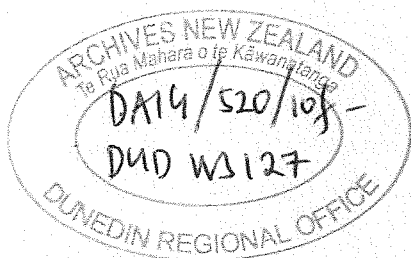


REPORT
OF
WORKING PARTY
ON
CENTRAL OTAGO IRRIGATION



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L W Hinchey Chairman
R J Riddell
R L Engelbrecht
R D Grant

ALEXANDRA
July 1981

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July 1981

Hon. Minister of Works and
Development
Parliament Buildings
WELLINGTON

Sir

Early in 1979 you approved establishment of a Working Party to investigate correction of anomalies existing within and between the older irrigation schemes in Central Otago, and to advise on the re-organisation and upgrading of these schemes.

Membership of the Working Party was to be:

- (i) The district commissioner of works with the Ministry of Works and Development in Dunedin.
- (ii) The regional advisory officer with the Ministry of Agriculture and Fisheries in Dunedin.
- (iii) An independent consultant with knowledge and experience of irrigation but from outside the area.
- (iv) A chairman representative of irrigation farming interests and with knowledge of Central Otago irrigation.

Your terms of reference in particular required the Working Party to:

- (i) Consider and help remove where necessary the anomalies of water supply within and between the older irrigation schemes in Central Otago.
- (ii) Consider and recommend fair future water charges for irrigation water in relation to the supply.
- (iii) Recognise the importance of irrigation to the social and economic needs of Central Otago farming (and in doing so help to recommend the comparative upper levels of water charges for schemes where a policy of complete recovery would be unreasonable).
- (iv) Make recommendations in respect of new irrigation agreements for landholders on the older schemes.
- (v) Help state and implement a programme for the improvement and upgrading of schemes where this is necessary, supported by the landholders and practicable.

Over the last two and a half years, and through a series of nine meetings, the Working Party has undertaken a thorough investigation of these older irrigation schemes, their costs

and benefits to the farmers which they serve, the water supply they provide and its deficiencies, and their future development or redevelopment. In this work we have been greatly assisted by the independent farm management consultants Messrs Engelbrecht, Royds, Tavendale and Co Ltd of Ashburton and a copy of their report to the Ministry of Works and Development, which provides background to the Party's considerations and recommendations, is enclosed. Acknowledgement is also made of the assistance provided by the Ministry of Agriculture and Fisheries and Ministry of Works and Development, and of the co-operation received from local farmers without which this work would have been impossible.

We now have the honour and pleasure to present our report as follows:

1 INTRODUCTION

The Central Otago area comprises a series of relatively flat-floored valleys separated by block mountain ranges rising to nearly 2000 m. Through the area the Clutha River, and its major tributary the Kawarau River, have established entrenched courses making them relatively inaccessible as a source of irrigation supply. Tributary streams join the main river system through a series of basins and antecedent gorges, the former forming the majority of the irrigable land in the area and the streams themselves the source of supply.

With the protection provided by the internal ranges and by surrounding mountain systems, Central Otago has a semi-arid climate with frosty dry winters (100-120 days) and prolonged hot dry periods during summer and autumn (150-180 days). Average annual rainfall ranges from 250 mm to 600 mm, with a slight bias towards the summer, but with wide variations between seasons and with seasonal moisture deficits of up to 400 mm. These deficits are accentuated by the funnelling of hot dry north-west winds down the valleys which can result in potential evapotranspiration rates in excess of 4 mm per day and up to 6 mm per day.

These semi-arid conditions which create the need for irrigation also mean that flows in the tributary streams are lowest when the demand for water is greatest. Characteristic of the area are the sustained high flows during the spring snow-melt which decrease rapidly to very low levels in mid-summer. Some recovery often occurs in the latter part of the season, but, under more severe drought conditions, low flows can extend into May. Under these conditions, only the schemes tapping the major lake-fed rivers can be considered as having an adequate irrigation supply.

In this environment the more accessible and reliable tributary streams have been tapped to provide irrigation supply to much of the valley floor area and marginal hill slopes. The greater part of this irrigation coverage is provided by a patch-work of 16 relatively small communal schemes (only three of the existing schemes serve more than 1500 ha) which together involve:-

1300 km of race
 38 km of pipeline
 6 km of tunnel
 12 storage dams or weirs
 8 pumping stations

to irrigate 26 500 ha on 770 properties within a commanded area of 222 500 ha.

Farming systems in the area have become strongly dependent on this irrigation supply for

- (i) extensive sheep and cattle grazing of the hill country where winter feed is the limitation
- (ii) intensive sheep and cattle grazing which depend on water for summer feed production
- (iii) orchard production (pip and stone fruit).

2 HISTORY

Irrigation in Central Otago originated in 1873 when a French man named Feraud was granted a water right by the Wardens Court for the irrigation of vegetables for sale to miners. The right was from the Waikerikeri Stream and involved a race some 10 km in length to deliver one head (100 m³/h) of water on the flats adjacent to the present township of Clyde. This represented a major change in the policy of the Court which, prior to that date, had reserved water solely for mining purposes.

However during the 1860's and 1870's almost all water in the Clutha River tributaries had been claimed under the Mining Act procedures, and it was not until the more lucrative gold mining activities decreased that water became available to any extent for irrigation. Slowly the races which had been cut on the contour high above the valley floors to provide head for sluicing were taken over by the settlers of irrigation purposes.

During the latter phases of the mining era, the higher priority and hence more valuable water rights from the larger sub-catchments of the Clutha River were taken over by Water Companies. These companies, and in at least one case the Mines Department, developed the storage necessary to provide a reliable summer supply and the race systems from which water was sold to individual miners for sluicing purposes. As various mining areas were worked out, the water rights held by these companies and, in many cases, the associated physical works were purchased by the Crown (through the Public Works Department and Department of Lands and Survey) as a basis for the development of the earlier communal irrigation schemes.

The first of these schemes came into operation in the Ida Valley in 1917 with the acquisition by the Crown of the water rights, Greenland reservoir and races serving the Galloway mining area. This scheme, with an irrigated area of 5000 ha served from storage dams in the upper Manorburn (flooding the Greenland

dam) and on the Poolburn, and the associated Galloway scheme (1075 ha) which came into operation in 1920, remains the largest in Central Otago.

Further development, much of which was also based on mining water rights and/or works, followed through the 1920's and early 1930's. By 1935 irrigation coverage was provided by the Manuherikia (1980 ha), Earnsclough (880 ha), Last Chance (1030 ha), Tarras (1460 ha), Ardgour (530 ha), Teviot River (1100 ha), Arrow River (1200 ha), Hawkdun (3300 ha) and Omakau (5780 ha) schemes. This final scheme, in addition to being the last in this early development, also marked the break with mining tradition with the adoption of higher physical standards and specific irrigation objectives.

In the 1950's the Pisa Flats (1030 ha) and Ripponvale (480 ha) schemes, drawing water by pump lift from the Clutha and Kawarau Rivers respectively, and the Blackmans (800 ha) extension of the Earnsclough scheme were added to this list. Finally, and although excluded from the working party's terms of reference, the Hawea Flat scheme (950 ha) in 1966 completed the existing irrigation coverage in Central Otago.

Over the years farming in Central Otago has become heavily dependent on these irrigation works, and the water they provide, to offset the deficiencies of the 300 - 400 mm annual rainfall and high evapotranspiration. With the heavy if not total commitment of the readily available tributary water resources, the water rights granted under the Mining Act, and their associated priorities and chattel status, have become an accepted part and essential part of both private and communal irrigation in the area.

However this development has also endowed Central Otago with a patch work of relatively small schemes which it is now difficult to understand but no doubt satisfied demands of the time. Many of these schemes rely largely or solely on run-of-river flows which, with sustained high runoffs during the spring snow melt falling to very low levels in January - February, are inadequate to meet the peak irrigation demands. The extensive low-standard works, often in difficult terrain, are also becoming increasingly more difficult and costly to operate and maintain, and in many cases must be regarded as nearing the end of their useful life.

It is in this context of course that this working party was established to consider and make recommendations on the older irrigation schemes in Central Otago.

3 WATER CHARGES AND AGREEMENTS

Considerable variations in water charges and conditions of water supply exist both within and between the older Central Otago irrigation schemes. Although generally created many years ago, these anomalies have been perpetuated by individual Irrigation Agreements, running for 21 year terms, and aggravated by the more recent percentage increases in water charges.

The earlier schemes in Central Otago appear to have been implemented largely to utilise particular water rights and/or

mining works with little recognition of farmer or farming requirements. This resulted in some reluctance by farmers to use the water available and, in certain cases, anomalies were created by an arbitrary reduction in water charges to make the supply more attractive. It is of interest to note that in at least one scheme water charges did not reach the original level again until the mid-1970's.

Further anomalies arose from an investigating committee set up by Government in 1928 to review rates charges for water, the ability of land to bear these charges, and the adequacy or otherwise of the depth of water applied to the land under the various schemes then in, or close to commencing, operation. This committee considered individual properties in terms of land use, nature of soils etc and for each case established:

- (a) The area which should be supplied with irrigation water and subject to water charges (irrigable area).
- (b) The rate of charge or quota charge (\$ per acre) to apply over the irrigable area.
- (c) The quantity (acre-feet) or depth (feet) of water to be supplied within the quota charge (water quota).
- (d) The rate of charge, if any, for water supplied in excess of the water quota (extra water charge).

This resulted in a multiplicity of different charges and water quotas, in many cases on the same scheme, which were written into Irrigation Agreements between individual occupiers and the Minister of Public Works. A renewal of Agreements in the early 1950's generally maintained the same relativity between charges, although a number of irrigators declined to accept the new rates at this time and continued under the earlier charges. Percentage increases in water charges since expiry of Agreements in 1973/74 have tended to magnify these differences.

Subsequent irrigation schemes adopted the same form of Agreement but generally with a single water quota and charge based on costs and supply rather than use. Also on the most recent schemes (Pisa Flats, Ripponvale, Blackmans) provision was made for five yearly review of water charges resulting in these schemes, and Earnsclough which adopted new agreements in conjunction with the Blackmans scheme, having somewhat higher charges.

In considering the Central Otago irrigation schemes, the Working Party has been very conscious of the anomalies created by the earlier investigating committee. Setting of charges on the basis of land use, and the within scheme differences this has created, are no longer considered realistic and a single basic charge, based on the service provided, has accordingly been recommended for each scheme. However some variation in the quantity or depth of water (basic depth) supplied within this basic charge may be warranted particularly on larger schemes where there are significant differences in climate and/or soil types.

On the other hand between scheme differences must remain since each will differ in its cost structure and the supply it can provide, and since each must ultimately stand or fall on its own merits.

Under the prevailing economic conditions, and with the recommended indexing of water charges, long term agreements of the type used previously are not considered appropriate. However some form of security of water supply is seen as essential for investment purposes.

Since the basic depth and water charge will be determined on a scheme basis, the variable on individual properties is essentially the irrigable or irrigated area which in turn will determine the supply available and its total cost. A more formalised procedure for assessing, varying and registering this irrigable area against the land title would therefore remove the need for agreements. The most satisfactory arrangement would involve:

- (i) Assessment and setting of individual irrigable areas by the district commissioner of works taking into account water availability from the scheme, and the suitability of land for irrigation.
- (ii) Provision for the occupier (or other party with a substantial interest in the property) to request reassessment at any time to take account of changed circumstances, availability of water or irrigation technology.
- (iii) In the event of any disagreement over assessed irrigable areas, the opportunity for an independent assessor, agreed to by the occupier, to determine the irrigable area.
- (iv) Registration of the irrigable area and other appropriate conditions governing the supply to be provided, but excluding water charges, against the land title.

Such a system would provide the necessary flexibility for changes in irrigation technology and yet provide the occupier with security of water supply. It also does not differ greatly from present procedures and can probably be accommodated within existing legislation.

4 VALUE OF IRRIGATION IN CENTRAL OTAGO

The Working Party has found it difficult to measure the value of irrigation in Central Otago but considers this is reflected in the intensity of farming and the presence of a community to support this industry.

For example irrigation is an essential component of the local horticultural industry and, without it, horticulture and the associated services would disappear completely.

Also, in reviewing the financial aspects of any existing irrigation scheme, the Working Party feels that the value of irrigation to individual farmers and to the wider community

tends to be overlooked. Considerations of irrigation charges and costs of supplying irrigation water are separate issues. For most of the older schemes much of the value of irrigation has been built into land values and various community interests.

In an attempt to assess the value of irrigation to pastoral farming, a study was made of the Omakau scheme by Messrs Bringans and Talbot, farm advisory officers with the Ministry of Agriculture and Fisheries in Alexandra. Their approach was to assess the changes on farms and in the community that would result from cessation of irrigation supply and showed:

- a The Omakau scheme covers nearly 6000 ha on 66 properties ranging in size from over 500 ha to an average of between 200 and 300 ha. The proportion of each farm irrigated varies from 10% to 80% with almost 20% of the properties having an associated dryland tussock area.

Despite the average annual rainfall of 420 mm at Omakau and 550 mm at Drybread, soil moisture deficits occur regularly from late spring until late autumn. The soils generally have a low moisture holding capacity and evapotranspiration losses in mid-summer are high.

- b Existing farm production is largely from sheep with some beef and cash cropping on several properties. Stocking rates on the irrigated area range from 12 to 15 su/ha with an average over the irrigated and dryland areas on all properties of 10-12.5 su/ha. Stock carried per farm generally ranges between 2500 and 3500 su.

In total the scheme is responsible for farm production worth some \$800 000 (at farm gate prices) and for the economic support of 20 farm families and an estimated five more families in ancillary industries.

- c Without irrigation it is estimated that the stocking rate would drop on average by 50% to something less than 5 su/ha overall. Stock carried per farm would fall to between 1200 and 1700 su which under current conditions is a sub-economic unit.

In addition each stock unit would be less productive with lambing decreasing by 10% overall and wool weights likely to be 0.5 kg per head lighter. Beef could no longer be carried.

Marketing arrangements would be much less flexible, farmers having to sell surplus stock when feed supplies dwindle, regardless of stock condition or prices. Overall result would be a drop in gross income of between 50% and 60%.

- d In the district as a whole 45 000 stock units less would be carried with 27 000 less lambs for sale and 1200 fewer bales of wool. Gross income would drop by \$800 000 per annum.

A large proportion of the farms would cease to be viable and, after resulting amalgamations, 20 less farm families would remain in the district.

The loss of the scheme would also result in closing of two small schools, the loss of employment for irrigation racemen and reduced services to the whole community. It is difficult to predict the likely effect on business activity but local servicing industries and the local transport firm depend on farming for their existence.

The psychological influence of a declining industry, empty houses and schools is impossible to quantify.

The Working Party considers the effects of closure of other schemes would be very similar to that shown for the Omakau Scheme. However in so concluding it is emphasised that the real value of irrigation in Central Otago is difficult to assess, and hence there is a tendency to under-estimate or downrate its effects. For this reason it would not be surprising if the longer term effects were rather greater than indicated above.

5 UPGRADING OF SCHEMES

Eleven of the thirteen schemes investigated are incapable of meeting present demands and the Working Party considers that the ultimate objective must be the upgrading or replacement of these older schemes to provide a more efficient, adequate and reliable water supply, to reduce overall costs, and to allow the introduction and adoption of modern irrigation techniques.

As noted earlier the existing irrigation schemes, are in many cases, based on antiquated mining works and even new works tended to be based on the labour intensive standards of the day. With the difficult terrain traversed by many of the distribution works, and the consequent poor access, operation and maintenance of the schemes is becoming increasingly more difficult and costly, and major problems arise in the repair and replacement of structures. The most significant costs in individual scheme accounts are those associated with this labour intensive operation and maintenance, and are also those which are currently increasing at the greatest rate.

In many cases the existing works are also at the end of, or beyond, their useful life and it is apparent that the current level of expenditure is insufficient to offset the long-term deterioration of the schemes. This in turn means there is an ever-increasing risk of failure of critical structures and a lack of security of supply which will limit the adoption of more effective and efficient irrigation techniques.

The existing situation can only be corrected by capital improvement or upgrading of the existing works, or the replacement of the existing schemes by completely new and larger systems.

In either case capital injection would allow an improvement in both the standard and capacity of the distribution systems, with improved access and provision for mechanised maintenance.

Higher standards would also result in structures with a longer life and reduced maintenance costs. These, together with the adoption of automated or semi-automated controls, would reduce the labour involved in, and hence the costs of, operation and maintenance. Reduction of these escalating labour based costs relative to capital charges would in turn result in greater stability in overall scheme costs and hence water charges.

Scheme upgrading or replacement is also the only way to ensure more effective and efficient storage, distribution and use of the extremely limited and limiting water resource in Central Otago.

The existing distribution systems involve long lengths of relatively low capacity race which, with operation based on the provision of small continuous but variable flows, incurs high losses. Higher standard structures would reduce these losses and improve the conveyance and reliability of supply. Increased capacities would also allow the introduction of higher constant rates of supply, and adoption of rostered operation which would avoid the more casual approach to efficient water use apparent where water is available on a continuous basis.

In conjunction with upgrading or replacement additional storage is necessary to carry the ample spring flows forward into the summer, and hence avoid the deficiencies which currently occur in mid-season when water is most important. However the high cost of on-stream storage suggests that smaller "turkey-nest" type dams may be a better proposition in cases where these are practicable.

More constant, reliable and adequate water supplies will encourage on-farm development, the use of more permanent and portable controls, and the adoption of more efficient and effective irrigation and management techniques.

However to fully realise these irrigation potentials it is essential that rural water schemes be installed throughout Central Otago to provide stock and domestic water supplies.

6. RECOMMENDATIONS

- A Specific water charges for the 1980/81 irrigation season under conditions of average farming profitability, and the associated basic quantity of water or depth and additional supply charge, have been recommended by the Working Party for each irrigation scheme and are shown in a table appended to this report.

These charges have been based on a survey of sample properties on each scheme, and analysis of this information by our independent consultants Messrs Engelbrecht Royds Tavendale and Co Ltd to show the benefits and costs of irrigation. This in turn has been used to determine the total and marginal costs of water farmers are able to meet in terms of the profits it generates, and hence the basic and additional water charges.

Although water requirements have been taken into account in establishing the recommended basic depths or quantity of water available within the basic charge, the dominant factor has been the unreliability and inadequacy of the available water supply. Except for the Pisa Flats and Ripponvale schemes the basic depth may not therefore be taken as a realistic measure of actual water requirements.

- B The Working Party further recommends that these charges, with appropriate adjustments, apply in full from the 1981/82 irrigation season (refer recommendation F).

Although the possibility of a transition period between the existing and recommended charges was considered, the irrigators facing the larger increases have already had the benefits of low rates for a considerable time, and there appears no reason to prolong these anomalies. Any short term effect on farmer confidence through the immediate impact of these charges will be compensated by the knowledge that all future charges will be directly related to farm profitability.

- C Adoption of a minimum annual charge of \$200 per property, indexed in the same way as other charges, is recommended by the Working Party in recognition of the proportionately higher cost of providing an irrigation service to smaller properties.

Such a charge would only affect properties with irrigated areas less than about 12 ha which are generally in horticultural use, and hence well able to sustain any additional cost this would impose, or the result of rural residential of larger properties around the margins (or in) urban areas.

- D For the Ida Valley scheme which relies completely on long term storage for its deficient water supply, the Working Party recommends the following specific conditions of supply:

- (a) a variable annual water allocation (as opposed to a fixed basic depth) up to 450 mm set on the basis of the water held in storage
- (b) the allocation be notified to the irrigators by 31 October each year and to apply over the following calendar year
- (c) at the time the water allocation is notified, a provisional allocation be advised for the succeeding 12 months
- (d) irrespective of the actual water allocation, a fixed basic charge should apply (refer recommendations A and B)
- (e) water supplied in excess of the notified allocation be subject to an extra water charge as recommended

- (f) a pro rata rebate of the basic charge be given on any part of the notified water allocation not supplied to a farmer.

In a succession of dry years the storage which serves the Ida Valley scheme is completely inadequate to meet realistic demands and a variable quota system with rebates already applies. However the present arrangement makes no provision for any additional supply.

The conditions now recommended by the Working Party are intended to provide the irrigator with advance warning of changes in the allocation and hence allow irrigation and management strategies to be planned ahead. A relatively high extra water charge, balanced by an incentive to save water, should discourage high usage and yet at times of drought, when water has a high marginal value, should still make it economic to continue irrigating at this high charge.

- E Messrs Engelbrecht Royds Tavendale and Co Ltd have suggested, and the Working Party recommends a system of indexing of water charges to a Meat and Wool Board Economic Service index (Taylor index) adjusted by a three year moving average of terms of exchange.

The Taylor index is in part based on, and over the last 20 years has closely followed trends in, the consumers' price index. Adjustment to terms of exchange would result in water charges moving above or below the index value, but the use of the three year moving average will ensure these relative movements are more gradual, and certainly less violent and erratic than would occur with a single year index. This in turn will allow better forward planning by both farmers and the Ministry of Works and Development.

The Working Party considers that farmers must have the confidence irrigation charges will not move too far out of line with farm profit levels. The recommended indexing of water charges to farm product prices is seen as one way of maintaining some relativity in the cost/price squeeze facing farmers and, in the security this offers, of encouraging further development and upgrading of on-farm systems.

- F Adoption of the proposed indexing system will make it necessary to review water charges annually. The Working Party recommends that farmers be advised of new charges by 30 June each year, ie two months in advance.

Index data should be available from the Meat and Wool Board Economic Service in June each year and, since trends would closely follow farming profitability with the buffer effect of the three year moving average, notification of water charges for the following season by 30 June will give farmers sufficient time to make the necessary adjustments to their budgets and cash flows.

The Working Party also recommends that the 1980/81 charges appended to this report form the base (at Taylor index 1787) for all future calculations of water charge.

For the 1981/82 irrigation season this will require an increase of 1.2255 (1787 to 2190) which must be corrected by a three year moving average of terms of exchange of 0.921, ie the net increase from the recommended 1980/81 charges will be 1.1287.

A table of existing (1980/81 season) charges and recommended 1981/82 season charges is appended.

- G Where the average annual revenue from a scheme meets the average annual costs of operation and maintenance, interest charges on capital expenditure and a contribution to a renewal fund, the Working Party recommends that water charges be related to costs, rather than to the indexing system, provided that the level of expenditure is sufficient to maintain the scheme in good condition for the future.

The Working Party sees few if any schemes likely to achieve this "break-even" point since the most significant annual costs are those which are increasing at the fastest rate. Where a "break-even" point is reached it is important to avoid the opportunity for absorbing the extra revenue from indexed increases in water charges.

- H The Working Party recommends that the basic charge be subject to rebate on a pro rata basis for any proportion of the basic depth not supplied to an irrigator, and that consideration be given to the allocation of the basic depth on a proportional monthly basis.

With the exception of the Pisa Flats and Ripponvale schemes which draw from an essentially unlimited resource, and the Ida Valley scheme which relies on storage, the Central Otago schemes depend on "run-of-river" supplies which are most inadequate when demand is greatest.

Although the availability and reliability of supply on a seasonal and within season basis have been taken into account in determining the recommended basic depths, the seasonal supply may be inadequate to meet these up to one year in every four. In addition to the immediate effects, such a deficiency may considerably limit production in subsequent seasons, and provision for a pro rata rebate is seen as one way this may be offset.

Adoption of monthly basic depths and rebating would extend the incentive this provides to the within season deficiencies which occur in most years and allow effective use of surplus flows, when these occur, at

the lower additional supply charge. Such a system however should only be instituted where it has the knowledge and support of the irrigators served by a scheme.

- I In some cases the irrigable areas subject to water charges bear little relationship to the areas actually being irrigated on a property, and the Working Party recommends that farmers be given the opportunity to review their Agreement areas. Any surplus water or area could readily be reallocated on most schemes.
- J The Working Party recommends the institution of regular and programmed meetings between Ministry of Works and Development staff, individual scheme committees and the farmers served by a scheme. As part of this communication, annual accounts and balance sheets for each scheme must be made available to the irrigators concerned as soon as possible after the end of the season by the district commissioner of works in Dunedin.

It is apparent that there is a significant communication problem existing between Ministry of Works and Development staff and farmers, resulting largely from a lack of understanding of each other's roles. The need is seen for regular meetings between Ministry staff and farmer committees elected by the irrigators on individual schemes, and less frequently with all irrigators, to openly discuss and resolve operating problems.

Reluctance of the Ministry of Works and Development to provide details of expenditure, and apparent discrepancies in information which has been provided, has tended to compound farmer suspicion and mistrust. Since it is apparent that few farmers understand the accounting procedure used by the Ministry of Works and Development, the need is seen for information which can be clearly understood by the irrigators and thus overcome many of the misunderstandings which exist. The best method of presenting this information appears to be in a similar form to a farm or small business income and expenditure account.

- K The Working Party sees opportunities for cost savings in the amalgamation of schemes, the introduction of rostered water supplies, and the adoption of automated or semi-automated water supply structures. Specific suggestions on amalgamations have been made by Messrs Engelbrecht, Royds, Tavendale and Co Ltd based on common water resources.

Although it is appreciated that in many cases physical constraints will prevent the adoption of rosters, this type of operation would almost certainly lead to more efficient utilisation of resources and water use. It should therefore be encouraged where at all practicable. A choice of flow rates should be offered to farmers where this is practicable and acceptable.

Provision of automated or semi-automated control structures should reduce racemen's time in maintaining of a regular supply. However it is recognised that little progress will be possible on these lines until upgrading of schemes is considered.

However a policy of scheme upgrading should be actively pursued and no works carried out on the existing schemes should in any way prejudice this objective.

- L Subject to the adoption of the recommended water charges and indexing system, the Working Party recommends that accumulated losses in individual scheme accounts should be written off.
- M The Working Party recommend that there should be some agreement to keep the schemes operating for at least 10 years or until the schemes are upgraded.

From the survey carried out by Messrs Engelbrecht, Royds, Tavendale and Co Ltd it is clear that farmers are generally unwilling to invest in new irrigation development while the future of their scheme and water charge, or the reliability of water supply, is uncertain. However, given the confidence that existing schemes will continue to operate until upgraded or replaced, farmers will continue to modernise and improve their own distribution and efficiency.

In the longer term the Working Party sees upgrading or replacement of the existing schemes as offering the opportunity to overcome so many of the present irrigation problems in Central Otago.

7 TERMS OF REFERENCE

In answer to your specific terms of reference the Working Party has concluded that:

- (i) Anomalies in the water supply and charges within particular schemes must be removed by setting of a basic water charge and basic depth to apply throughout each scheme.

Differences between schemes however are not anomalous since each scheme will differ in terms of the reliability and adequacy of the supply it can provide, the benefits which will result from the use of this supply, and the costs (both annual and capital) of delivering the supply. Subject to certain recommended amalgamations based mainly on a common water resource, each of the existing schemes must be considered on its own individual merits.

- (ii) Water charges recommended in this report are fair and reasonable taking into account the availability, unreliability and inadequacy of the water supply, and the costs and benefits of irrigation to the individual farmer.

These charges, and the associated basic depths, will also influence the total amount of water used and encourage more efficient irrigation, but will not restrict usage when and where it is really necessary.

Adoption of the recommended index system will ensure a continuing parity between farm commodity prices and future water charges which will therefore remain fair and reasonable.

- (iii) Irrigation is essential to maintain the current levels of horticultural and pastoral farming production in Central Otago, and hence the existing infrastructure of the area.

The recommended charges and indexing will provide the security necessary to encourage on-farm development and, in so doing, ensure more effective and efficient use of the limited water resource.

Investigations have shown that at least some irrigated properties in Central Otago are being severely affected by the cost/price squeeze and do not now have a sound economic base. However the recommended charges should not in themselves result in any farm becoming uneconomic.

- (iv) Long term irrigation agreements of the type used previously do not fit the present circumstances. On the other hand security and continuity of water supply is essential for investment purposes and to promote further irrigation development.

For the individual farmer, security is determined by the irrigable or irrigated area which will be supplied with water. Registration on the land title of a notice defining this area, together with a provision for review and independent reassessment, will provide the necessary security of supply.

A pro rata rebate of the basic charge, and a monthly proportioning of the basic depth throughout the season, would further enhance this security.

- (v) Upgrading or replacement of the existing works must be regarded as the objective for the older irrigation schemes in Central Otago.

Only through the capital improvement of these schemes will it be possible to provide an adequate rostered supply, a stable water charge, and allow adoption of modern irrigation techniques.

Each upgrading or replacement proposal must be considered in terms of the needs and expectations of the irrigators it is to serve, the water resource which is available, and

the costs and benefits of water supply. It must also be implemented only with the knowledge and support of the community it is to encompass.

L W Hinchey

Chairman

L W Hinchey

R J Riddell

Regional Advisory Officer
MAF Dunedin

R J Riddell

R L Engelbrecht

Farm Management Consultant
Ashburton

R L Engelbrecht

R D Grant

District Commissioner of Works
MWD DUNEDIN

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APPENDIX I

Recommended basic water charges (\$ per ha irrigated), basic depths (or supply available within basic charge), and additional supply charges (for water supplied in excess of basic depth) for 1980/81 irrigation season under average terms of trade.

SCHEME	BASIC DEPTH	BASIC CHARGE (per ha)	ADDITIONAL SUPPL CHARGE (per 1 000 m ³)
ARDGOUR	600	\$18.00	\$ 1.50
TARRAS	600	\$18.00	\$ 1.50
EARNSCLEUGH/ BLACKMANS	- *	\$20.00	-
LAST CHANCE	(450 to 600) *	\$16.50	-
HAWKDUN	300	\$17.00	\$ 1.50
IDABURN	450 *	\$16.50	-
MANUHERIKIA	750	\$15.50	\$ 1.00
OMAKAU	300	\$14.00	\$ 1.50
Share of Supply GALLOWAY	- *	\$17.00	-
Controlled Supply	750	\$15.50	\$ 1.00
IDA VALLEY	Variable allocation	\$17.50	\$10.00
PISA PLATS	750	\$19.50	\$ 2.50
RIPPONVALE	750	\$20.50	\$ 2.50
TEVIOT RIVER	750	\$18.00	\$ 1.50

* Not significant since supply not metered.

APPENDIX II

Actual water charges during the 1980/81 irrigation season (converted to metric terms) and water charges recommended to apply in the 1981/82 irrigation season.

1980/81 WATER CHARGES			1981/82 RECOMMENDED CHARGES		
Basic Charge \$/ha	Basic Depth mm	Extra Water \$/1000m ³	Basic Charge \$/ha	Basic Depth mm	Additional Supply Charge \$/1000m ³
<u>ARDGOUR</u>					
14.08	610	0.58	20.30	600	1.70
16.72	610	0.58	20.30	600	1.70
17.28	610	0.58	20.30	600	1.70
<u>TARRAS</u>					
11.94	610	0.58	20.30	600	1.70
13.00	610	0.58	20.30	600	1.70
14.07	610	0.58	20.30	600	1.70
15.15	610	0.58	20.30	600	1.70
16.20	610	0.58	20.30	600	1.70
17.28	610	0.58	20.30	600	1.70
19.38	610	0.58	20.30	600	1.70
<u>TEVIOT</u>					
11.94	914	0.35	20.30	750	1.70
12.99	914	0.35	20.30	750	1.70
14.07	686	0.35	20.30	750	1.70
14.07	838	0.35	20.30	750	1.70
14.07	914	0.35	20.30	750	1.70
15.15	686	0.35	20.30	750	1.70
15.15	838	0.35	20.30	750	1.70
15.15	914	0.35	20.30	750	1.70
15.66	838	0.35	20.30	750	1.70
15.69	686	0.35	20.30	750	1.70
15.69	762	0.35	20.30	750	1.70
16.20	762	0.35	20.30	750	1.70
16.71	686	0.35	20.30	750	1.70
17.28	838	0.35	20.30	750	1.70
18.33	838	0.35	20.30	750	1.70
<u>MANUHERIKIA</u>					
10.90	762	0.91	17.50	750	1.10
10.90	838	0.91	17.50	750	1.10
10.90	914	0.91	17.50	750	1.10
11.83	838	0.83	17.50	750	1.10
11.94	838	0.91	17.50	750	1.10
11.94	914	0.91	17.50	750	1.10
13.00	686	0.91	17.50	750	1.10
13.00	762	0.91	17.50	750	1.10
13.00	838	0.91	17.50	750	1.10
13.00	914	0.91	17.50	750	1.10
14.07	762	0.91	17.50	750	1.10

MANUHERIKIA (Continued)

14.07	838	0.91	17.50	750	1.10
14.72	762	1.67	17.50	750	1.10
15.15	610	0.91	17.50	750	1.10
15.15	686	0.91	17.50	750	1.10
15.15	762	0.91	17.50	750	1.10
16.20	762	0.91	17.50	750	1.10
17.28	610	0.91	17.50	750	1.10
17.28	686	0.91	17.50	750	1.10
17.28	762	0.91	17.50	750	1.10

GALLOWAY

10.35	610	0.70	17.50	750	1.10
10.90	610	1.39	17.50	750	1.10
11.94	-	-	19.20	-	-
13.00	610	0.70	17.50	750	1.10
14.08	610	0.70	17.50	750	1.10
14.08	-	-	19.20	-	-
15.15	610	0.70	17.50	750	1.10
15.15	-	-	19.20	-	-
16.20	610	0.70	17.50	750	1.10

EARNSCLEUGH

22.57 - -

IDA VALLEY

8.87	457	1.93	19.75	Variable	11.20
8.87	502	1.93	19.75	"	11.20
14.88	457	3.28	19.75	"	11.20

HAWKDUN

11.94	305	-	19.20	300	1.70
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OMAKAU

6.66	305	2.09	15.80	300	1.70
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LAST CHANCE

13.26	457	-	18.60	-	-
13.26	457	0.48	18.60	-	-
13.56	-	-	18.60	-	-
14.61	457	0.35	18.60	-	-
15.66	457	-	18.60	-	-
11.15	610	-	18.60	-	-
14.61	610	0.52	18.60	-	-

PISA FLATS

15.17	610	1.33	22.00	750	2.80
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RIPPONVALE

25.00	457	2.33	23.10	750	2.80
25.00	572	2.33	23.10	750	2.80
25.00	610	2.33	23.10	750	2.80
25.00	664	2.33	23.10	750	2.80
25.00	671	2.33	23.10	750	2.80
25.00	674	2.33	23.10	750	2.80
25.00	686	2.33	23.10	750	2.80
25.00	762	2.33	23.10	750	2.80

IDABURN

14.18	457	-	18.60	-	-
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