An aerial photograph of a residential and industrial area. In the center, a large, cylindrical water tower stands out. The surrounding area is filled with houses, streets, and some industrial buildings. The foreground shows a large, rectangular structure, likely the pumping station mentioned in the text. The overall scene is a mix of urban and industrial development.

A new era in irrigation at Renmark

**Opening of The
Renmark Irrigation Trust
New Main
Pumping Station**

December 1st, 1972

A New Era in Irrigation at Renmark

**OFFICIAL OPENING OF THE
RENMARK IRRIGATION TRUST
NEW MAIN PUMPING STATION
FRIDAY, DECEMBER 1st, 1972**

Ceremony Performed by the
Premier of South Australia,
Hon. Don. Dunstan, Q.C., M.P.

Introduction

The opening of the impressive new Pumping Station in December 1972 on such a picturesque and well-known site must rank as one of the most important and vital events in the annals of Renmark.

No more appropriate time than the present could be chosen for recalling the history of irrigation in this district.

The replacement of the old low-lift open channel water distribution system by a modern pipeline system, coupled with the provision of a comprehensive drainage scheme, represents by far the most spectacular development in the history of the pioneer irrigation settlement since its founding by the Chaffey Brothers 85 years ago.

The Start of the First Irrigation Settlement

It was in 1887 that the two brothers, George and William Benjamin—Canadians who had made their name as “irrigation colony” promoters and engineers in California—demonstrated for the first time in Australia what vast possibilities in fruit growing lay in the application of the life-giving waters of the River Murray to the thirsty semi-arid soils that lined its banks.

The Chaffey Brothers' original scheme, envisaging the ultimate development of some 50,000 acres at Renmark, with a further 200,000 acres to follow, was nothing if not bold in the extreme, and it was no discredit to their capabilities as irrigationists, but rather the result of financial, political and marketing influences that their company failed when no more than about 3,000 acres had been brought under irrigation.

Although Mildura was planned as the Chaffey Brothers' first irrigation venture in Australia, the honour of being the first to be commenced falls to Renmark, by a matter of only three months. This was due to the Chaffey Bros. having been encouraged to turn their attention to South Australia after political wrangling in Victoria appeared to have wrecked their Mildura project. The ready agreement reached with the S.A. Government through its Premier and Attorney-General (Mr. John Downer—later Sir John) had the effect of the Victorian Government rapidly overcoming its objections, and as a consequence Mildura was started quickly on the heels of Renmark.

Renmark was founded with the signing of the agreement on February 14, 1887, the site chosen lending itself admirably to an irrigation system consisting of a series of very low lifts, the highest, or third lift, taking the water to only 60 feet above mean summer level of the river. The initial area to be developed was fan-shaped, with the town on the river bank at its apex, and two main avenues—Renmark and Ral Ral—commencing at the wharf and running out at right angles to one another. The streets were laid out at right angles, with few exceptions, and the whole make a very pleasing design. Because of the nature of the land, most of the channels were of unlined earth construction, an important factor in minimising the initial cost of the project, though destined to bring serious problems as the years went on in high maintenance costs and seepage damage to adjoining land and plantings.

A big proportion of Renmark's early settlers came from the United Kingdom, having been attracted by the famous "Red Book"—an elaborate promotional publication compiled for the Chaffeyes for distribution in the "Old Country".

EARLY TROUBLES

Six years after Renmark was founded the failure of the Chaffey Bros. led to the formation, in 1893, of the Renmark Irrigation Trust No. 1, brought into being by special Act of Parliament to enable the infant "irrigation colony" to survive. Franchise was on an acreage basis, with a board of seven, each serving for a term of two years. This was to be the first major demonstration of that co-operative enterprise among the growers which was to become a feature of both Renmark and other River Murray irrigation areas in the field of processing and marketing their produce, and of community enterprise generally.

CO-OPERATION

Early in its history the Renmark settlers were impressed with the need to work together or perish—a classic instance having occurred when, due to lack of finance after the formation of the Trust, it was only through their combined efforts that enough firewood was cut and fed to the furnaces to keep the steam-driven pumps working.

R.I.T. TAKES OVER

The first board of the Renmark Irrigation Trust which took office in 1894 had Col. C. M. Morant as chairman and Mr. J. Price secretary. Other board members were Messrs. C. R. D'Olier, R. Turner, W. H. Harrison, T. Madigan, J. I. McGarvie, M. R. Fitzgerald.

The eligibility to be a member of the Trust, as prescribed by the Act, is the ownership of a minimum of ten acres of ratable land.

The area under irrigation at that time—only five years after the settlement was founded—was nearly 3,000 acres, and the settlement's total population 900.

Although comprising only a very modest area when compared with the promoters' original plans, Renmark soon became widely known for the quality of its produce, comprising mainly dried fruits and citrus. Because of its example the Government of the day assisted in the establishment of 12 "village" settlements on a communal basis along the River Murray as a relief measure during the severe depression of the early 90's. Similarly, it was because of the ultimate success of Renmark that the Government embarked on the establishment of its own irrigation areas under departmental control.

GRADUAL DEVELOPMENT

The area under irrigation at Renmark was about 5,000 acres by the time of the First World War. At the end of that war, expansion, largely for returned soldier settlement on "Block E", saw the total area increased to about 7,000 acres.

Since World War II, further development, by means of private pumping from the 60 ft. channel to land above that level, has sent the total to about 9,560 acres.

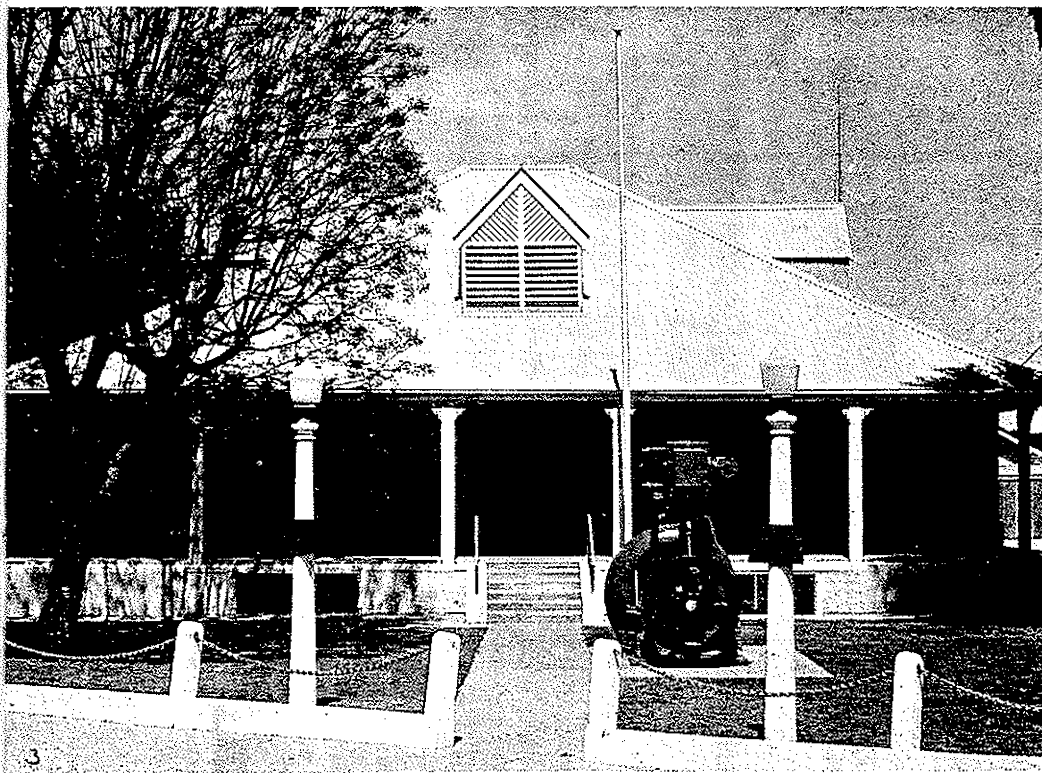
Following the expansion in the area after the First World War, a great era of development took place in the form of electrification, channel reconstruction and drainage. This was during the record terms of office of Mr. C. H. Katekar as chairman for 21 years and Mr. J. S. Tolley as engineer for 29 years.

ELECTRIFICATION

The electrification of the pumping system was embarked upon in 1933, power being generated by a wood-burning steam driven plant at No. 1 Pumping Station, and reticulated by power lines to the other four pumps, Nos. 2 (Crescent), 3 (Bookmark) 4 (60 ft.) and 6 (Block E). Subsequently the scheme was expanded to include a domestic electricity supply to the whole area under the control of the Trust—this being one of the first rural areas in Australia to be provided with such a service. As time went on the project continued to grow with extensions to the neighbouring areas of Chaffey, Berri (including enabling the radio station 5RM to be established), Lyrup, Monash, Loveday and later to Cooltong and Paringa.

In the late 1930's diesel oil units were installed to supplement the steam unit, and in 1946 a further large diesel unit was installed, and the steam unit held for stand-by purposes. Later again, in 1954 the Trust commenced the purchase of some electricity in bulk from the Electricity Trust of South Australia, whose power lines had been gradually extending throughout the State. By 1956, the whole of the requirements of the Trust were obtained from ETSA, and the Trust's own plant was no longer required.

The Trust's Office, constructed by the Chaffey Bros., in 1888 and maintained in excellent condition. An original Chaffey Bros. steam-driven pump is mounted in front of the building. This pump was designed by the Chaffeys and manufactured by Tangyes, of Birmingham, United Kingdom.



CHANNEL LINING

The major item in the channel reconstruction scheme embarked on between the two world wars was the conversion of the major portion of its 80 miles of channels from earth to concrete-lined.

FIRST DRAINAGE WORKS

Another very important work was in the field of drainage, a number of open-cut drains, being excavated in an endeavour to relieve the inevitable build-up of subsoil salinity which, as with almost all irrigation areas, was proving a very serious problem.

LOCAL GOVERNMENT

The responsibilities of local government were carried out by the Trust for the whole area, under the provisions of the Act, until 1904, when the town area, amounting to only about a third of a square mile, was constituted a separate local governing area. The Trust continued capable to administer the irrigation district for local government as well as water supply purposes until 1960. In that year, as a result of a mounting desire on the part of ratepayers for a single local governing body, the Corporation of the Town of Renmark was expanded to incorporate the whole of the irrigation area and also the neighbouring Ral Ral and Cooltong divisions of the State-administered Chaffey Irrigation Area.

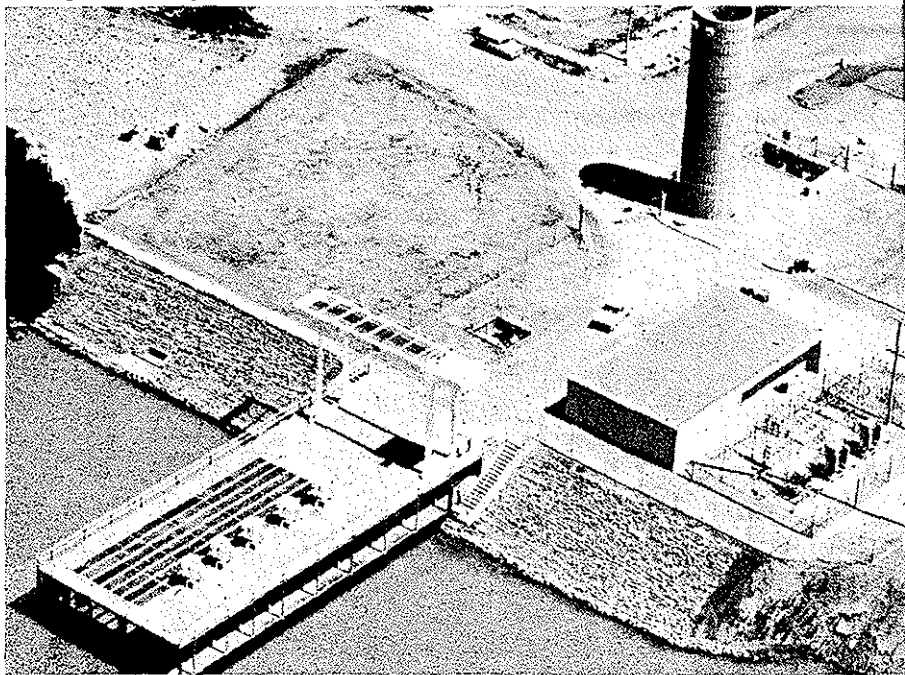
Under the amalgamation arrangement the Corporation retained its municipal status while the Trust continued to provide water and electricity supply services outside the old town area.

NO. 1 PUMPING STATION

The original site of the Chaffey Brothers' No. 1 Pump, lifting the water from the river, was at the mouth of Ral Ral Creek. This enabled the main feed channel to follow a natural depression leading into a creek which was used as a reservoir from which other pumps lifted the water a further few feet to permit reticulation to the irrigated properties.

Within a short time, however, it was found that in times of low river, brackish water draining from the creek made the water at that point unduly salty, and so the pumping station was brought right to the top end of the town at Ninth Street, well clear of the mouth of the creek. Water quality at this point was

The new main Pumping Station, showing double deck staging jutting into the river to support the vertical motors and pumps, with control room at right and surge tower in background.



helped by a log spur, or beacon, constructed in the bed of the river to direct the main flow to the pump intakes.

After the River Murray locking system came into operation in the 1920's, the Trust was successful in arranging for the weir at Lock 5, which controls the Renmark Pool, to be kept at a sufficiently high level to enable an adequate gravity flow through the feed channel to the outlying pumping stations. This by-passing of the No. 1 pump meant a considerable saving in irrigation costs.

The main method of conveying merchandise to and from the irrigation district in its earliest years and for many subsequent years was by river paddle boat, and the Trust had a further close link with the river trade in that it had its own steamer, the ERO, engaged in transporting firewood, first to its steam-driven pumps, and later, on conversion to electric power, to its steam-driven generators.

METHOD OF RATING

The first (half-yearly) general water rate was declared on February 1, 1894, and was \$1 per acre, with a rebate of 25c per acre for purchasers of land prior to November 1, 1892. The general rate was raised to \$1.50 in 1915, \$2 in 1919, and \$2.50 in 1921. Following the disastrous frost of September 1927, the rate was reduced to \$2.25 in 1928, and the Depression years led to further reductions to \$2.10 in 1931 and \$2 in 1932.

Ten years later, in 1942, the rate was increased to \$2.50 again. Further increases have occurred over the years, the rate being \$2.75 in 1950, \$7.75 in 1959 and \$8.75 in 1960.

The present general half-yearly rate is \$12.00 per acre.

INDEPENDENCE AND AUTONOMY

It is significant that the Renmark Irrigation district has remained under the control of its growers since the inception of the Trust. It is the only major irrigation area in South Australia where this is the case, all of the others—Berri, Barmera, Loxton, Waikerie—being administered by the Department of Lands.

Not only has it had reason to be proud of its independence but also of its ability, until comparatively recent years, to stand on its own feet financially.

NEED FOR GOVERNMENT LOANS

While millions of dollars had been spent by the Government on its own departmentally controlled irrigation areas, Renmark had managed on a minimum of assistance in the form of repayable loans. The earliest of these were \$6,000 in 1896 and a further \$32,000 in 1900. Then, in 1919, another loan, not exceeding \$36,000, was provided for constructing the irrigation system for Block E (the Trust's soldier settlement area), monies raised from a water right charge c. up to \$20 per acre being used to repay the loan.

The old gravitational main feed channel, soon to be discarded, showing the salt impregnated flats which border it and are a constant serious threat to water quality at the old inland pumping stations.



The Aftermath of War and Flood

As might have been expected, due to a lack of man-power, finance and other resources, the Trust had to "tighten its belt", both during World War II and the early post-war years.

During the 40's little could be done by way of capital improvements, and the deterioration in the irrigation and drainage facilities became more apparent. These disabilities were aggravated by the Trust's unselfish decision to make available a water supply to enable many ex-servicemen to be settled mainly on the land at higher levels on the outskirts of the original settlement.

These newly irrigated properties saw the advent of sprinkler irrigation, a method which has since increased in popularity and caused radical, yet favourable results in water and land usage. Other unusual changes were occurring due to many ratepayers either adding to or changing plantings from vines to trees, requiring additional and more frequent irrigations. This trend has proved the rule rather than the exception ever since.

The combined effect of an increase in the irrigated area and greater and more frequent water usage was to cause a serious overload on irrigation and drainage facilities already obsolete, inadequate, and in need of repair and rehabilitation.

It was obvious to the Trust during these worrying and frustrating years that the capital costs involved in rehabilitation were far beyond their resources or borrowing capacity from normal sources. Unfortunately, approaches made to the Government met with luke-warm reaction.

THE 1956 FLOOD

Sometimes it takes a disaster to reveal the truth.

The record 1956 Flood has proved a turning-point in the history of the Trust and the fortunes of Renmark.

The Flood proved that Renmark people could and would co-operate and fight to the last for their very existence, that other people from the rest of the State and Nation in admiration and compassion would help them, and that as a valuable community and area of production, the Government realised it had to act by providing massive financial, technical and physical support, to ensure a minimum of damage.

But above all the Flood revealed in stark reality to the Government and other outside helpers, not only Renmark's vulnerability, but also the obsolescence and glaring disrepair of its vital irrigation and drainage facilities.

Both during and immediately after the Flood, Federal and State Governments provided finance for repairing roads, bridges, flood levees, and damaged properties. A State loan was made available to the Trust for use in de-watering flooded and seepage-affected land.

GOVERNMENT AID FOR REHABILITATION

In 1957 the Trust appealed to the Government for aid in solving its major problems, and later advised the Government that it had resolved to appoint an Advisory Committee to investigate, report and recommend appropriate remedial action.

As a result the Advisory Committee was formed comprising Mr. J. A. Ligertwood (Engineer for Irrigation and Drainage, E. & W.S. Dept.), Mr. E. J. Carey (S.A. State Treasury), Mr. J. A. F. Oram (Engineer-Manager First Mildura Irrigation Trust), Mr. F. Penman (Officer-in-Charge C.S.I.R.O. Research Station, Merbein), Mr. T. M. Price (Chairman R.I.T.), Messrs. S. W. Heritage and H. J. Katekar (Members R.I.T.) and the Chief Engineer and Secretary R.I.T. The presence of Mr. Oram on this committee served to illustrate the friendliness and affinity which has already existed between the two pioneering irrigation authorities.

At its first meeting in April 1958 the committee recognised the urgent need for accurate survey data and contour plans to enable a proper design and plans for a comprehensive drainage scheme. The Trust forthwith employed a survey team to carry out field work and the Department of Lands made available personnel and facilities for drafting plans. Later in October 1958 the

Government agreed to its officers preparing designs, and plans for a drainage scheme, provided the Trust met the full costs of all investigation, designs and plans.

COMPREHENSIVE DRAINAGE

The Trust emphasised the urgent need for action to save the areas in Block E and Bookmark, which had suffered more seriously from high water tables aggravated during the 1956 Flood. As a result it was agreed that as a temporary expedient, a pump and sump system should be installed in Block E and this was started in the winter of 1959.

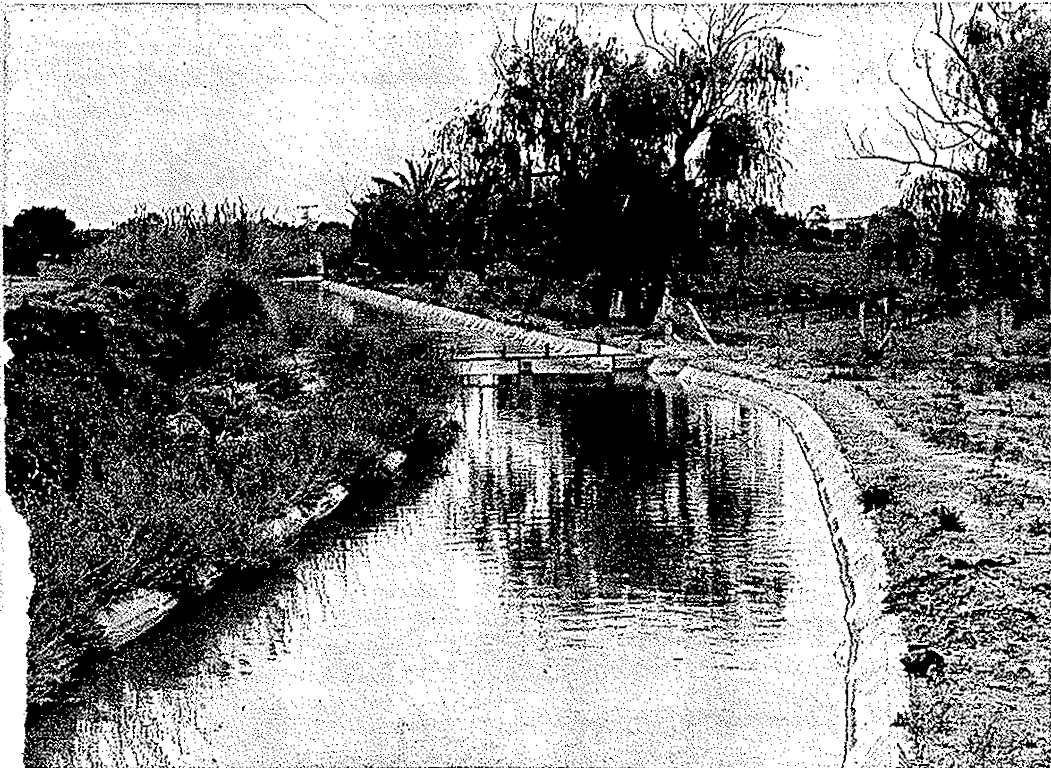
In June 1959 the Trust, led by Mr. T. M. Price (who served as Chairman for 9 years), supported by the evidence and recommendations of the Advisory Committee, emphasised the urgent need for and ultimate benefits to be gained by the provision of adequate drainage facilities and a rehabilitation of the irrigation system and appealed for financial assistance.

In August 1959, the Premier (Sir Thomas Playford) advised the Trust that the Government would help with a Grant of \$1 million, and a loan of \$½ million over a period of 16 years (later reduced to 10 years), provided the Trust contributed another \$½ million and agreed to withdraw from the exercise of its local government powers in order to facilitate the amalgamation of local government in Renmark.

Subsequently it was agreed that certain Trust expenditure on channel reconstruction and drainage works in Block E already carried out as well as additional works to be completed in 1960 could be re-imbursed to the Trust out of those funds.

In March 1961 the Advisory Committee recommended that the first part of the gravity drainage scheme be started in the Bookmark Area and that the Trust examine the merits of a main pumping station on the river. However the preliminary estimates of the cost of a comprehensive drainage scheme amounting to \$2½ million, proved a shock.

A concrete-lined main irrigation channel, to be replaced by the pipeline scheme.



The Government advised the Trust that any consideration of improvements to the irrigation system must be deferred until the detailed estimated cost of drainage had been assessed.

Late in 1961 the first part of the comprehensive drainage scheme was started in the Bookmark area.

In April 1962 the final plans for the comprehensive drainage scheme became available and disclosed a total estimated cost of nearly \$2 million.

The Trust again expressed its concern to the Government regarding its inadequate finances for tackling the urgently needed improvements to its irrigation system.

During 1962 and early 1963 the Auditor-General (Mr. G. H. P. Jeffery) and his staff, at the Government's request, investigated the Trust finances, and as a result the Government agreed to provide additional financial assistance to enable the drainage scheme to be completed by 1967 instead of 1970 on terms more favourable to the Trust.

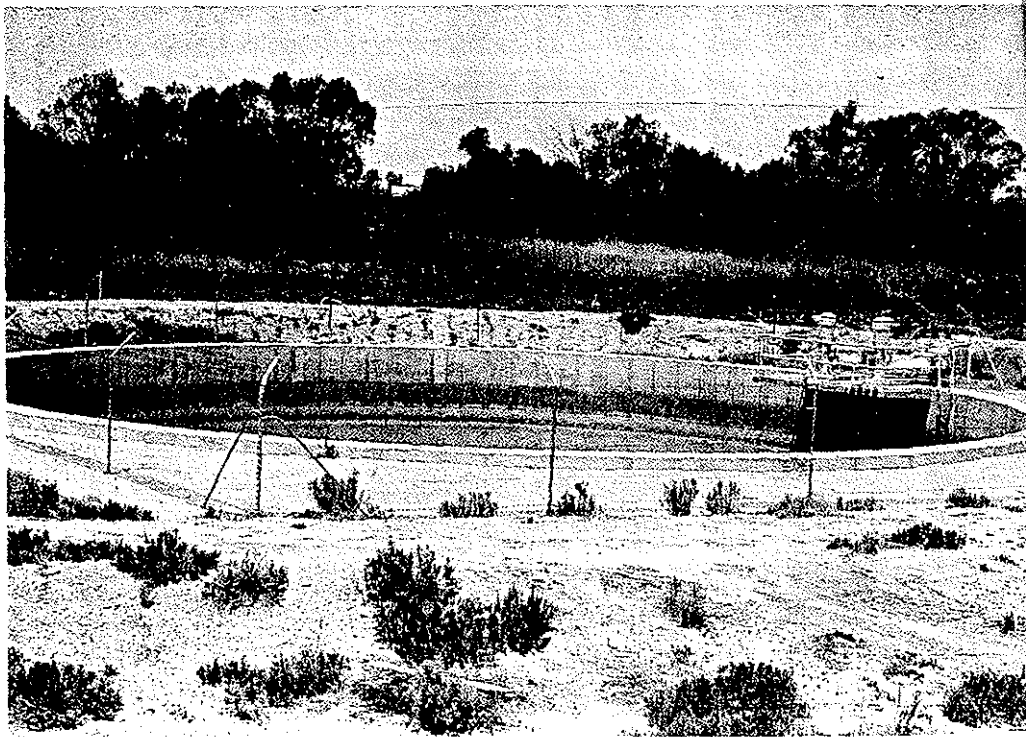
These drainage works were completed in June 1967, and from the time they started until now the benefits to soils and plantings have been remarkable and have completely justified the expenditure and the advocacy of the Trust and its Advisory Committee.

IRRIGATION SYSTEM REHABILITATION

In the meantime, the Trust continued to emphasise the obvious futility and naivety of expending large sums on one serious defect such as seepage whilst neglecting to correct the disabilities in the irrigation system which not only aggravated the seepage and salinity problems, but also imperilled the very existence of the settlement.

The concrete-lined channels were cracked, leaking and often over-loaded (with rising wages making proper maintenance impossible), the obsolete pumps were inefficient and unreliable, the gravity supply through the feed channel from the river at times inadequate and insecure. At all times there was some salt con-

A 75 ft. diameter drainage caisson with pumping units for disposal of seepage effluent.



tamination from adjoining river flats, and during flood periods a risk of major contamination and disruption of supply.

During 1964 the Trust pressed its claim for aid and Ministers, politicians and public servants made inspections at the Trust's request.

In January 1965 the Premier (Sir Thomas Playford) visited Renmark and advised the Trust that the Government would finance a new pumping station on the river and rising mains across the flood flats costing \$1,120,000 of which sum the Trust would eventually have to repay 5/7ths to the Government, and in addition the Government would grant the Trust \$1 million, provided the Trust found a matching amount of \$1 million towards the cost of reconstructing its channel system.

These works were to be carried out during the ensuing 10 years, and were based on preliminary plans and estimates prepared by the Government and not by the Trust.

There was a change of Government in March 1965, and the new Government instigated a further investigation by the Auditor-General of Trust finances resulting in a Government decision in July 1965 to endorse the proposal of the previous Government with some further leniency in regard to the drainage loan terms and a suggestion that the Trust could meet its financial commitments under the proposal, by increasing its general rate by \$4 per acre per annum.

PIPE LINES INSTEAD OF CHANNELS

As a result of a private visit by a Trust member to California in 1959, the Trust had been made aware of the extensive use and merits of completely pressurised pipe-line systems in lieu of channels and during the ensuing years of research and investigation had continued to promote the idea of adopting a similar system for Renmark.

The initial Government reaction was not favourable on the grounds of exorbitant cost.

The Trust persisted with its conviction that pipe-lines were better and that channel reconstruction was not feasible.

In March 1966 the Trust submitted to the Government a list of advantages of a pipe-line system, pointing out that the projected life of a pipe-line system was 50 years as against less than 25 years for channels, pipe-lines would free for productive use substantial areas of land occupied by channels, which also unlike pipe-lines leaked and over-flowed, thereby damaging much adjoining land and plantings, and which because of leaks, cracks and weed growth, needed continuous costly maintenance; that channels, not pipe-lines, were prone to allow water contamination through salt, silt and storm-water inflow, they constituted a danger to young children, caused loss of water through leakages, over-flows and evaporation, and were a medium for spreading noxious weeds and pests. But above all it was stressed that existing channels were in such constant use that it would be almost impossible to carry out reconstruction, whereas pipe-lines could be laid and be ready for use whilst the channels continued to serve the needs of ratepayers.

During these years of research into better methods and systems the Trust made many visits to other irrigation areas in other States.

In July 1966 the Trust submitted to the Government that there should be an agreement on certain matters including responsibility for design and planning, criteria for design, and pipe-lines versus open channels.

REHABILITATION ADVISORY COMMITTEE

Late in 1966 the Trust chairman (Mr. S. W. Heritage), suggested to the Minister that both the Government and the Trust could be better served and protected if a new Advisory Committee was formed to advise the Trust on engineering, technical, administrative and financial matters involved in the proposed rehabilitation scheme.

In February 1967 The Renmark Irrigation Trust Rehabilitation Advisory Committee, known as R.I.T.R.A.C., was appointed, comprising Government members, Mr. J. A. Ligertwood, Engineer for Irrigation and Drainage (as chairman), Mr. J. E. Nitschke, Engineer for Design E & W.S. Department of Lands, and Trust members, the chairman (Mr. S. W. Heritage), the engineer-manager (Mr. R. H. Maddocks) and the secretary (Mr. D. L. Tripney).

In February 1969, Mr. G. M. Story, Supervising Design Engineer, E & W.S.

Department and Mr. M. G. Gallasch, Project Engineer of the Trust, were added to R.I.T.R.A.C., and during his term of office as chairman of the Trust, Mr. T. W. Pitt replaced Mr. Heritage.

Since its appointment, R.I.T.R.A.C. has proved extremely helpful in guiding and assisting the Trust and its staff on a wide range of highly technical and complicated aspects involved in the Scheme. To date it has met nearly 40 times, travelled extensively and co-ordinated the investigating and design work performed by Trust and Government Staffs.

It must be remembered that the proposed Scheme was breaking new ground in Australia, a first attempt by all those involved to assess the merits of a highly sophisticated, and exciting, yet potentially costly project.

It came as a great relief and pleasure to all concerned, especially the Trust, when R.I.T.R.A.C. in April 1967 recommended that the Pipe-Line System was feasible, similar in cost to a Channel System, far more advantageous and should be proceeded with.

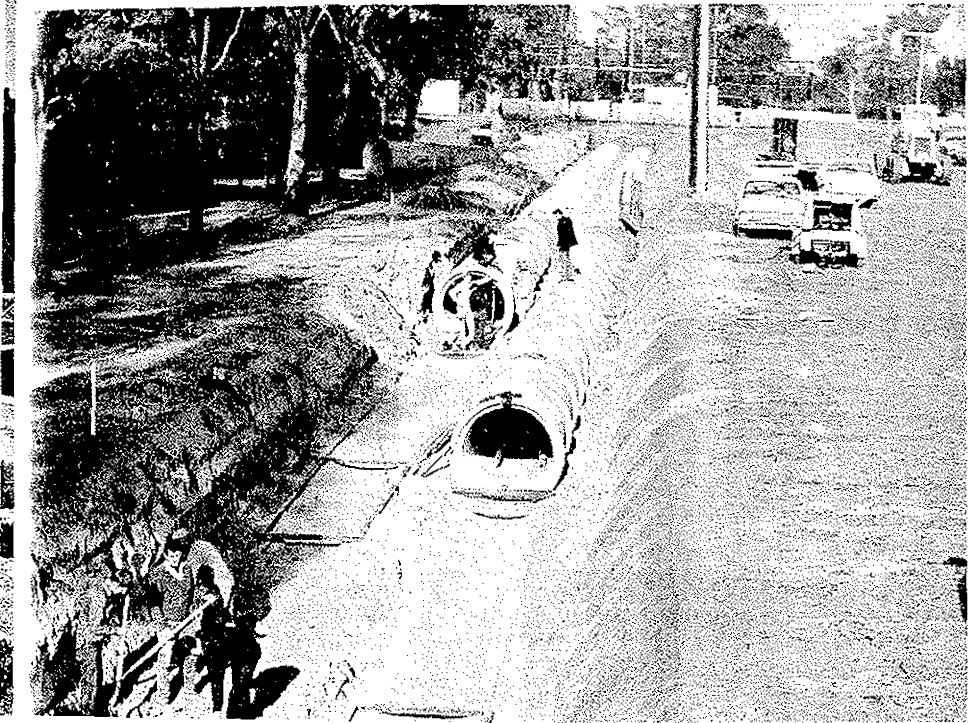
By October 1967 R.I.T.R.A.C. was able to submit basic plans for the new Pumping Station, rising mains and piped distribution system together with a proposed works programme and revised estimates of cost.

These costs were greater than those covered by the 1966 Financial Agreement between the Government and the Trust, taking into account the effects of inflation since the previous calculation, the costs of pipe-lines in lieu of channels, and additional gravity drainage for Block E and other areas not covered by the previous Scheme. The Estimates for the Pumping Station and Rising Mains showed an increase from \$1,120,000 to \$1,357,000, and for the Distribution System and Drainage from \$2,000,000 to \$2,315,000. In February 1968 the Trust accepted the obligation to repay 5/7ths of the cost of the first item, and to find \$1,315,000 towards the cost of the second item.

OVERSEAS STUDY TOUR

Late in 1968 at the initiative of the Trust, the Government agreed to a proposal to send a research team on an overseas study tour with the object of obtaining relevant information on all aspects of the installation, operation,

Laying of 60 in. and 54 in. diameter rising mains. Pumping station site at rear.



maintenance and administration of systems similar to that intended for Renmark.

The tour occurred in September-November 1968. The personnel were Mr. S. W. Heritage, leader of the tour, Mr. R. H. Maddocks, Mr. G. M. Story and Mr. J. W. Gilchrist. Countries visited included California, Israel, England and France.

The study tour was highly successful for many reasons, but most importantly it confirmed the correctness and wisdom of the decision to instal a pipe-line system.

Other recommendations suggested that feasibility studies be undertaken on the adoption of a system of continuous availability of water, the possibility of pressurising selected areas for sprinkler operation, the provision of constant industrial and domestic water supply, the use of remote supervisory control with possible future extension to automatic computer control; and that all supplies to consumers should be metered.

PIPE LAYING COMMENCES

The Trust commenced work on the new scheme in May 1968, when the first pipes in the rising mains from the site of the new pumping station were installed.

In the years that have followed, in addition to the continuous research, planning, survey, and design work, the Trust staff and work force have performed outstandingly in laying miles of rising mains and distribution pipe lines throughout the district, removing redundant channels, installing valves, meters and irrigation supply connections, supervising contracts for the various stages of the construction of the main pumping station, new electric supply installations, and additional drainage. The main Pumping Station took 15 months to construct, between May 1971 and August 1972.

All of these and many other unusual, complicated and highly demanding activities have been carried out by the Trust, whilst still fully involved in the normal requirements of administering, maintaining and operating its old system.

ESCALATION OF COSTS

To add to the problems, the Trust has continued to be haunted by the spectre of escalating costs, the effect of which has been to make obsolete and inadequate each successive financial arrangement with the Government almost before the ink was dry.

By 1970 it was obvious to R.I.T.R.A.C. and the Trust that the estimated costs were inadequate, and in December 1970 the Trust made a further submission to the Government for increased assistance.

Throughout 1971 this submission was the subject of detailed analysis by Government officers and further negotiation between the Government and the Trust. As a result the Trust re-submitted a proposal including a Revised Budget in November 1971 which showed that the cost of the pumping station and rising mains had risen to \$1,675,000, and pipe-line distribution system to \$3,037,000, and additional drainage to \$1,225,000.

The Trust further suggested that if a domestic and industrial water supply scheme was adopted it should be separately financed.

The outcome of this submission and subsequent negotiations has been new financial agreements between the Government and the Trust, reached in 1971, whereby the Trust is still required to repay 5/7ths of the cost of the main pumping station and rising mains, and in 1972 whereby the Government will make a grant of \$1,800,000 and a loan of \$1,450,000 towards the cost of the distribution system and additional drainage, and a separate loan of \$313,000 towards the cost of a domestic water supply scheme, all loans repayable over 40 years with interest at 5 per cent per annum.

The 1971 and 1972 financial agreements made provision for the whole programme of works to be completed by 1978. The new main pumping station is now functioning and is pumping all the water supply requirements for the district. In 1973 it is planned to instal the relift pumps which will pressurise the supply of water to a part of the district at the higher levels. About one third of the pipeline distribution system has been installed including many grower supply connections. The additional gravity drainage works will be commenced in 1973 and during the period 1973-1978 the new domestic and industrial water supply will be installed.

Necessarily, the Trust and its ratepayers are going through a period calling for greater initiative, persistence, and adaptability. This pioneer irrigation settlement, the first of its type in Australia, the first with many other initiatives in its history, is now well on its way to being the first with one of the most modern, sophisticated systems in the world.

After many vicissitudes, worries, and perils in recent years, the stage is now well set for a long period of efficient and economical production.

It is to be hoped that the Trust can retain its autonomy, individuality and resourcefulness, which obviously the Government recognises, respects and wishes to preserve, if for no other reason than that lessons learned in Renmark have been beneficial to other areas.

However, after a long period of hesitancy, the Government, in recent years, has displayed a spontaneous desire to help and to become involved, which financially it is now committed to for at least the next 50 years.

OTHER ACTIVITIES

During recent years the Trust has continued to improve the efficiency of its electric supply service, borrowing large sums of money to maintain an up-to-date and adequate supply. During 1972 it has concluded negotiations with E.T.S.A. to take-over this undertaking because it realises that E.T.S.A. has greater resources whereby to meet the continuously increasing demands of modern consumers.

The Trust has modified its offices and administrative equipment including the introduction of a mechanised accounting system.

The crushing plant and quarry which was operated for many years, when there was a greater need for crushed metal for channel and road construction, has been sold.

These adjustments will tend to make it more certain than ever that the Trust can maintain peak efficiency in its irrigation and drainage operations.

Furrow irrigation on a vineyard. Inset: An irrigation outlet from an underground pipeline.



The Renmark Irrigation System

The irrigation system being installed at Renmark comprises a pumping station on the river frontage and a network of 80 miles of underground pressure pipe-lines from this station to serve the land under irrigation in the district. Three relief stations will boost the pressure to supply land above the primary lift level. The system is designed to supply a 6" irrigation to 10,000 acres within 15 days.

THE MAIN PUMPING STATION

The main pumping station incorporates a two-deck reinforced concrete structure measuring 100 ft. x 44 ft. supported over the river on 28 vertical reinforced concrete piles and anchored to the bank by an anchor block founded on 15 raking steel piles. The structure supports five pumping units, each comprising a water-cooled electric motor direct-coupled to a vertical spindle mixed flow pump. Three of the units are driven by 400 h.p. motors, one by a 325 h.p. motor and the other by a 190 h.p. motor. The total duty out-put of the station is 4,250,000 gallons per hour and the duty operating head on the pumping plant is 57 feet. A sixth pump for domestic purposes will be installed later.

The main pumping station control building features a control room, office, staff room, workshop and toilet areas. The complex is designed as an unmanned station, with protective devices installed to automatically shut down any pumping unit in which faults should develop. A ten ton gantry crane is mounted on the top deck of the pump support structure, to enable pumps, motors, valves and pipe-work to be removed for maintenance or repair. The top decking is removeable to facilitate the removal of equipment from the lower deck. A flow meter records the rate of flow and total flow of water pumped at the station.

THE RISING MAINS

The delivery main from the pumping units is 72" in diameter, constructed of mild steel concrete lined pipe. This enters the base of a reinforced concrete surge tower, measuring 15 feet in diameter and 60 ft. high, from which it branches into two reinforced concrete mains of 60" and 54" diameters.

THE DISTRIBUTION PIPE-LINES

The diameters of the pipe-lines progressively reduce as the system extends into the district, to a minimum pipe diameter of 8 inches. A minimum residual head of 10 feet is available at the extremities of the system when operating at duty flow. Each property is supplied by at least one irrigation supply connection, which comprises an isolating valve, a flow recording meter and a control valve. This facility is housed in a reinforced concrete pipe chamber, set adjacent to the property boundary and represents the end of the Trust's supply system to the ratepayer. From this point, the ratepayer distributes water on his land by means of sprinklers or furrow irrigation. In the former case it is necessary for him to boost the pressure sufficiently to operate his sprinklers, whilst in the latter, the ratepayer distributes the water by means of private channels or underground pipelines.

DRAINAGE WORKS

A problem which eventually arises in most Districts where irrigation is practised is that of the need for sub-soil drainage. After a period of years, which varies from District to District, the build-up of sub-soil moisture or "water table", containing accumulated dissolved salts harmful to plant life, makes it necessary to install sub-soil drainage systems.

The individual property owner installs either tile or plastic drainage lines in the sub-soil of his holding, to maintain this water table at a constant level below the roots of his permanent plantings. Sub-soil drains are constructed of pipes manufactured from plastic or tile material, which range from 1½ in. to 6 in. in diameter. Tile lines or slotted plastic lines are laid in a bed of coarse sand which permits easy inflow of water. The depths to which drains are laid and the spacing of the various lines are dependent upon the type of soil being drained. In Renmark, the soils vary from heavy river clay flats to light sandy

loams and each type has its particular characteristics as far as drainage requirements are concerned.

Sub-soil drains are laid in such a manner as to allow the water collected to gravitate to a terminal collecting point or sump within the property.

From the terminal sump, the Trust provides disposal facilities to remove drainage water from all private drainage installations within its District.

With several minor exceptions, the comprehensive drainage scheme of the Renmark Irrigation District is a gravity system which connects ratepayers' terminal sumps to six major collecting points or "caissons". Two of these caissons are 75 feet in diameter and the remainder 40 feet in diameter and each is approximately 20 to 25 feet in depth. From these caissons, the drainage effluent is pumped to one or two drainage evaporation basins, situated adjacent to the River Murray. Whilst their location presents a risk of pollution to the main source of water for irrigation purposes, the evaporation basins are constructed in such a manner as to reduce this problem to a minimum.

METHODS OF IRRIGATION.

There are four main methods of irrigation employed in the Renmark District, namely, flood, furrow, sprinkler and trickle.

Flood irrigation consists of constructing low embankments around sections of the property and successively filling the areas between these with water to a required depth.

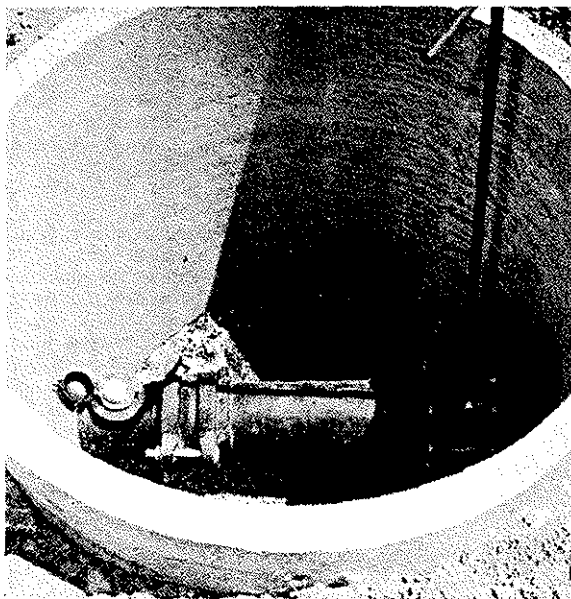
Furrow irrigation, which consists of running water down a shallow trench or furrow through the property adjacent to the plantings, is practised using either narrow or broad based furrows.

The latter method is becoming more popular on properties where it is difficult to achieve good lateral soakage, due to the fall of the land.

Sprinkler irrigation is of two types:

- (a) Overhead rotating sprinklers and,
- (b) Low-level sprinklers.

Overhead Sprinklers are more widely used and consist of a rotating sprinkler mounted on a permanent standard. With this method the irrigator is required to start his irrigation pump and, provided any small particles of foreign matter in the water are screened at the pumping plant to prevent blocking of the sprinkler jets, these present few operating problems. However, there are disadvantages in this type of system, in that they are subject to the effects of wind, which causes an uneven distribution of water over the property. During periods of low river flow, with consequent increase in salinity of the water in the River, the appli-



An irrigation supply connection (I. S. C.), comprising a valve and meter installed in a reinforced concrete chamber. This facility represents the end of the Trust's new distribution system, from which the irrigator receives a water supply by pipe-line for the irrigation of his property.

cation of polluted water to the leaves of tree plantings during the hot summer months has an adverse affect on tree health.

Low-level sprinklers comprise small rotating sprinklers, similar to the domestic garden type, which are either installed in fixed positions, i.e. each sprinkler irrigates specific trees in the orchard, or portable. The latter type of system consists of a series of evenly spaced sprinklers connected by plastic hoses, which are arranged between rows of trees on the property. After a pre-determined period (and hence rate of application of water) these hoses are moved to other positions between the tree plantings. Where portable low-level systems are used, it is desirable that chemical weed control be practised, due to the inconvenience which otherwise occurs in coiling the hoses to allow access for implements to cultivate the property.

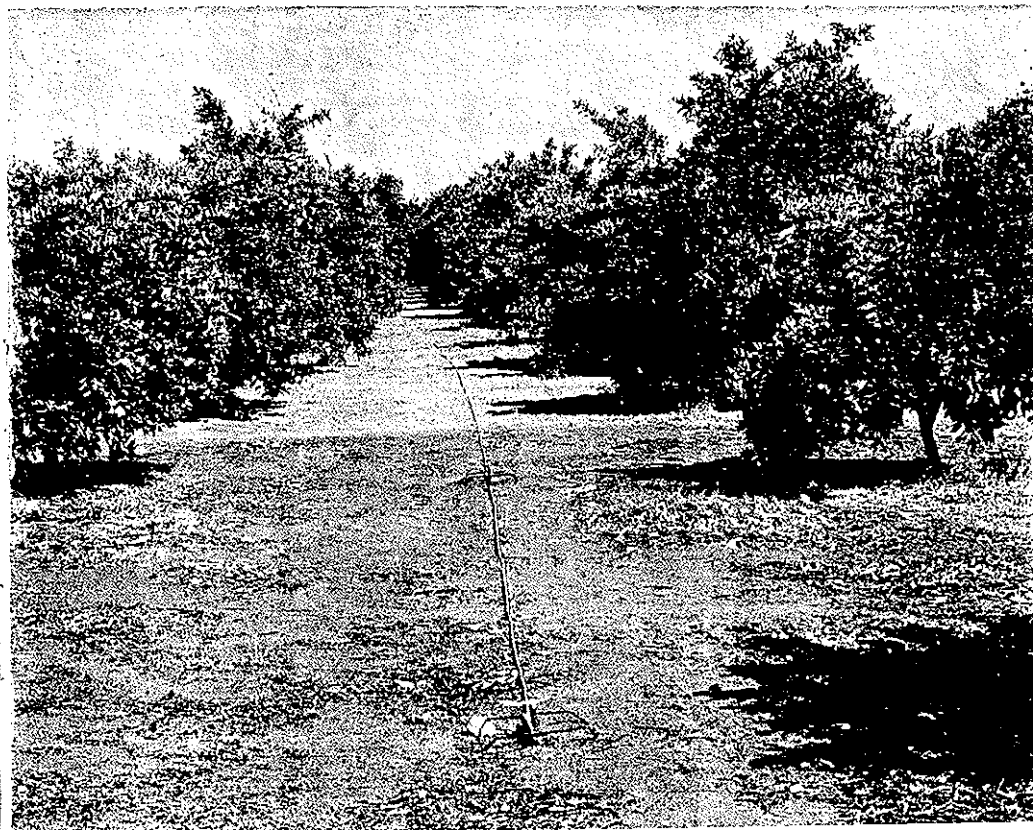
Trickle irrigation is still employed somewhat on an experimental basis in Renmark, although it is a method of irrigation used overseas. Drip irrigation is carried out by means of trickle attachments on hoses, which replace the water lost from the soil by evaporation and the needs of plant life. This method seeks to apply only as much water as is necessary to maintain optimum moisture content of the soil and provides for economies in water usage.

CROPS.

The main crops grown in the Renmark District are citrus, stone fruits and vine fruits. The main citrus varieties are Valencias and Washington Navels and Renmark citrus has an Australia wide reputation for quality.

The main stone fruit crops are apricots, peaches and, to a lesser degree, nectarines and plums.

Portable low-level sprinklers irrigating young citrus plantings.



Pears are grown fairly extensively on the heavier clay soils, where these plantings produce heavy crops.

Many varieties of vine fruits are grown in the district; in fact, more than half the area is planted to wine or drying varieties. The main varieties are currant, sultana and gordo for drying and doradillo, shiraz, palamino, grenache and riesling for wine production.

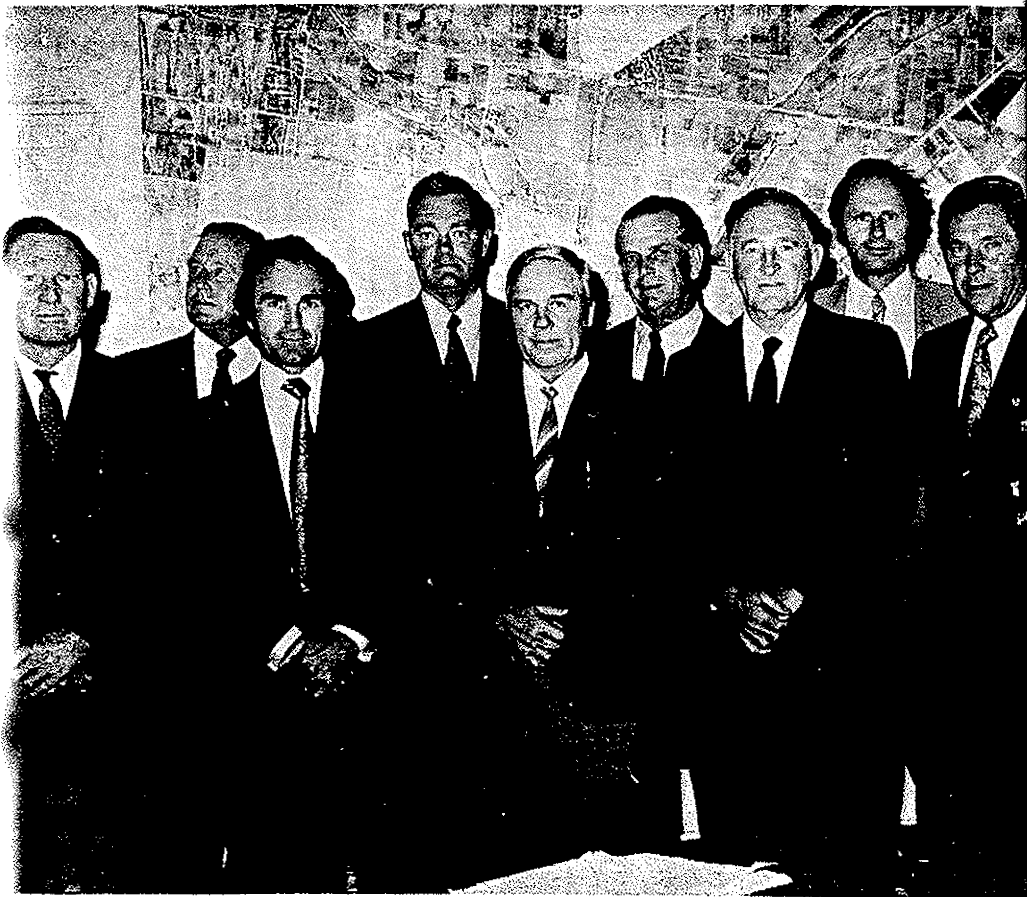
PROCESSING.

Renmark has three packing companies which process and pack dried vine and tree fruits and fresh fruits for the various markets. There are two wineries, one operated on a co-operative basis and the other by private enterprise, which cope with the wine grape production of the district. Tree fruit canning is carried out by a large co-operative enterprise at the adjacent town of Berri, which is twelve miles away.

ACKNOWLEDGEMENT

The Renmark Irrigation Trust gratefully acknowledges the contributions brochure, and by Mr. S. B. Ogilvy and The Murray Pioneer Pty. Ltd. in supplying photographs.

Chairman, members and executive staff of The Renmark Irrigation Trust. From left: Messrs. D. R. Olorenshaw, T. W. Pitt, D. L. Tripney (secretary), J. M. Barrington, S. W. Heritage (chairman), V. R. Zadow, H. J. Katekar (vice - chairman), R. H. Maddocks (engineer - manager), and L. Ivanovic.



ASSESSED AREAS

Assessed areas of the Renmark Irrigation Trust at 10 year intervals are as follows:

	Acres	(Hectares)
1900	3660	(1481)
1910	5100	(2064)
1920	5365	(2171)
1930	7556	(3058)
1940	7782	(3150)
1950	8052	(3259)
1960	8950	(3622)
1970	9420	(3812)

PLANTINGS, PRODUCTION

Principal plantings and production of the Renmark Irrigation area, according to latest figures (1968-69):

Green forage and pasture—1,306 acres.

Drying grapes—1,253 acres, producing 1,183 tons dried.

Wine grapes—3,974 acres, producing 19,155 tons fresh.

Orchards—3,638 acres, producing 378,598 bushels oranges, 88,296 bushels pears, 182,110 bushels apricots and 237,785 bushels peaches and nectarines.

CHAIRMEN OF RENMARK IRRIGATION TRUST

Col. C. M. Morant	1894 - 97
R. Turner	1897 - 98
H. Showell	1898 - 99
J. M. Smith	1899 - 1903
C. F. Chaffey	1903 - 04
H. Showell	1904 - 06
M. S. Woodward	1906 - 07
E. R. Olorenshaw	1907 - 10
J. M. Smith	1910 - 13
E. R. Olorenshaw	1913 - 15
H. Showell	1915 - 17
J. M. Smith	1917 - 21
W. R. Woodham	1921 - 25
C. H. Katekar	1925 - 45
W. H. Waters	1945 - 47
C. S. Ruston	1947 - 57
T. M. Price	1957 - 66
S. W. Heritage	1966 - 70
T. W. Pitt	1970 - 72
S. W. Heritage	1972 - —

SECRETARIES

J. Price	1894 - 96
A. Roper	1896 - 1926
R. C. Penhall	1926 - 36
H. C. Dridan	1936 - 45
V. J. Tillet	1945 - 46
J. A. Brazil	1946 - 51
R. H. Waters	1951 - 60
R. L. Hender	1960 - 65
D. L. Tripney	1965 - —

ENGINEERS

Col. H. G. Tolley	1923 - 26
I. S. Tolley	1926 - 55
B. Addis	1955 - 56
A. A. Wilkinson	1956 - 58
F. F. B. Waltham	1961 - 64
R. H. Maddocks	1964 - —

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