, industrial waste and recreation continue to cause major pollution problems in the river.

Again the Department led the initiative in a new direction when in 1971 it released its Report, 'Water Treatment for Metropolitan Adelaide.' Back in 1967 Director and Engineer-in-Chief Beaney had authorized a full-depth investigation in this field, knowing that the Department possessed the expertise equal to the task. In June 1972 the Dunstan Government announced agreement in principle with the Departmental proposals for treatment of Adelaide's water via seven treatment plants. Again the Opposition had no bone to pick - indeed the Hall Government had been prepared to take the initiative in this matter in its term of office. Work began on the Hope Valley Treatment Works in January, 1974, but it was soon apparent that the complete programme would not be finished within the ten years and estimates as planned. Funding such a non-reproductive exercise remains the problem.

As the seventies wore on the Government kept to the plan of eventually placing responsibility for the preservation and development of all water resources in the State in the hands of a single authority - the E. & W.S.

Department. The Underground Waters Preservation Act Amendment Act of 1973-'74 gave effect to the transferral of the administration of the Act from the Mines Department to the E. & W.S. Department. In the following years State irrigation and drainage activities were likewise brought under E. & W.S. management. Responsibility for the South Eastern Drainage Board was transferred from the Minister of Lands to the Minister of Works as from July 1, 1977. Then the administration of irrigation and drainage works was transferred from the Lands Department to the E. & W.S. Department as from July 1, 1978. The E. & W.S. Department had already been responsible for the engineering activities associated with these areas for over 40 years. The Government also began to talk of placing State Floodwater Schemes under Departmental administration, but this time the Department expressed strong fears that the mix, (floodwater control and water supply), would not work.

In 1974 officers of the newly-created Water Resources Branch, Parliamentary Counsel and the Minister of Works went overseas on a study tour. The object was the preparation of the most comprehensive Water Resources Act possible. Such an Act was passed in 1976, thereby allowing for the treatment of all aspects of water resources as a unified whole. The Opposition expressed itself to be more than happy with the general thrust of the legislation.

The Act, (No. 19 of 1976), provides for assessment, conservation, development and management of water resources of the State by the Minister of Works. It includes provision for the establishment of a South Australian Water Resources Council and Regional Advisory Committees, formal mechanisms for public involvement in the management process. It creates an Appeal Tribunal to provide the individual with an additional opportunity to have his/her case examined by an independent body.

More recently with the February 1979 resignation of Premier Don Dunstan, the new Corcoran Government has implemented a major reshuffle of Ministerial portfolios. Significantly, the position of Minister of Water

Resources was created, its first encumbent being R. Payne. With a Minister specifically concerned with its programmes, and a former Minister of Works in the Premier's seat, the Department is assured of prominence and support in the future.

The advent of water resources legislation and a specific ministerial portfolio may be seen as the inevitable culmination of the State's water management history. Slowly but surely successive Government have moved to centralize the administration of water matters in the hands of one competent and answerable body. This was clearly the most sensible course of action as the limited extent of the State's water resources became fully known and the interrelationship between them became clear. The E. & W.S. Department earned itself a reputation for reliability and trustworthiness, so Governments and Parliament have continued to invest their faith in the organisation's initiatives and directives.

But just in case, the politicians of the seventies created new ways of assessing this and other Department's activities. Legislation creating a Public Accounts Committee was finally passed in 1972. Before long that Committee was involved in the assessment and rationalization of the Metropolitan Depots of the E. & W.S. Department. This proved to be a painful teething experience for both sides! Late 1972 saw the Government create the position of Ombudsman. Henceforth, the individual had a champion to fight his/her particular battle against a Government Department or institution when satisfaction was not forthcoming. The Ombudsman showed himself to be quick to report to Parliament in a number of cases involving the E. & W.S. Department when his recommendation was not acted on by the Head. Parliament was thereby given the chance to intervene.

Indirectly, the (Corbett) Committee of Inquiry into the Public Service of S.A. also served to test the standing of the E. & W.S. Department, amongst other Departments. Despite only a cursory study of the Department, this non-Parliamentary Committee was prepared to proclaim that it had

responsibilities "vital to the State's future."[2] As such it was prepared to recommend that it remain a separate Department. That members were in general "favourably impressed" with its workings could only bode well for the Department's future - especially when compared with their outspoken comments about other areas of the service. The Government was content. No dismantling or re-organization was imposed upon the E. & W.S. Department.

ORGANIZATION:

April 1965 brought the culmination of Departmental efforts to create a more viable management structure. A general re-organization at the top levels took place, beginning with a change in title from Engineer-in-Chief to Director and Engineer-in-Chief and the emergence of three major divisions. Each Division had as its head an Assistant Director responsible to the Director and Engineer-in-Chief. The first to hold these positions were J.W. Murrell (Assistant Director, Engineering Operations), H.J. Hodgson (Assistant Director, Engineering Services) and J.A. Wright (Assistant Director, Administration and Finance).

This was the first significant change in the management of the Department (and its predecessors) for over 100 years. The new management structure was similar to that of a company with its Board of Directors. The Director and Engineer-in-Chief and the three Assistant Directors form an Executive Panel which meets every week to discuss matters of policy, important projects and top level management problems. There was nothing extraordinary about the application of such principles to the management of a Government Department. In fact, it had been done before in a number of places - namely, in the South Australian Public Buildings Department and in the Commonwealth Public Works Department.

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[2] Report of Committee of Inquiry into Public Service of S.A., Government Printers, 1975 p. 132.

The reorganization meant an important guarantee for the clerical side of the Department. Henceforth, they were assured of a say through the person of the Assistant Director, Administration and Finance. A few even agitated for the sharing of the top position between two men - the Director to be a non-engineering professional, and the Engineer-in-Chief to remain, as in the past, an engineer. But theirs was a hopeless case. The engineers were not prepared to contemplate such a division and anyway, past Engineer-Heads of the Department had invariably proved themselves to be competent administrators as well as fine engineers.

Director and Engineer-in-Chief Dridan saw the Department step off into a number of other new directions before he retired in late 1966. Not that Dridan actually retired from public service - he became Chairman of the S.A. Housing Trust and remained Deputy Chairman of Electricity Trust of S.A.

In February 1966 the Central Workshops at Ottoway, formerly known as Sassafras and operated by the Construction Branch, were re-established as an independent Branch of the Department under the control of a Supervising Engineer. That Engineer was responsible to a Board of Management consisting of various divisional and Branch Heads. Gradually the workshops were equipped to undertake work for all branches of the Department. A new central store was also completed at Ottoway to provide supply services for all Departmental storehouses throughout the State. Bulk fuel orders and bulk purchases of fast-moving lines were introduced for the first time.

A new centre for water and sewage treatment work emerged with the opening of the Bolivar laboratories in 1966. The cramped conditions of the laboratory at the Glenelg Sewage Treatment Works became a thing of the past and further specialized appointments were able to be made. Selected staff were also trained in A.D.P. computer techniques. Before long the Department had established its own A.D.P. Branch. Gradually the output of that Branch increased as programmes relating to supply, payroll, costing,

revenue billing and numerous technical and engineering investigations were undertaken. Thus, two new areas of expertise - water and sewage treatment and computer services - had earned themselves a permanent role.

The appointment of a Training Officer and Master of Apprentices, and re-organization of the Departmental Apprentice Training Scheme meant that the Department had taken another important initiative. Henceforth the policy was to ensure a reservoir of tradesmen and technological expertise by appointing and recruiting an increasing number of trade apprentices. Eventually a new centre was created at Ottoway for this purpose.

Harold Beaney followed Dridan as Engineer-in-Chief in November 1966. He was the obvious choice - numerous senior officers about him were retiring or due for retirement - and indeed he was the only applicant for the job. His qualifications for the job were an interesting mix of traditional and futuristic factors. He had had experience in the River Murray construction programme, as had all E. & W.S. Engineers-in-Chief, but beyond that he was distinctly representative of a new breed. His experience was in planning, development, research and design. As such he brought to office a willingness to encourage the planning of water resources, investigation and research, and the involvement of the Department in Australia-wide initiatives.

In practice this meant extensive water resource investigations with the aim of long-term planning for the future. Grants under the Commonwealth State Grants (Water Resources) Act of 1964 were utilised to assess resources and regional studies were undertaken. The Department became actively represented on Committees of the Water Resources Council and began to co-operate with interstate authorities on problems associated with River Murray hydrology and salinity. Investigations in the Water and Sewage Treatment field burgeoned. Special Testing, Virological and Water Pollution Sections were established at Bolivar. Comprehensive water pollution surveys were undertaken as was a major investigation into possible methods

of improving the physical quality of the Metropolitan Water Supply. As well there were ongoing research projects in the fields of sewage treatment, corrosion prevention, and electrical and mechanical problems.

The new policy directions and functions which emerged out of these investigations created specific growth areas in the Department. Additional staff were needed to provide an increased field surveillance of catchments, and in general the Water and Sewage Treatment Branch expanded to meet a widening range of responsibilities. As well, in August, 1968 the relevant valuating staff of the Department transferred to the Valuation Department, henceforth an entity in its own right. But the Department still needed someone to value and negotiate concerning property acquisitions, so the Property Branch was born. The acquisition of buffer zone land around the major reservoirs, for example, had become a task of immediacy. Finally, in 1970, the Information Officer appeared on the official list for the first time. Previously he had been a clerk who undertook to deal with enquiries when necessary. Henceforth the position became fixed and full-time in nature - the Department's important new water pollution and conservation policies ensured a steady stream of public interest.

The Department also lost some functions in these years. In 1967 responsibility for northern roadworks was handed over to the Highways Department along with staff and machinery. Likewise the Sewage Farm and the Glanville foundry closed down after slowly deteriorating for years. All were functions gained by forerunners of the E. & W.S. Department nigh on a century before. Even the P.S. Industry, commissioned in 1916 for the River Murray works, was replaced by a new self-propelled derrick boat called the Maratala.

But the processes of rationalization also threatened other time-worn arrangements, to the horror of many in certain branches of the Department. Right up until 1970 improvements were made by the Water Supply and Sewerage Branches to their major depots at Kent Town and Thebarton. As well both

had begun to decentralize activities at their own pace. Then, in 1970 the management consultants W.D. Scott and Co., were brought in to investigate, with representatives of the Department and Public Service Board, the workshop organization of the Department and possible rationalization of activities. Predictably, the consultants recommended that the Water Supply and Sewerage Branches should move towards sharing their depots. This had never been done before, despite the obvious arguments in favour. As well, they suggested two possible alternatives - the development of two major workshops or a single workshop.

Engineer-in-Chief Beaney directed that the two-workshops policy be adopted, the implicit assumption being that Kent Town would continue to be used for manufacturing activities. Thebarton would be phased out. Naturally the Sewerage Branch people were none too pleased. Then in 1972 the Government advised the Department that tenure at Kent Town was limited - the site was owned by the City Council and would revert to Parklands. That left an interdepartmental committee little choice but to recommend a single-workshop strategy, pivoting around Ottoway. In March 1974 Cabinet approved the concept.

Likewise the Parliamentary Public Accounts Committee, which had taken the matter in hand, decided that the centralization of activities was the be all and end all. However, at the end of its investigations it concluded that the Department had failed to implement the rationalization promptly, thereby missing out on the savings to be made. As well it was irate that some workshop personnel were to remain at Thebarton and that the depot had not been converted to a combined operations centre for both sewerage and water supply.[3]

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[3]See P.P. No. 119 of 1975-'76: Public Accounts Committee: 10th Report on Rationalization of E. & W.S. Metropolitan Workshops.

On paper centralization looked fine, but the actual implementation process created problems within the Department. To cope with the situation a new Operational Services Branch was formed and given the task of achieving a better co-ordination of workshop activities. The central workshops at Ottoway - which would be gradually upgraded - became its nucleus. Naturally some of the Branches remained unimpressed. Their autonomy was eroded and decision-making was to become more involved.

At the workshop level the reaction to the new arrangements was also mixed. A consultative Committee was established to bring together representatives of the unions and management to discuss conditions of transfer. Some of the men were more than happy to move to Ottoway because their working conditions - for example, in the Kent Town plastics shops - had long been far from ideal. But others did not like the extra distances to be travelled and the fact that mutual aid schemes, (such as the Kent Town Social Club and Accident Funeral Benefit Fund), did not exist at Ottoway. It remained to be seen whether the Ottoway complex would rob men of the intimacy and security which the smaller workshop arrangements had fostered. In the long run would the supposed economic advantages of centralization pay off?

One area in which centralization did improve working conditions and relationships was that of Head Office accommodation. By the end of 1968 all Departmental branches had moved into the new Government office building, the State Administration Centre, in Victoria Square. For the first time for decades all branches were in close proximity to one another, and were close without being cramped. As well, numerous depots in the country received better workshop and office accommodation. The new Southern Regional Office at Mount Gambier, for example, did much to improve the morale of staff long-used to makeshift accommodation. A steady programme of upgrading the standard of country depots continued throughout the seventies.

April 1974 brought Keith Lewis to the position of Director and Engineer-in-Chief, the youngest ever Head of the E. & W.S. Department. His energy, ability and personality made him a natural choice, but more importantly he was ideally a man for his time. His training was in civil engineering, bacteriology, biology, organic chemistry and public health engineering, the latter having been obtained at the University of London while on a Rockefellar Foundation. Even before coming to office he had played major roles in all the important, new Departmental initiatives - water and sewage treatment, anti-pollution measures, fluoridation, filtration and water resource assessments.

Once Head of the Department Lewis ensured that the concept of total water resources management reached legislative fruition. He promptly established a Water Resources Branch to bring together the necessary expertise. (This did not please those who saw past responsibilities being taken out of their hands.) As well pollution monitoring became an important Departmental priority with the Chief's blessing.

But he was also an ideas man, a doer in the cause of healthy management. In 1975 a Management Services Division was created within the Department to provide specialist management support services on organisation methods, management science applications, personnel and staff development, and safety matters. The Safety Branch, for example, promptly repaid dividends. In a little over a year the Department's disabling accident frequency rate was reduced by one-third. Some of the other branches could provide no such ready yardstick and scepticism was the attitude which often greeted their activities.

Then in 1977 a Public Relations Branch was formed, headed by a public relations officer. For such a large Department with such a variety of activities and responsibilities, it was long overdue. It incorporated the Information (later Publicity) Officer and the Photographic Section, formerly a part of the Design Branch. Again it was the Chief's desire to

bring the Departmental organisation in line with a sophisticated world which spurred on this development.

The Department has also collected a number of functions which naturally fit in with its role as guardian of water resources in the State. Responsibilities have increased in the areas of underground waters, South Eastern Drainage and irrigation and drainage schemes. Acquisition of the management and administration of Government irrigation areas, for example, will obviate problems caused in the past by clericals vetoeing technical information, estimates and priorities presented by the engineers.

The Department's role is obviously changing. Its new interests are less labour-intensive and more specialist-oriented. In the seventies the Department has expanded at a rate much less than that of the total South Australian public service.[4] Staff are tending to stay longer; even construction and maintenance gangs are becoming more permanent. The glorious days of intensive construction activity are over.

The Department is now recognizing the fact that its role is steadily broadening to achieve overall management of all the State's water resources; that it must change from being a development orientated undertaking to one emphasizing continuing management of existing works in the most efficient and cost effective way possible; and finally, that severe capital rationing in the public sector is more than likely in the years ahead. The Director and Engineer-in-Chief has, therefore, called in management consultants to tailor the organization to meet these needs. That the present management is prepared to reassess its very existence, and to undergo a radical re-organization is an answer in itself. The future rests in capable hands.

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[4]See 1974-'75 Report of the Public Service Board.

THE PRODUCT:

By the mid-seventies the Department was proving itself equal to the challenge of major new priorities. They were largely of its own making. Water pollution control, the assessment of water resources, long-term planning, and water treatment programmes were accorded increasing attention as the development boom subsided. The fluoridation of water supplies, the completion of the first water treatment works at Hope Valley Reservoir and the ongoing construction of similar works at Anstey Hill provide some concrete evidence of the Department's successful entry into new fields of engineering.

Yet the Department was not complacent about its traditional responsibilities. In the Metropolitan area there were new suburbs and extensions needing mains water and much ground to be caught up in the way of renewal of old mains and services. December 1969 saw the commissioning of the Kangaroo Creek Reservoir, the only structure to dam the River Torrens itself. Later, in 1974, work began on the Little Para Dam. It was seen as a means of supplementing the water supply system in the Elizabeth-Salisbury area, providing a balancing storage for the River Murray Water and a certain degree of flood control. The development of such storage sites was still the cheapest means of obtaining water. But by 1968 work had begun on a second River Murray pipeline to augment Adelaide's water supply— namely, the Murray Bridge - Onkaparinga pipeline. It delivers water via the Onkaparinga Reservoirs and was completed in 1974.

Much preparatory work was done by the Department on the Chowilla Department project before it was axed in favour of the Dartmouth Dam. Extensive testings and borings were undertaken and the investigations of the consultants, Soil Mechanics Ltd., were facilitated. A sealed road and railway line were built from Paringa to the dam site; a pipe-line to dispose of saline water was constructed; transportable homes erected at Paringa and telephone, water supply and sewerage services made available at the camp site. The Dartmouth Dam construction, on the other hand, is naturally

outside the Department's territory.

In the country the Department undertook further major pipeline schemes, both to supplement existing arrangements and to cover previously unserved areas. The duplication of the Morgan-Whyalla pipeline was completed in 1967, including the submarine crossing of Spencer Gulf by the contractors in an amazing eight days. Later the prestressed concrete section of the pipeline was replaced. The Tailem Bend-Keith pipeline scheme was completed in 1972 with the aid of monies provided under the National Water Resources Development Programme. Towns and farms in the Upper South East are benefited, including Keith, Tintinara and Coonalpyn.

The Swan Reach-Stockwell pipeline was also completed in the early seventies. It augmented the water supply based on the Warren Reservoir, (that is, the Central region), with water pumped from the Murray. The original Lock-Kimba pipeline scheme was completed by 1973, but work then began on an additional branch main network. The replacement and enlargement of the Tod Trunk mains between Knott's Hill and Minnipa, and Minnipa-Thevenard were gradually undertaken in the period 1962 to 1975. More recently the Myponga-Victor Harbor pipeline has been constructed to augment water supplies in the Victor Harbor-Goolwa area.

Elsewhere improvements have been made to country town water supplies, particularly in the Riverland by using the distinctive wineglass elevated tank. The Strathalbyn-Milang scheme was completed, improvements were made at Murray Bridge and permanent water supplies made available to Peake, Robe and Beachport. On Kangaroo Island the Middle River Reservoir provided a new source of supply when it was commissioned in 1968. Coober Pedy has the distinction of being the first place in the State to be provided with water by means of a reverse osmosis desalination plant. Finally, work began on the development of the only remaining underground basin near Port Lincoln - the Uley South Basin. The scheme became operational in November 1976, thereby relieving the draw-off from the Lincoln Basin.

All in all the Department has laid over 22,000 km of water mains throughout the State.

In the field of sewer construction sustained activity has been the keynote. Stage 1 of the Christies Beach-Noarlunga, Blackwood-Belair and Salisbury-Parafield Gardens Schemes have been completed. Temporary Sewage Treatment plants have been phased in and out as necessary. From May 29, 1966 the Bolivar Works took all sewage previously received at the Sewage Farm, and by 1969 the final stage of its construction was completed. The Christies Beach Sewage Treatment Works were commissioned in 1971, thereby adding another link to the chain of permanent treatment works running along the coast. Extensions were made to the Glenelg Treatment Works and to the reclaimed waters scheme in operation there. Major reorganisation work has been undertaken in the Western and South-eastern suburbs to effect much needed improvement.

The sewer construction programme in the country has continued at an even pace. Sixteen country centres are now served. In the late sixties and in the seventies schemes were completed or taken in hand at Whyalla, Mount Gambier, Millicent, Mannum, Murray Bridge, Gawler, Port Pirie - Solomontown, Victor Harbor, Stirling, Hahndorf and Port Augusta West. The sewering of towns in watershed areas was given a high priority in line with the Department's anti-pollution policies.

As well the Department has undertaken work traditionally thrown in its direction, and the usual miscellaneous projects besides. Before its responsibility for roads in the north was lost, access tracks for oil and mineral development were constructed in the Simpson Desert, Gidgealpa and Mt. Gunson mine regions. Airstrips, as usual, were graded to meet the needs of the Royal Flying Doctor Service.

By 1968-'69 the major South-East drainage work was over. A total of 545 miles of drains and large numbers of control structures, bridges and culverts had been completed. But responsibilities in the irrigation

and drainage field did not slacken. The rehabilitation of distribution, drainage and pumping systems were ever necessary. In particular pipelines were steadily replacing the old, open channel systems. A programme of installing meters to keep track of private diversions was undertaken. Internal block work still had to be supervised and advisory services made available. The first stage of a Salinity Interception scheme at Renmark Reservoir was completed. Much work had yet to be done in the direction of effective salinity control.

Beautification programmes have been inaugurated along the Torrens and in the River Sturt Reserve, and inspections made of similar work and bank protection measures undertaken by various Corporations and Councils. In 1973-'74 the Department carried out reinstatement of storm damaged foreshore areas and graded stone protection works for the South Australian Coast Protection Board. Roads, bridges, other structures and earthworks have been undertaken on behalf of the South Australian Railways for the Christie Downs Railway Extension. Much development work was put in at the Islington Industrial Estate for the S.A. Land Board. Five islands have been built in the Bool Lagoon to provide bird sanctuaries for the Fisheries and Fauna Conservation Department. Certainly the Department's capacity to meet any unusual challenge has never been in question!

THE PUBLIC:

In these years, as never before, the Department showed a willingness to formulate policies and to take positive steps in the direction of healthy public relations. Formal recognition of the Department's responsibility in this area came with the creation of an Information Officer, and later, a Public Relations Branch. Theoretically the Department was making itself more accessible than ever before.

Positive programmes to educate the public in matters of water conservation and water pollution were put into operation. A "save water" campaign was conducted in late 1967 and early 1968 to avert a severe water shortage. Departmental switchboards were jammed in late September when a free tap washering service was offered as part of the campaign. In 1976 the Minister of Works used both radio and television appearances to promote a "save water-save money" theme, using material prepared by the Department. Pamphlets promoting the theme, "Think of it as money . . . your money," reminded the public of ways to keep within their water allowance, just as the Department had done in 1936. More recently "Turn it off" stickers have been made available to anyone not averse to carrying a little propaganda on their cars, folders or whatever.

As from 1969 the Department fostered an essay competition in schools on the subject of water conservation. Gradually films were acquired on the subjects of water conservation and pollution and were readily made available to interested schools, colleges or groups. Before the new watershed controls were implemented qualified personnel addressed numerous public meetings throughout the watersheds and elsewhere. Speakers were also made available, as well as films and literature, to any Service Club, Agricultural Bureau, Schools, Councils and other groups interested. A working model of a water filtration plant created considerable interest at the Royal Adelaide Show. More recently the commissioning of a film on water treatment for Adelaide indicated that the Department was prepared to use the best means at its disposal to promote public awareness.

The Department also began to promote a concern for the environment. It provided trees to be planted and maintained by interested persons along the banks of Breakout Creek in a number of Municipal Council areas. Where construction projects were concerned an effort was made to integrate works as gracefully or as naturally as possible with the particular environment in question. Civic awards for landscaping of the Springbank

Tank area at Panorama and for the completed Hope Valley Treatment Works proved that such concern was appreciated. On country pipeline projects the policy of leaving the environment as it was meant the replacement of any natural roadside vegetation destroyed in the construction process. Pipelines became less angular in appearance and were merged with their environment as naturally as possible.

Positive efforts were made to encourage the public to visit Departmental plants and view their operations. Bolivar Sewage Treatment Works, for example, has its own guide for the benefit of the many visiting groups. At Mount Gambier the old Blue Lake Pumping Station has been renovated and now houses historic instruments, meters, plans, tools and photos. This was also a positive way of promoting the local tourist industry. A Committee of Inquiry was appointed to study the nature and extent of possible public access to reservoir reserves. One major outcome is that the State's first reservoir, Thorndon Park, will become a recreation area offering a great variety of activities.

The Department has also learnt the value of injecting tactful, personable officers into troublesome areas. At Whyalla the Superintendent has played an important role in organizing regular meetings with other utilities and the City Council to ensure co-ordinated planning. Likewise the present Southern Regional Engineer persevered in his efforts to bring about co-operation between the Department, Council authorities and newspaper proprietors in Mount Gambier. His tactfulness has paid off - at least the Department and Council inform one another about street making and main laying programmes now! The Director and Engineer-in-Chief's handling of a public meeting at Mount Gambier on the heated issue of underground waters legislation, also earned the Department some 'kudos' in the area.

Likewise the Department's decision to interview all prospective consumers along the proposed Tailem Bend-Keith pipeline was a positive step in the right direction. The choice of interviewer was a sensible one - Pat Mitchell had both the experience and the interest in people necessary for the task. For four years, between 1969 and 1972, he travelled from property to property, learning people's needs and answering their questions and fears. Over 750 people were approached in this way, and it was the information gleaned from them which determined the pattern of mains which would be constructed. The very same officer returned to the area once the work was done. Most people expressed themselves to be more than happy with the result and with their treatment at the hands of the Department.

In one official area at least, an important co-operative relationship developed. Occupation of South Australian Housing Trust homes had, at times, been delayed by the lack of water supply and sewerage facilities. In 1965 the Engineer-in-Chief and Chairman of the Trust met together in conference, the outcome being a financial arrangement from July 1 in regard to provision for Trust areas. In future the Trust advanced money and entered into agreement with the Department, just as private subdividers were doing. A Joint Services Committee was set up to administer the new system and past antagonisms were thereby contained.

Despite these more constructive attempts towards better public relations the Department still came in for pockets of criticism, some of it justified, some unjustified. That this was the case was confirmed by the investigations of a new independent agency - the Ombudsman. He reported that the largest number of claims he received against any Department were, (and are), those against the E. & W.S. Approximately 25 percent of them were found to be justified compared with the overall percentage considered justified of 23 percent and 21 percent in two

consecutive years.[5] Much good continues to come out of these investigations —the great majority of complaints are shown to be unjustified; the Department is forced to reassess the application of policy in relation to individual cases; and improvements in administrative policy or procedure are sometimes brought about.

Of the great variety of complaints brought against the Department, many relate in one way or another to the area of rating. It always conjures up mixed feelings. When pensioner remissions were brought in there was nothing but praise. But when payment by quarterly accounts and the choice of using Savings Bank branches were announced, the State Chamber of Manufacturers immediately criticized the policies on the grounds that they would multiply costs. Others were happy to have the convenience. The Sangster Committee of Enquiry on Water Rating Systems evoked further conflicting opinion. Most of the submissions from home owners and farmers sought a change in emphasis to payment by measure while the S.A. Housing Trust and Chamber of Manufacturers argued in favour of the existing system.

A group of landowners from Colburra to Keith took their case to the Supreme Court. They refused to be assessed and pay for water rates under the Tailem Bend-Keith pipeline scheme. (Some had signed the original petition in favour of a water supply.) The Court proceedings extended over many years and ultimately those south of Keith were not given branch mains as had been the original plan. Likewise, in 1974, massive increases in water and sewerage rates (as a result of property reassessments) led certain groups in the Metropolitan area to take a stand. Large public meetings took place. Many Burnside, Henley and Grange, Glenelg and Stirling residents agreed to ignore notices of increased water and sewerage rates. Computer mistakes, which caused some people to receive their water rates

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[5] See Ombudsman's Reports for 1974-'75, 1975-'76.

twice over, did little to enhance the Department's image. The announcement of a Rates Equalization system, however, seemed to quieten most of the dissenters. The most vocal, the Burnside Rates and Taxes Protest Committee, eventually disappeared from view.

At times specific water supply matters excited public attention. Never before were people more vocal than they were about the Chowilla-Dartmouth issue. Although at times the Department was seen to be wavering in the political wind, Engineer-in-Chief Beaney was the one constant figure to whom the press could refer for information. As such he became something of a public figure as the battle progressed. Certainly he appeared more frequently in the press than his predecessor and successor. Only one reporter from one particular newspaper created problems when he inserted his own paragraph within the context of reporting a speech Beaney had made.[6] Mr. O. Hannaford for one, must have been more than pleased with the outcome of the whole issue — for years he had maintained that Chowilla was impractical, and had conducted a running battle with Engineer-in-Chief Dridan in the daily press to that effect.

In the South East the people took umbrage when it was suggested that water from the region should be piped to the Metropolitan area. A South-Eastern Water Protection League was promptly formed in 1969. Likewise a row erupted when it became known that the Department had temporarily chlorinated Mount Gambier's water supply. The pathogen content of the water was alarmingly high and an election was looming so the Department acted by stealth. But despite the protestations of the Local Council and a particular land agent, chlorination eventually came to stay. The dust blown across the Blue Lake from increasing tourist traffic at the nearby Caravan Park made this imperative. One battle the Mount Gambier people

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[6] As told to me in interview with Beaney, Dec. 14, 1976.

did win was that against fluoridation. They lobbied so hard that the decision was taken not to fluoridate - but the Blue Lake water possesses a natural amount of fluoride which is half the usual dosage given anyway!

The ongoing battles by Kimba, American River (Kangaroo Island) Yatala Vale, Callington and Watervale for permanent water supplies regularly received press attention. In the Metropolitan Area when water storages became low people continued to ask the age-old question - why doesn't the Department encourage the use of rainwater tanks? Naturally there were snorts of disgust when the Department released a report in 1977 claiming that drinking water from household rainwater tanks could be dangerous. The original argument had been that such tanks were not an economical adjunct to reticulated water. Neither argument meant anything to those people who drank rainwater every day of their lives.

In fact many Adelaidians (and visitors) were still quick to roundly condemn the quality of water the Department provided them with. Between November 1, 1973 and February 1974, for example, 619 complaints were received by the Department about quality of the water in the Metropolitan area, particularly in the north-eastern suburbs. Visiting celebrities and sports teams refused to drink it. Even the Duke of Edinburgh called it a "chemical cocktail". When the organism which caused the outbreak of amoebic meningitis in South Australia in the early seventies was traced to water in the Morgan-Whyalla pipeline, the demand by the public for filtered water accelerated. Yet even when the water treatment programme got underway some were still not placated by the promise of better things to come. "The repulsive, revolting brown slush that vomits from our household taps year after year"[7] was still with them. At least Director and Engineer-in-Chief Lewis was prepared to admit publicly that the water did not meet World Health Organization standards.[8]

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[7]"Letter to Editor" in The News, Nov. 25, 1975.

[8]The News, June 6, 1974.

Likewise the problem of salinity was still with irrigators who relied on Murray water. The year 1967 proved to be a particularly damaging one. In the absence of a concerted attack on the problem by the three States which are a party to the River Murray Commission, nothing the Department could do was adequate. Independent watchdogs like the Murray Valley Development League are forced to keep on agitating.

Owners of flood-damaged property in the Virginia area had a quantity, rather than quality problem. Their claim for compensation arose out of the Department's sudden and simultaneous opening of the fourteen flood gates of the South Para Reservoir in 1971. The battle for recognition of their claim was time-consuming but was eventually successful.

In general, in matters relating to pollution, the Department had an attentive, and concerned public at its bidding. Particularly in the late sixties and early seventies were the newspapers full of pollution problems on the local, and international scale. The Mt. Lofty Ranges Association monitored problem spots in the watersheds even before the Department brought in the new regulations. However, when individuals began to see they had little choice in the face of Departmental initiatives, not all were ready to oblige. The township of Chain of Ponds was one major casualty. By 1972 the public attitude towards the acquisition of property for buffer zone land had stiffened and the Department was forced to commence proceedings under the 1969 Land Acquisition Act. Likewise the South Australian Dairymen's Association and Local Council were upset that the Department allowed a pop festival to take place in the Myponga catchment area in 1971 - at the same time, the urgency of the need to protect Adelaide's water supply from pollution was imposing severe restrictions on the activities of primary producers in the catchment areas. Some Councils were concerned that the Department's acquisition policy would mean loss of rates.

The sewerage activities of the Department were not free from criticism either. Residents of Blackwood, Eden Hills, Reynella, Glenalta, Happy Valley, Athelstone and Coromandel Valley periodically went on record to decry the official disinterest in their particular problems. In 1970, 24 Blackwood housewives even conducted a protest campaign in Victoria Square. Meanwhile Stirling residents were unhappy with the fact that the proposed local sewage treatment works would be built in a zoned residential area while Renmark people won their battle against the Department's move to site a sewage station in the local public gardens. Mount Gambier City Councillors raised a hue and cry about the "dumping" of sewerage vents on the city. They were upset that the Department had not informed them of this aspect of the sewerage scheme.

Until work began on the reconstruction of sewerage systems in the South-Eastern and South-Western suburbs, complaints about overflooding were regularly received by the Department. For example, every winter the Health Officer of the West Torrens Council noted that the overflow from sewers discharged into the main drain on the southern boundary of the airport and thence into the Patawolonga Creek and Boat Haven. Before Stage III of the Bolivar Sewage Treatment Works was completed people complained of the smells emanating far and wide from them. Market gardeners in the region, however, were more than happy with the siting of the works. They lobbied for access to the effluent the Works produced, but years passed before such a course of action was approved. Meanwhile underground resources in the Northern Adelaide Plains continued to be over-exploited.

More recently, and of more serious a character, have been the charges by individual researchers that the discharges of liquid from sewage treatment works have caused localized changes of the coastline environment, and degradation of sea grasses, sea creatures and mangrove swamps. The Department has countered much of this criticism with research

of its own but some are still convinced that discharged stormwater and effluents are the crucial factor in this issue of environmental change.

That all antagonisms had not been contained by creation of the State Public Utilities Advisory Co-ordination Committee became abundantly clear in 1973 when a Salisbury City Council engineer resigned from its ranks. His protest was that it had refused to tackle the problem of reducing the number of times trenches were dug in newly made roads for connection with water and sewerage. Certainly the Committee's "standard street" and the Department's tree planting regulations remain widely - and justifiably - unpopular.

Although the Department has begun to take more positive steps in the direction of better public relations, it has yet to learn the lesson of eternal vigilance. As a large Department with an increasing number of responsibilities and functions to exercise, it affects the vast majority of people in South Australia. There will always be Professor Schwerdtfergers[9] and lesser mortals stalking its every move. They must be treated as welcome participants in all processes.

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By the mid-seventies it was clear that the State was heading in new directions. Labor Governments continued to dominate the political scene and to implement far-reaching changes such as the concept of total water resources management. In such matters they were largely guided by the E. & W.S. Department which was itself undergoing processes of re-direction. In the areas of management organization, public relations, and workload priorities the Department was experiencing dramatic changes in order to meet the demands of a complex computer world. Past assumptions and priorities needed an urgent reassessment for circumstances had changed dramatically in the State, and indeed, throughout the world.

9 Professor of Meteorology at Flinders University (S.A.) who has promoted, throughout the seventies, the idea of towing icebergs from Antarctica to meet the State's water supply needs.

CONCLUSION

Two factors have been largely responsible for the pattern of development of South Australia's water supplies and associated activities. For one, the nature of the early white settlement left a stamp of rationality and idealism on the generations which followed. For another, the stark reality of being the driest Colony/State in the driest continent could never be ignored. In a "dog bites tail" manner they have been constantly brought to bear on one another.

From the very beginning the availability of water supplies determined areas of settlement. For instance, colonists had the good sense to grasp that in this respect, Adelaide had advantages over all other contenders as a site for a major settlement. But it soon became apparent that water supplies could never be assured all year round. Many recognised the advantages which a permanent scheme would bring, but few were prepared to lead in the matter. Eventually the Government stepped in to provide for the common good. Good sense prevailed.

Once the first public waterworks scheme was in operation interest was assured. However, for a time tensions and uncertainties tended to cloud any success associated with the endeavour. A rapid turnover of Governments and the consequent experimentation in waterworks/public works management revealed that the game of Responsible Government had yet to be mastered.

But rational thinking won through - it was appreciated that the provision of assured water supplies would encourage settlement and development. Since settlement was scattered and the dominance of centralized administration was well established, it was expected that the Government would provide. The individual's sphere of action was limited. Cheap, reliable schemes were not possible where water resources were scarce.

And so in the 1880's issues were resolved, expertise was obtained, and creative public works - such as the implementation of a sewerage system for Adelaide - were undertaken with the good favour of the general public.

But the boom faded. The plethora of government bodies involved with water supply matters were seen to be unwarranted. Soon the reality of the drought and depression of the nineties brought perspective, and reassessment to the area. With such limited water resources, and the need to urgently develop what there were, too many organizations in the arena were counter-productive. Still, water conservation schemes were utilized in such a way in the decade as to play a major role in the Colony's survival.

The first two decades of Statehood saw major conflicts to the fore. The State's battle for a share in the utilization of the Murray River, the widespread drought of 1913-'14, and World War I demanded intelligent action, but did not always receive it. Changes were imperative.

Again good sense prevailed, if prodded by an encroaching depression. The departments associated with water supply, sewerage and engineering were at last amalgamated. The Engineering and Water Supply Department emerged in 1929 - just in time to face the challenges of the depression and World War II. In the experience past strains began to meld together.

The Department proved its ability to cope. Thus, when the Government showed the good sense to develop the State's industrial base, the organization was accorded further major responsibilities. Inventive water supply programmes were constantly in demand to meet the needs of expansion and the post-war boom.

The pace slackened in the 1970's. It was time for reassessment. The Department began to overhaul outdated structural and managerial systems and moved to alter its perspectives. There were new roles and different growth areas to develop.

In particular the concept of total water resource management reached fruition. It was the obvious response to the problem of the State's limited resources, now that the interrelationships were clear. The Government wisely embraced the concept and acted on it.

The record of the past augurs well for the future. Politicians have invariably argued about the degree of State involvement, but never about the need for that involvement. Governments have moved to ensure that rural, urban and industrial development has not been hindered for want of adequate water supplies.

The responsible organizations have, on the whole, performed competently - particularly when the task has been in the hands of a single Department. There have been no calamitous blunders, no shattering scandals. Water supplies have been provided all over the State in line with the general rule of utilizing the cheapest sources of supply first. And there has always been enough skill and ingenuity to tackle other projects and functions besides.

The public has generally been happy with the product. State control of such functions has never created any widespread fear. However, people demanded, and expected, a high standard from the beginning. In return they have accepted, for the most part, the heavy, annual draught on State coffers necessary to meet that commitment.

There is not, and will not be any ultimate solution to the State's water resource problems. But while there are South Australians with the spirit of resolution of their forebears "the parched ground shall become a pool and ... there shall be ... a way".(ISAIAH 35: 7,8)

APPENDIX I

Problems of Research

This thesis emerged from a research project which I undertook for the Engineering and Water Supply Department of South Australia. That organization required a history which paid particular attention to individuals and achievements.

As such I took an all-embracing approach to the topic from the outset, rather than developing a particular idea or theme. It was a case of recording as much as possible, in as many areas of interest as possible. This approach, together with the problems inherent in covering an 150 year time span, led to an artificial, but necessary, sectionalizing of material in the end product.

The major, primary sources of my research added further complications. I worked through all the relevant files and dockets which survive from the nineteenth and first quarter of the twentieth centuries. None are indexed and there are many gaps in the material. Thus the picture of some periods of administration is very complete, while others are very sketchy. The opposite situation confronted me when dealing with the 1930's and onward. The dockets are complete, but so numerous that there was no hope of working through them. I had to be content with selecting the odd relevant file (via Index Books) and with securing leads and information from an entirely different source - namely, retired and serving officers of the Department.

My assessment of the Department's public image at any point in time relies rather heavily on newspapers as the major source of material. Again there was the problem of adequate coverage. Few newspapers are indexed and the sheer volume of them is daunting. My task was alleviated somewhat towards the end - the Department has newspaper cutting scrapbooks which cover the most recent decades.

Overall then, my thesis displays an ever-changing pattern of interest, largely dictated by the nature and extent of sources available. Unfortunately there is a dearth of Australian administrative histories, the like of which could have guided and inspired confidence in the task at hand.

APPENDIX II

(a) Water Supply – South Australia

Year	Population*	No. of Assessments	Length of Mains	Capacity of Reservoirs	Invested Capital (cumulative)
1861	126,830	2,870	38 miles	138 million gallons	£ 223,000
1870	183,797	≏ 8,000	≏ 85 "	142 " "	£ 360,736
1880	260,000	25,207	251	650	£ 725,860
1890	315,212	66,069	976	1,851 · 782	£ 1,784,925
1900	358,346	75,842	1,576	5,034 · 224	£ 3,004,469
1910	406,868	96,965	2,624	7,609 · 478	£ 5,382,574
1920	491,006	140,343	4,018	9,084 · 439	£ 8,290,870
1930	574,467	184,192	5,980	16,849 · 329	£ 14,422,536
1940	599,056	186,431	6,417	23,814 · 102	£ 15,018,366
1950	722,843	210,808	7,126	23,942 · 027	£ 21,247,004
1960	957,022	289,235	9,016	33,957 · 000	£ 59,754,865
1970	1,177,807	339,446	11,753	50,805 · 000	$ 280,198,000
1978	1,287,600	417,594	22,831 Kms (14,269 miles)	228,860 ML* (503,492 m.galls)	$ 438,936,751

* Census or Year Book figures

* figure includes both natural intake and R. Murray water held in reservoirs

(b) Sewerage – South Australia

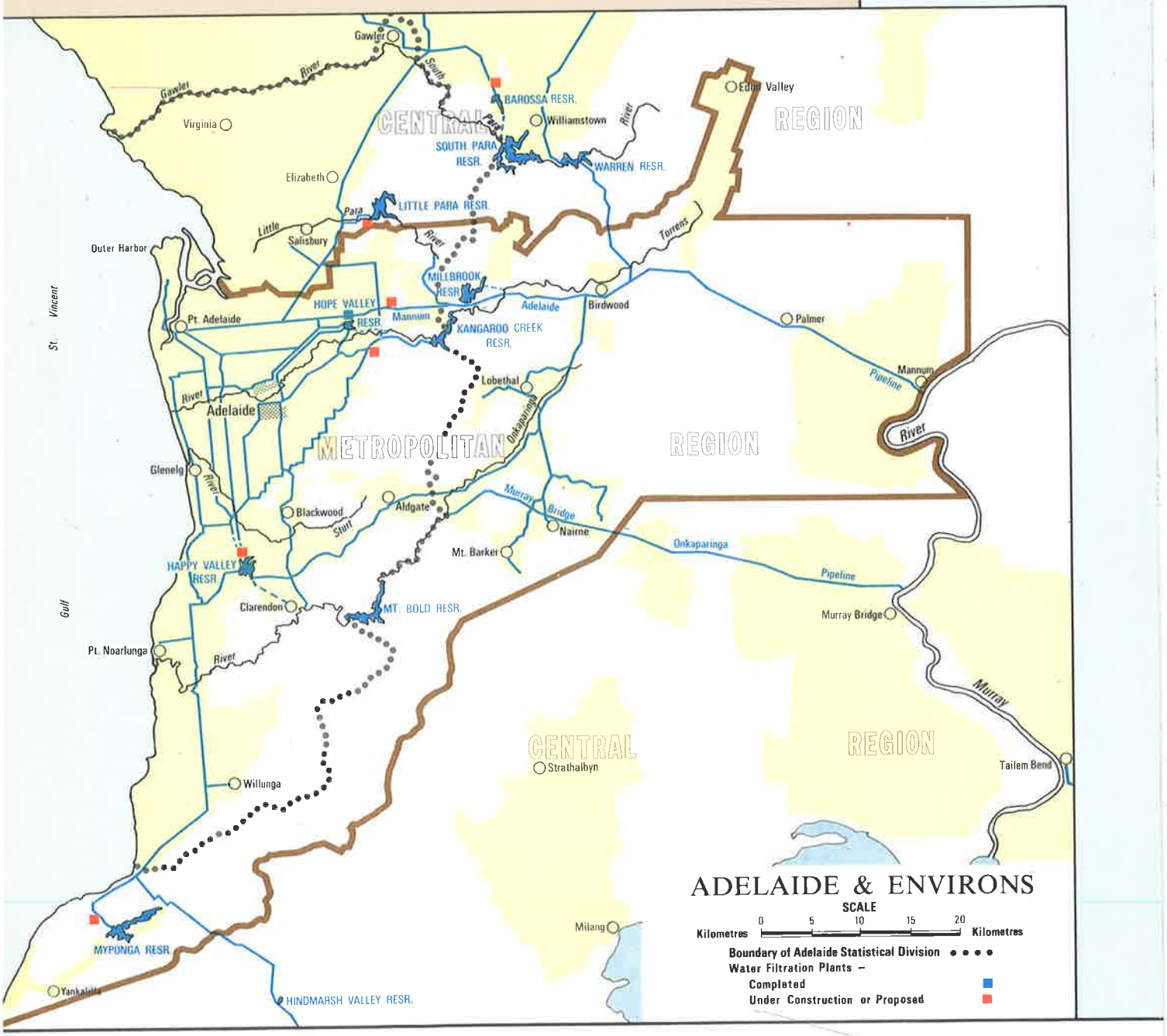
Year	Population	No. of Premises connected	Length of Sewers	Invested Capital (cumulative)
1882	275,344	207	29 miles	£ 215,937
1890	315,212	12,190	129 "	£ 446,967
1900	358,346	20,936	226	£ 609,496
1910	406,868	27,114	288	£ 804,387
1920	491,006	43,636	422	£ 1,214,522
1930	574,467	66,042	683	£ 2,519,650
1940	599,056	82,979	929	£ 3,558,879
1950	722,843	102,782	1,092	£ 4,629,511
1960	957,022	167,333	1,565	£ 10,437,696
1970	1,177,807	258,945	2,553	$ 104,737,000
1978	1,287,600	362,879	5,777 Kms (3,611 miles)	$ 214,457,912

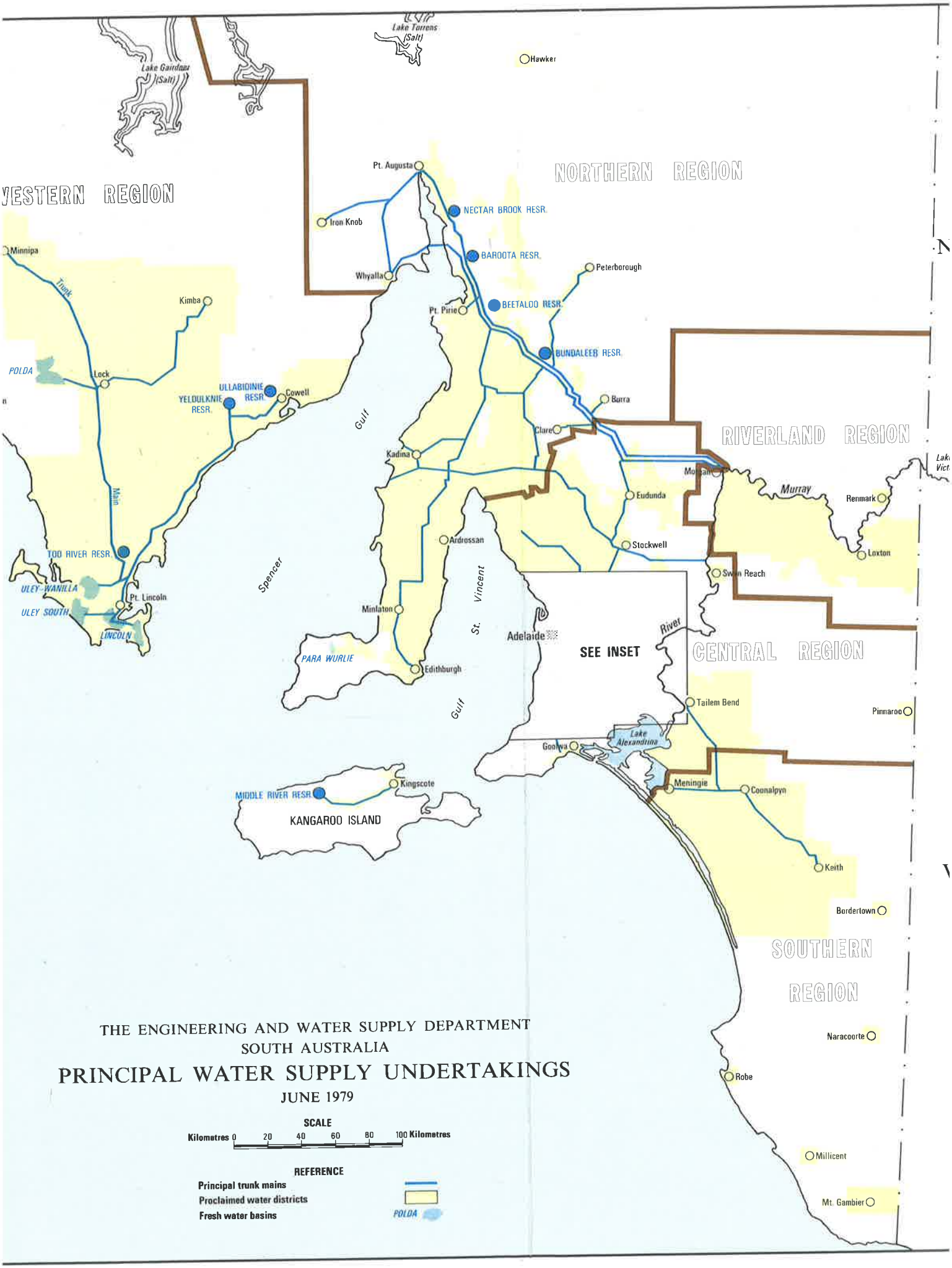
APPENDIX III

PRINCIPAL RESERVOIRS

Name	Source of Supply	Type of Dam or Embankment	Capacity Megalitres	Full Supply Level EL	Low Water Level EL	Year Completed
METROPOLITAN						
Hope Valley	River Torrens	Earth	3 470	103·56	88·17	1872
Happy Valley	River Onkaparinga	Earth	12 700	145·92	134·64	1896
Barossa	South Para River	Concrete Arch	4 510	220·08	195·62	1902
Millbrook	River Torrens	Earth	16 500	302·95	277·52	1918
Mount Bold	River Onkaparinga	Concrete Gravity-Arch	30 200	240·50	205·45	1938
raised			47 300	248·90	205·45	1962
South Para	South Para River	Earth and Rock Fill	44 900	255·43	226·43	1958
raised			51 300	256·96	226·43	1960
Myponga	Myponga River	Concrete Arch	26 800	211·69	178·54	1962
Kangaroo Creek	River Torrens	Rock Fill	24 400	242·14	193·14	1969
Little Para	Little Para River	Rock Fill	21 400	149·58	109·20	1977
COUNTRY						
Beetaloo	Crystal Brook	Concrete Gravity	3 700	365·87	340·39	1890
Nectar Brook	Nectar Brook	Earth	700	129·68	115·66	1899
Bundaleer	River Broughton	Earth	6 370	295·01	276·26	1902
Yeldulknie	Yeldulknie Creek	Concrete Gravity	740	194·45	183·17	1913
Ullabidinie	Ullabidinie Creek	Concrete Gravity	520	118·68	106·18	1914
Warren	South Para River	Concrete Gravity	5 080	385·31	371·52	1916
Hindmarsh Valley	River Hindmarsh	Earth	460	68·19	57·27	1917
Baroota	Baroota Creek	Earth	6 140	117·25	94·22	1921
Tod River	River Tod	Earth	11 300	118·73	95·72	1922
Middle River (K. I.)	Middle River	Prestressed Conc. Gravity	470	*	*	1968

* Conversion of levels to Australian Height Datum not yet completed





THE ENGINEERING AND WATER SUPPLY DEPARTMENT
SOUTH AUSTRALIA

PRINCIPAL WATER SUPPLY UNDERTAKINGS

JUNE 1979

SCALE

Kilometres 0 20 40 60 80 100 Kilometres

REFERENCE

Principal trunk mains

Proclaimed water districts

Fresh water basins

POLDA

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Retired Personnel:

Ray Ashton	- Dec. 6, 1976	Ron Goulter	- Aug. 30, 1977
Moffat Anderson	- Dec. 6, 1976	George Oakey	- Aug. 30, 1977
G.H. Brooks	- Dec. 7, 1976	Reg Coumbe	- Aug. 31, 1977 Dec. 1977
H.J.N. Hodgson	- Dec. 8, 1976	Reg Baker	- Aug. 31, 1977
J.A. Davis	- Dec. 8, 1976	Sid Welk	- Aug. 31, 1977
L.W.N. Collins	- Dec. 9, 1976	Stan Hatch	- Aug. 31, 1977
H.G. Oliver	- Dec. 9, 1976	Charlie Wright	- Aug. 31, 1977
J.S. Gerny	- Dec. 13, 1976	L.R. Steele	- Sep. 12, 1977
C.E.F. Jacob	- Dec. 13, 1976	Bill Crickett	- Sep. 19, 1977
H.L. Beaney	- Dec. 14, 1976	Roy Atkins	- Sep. 19, 1977
J.R. Dridan	- Dec. 14, 1976	Herb Tilmouth	- Oct. 3, 1977
S. Gild	- Feb. 1, 1977	Jack Wright	- Oct. 3, 1977
G.G. Poole	- Feb. 2, 1977	Ken MacAlpine	- Oct. 20, 1977
Clem Gunner	- Aug. 3, 9, 1977	Sam White	- Oct. 20, 1977
Pat Mitchell	- Aug. 12, 1977	J. Murrell	- Dec. 2, 1977
Eric Pope	- Aug. 12, 1977	Tom Farrent	- Feb. 1978
Ted Wannan	- Aug. 15, 1977	Sir Thomas Playford	- Mar. 13, 1978
Jack Haines	- Aug. 15, 1977		

Serving Personnel:

Hugh Kimber	- Aug. 8, 16, 1977	Vernon Curnow	- Aug. 31, 1977
Glen Gum	- Aug. 23, 1977	Tom Wills	- Aug. 31, 1977
Don Ide	- Aug. 24, 25, 1977	S. Mudge	- Aug. 31, 1977
A.C. Gilbert	- Aug. 30, 1977	Jack Gibbs	- Sep. 19, 1977
Jack Ellis	- Aug. 30, 1977	Les Cooney	- Sep. 19, 1977
Russel Woods	- Aug. 30, 1977	Allan Baker	- Sep. 20, 1977
Alan Mathews	- Aug. 30, 1977	John Stanley	- Sep. 20, 1977
T. Flinn	- Aug. 30, 1977	Don Hogben	- Sep. 20, 1977

Serving Personnel (cont.)

Doug Lane - Oct. 20, 1977

N.B. The many unrecorded conversations I had with numerous Departmental personnel, also contributed to my research.