

AN ANALYSIS OF  
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT -  
MANITOBA HYDRO ELECTRICAL AGREEMENTS

By

Darcia Michele Siryj

A Practicum Submitted  
In Partial Fulfillment of the  
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## ABSTRACT

Manitoba Hydro currently provides electricity to eighteen remote Reserve communities; three non-Reserve communities; and Churchill, using isolated on-site, small scale diesel capacity. Electrical rates in diesel communities are substantially higher than those in communities of similar size served from the conventional hydro-electric system and distribution network.

Diesel service is introduced when the initial cost of commissioning generation and distribution facilities has been guaranteed to the Manitoba Hydro-Electric Board by a signatory to a community electrical agreement. The Department of Indian Affairs and Northern Development is the signatory to agreements establishing service in Status communities. The majority of DIAND-Manitoba Hydro electrical agreements had elapsed or were due to elapse by 1980. A review of diesel policies and practices, and of the service afforded by the electrical agreements, commenced in the late fall of 1978 as a prelude to re-negotiation. The PRACTICUM was derived from this study. The purpose of the PRACTICUM is: to review the historical growth of the diesel electrical market, its rate structure and operations; to assess the present revenue significance of Native residential consumption and electrical consumption by Federal government installations to Manitoba Hydro's diesel operations; and, to determine whether there is an economic basis for a negotiating strategy aimed at obtaining equivalent or upgraded service at lower cost.

Issues receiving primary emphasis included the substantiation of rates and capital charges by costs, the comparability of service in Reserve and non-Reserve communities, and the documentation of departures from contractual rates and rate-adjustment procedures. The prevailing diesel rate structure was examined to determine the extent and direction of subsidies and the success of rate design in achieving cost recovery and funding cross-subsidies.

It was concluded that an economic basis exists for a negotiating strategy aimed at reducing rates for limited residential service and reducing the annual fluctuations in rates paid by large commercial and general purpose customers. In addition it was demonstrated that the assumptions on which Manitoba Hydro presently bases assessments of capital contributions can be challenged, with tests performed indicating that a reduction of between 33 and 50 per cent is warranted. Finally, it was concluded that the pivotal conceptual issues from which modifications to the current rate structure would flow, are the following:

- (1) Whether a distinction should be made in future between employing accounting procedures as indicators of cost of service, and employing accounting procedures as rate-setting instruments per se; and
- (2) Whether the inability of the diesel market (given its size) to return revenues sufficient to achieve complete cost recovery and cross-subsidization, suggests that diesel rates should not be designed without reference to revenues and costs accruing to the Manitoba Hydro Integrated System.

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CHAPTER ONE  
BACKGROUND TO THE STUDY

1.0 Foreword: The Role Of Diesel Generation  
As A Means Of Supplying Electricity At  
Remote Locations In Manitoba

The commercial generation and distribution of electricity in the Province of Manitoba is conducted by one utility principally, Manitoba Hydro<sup>1/</sup>. Total interconnected capability within Manitoba<sup>2/</sup> at March 31st, 1978<sup>3/</sup> was some 3202MW. The Manitoba Hydro Integrated System is largely a hydraulic system, deriving approximately 87 per cent of its generating capability from the hydro-electric resources of the Winnipeg, Nelson, Saskatchewan and Laurie Rivers and the balance from modest coal-fired thermal and gas turbine facilities<sup>4/</sup> in Brandon and Selkirk. Approximately two-thirds (1713MW) of the hydro-electric capacity is situated on the Nelson River. Power transmission south from the Nelson is by a 450kV HVDC line, which precludes power supply to remote communities situated at intermediate points along the transmission line<sup>5/</sup>.

In addition, Manitoba Hydro currently provides electricity to Churchill, and to eighteen Indian Reserves and three Metis communities from isolated on-site, small scale<sup>6/</sup> diesel capacity. A total of 11MW<sup>7/</sup> of diesel capacity are deployed in the twenty-one Reserve and non-Reserve communities, with installed capacity at individual locations ranging from 40kW to 1200kW.

Sufficient excess capacity exists on the hydro-electric system to allow the export of substantial quantities of power to the northern United States, Ontario and Saskatchewan. In fiscal 1977/'78 the quantity of



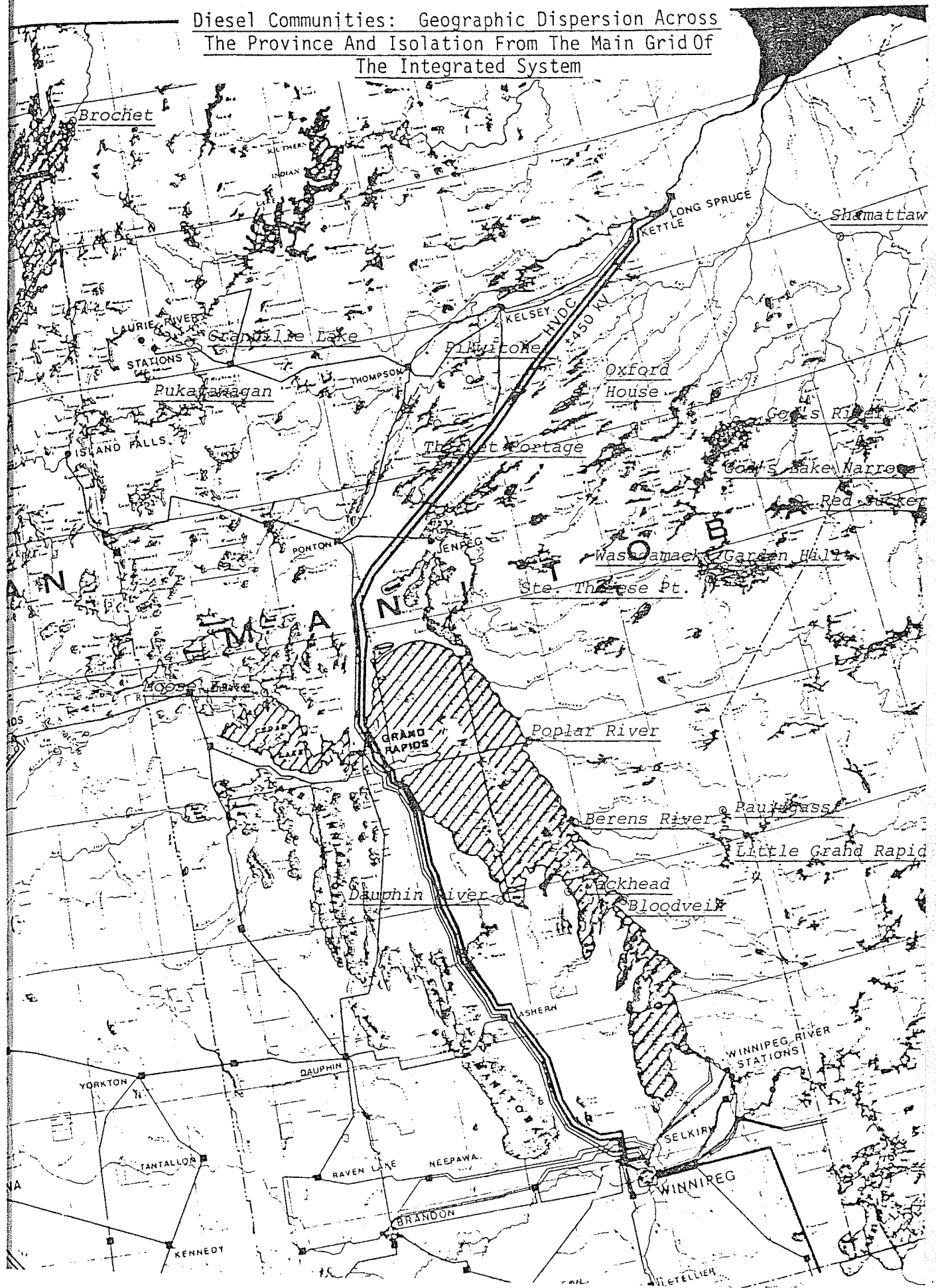
electricity exported to the U.S. alone was sixty-three times the amount of energy generated and sold in all twenty-one Status and non-Status communities. Yet the availability of capacity on the hydro-electric system is not a factor in serving remote communities. Rather, the establishment of isolated diesel capacity at remote locations is a means of ensuring the introduction of electrical service to communities situated out of economic range of the power grid or adjacent to its DC component. Geographic, technical and economic factors would otherwise preclude<sup>8/</sup> service by Manitoba Hydro<sup>9/</sup> to these small population centres.

Those sites at which Manitoba Hydro currently operates commercial<sup>10/</sup> diesel plants are: Berens River; Bloodvein; Brochet; Dauphin River; God's Lake Narrows; God's River; Granville Lake; Garden Hill, Ste. Therese Point and Wasagamack, collectively known as Island Lake; Jackhead; Little Grand Rapids; Moose Lake; Oxford House; Pauingassi; Pikwitonei; Poplar River; Pukatawagan; Red Sucker Lake; Shamattawa; and Thicket Portage.<sup>11/</sup> Their geographic dispersion across the province and isolation from the main grid are illustrated by Figure 1.

The majority of the diesel installations are in service in two areas of the province: in the north-eastern region of Manitoba and along the east side of Lake Winnipeg.

The practice of providing community service from diesel capacity commenced in 1963, when Norway House became the first isolated Indian Reserve to receive electrical service. Initial service has been supplied to

## Diesel Communities: Geographic Dispersion Across The Province And Isolation From The Main Grid Of The Integrated System



Reserve and non-Reserve communities in this way over the past sixteen years and many have subsequently received central system power. Examples of communities subsequently linked with the conventional power grid are The Pas<sup>12/</sup>, Cormorant, Split Lake, Nelson House, Cranberry Portage, Waboden, Cross Lake, Manigotagan, Wanless, Ilford, and Norway House<sup>13/</sup>.

Central station power is introduced on a community-by-community basis "when the economics of operation warrant this and the capital is available"<sup>14/</sup>. Manitoba Hydro re-examines the feasibility of conversion annually. Of the twenty-one sites remaining in operation across the province, several are being considered for conversion within the near future. Moose Lake is the primary candidate<sup>15/</sup>.

Electrical rates in diesel communities are substantially higher than those in communities of similar size served from the conventional hydro-electric system and distribution network. If conversion occurs, the lower rate schedule then comes into effect.

It is conceivable that centres along the east shore of Lake Winnipeg will eventually join the integrated system; and also that several others in the northeast region, such as Ste. Therese Point, Wasagamack, and Garden Hill, will receive full service in time. Viewed optimistically, the diesel system in Manitoba may well be at the mid-point of its expansion cycle, with the number of Reserve communities permanently dependent on local diesel service for their electrical needs shrinking in each succeeding year<sup>16/</sup>.

However, given the high capital cost of transmission lines it is not unrealistic to assume that diesel service will not be eliminated entirely within the next decade; or even that the most isolated communities may remain on diesel service indefinitely, upgrading service eventually by other means where possible. For example, low-head hydro-electric generation from isolated local plants may be examined for feasibility in some instances. However, conversion from diesel to other alternatives will still be limited by many of the same factors as conversion to central station power; namely high capital cost, distance of transmission, availability of capital, and recipient markets too small to generate revenues sufficient to justify the initial expenditure required.

Whatever the correct long-term view, the consumer cost attached to diesel service nevertheless is presently high and certain to rise, and poses a long-term problem for consumers in those communities which face permanent dependence on diesel power. Thus it is appropriate to examine the process which the utility presently uses to determine rates and connection charges, and to determine whether alternate arrangements are not justifiable for the duration of diesel service.

2.1 Administrative Procedure And Cost  
Entailed In Obtaining Diesel Service

Electrical service is introduced into remote communities when the initial capital cost of commissioning generation and distribution facilities has been guaranteed to the Manitoba Hydro-Electric Board by a signatory to a community electrical agreement. The Department of Indian Affairs and Northern Development<sup>17/</sup> is the signing party<sup>18/</sup> in the case of Status communities<sup>19/</sup>. Eighteen such contracts presently exist and there is a possibility that two more will result from current investigations of the feasibility of introducing diesel service to the Reserve communities of Lac Brochet and Tadoule Lake<sup>20/</sup>.

Community electrical agreements are binding on both signing parties for a period of ten years from the time that service is introduced. Once this initial term has elapsed the contracts continue in force, but are subject to cancellation by either party on six months' notice. From a practical standpoint, cancellation is unlikely to occur<sup>21/</sup>. Although cancellation is virtually precluded, the re-negotiation of contract terms is not. Re-negotiation is possible once the binding period has elapsed.

At least nine of the DIAND agreements had elapsed or were due to elapse by mid-1979, and the bulk of the remainder were due to elapse in the following year<sup>22/</sup>. In complying with its obligation under the capital provision clause, DIAND had provided some \$3.8 million<sup>23/</sup> toward the commissioning of electrical facilities (or about 56 per cent of Manitoba Hydro's gross investment in existing diesel systems), and the annual charges

levied on electricity used by private residential customers served :  
through the agreements had reached three-quarters of a million dollars.

A degree of unreliability in the service itself and a lack of clarity attached to administrative issues were felt to be inconsistent with the substantial and rising payments made by DIAND and Indian consumers. Service was characterized by frequent electrical outages; by service interruptions due to delays in repairs or adjustments to transformers, circuit breakers and ancillary equipment; by dissatisfaction with service size<sup>24/</sup>; by rapid and repeated increases in electrical rates; and by apparent Hydro policy shifts toward the administration of rates and toward service installation terms for new connections.

These factors, the opportunity to redraw the agreements and, perhaps, the existence of the Tritschler Commission of Inquiry, stimulated concern as to the adequacy of the agreements and the accuracy and equitability of pricing arrangements. With the need for a review established and the review scheduled to commence in the fall of 1978, the issues requiring attention were divided into two separate but complementary categories for the purpose of analysis.

1.2 Reviewing Existing Agreements:  
A Prelude To Re-Negotiation

In the first category were those issues where the needed direction of change was known, its consideration in developing a negotiating strategy being contingent primarily on giving it definition by obtaining formal documentation of the need. These issues consisted chiefly of consumer dissatisfaction with the size of residential service and of the technical quality of day-to-day operations and maintenance. Documentation of consumer satisfaction was conducted by the Manitoba Indian Brotherhood through a series of community surveys and meetings, and confirmed dissatisfaction with the size of service available. The technical inspection of diesel plants, community distribution facilities and residential service connections was carried out by UNIES Ltd., a firm of consulting engineers. The inspection identified several isolated cases of maintenance problems, but concluded that, in the main, service problems have not been inconsistent with the normal pattern of difficulty associated with diesel engines in constant service.

Issues belonging to the second category included the verification of the cost basis for rates, the comparability of service in Reserve and non-Reserve communities, and also of the comparability between the terms of service in Manitoba and those in adjacent provinces.

The first issue (whether rates and other charges are substantiated by costs) was an issue of particular concern. While arrangements for electrical service had existed for approximately sixteen years, it had been

only in the last five years that the economic basis for consumer charges had been questioned. This was due largely to the fact that changes in billing procedures, rate increases, and increases in the levels of capital contributions, had occurred repeatedly over a relatively short span of time<sup>25/</sup>, and in this way had become conspicuous.

For several years after the introduction of diesel service to most communities, local markets had continued to consist primarily of those connections whose service was installed by virtue of the DIAND - Manitoba Hydro community electrification agreements. The number, types and mix of types of connections served by each local plant today differs from the original market, primarily in the number of commercial and general purpose connections added. Manitoba Hydro responded to market growth by developing new rates, rate structures and service policies.

There is some evidence to suggest that certain changes were introduced by modifying the agreements without the knowledge of those responsible for the program in the Department of Indian Affairs. There is evidence as well that some policies and practices have been introduced both without prior notification being given to DIAND, and without formally amending the agreements. The cost assumptions which have underlain the new policies and practices therefore appear to deserve examination to determine whether they had been justified. Much of the ensuing analysis was linked to this one point.



## 2.0 The Purpose Of The Practicum

The report which follows documents the methods used and results obtained in analyzing this second body of issues i.e. costs and comparability of service. The material presented differs in no substantive way from the draft material presented to DIAND for its use in developing a strategy for re-negotiating the electrical agreements. Changes made pertain largely to report organization, and any observable shift in emphasis is the result of this process.

In its revised form, the practicum documents the economics of providing remote diesel service to the Federal government and Native consumers in communities in Manitoba. In summary, the purpose of the study is:

- to review the historical growth of the diesel electric market, its rate structure and operations;
- to assess the present revenue significance of the Native residential and Federal government consumption to Manitoba Hydro's diesel operations; and,
- determine whether there is an economic basis for a negotiating strategy aimed at obtaining equivalent or upgraded service at lower cost.

2.1 Parameters Of The Study And  
Basis For Final Recommendations

*Review Period Chosen.* Diesel operations were reviewed for the period fiscal 1969/'70 - fiscal 1977/'78 inclusive and supplemented by fiscal 1978/'79 material where possible. It will be noted that this period does not span the entire sixteen years of diesel operations. The shorter period was judged to be adequate since (a) the primary emphasis throughout the study was to determine whether rate increases were substantiated by parallel cost increases, and the period of rapid rate increase commenced approximately 1972, and (b) consolidated cost data were readily available for this period.

*Data-Related Limitations.* The nature of their function requires that electrical utilities maintain extensive records on countless individual transactions. Volumes of electricity generated, traded and sold; production costs, including the volume and price of inputs and utilization rates of inputs; prices levied on electricity sold; payment received; condition and value of equipment, are but a few of the facets of their operations which utilities monitor with regularity.

Data are recorded on a daily, monthly, annual, and even hourly basis and the same data may be organized in several ways to serve a range of internal statistical needs. Despite the effort to maintain comprehensive data files, specific statistical relationships may go unreported unless a special need, for example an in-house study, makes it necessary to break down grouped data for recombination with other information.

It is not uncommon for accounting practices, rate setting or planning procedures to change over time, and for changes of this nature to entail modifying the criteria used to classify statistics for the end uses mentioned. A significant modification to the criteria can diminish the comparability between old and new data. Standards of confidentiality, too, will circumscribe the types and volume of data released for use by independent analysts and even for interdepartmental use.

Limitations of these types foreclosed certain avenues of analysis and made it necessary to process fairly large quantities of information in instances where the appropriate data base was unavailable.

*Identifying Areas For Research.* Research entailed two functions, documentation and investigation. The documentation function consisted of acquiring cost, revenue, rate and consumption information to build a data base that could be used to determine whether rate levels are consistent with costs.

The investigative function entailed obtaining explanation of, and assessing, relevant Hydro policies and practices that have been implemented without discussion or prior notice. Policies of primary interest were those relating to the standard of fiscal performance set by the Hydro-Electric Board for its diesel operations, as mirrored in cost accounting procedures and methods used to determine rate increases and capital charges.

Issues requiring documentation and/or investigation were identified in five ways:

- by fulfilling information requests and following up concerns expressed by DIAND;
- through discussions with Hydro personnel;
- by a comparison of terms and conditions specified in contracts with those operative at the present time;
- by reviewing internal diesel policy documents provided by Manitoba Hydro staff; and,
- by scanning historical data for discontinuities.

*Basis For Developing Recommendations.* The trends and issues isolated in the manner described acted as the parameters for the study. The material compiled by documenting these issues was synthesized, and yielded two general conclusions. These were:

- that the assumptions on which Manitoba Hydro presently bases assessments of capital contributions for new connections could be challenged; and,
- that alternative rate-setting procedures and rate structures could be developed which would result in lower rates to diesel customers without significantly increasing annual operating losses to Manitoba Hydro.

Alternative capital assessment and rate-setting procedures were then developed and proposed as evidence that negotiations might legitimately focus on a request for a modified rate structure.

The trends and issues isolated for study are listed next.

2.2 Methods

Task One: *Identify quality and level of diesel service at outset of period.*

- subtask (1) Determine the nature of the initial electrification program:*
  - isolate references in each contract and determine extent of program and uniformity of program from community to community.
- subtask (2) Identify type of residential service provided to Indian consumers:*
  - obtain service size and appliance prohibition information from electrical agreements.
- subtask (3) Identify type of service provided to Federal Government installations:*
  - obtain service size and conditions from electrical agreements.
- subtask (4) Obtain number of rates and service classifications (types of customers) who received service in the early years following electrification:*
  - interview Manitoba Hydro personnel.
- subtask (5) Identify clauses in agreements limiting the utility's liability in the event of service interruption and determine the nature of service interruption permitted under the agreements:*
  - refer to electrical agreements and supplement with interview of Manitoba Hydro personnel.
- subtask (6) Identify aspects of service not regulated by the agreements:*
  - compare guidelines set out in contracts with typical daily administrative and maintenance tasks entailed in providing service and managing service accounts. Establish through interviews with Manitoba Hydro personnel and discussions with client.
- subtask (7) Identify non-conforming services and policy exceptions granted from fiscal 1969/'70 through 1975/'76:*
  - review internal administrative documents available for inspection and seek confirmation from Manitoba Hydro personnel.

Task Two: *Identify quality and level of diesel service at the current time.*

*subtask (1) Determine whether difficulties are experienced in obtaining service for new connections:*

- obtain comments from client and interview Manitoba Hydro personnel on procedure for obtaining service. Also obtain comments as to planning or administrative delays to be expected.

*subtask (2) Determine factors which have prevented residential customers from obtaining upgraded service equivalent to that provided to government personnel:*

- identify time, cost, and technical factors associated with Manitoba Hydro and DIAND's operations which have made equivalence difficult to achieve.

*subtask (3) Gauge comparability of service to Status and non-Status communities:*

- obtain verbal confirmation of equivalence from Hydro personnel (examination of specific documents is not possible without permission from the provincial government). Also examine generalized rate, cost and revenue information to determine whether operations are comparable.

Task Three: *Identify characteristics of rate structure and changes made over the review period.*

*subtask (1) Determine number of service categories in present use and significance of individual categories from the perspective of consumption and revenues:*

- review monthly records of consumption and billings for each diesel site for the twelve month period April 1st 1977 through March 31st, 1978.

*subtask (2) Determine design of tariff applied to each of the significant customer categories:*

- using rate records determine whether rates are flat rates or stepped rates. In the case of stepped rates, determine whether an increasing or declining rate is applied and the purpose and effect of this design.

*subtask (3) Determine the cost basis for current and past rates:*

- review rate information provided by Manitoba Hydro and test accuracy of rates by substituting cost information in formulae. Confirm types of costs included in generalized cost figures. If published rates differ from cal-

culated rates, seek clarification from Rates Department personnel.

- subtask (4)* Determine when residential rates departed from levels specified in contracts, when the prompt payment discount was discontinued and reasons for the policy change:  
- obtain clarification from Rates Department personnel.
- subtask (5)* Determine the cumulative level of rate increase experienced by residential customers:  
- quantify the impact of rate increases by comparing monthly and annual costs for electricity at current rates and rates specified in contracts using a representative figure for average consumption.
- subtask (6)* Determine average residential electrical consumption from monthly records of sales, billings and connections:  
- obtain a representative figure for average consumption by examining consumption under all residential categories for each community. Observe degree of fluctuation in the customer count and apply a representative figure to consumption.
- subtask (7)* Determine basis, extent, and mechanism of residential rate subsidy:  
- examine internal policy documents for references to the subsidy and obtain explanation of subsidy from Hydro personnel in Rates Department;  
- compare monthly and annual expenditures for electricity by customers in diesel communities with those of customers in Winnipeg, other cities, and towns assuming use of an identical quantity of energy;  
- compare the amount of electricity which would be used by diesel, city and town customers assuming an identical expenditure for electricity;  
- identify degree of cost recovery provided on residential services through rates;  
- compare average revenue per kWh for all non-residential customers with average cost of supplying electricity;  
- determine whether losses on residential service are recovered through rates and rate revenue obtained from non-residential customers.

subtask (8) Clarify reasons for departure from use of Government of Canada rate and rate adjustment formula specified in contracts:

- obtain explanation from Rates personnel and compare with statements in administrative documents;
- determine accuracy of past and proposed rates by examining records of fuel and fuel haulage costs and substituting into formula.

subtask (9) Examine fluctuation in all major rates:

- compare change in published rates for three preceding fiscal years;
- determine maximum or minimum levels of change possible given use of prevailing rate adjustment formulae;
- determine whether rates are uniform across the diesel system or are individually set;
- determine annual differences in rates between communities;
- determine practical significance of rate differences and relative change between communities by examining the rate differential in terms of money saved by a typical customer located in the least-cost community.

Task Four: *Examine and assess relevant trends in the physical operation and financial performance of Manitoba Hydro's diesel service.*

subtask (1) Determine the increase in average cost of production over the review period:

- document growth in consumption by community from fiscal 1968/'70 through fiscal 1977/'78;
- document costs for the same period and determine the increase in average cost in constant (1970) dollars.

subtask (2) Determine magnitude of annual losses or profits on a community and aggregate basis for each year in the review period:

- document costs and revenues for each operation, calculate net profits and losses and determine factors contributing to a loss trend;
- disaggregate component costs, calculate



direct and indirect costs and determine which costs in particular have shown increases out of line with revenues.

*subtask (2) Determine basis for capital contributions:*

- *Identify engineering and cost assumptions on which contributions are based; obtain quotation on level of contribution requested in each community; test engineering and cost assumptions; and quantify reduction in capital contribution indicated by test results.*

*Task Five:* *Synthesize data obtained in Tasks One through Four. Summarize preferred improvements in cost and quality of service and test for feasibility by applying consequent rates to 1977/'78 consumption and determining revenues which would result. Compare with actual operating costs and calculate losses that would accrue under conditions of improved service and modified rate structure. Compare with actual levels of loss and comment.*

### 2.3 Definitions Of Terms

Ampere. The unit used to measure electrical rate of flow. Abbreviated throughout the report as amp.

Community Electrical Agreements. Agreements between Manitoba Hydro and the Department of Indian Affairs and Northern Development for electrical service in Reserve communities. The electrical agreements established an electrification program, under which Indian residential customers and installations maintained by the Government of Canada received service. The performance of service was contingent on the provision of capital contributions (by DIAND) to cover commissioning costs.

Distribution Contribution. Capital contribution required prior to service installation or upgrading. The distribution contribution is intended to cover materials costs for poles, anchors, wire and transformers; of upgrading transformers if necessary, of labour and overhead expense associated with the installation work.

Flat Rate. A consistent charge in cents per unit of electricity used. Thus, the customer's bill under a flat rate would be determined by multiplying the rate times the number of kilowatt-hours of electricity used during the billing period.

Generation Contribution. Capital contribution required prior to service installation or upgrading. The amount of the contribution is: the average cost per kW of generation capacity (including standby) required to meet the incremental load expected of the new connection times the expected load. Expenses rolled into the generation contribution include the value of engines, auxiliary equipment and site preparation; fuel storage facilities, equipment haulage costs; miscellaneous expenses for equipment rental, travel expenses and temporary operational facilities; overhead expense and expense associated with engineering.

Manitoba Hydro Fiscal Year. Manitoba Hydro utilizes an April 1st - March 31st fiscal year. The fiscal year notation used throughout the study is as demonstrated in the following example: 1977/'78 = the 1978 fiscal year ended March 31st, 1978.

Non-coincident Demand. As used in the study, the term refers to the maximum instantaneous demand created by an aggregate customer load; for example, the community residential load.

Stepped Rate. A varying charge arrangement for electrical consumption; that is, a tariff consisting of several rates, with a different rate applied to each successive block of electricity used. (The first 250 kWh of electricity used (or any block) might constitute the first block. This is the actual arrangement in diesel communities. The second block consists of the balance of energy used. The diesel charge for the first block is 5¢/kWh, and the charge for the balance is 2.53¢/kWh on residential use.)

Volt. Unit of measurement for electrical pressure.

Watt. Unit measurement of current drain taking both voltage and amperage into account. Thus 1 ampere at pressure of 1 Volt = 1 Watt. One watt used for 1 Hour = 1 Watt Hour, and 1000 Watt hours = 1 kilowatt-hour (kWh). The kWh is the unit in which electricity is metered.

0 Footnotes: Chapter One

- 1/. Manitoba Hydro, a Crown Corporation, distributes electricity throughout the province except in the central portion of the City of Winnipeg, an area served by Winnipeg Hydro. Winnipeg Hydro, a Municipal Corporation, owns approximately 6 per cent of the total generating capacity in the province of Manitoba; however, Manitoba Hydro and Winnipeg Hydro operate as an integrated electrical generation and transmission system.
- 2/. Inclusive of Winnipeg Hydro but exclusive of interconnected capability in adjacent provinces and in the northern United States.
- 3/. Manitoba Hydro operates on an April 1st - March 31st fiscal year.
- 4/. Totalling 394 MW at the same date.
- 5/. Electricity generated at stations on the Laurie River and on the Saskatchewan and Winnipeg Rivers is conveyed by AC transmission.
- 6/. Communities are typically served by two, three or five diesel engines, depending on the size of the local load. Two-engine communities are typically served from 75kW and 175kW engines, while 175kW and larger, 300kW engines are typically in service in the larger load centres.  
  
Diesel capacity is isolated. While there is no integrated diesel 'system' as such, the various commercial diesel operations can be viewed as a non-interconnected system discrete from the conventional line power grid.
- 7/. At March 31st, 1978. Additions and equipment retirements have subsequently occurred. The annual report for the 1978/'79 fiscal year may be consulted to determine the subsequent net generation capacity.
- 8/. Manitoba Hydro annually reviews the feasibility of converting diesel communities to central station power. It is not the purpose of the present study to examine the methods employed or conclusions reached in the past, nor to gauge the feasibility of conversion today.
- 9/. In practice, diesel service has been the sole alternative to central station power in isolated communities. While Manitoba Hydro has reviewed the feasibility of other alternatives, for example low-head hydro-electric generation, such analyses are treated as confidential internal documents.
- 10/. As opposed to diesel facilities maintained at Hydro construction sites for the purpose of providing a temporary power supply to equipment, site offices, and living quarters.
- 11/. There are, therefore, eighteen Reserve communities and three non-Reserve communities served in this way, for a total of twenty-one.

- continued -

If the three communities of Garden Hill, Ste. Therese Point and Wasagamack are considered together as the single community of Island Lake, the total is nineteen.

- 12/. Diesel capacity is still maintained at The Pas for standby use.
- 13/. List of converted communities has been drawn from page two of Manitoba Hydro Office Memorandum dated 78 08 03; memorandum from C. Jaworski, Maintenance & Construction Manager, Eastern Region, to R.O. Lambert, Assistant to the General Manager, Corporate Operations.
- 14/. Ibid.
- 15/. Personal communication, Management personnel (Eastern Region), Manitoba Hydro; Meeting of Friday, March 9th, 1979.
- 16/. However, if the settlement of land claims is followed by a migration to those locations, additional services might result.
- 17/. The Departmental acronym, DIAND, will be used from time to time throughout the report.
- 18/. On behalf of Her Majesty the Queen. The two parties to the contracts are DIAND, for Her Majesty, and the Manitoba Hydro-Electric Board for Manitoba Hydro.
- 19/. The Provincial Government assumes this role in agreements governing the introduction of service to non-Status communities.
- 20/. DIAND has retained Manitoba Hydro to examine the feasibility of establishing diesel service in these two communities. DIAND itself has been operating in a limited capacity as the supplier of electricity to schools in these two communities.
- 21/. Cancellation would occur if the administration, operation and maintenance of facilities were to be transferred to DIAND from Manitoba Hydro. But DIAND customarily contracts for power supply from the local utility at the location in the Province or Territory where service is required, rather than establishing and administering a service directly.
- 22/. Expiry dates of contracts are listed in Appendix One.
- 23/. DIAND payments for electricity used in federal installations such as schools and teacherages, was about \$520,000 in fiscal 1977/'78, and billings to residential consumers had totalled nearly \$260,000.
- 24/. Site inspection notes, B. Phillips (P. Eng.), UNIES Ltd. 1979.
- 25/. Since 1976.

0 The Scope Of The Electrification  
Programs Outlined In The Community  
Electrical Agreements

The DIAND - Manitoba Hydro electrical agreements provided for the electrification of residences located on Reserves and for limited 15 amp service to each residential connection<sup>26/</sup>. They provided, as well, for the electrification of institutional and service facilities operated by federal agencies. These included schools, teacherages, water and sewage pumping stations and standpipe systems<sup>27/</sup>. The size of service made available to teacherages and residential quarters of nursing stations and similar facilities generally exceeded the size of service provided to Indian residential consumers in the same communities.

All contracts follow a similar format<sup>28/</sup>. The particular community is named; the recipients of power and locations to be served are named; the contractual obligations of Manitoba Hydro and Her Majesty (DIAND) are listed; the level of electrical service to be provided is described; the signatures of representatives of Manitoba Hydro and DIAND appear; and a rate schedule is appended to the end of the document. A drawing illustrating the Reserve land in each case, the location of proposed generating facilities, fuel storage facilities, the locations of residences and institutional facilities to receive service, the location of distribution lines, etc., also accompanied the original documents.

The contractual obligations of each party are identical in all contracts.

For Manitoba Hydro these are:

- to provide three-wire 120/240 volt single phase service to Indian consumers, the service to be limited by 15 amp circuit breakers;
- the provision of service to Her Majesty (DIAND) for schools, teacherages, water and sewage systems.

Her Majesty's (DIAND's) obligations include:

- a specified capital contribution toward the cost of generation and distribution equipment, service wires and meters, needed to supply service to Indian residences and Government of Canada connections;
- the obligation to meet the cost of installing service to later new connections in Indian consumers' residences and for upgrading service (or adding new service) to Government of Canada connections.

Standard clauses limiting Manitoba Hydro's liability in the event of power fluctuation, interruption or failure are included in all contracts and read as follows:

" Manitoba Hydro shall use reasonable diligence in providing Her Majesty with a regular and uninterrupted supply of power, but is not to be liable for any loss, costs, damages or expenses directly or indirectly resulting from any fluctuations, interruptions, reduction or failure in the supply of power. "

(and)

" Manitoba Hydro is to have the right to interrupt the supply of electric power and energy at any time for the purpose of safeguarding life or property and for the purposes of inspecting, maintaining, repairing,

replacing, adding to or improving Manitoba Hydro's equipment and facilities, without being liable to Her Majesty or consumers for any penalty or for any loss, costs, damages or expenses caused by or resulting from any such interruption, but all such interruptions are to be of a minimum duration and whenever possible shall be made after reasonable notice has been given to the Customer and at a time least inconvenient to Her Majesty. "

1.1 Policy Shifts Toward Rates And  
Capital Contributions: Residen-  
tial Service

Rates charged today for electricity are substantially higher than those originally set out in contracts and charged at the time that electricity was introduced into the communities.

The practice of disregarding the contractual rates in the early 1970's actually worked to the consumers' advantage for a period. The shift consisted of setting diesel residential rates equal to rural rates, and at the time at which some communities were transferred they would in fact have been transferred to lower rates.

The decision to introduce the rate reduction was a political decision initiated by the (then) NDP provincial administration. It was, presumably, made on the assumption that the price advantage would be maintained. This did not occur, yet the practice of tying diesel rates to rural rates continued.

Rural rates had been introduced without amending the electrical agreements. It was not until 1977 that such an amendment was actually made. The 1977 'general amending agreement' simply deleted all rate clauses and replaced them with a clause permitting Manitoba Hydro to make any adjustment at any time. A copy of the document is provided in Appendix Three.

It appears that DIAND was not aware of either the shift in practice in



the early 1970's or the 1977 amendment.

Manitoba Hydro has only recently enforced those clauses of the contracts which specify that service will not be provided to new connections until capital contributions have been paid to cover the cost of the additional generation and distribution capacity needed to meet the load created by such new connections.

Although Indian residential customers meet their electrical bills individually out-of-pocket, the capital contribution required for the connection of new homes is met out of Band capital housing budgets. The recent enforcement of the requirement for such sums of money, coming as it does after a lengthy period of non-enforcement, has abruptly brought home the meaning of the capital obligation clause in the electrical agreements. The cost of installing new service is now such that the actual electrification of homes competes as a budget item with home construction for the monies available in Band capital housing budgets. It is reported that the result in some instances is that budgets prevent electrification at the time of construction; so wiring is not installed initially and homes must be retrofitted later for electric service at high cost<sup>29/</sup>.

As written, the contracts specify that Indian customers receive limited 15 amp service in residences. With the growth in personal income to Native people, 15 amp residential service is today considered inadequate by many consumers. Band members wish to operate the full range of electrical appliances and equipment to which they have access from retailers

in the communities. A circuit of the 15 amp size is essentially sufficient to carry a residential lighting load only, or a mixture of lights and a very few other small appliances. Since a 15 amp residential circuit will overload, being the sole circuit, unless appliance use is restricted to load combinations which the circuit will handle, the residential service limitation essentially prevents the free use of those appliances which may be at hand. The daily use of lights, a rangette, toaster, iron and other common household items will, for example, involve unplugging one or more appliances when it is necessary to use another.

Capital contributions required for new 15 amp connections are already considered prohibitively high. The amount of the contribution required to obtain expanded service is therefore so high as to be beyond consideration as an across-the-board step unless it were undertaken in the same fashion as the initial funding for electrification i.e. through special funding by DIAND which would not reduce a Band's other capital budgets.

Limited 30 amp service had been made available automatically in the past to Indian and other consumers for residential, and even commercial and general purpose premises until the growth in community electrical loads against installed capacity and rising costs of operations led Manitoba Hydro to make the provision of all new service conditional on the prepayment of capital contributions. The contribution requirement has been enforced for new limited service connections since 1976.

Electrical agreements specify rates for both limited 15 amp residential and 30 amp general purpose or commercial services. These clauses are

merely rate clauses, and their presence in contracts does not make it obligatory that Manitoba Hydro provide services of such size. It may refuse to do so until the capital contribution requirement has been met as specified in contracts, or until a capacity expansion program is planned which would augment capacity in place to a level sufficient to carry the additional load.

1.2 Diesel Residential Rates As  
Subsidized Rates

The 6.9 million kWh of electricity used by the 15 amp limited service residential market in 1977/'78 represents the electrical consumption of roughly 1,500 connections<sup>30/</sup>. The residential base in each of the twenty-one communities is small, averaging fewer than 100 connections. Nevertheless, in ten communities the residential market accounted for a minimum of 45 per cent of energy used (Table One). Based on total residential billings and kWh sales to residential customers in all communities, the average revenue per kWh of electricity sold for lighting, cooking, and operating small household appliances was about 4.2¢ per kWh in fiscal 1977/'78.

While 40 per cent of all electricity generated at diesel sites was distributed to residential customers having limited 15 amp service, the resulting revenues made up only 18 per cent of the total earned on all customer sales. By implication, the rates levied on residential energy use are pegged at levels substantially below those set for members of diesel general service categories.<sup>31/</sup>

The average cost of supplying a kWh of electricity to isolated diesel markets was about 16.1¢/kWh, as compared with average revenue of 4.2¢ on residential sales. In respect of the existence of the subsidized residential rate, Manitoba Hydro policy states that:

" The Corporation will assist in the improvement of living standards in the

Table One

Residential Category Consumption and Rate Revenue  
As Compared With  
Total Community Consumption and Community Rate Revenue  
Fiscal 1977/'78

Community	Residential Consumption (kWh)	Community Consumption (kWh)	% (%)	Residential Revenue (\$)	Community Revenue (\$)	% (%)
Berens River	577,683	1,345,967	42.9	25,202.16	118,818.90	21.2
Bloodvein	253,909	645,800	39.3	11,456.23	59,791.47	19.2
Brochet	330,990	892,195	37.1	14,219.54	116,467.98	12.2
Dauphin River	179,178	300,018	59.7	6,655.83	19,188.40	34.5
God's Lake Narrows	353,497	1,243,231	28.4	15,996.12	117,579.00	13.6
God's River	125,961	256,922	49.0	5,374.30	26,987.35	19.9
Granville Lake	21,448	56,823	37.7	1,732.09	8,488.73	20.4
Garden Hill	961,927	2,579,829	37.3	40,928.16	250,259.67	16.4
Ste. Therese Point	582,087	1,298,046	44.8	24,778.44	99,961.69	24.8
Wasagamack	201,473	976,705	20.6	8,383.27	99,391.57	8.4
Jackhead	234,760	552,349	92.5	9,341.72	55,322.83	16.9
Little Grand Rapids	161,579	512,469	31.5	8,147.49	41,571.69	19.6
Moose Lake	576,529	1,118,488	51.5	25,582.84	81,461.32	31.4
Oxford House	654,934	1,427,108	45.4	27,267.63	127,605.02	21.4
Pauingassi	75,610	160,652	47.1	4,606.34	14,194.12	32.5
Pikwitonei	174,470	328,358	53.1	7,528.79	31,301.21	23.2
Poplar River	452,706	1,057,201	42.8	17,023.32	86,544.86	19.7
Pukatawagan	327,670	898,239	36.5	14,194.48	84,958.87	16.7
Red Sucker Lake	265,287	538,910	45.0	10,369.61	73,581.53	14.1
Shamattawa	230,759	499,587	46.2	10,901.59	65,528.99	16.6
Thicket Portage	174,227	395,283	44.1	7,547.32	44,074.56	17.1
TOTAL	6,928,684	17,146,077	40.3	297,217.17	1,627,272.16	18.3

remote northern settlements by establishing local diesel generating stations and distribution systems. In order to permit customers in these areas to make use of electric service, Residential and General Service classifications of limited capacity will receive subsidized energy rates.<sup>32/</sup>

A comparison of diesel residential rates with the average cost of generation would seem to confirm the policy of residential rate subsidization. The total operating expense accumulated by the twenty-one diesel operations in 1977/'78 amounted to \$1,104,284.63, against the generation and distribution of 16,355,103 kWh<sup>33/</sup> of electricity to all diesel customers. Since the average cost/kWh of electricity sold was 16.07¢ and the residential market returned just 4.2¢/kWh through rate revenues, it appears that residential consumption returned about 26 per cent of the cost of service. Seen from the opposite perspective, residential service was subsidized by nearly seventy-five per cent. On a community-by-community basis, the relation between average cost per kWh sold and the average subsidy on residential service sales was as shown in Table Two.

Table Two

Average Cost/kWh Generated  
Average Residential Rate Revenue/kWh  
(Fiscal 1977/1978)

Community	Cost/kWh (¢)	Revenue/kWh (¢)	Return/kWh (%)	Loss/kWh (%)
Berens River	16.3	4.36	26.7	73.3
Bloodvein	14.9	4.51	30.3	69.7
Brochet	20.8	4.29	20.6	79.4
Dauphin River	20.5	3.36	16.4	83.5
God's Lake Narrows	13.4	4.38	32.7	67.3
God's River	39.5	4.27	10.8	89.2
Granville Lake	59.9	8.08	13.5	86.5
Island Lake	14.8	4.26	28.8	71.2
Jackhead	11.6	3.98	34.3	65.7
Little Grand Rapids	16.8	4.42	26.3	73.7
Moose Lake	13.3	4.43	33.3	66.7
Oxford House	12.1	4.16	34.4	65.6
Pauingassi	34.2	4.95	14.5	85.5
Pikwitonei	14.4	4.32	30.0	70.0
Poplar River	13.6	3.77	27.7	72.3
Pukatawagan	16.3	4.34	26.6	73.4
Red Sucker Lake	27.1	3.99	14.4	85.6
Shamattawa	19.1	4.72	24.7	75.3
Thicket Portage	16.5	4.33	26.2	73.8

2.3 Type Of Charges Levied On  
Residential Electrical Use

From the perspective of operating cost, the implicit residential subsidy in specific communities ranged from 66.7 per cent to 89.2 per cent in fiscal 1977/'78. During the fiscal year, residential rates were increased in February and therefore revenue per kWh used in arriving at such estimates represents the average return, taking into consideration sales of quantities of electricity at two different rates.<sup>34/</sup>

The actual residential rate tariff in effect today consists of three individual charges. These are:

- an automatic monthly service charge, used as the minimum monthly bill when no electrical use is recorded over the billing period;
- a rate which is taken times each kWh of electricity used, up to 250 kWh;
- a second rate that is applied to the amount of energy used in excess of 250 kWh.

It will be observed that this energy fee structure is not the one which appears in the community electrical agreements. The residential fee schedule shown in those documents differs in several respects from the fee schedule in use today:

- no automatic service charge was listed in the contract fee schedule;
- a 10 per cent prompt payment discount was allowed<sup>35/</sup>;
- energy consumption was divided into three consumption blocks in calculating monthly charges, the first being 75 kWh, the second being 175 kWh, and the third block being the balance of energy used.



Increases In Residential Rates From  
The Time Of The Signing Of Electrical  
Agreements To The Present

The practical impact on Native customers of increases in residential electrical rates can be determined by calculating the total monthly bill for a constant, representative quantity of energy under various fee schedules. Table Three shows the average monthly and annual electrical consumption per 15 amp residential connection in each of the twenty-one communities. Typical monthly residential electrical consumption appears to be about 380 kWh per month, and it is this figure that will be used in estimating the impact of rate increases on consumer electrical costs.

The actual rates and energy block sizes written into contracts signed in the mid and late 1960's<sup>36/</sup> were as follows:

- first 75 kWh used .....9 ¢ per kWh;
- next 100 kWh used.....2 ¢ per kWh;
- balance of energy used.....11/2¢ per kWh;
- prompt payment discount.....10 % of gross bill;
- minimum monthly bill.....\$3.60 net.

At the rates specified in electrical agreements, the consumer cost of 380 kWh of electricity would be \$11.83 (\$10.65 with the prompt payment discount). By the end of fiscal 1977/'78 the monthly cost of this energy had risen by 79 per cent, from \$11.83 to \$21.12. With the recent February 1st, 1979 rate increase, the absolute increase in monthly cost over the initial level is \$11.96 or 101 per cent, to a bill which now amounts to \$23.79.

Table Three

Average Monthly and Annual Consumption  
Per Residential Connection, Diesel Communities  
Fiscal 1977/ '78

Community	Total Residential Consumption	Number Of Customers	Average Annual Consumption /Connection	Average Monthly Consumption /Connection
	(kWh)		(kWh)	(kWh)
<i>I. RESIDENTIAL 1610<sup>1</sup>/</i>				
Berens River	576,922	147	3,925	327
Bloodvein	-----	---	-----	---
Brochet	329,011	76	4,329	361
Dauphin River	17,140	2	8,570	714
God's Lake Narrows	365,497	84	4,351	363
God's River	125,961	27	4,665	389
Granville Lake	20,938	14	1,496	125
Garden Hill	952,016	209	4,555	380
Ste. Therese Point	582,087	126	4,620	385
Wasagamack	194,246	38	5,112	426
Jackhead	-----	---	-----	---
Little Grand Rapids	3,920	2	1,960	163
Moose Lake	576,329	132	4,366	364
Oxford House	654,934	137	4,781	398
Pauingassi	6,990	2	3,495	291
Pikwitonei	174,470	40	4,362	364
Poplar River	448,766	71	6,321	527
Pukatawagan	325,535	70	4,651	388
Red Sucker Lake	262,688	45	5,838	486
Shamattawa	230,759	59	3,911	326
Thicket Portage	174,227	38	4,585	382
TOTAL (Residential 1610)	6,022,436	1,319	4,566	380

- continued over -

Table Three

(continued)

Community	Total Residential Consumption	Number Of Customers	Average Annual Consumption /Connection	Average Monthly Consumption /Connection
-----------	----------------------------------	------------------------	---	--

II. RESIDENTIAL 3510<sup>1/</sup>

Berens River	-----	---	-----	---
Bloodvein	253,929	64	3,967	331
Brochet	-----	---	-----	---
Dauphin River	162,038	28	5,787	483
God's Lake Narrows	-----	---	-----	---
God's River	-----	---	-----	---
Granville Lake	-----	---	-----	---
Moose Lake	-----	---	-----	---
Garden Hill	-----	---	-----	---
Ste. Therese Point	-----	---	-----	---
Wasagamack	-----	---	-----	---
Jackhead	234,760	42	5,590	466
Little Grand Rapids	156,963	56	2,803	234
Moose Lake	-----	---	-----	---
Oxford House	-----	---	-----	---
Paungassi	68,620	32	2,144	179
Pikwitonei	-----	---	-----	---
Poplar River	-----	---	-----	---
Pukatawagan	-----	---	-----	---
Red Sucker Lake	-----	---	-----	---
Shamattawa	-----	---	-----	---
Thicket Portage	-----	---	-----	---
TOTAL (Residential 3510)	876,290	180	4,868	406

III. RESIDENTIAL 3410<sup>1/</sup>

Little Grand Rapids	696	1	[in service 3 months]	348
TOTAL (Residential 3410)	696			348

- continued over -

Table Three

(continued)

Community	Total Residential Consumption	Number Of Customers	Average Annual Consumption /Connection	Average Monthly Consumption /Connection
	(kWh)		(kWh)	(kWh)
<hr/>				
IV. RESIDENTIAL 0910 <sup>1/</sup>				
Berens River	761	2	2 mo.in service	381
Bloodvein	-----	--		---
Brochet	1,979	2	2 mo.in service	990
Dauphin River	-----	--		---
God's Lake Narrows	-----	--		---
God's River	-----	--		---
Granville Lake	-----	--		---
Garden Hill	9,911	2	4,956	413
Ste. Therese Point	-----	--		---
Wasagamack	7,233	2	7 mo.in service	517
Jackhead	-----	--		---
Little Grand Rapids	-----	--		---
Moose Lake	200	1	1 mo.in service	200
Oxford House	-----	--		---
Pauingassi	-----	--		---
Pikwitonei	-----	--		---
Poplar River	3,940	1	5 mo.in service	788
Pukatawagan	2,135	3	3 mo.in service	237
Red Sucker Lake	2,599	1	2,599	217
Shamattawa	-----	--		---
Thicket Portage	-----	--		---
TOTAL (Residential 0910)	28,758	14		

<sup>1/</sup> Coding notations are explained on page 74.

The rise in diesel rates would have exerted a greater relative impact on consumers in diesel communities than did the simultaneous increases on rural consumers because, apart from the consideration of the lower per capita income of on-Reserve populations, the number and kinds of electrical appliances purchased per household grew in the years following the introduction of service. Logically, if consumers make use of more radios, television sets, record players and kitchen appliances, they will experience an inevitable increase in monthly billings. These, then, will rise further still under the influence of actual rate increases<sup>37/</sup>.

In theory, the diesel customer receives a subsidized residential rate in as much as it costs about four times as much to supply a single kWh of power than customers pay per kilowatt-hour used. So as to determine whether this apparent subsidy awards the diesel customer an advantage over other residential customers in Manitoba, annual bills were calculated at each of the residential tariffs applied in the province of Manitoba. The annual bills and necessary calculations performed, are displayed in Table Four.

There are three rates apart from the one charged in diesel communities. There is a rate for Winnipeg residential customers; a rate for customers in cities other than Winnipeg; and a Town rate. Consumer costs are tabulated for the twelve months of the 1978/'79 fiscal year, and so reflect regional cost differences as they exist at the present time with the most recent rate increases taken into account.

Comparative Annual Costs, Fiscal 1978/'79: Total Charges Over the Year  
For Monthly Residential Electrical Consumption of 380 kWh,  
Under Each of the Residential Tariff Schedules in Effect In Manitoba  
(i.e. Winnipeg, City, Town and Diesel Tariffs)

Tariff Area	Cumulative Ten-Month Cost At Rates in Effect April 1/'78 to January 31/'79	Cumulative Two-Month Cost At Rates in Effect February 1/'79 to March 31st/'79	Total Annual Cost 4,560 kWh
Winnipeg	* service charge.....\$ 2.75 1st 150 kWh @ 3.60¢..\$ 5.40 balance.....@ 2.21¢..\$ 5.08 monthly bill.....\$ 13.23 x ten months.....\$132.30	* service charge.....\$ 3.15 1st 225 kWh @ 3.60¢..\$ 8.10 balance.....@ 2.53¢..\$ 3.92 monthly bill.....\$ 15.17 x two months.....\$ 30.34	\$ \$ 162.64
Cities	* service charge.....\$ 3.20 1st 130 kWh @ 5.00¢..\$ 6.50 balance.....@ 2.21¢..\$ 5.53 monthly bill.....\$ 15.23 x ten months.....\$152.30	* service charge.....\$ 4.00 1st 200 kWh @ 4.42¢..\$ 8.84 balance.....@ 2.53¢..\$ 4.55 monthly bill.....\$ 17.39 x two months.....\$ 34.78	\$ 187.08
Towns	* service charge.....\$ 3.30 1st 130 kWh @ 5.50¢..\$ 7.15 balance.....@ 2.21¢..\$ 5.53 monthly bill.....\$ 15.98 x ten months.....\$159.80	* service charge.....\$ 4.10 1st 200 kWh @ 4.74¢..\$ 9.48 balance.....@ 2.53¢..\$ 4.55 monthly bill.....\$ 18.13 x two months.....\$ 36.26	\$ 196.06
Diesel	* service charge.....\$ 7.00 1st 250 kWh @ 4.50¢..\$ 11.25 balance.....@ 2.21¢..\$ 2.87 monthly bill.....\$ 21.12 x ten months.....\$211.20	* service charge.....\$ 8.00 1st 250 kWh @ 5.00¢..\$ 12.50 balance.....@ 2.53¢..\$ 3.29 monthly bill.....\$ 23.79 x two months.....\$ 47.58	\$ 258.78

The preceding table illustrates that the subsidized diesel rate does not afford the diesel customer any subsidy or advantage relative to other residential customers in the province. The subsidy reduces residential rates relative to other customers' rates in diesel communities only; customers who, in any case, are not restricted to 15 amp service.

The cash outlay for a year's electrical service, at \$259, is thirty-two per cent higher than the outlay under the next highest, or Town, schedule and 60 per cent more than would be paid under the lowest fee schedule (the Winnipeg Tariff). Put another way, if each of the other three hypothetical customers' billings were identical to the diesel customer's monthly bill of \$23.79, then at present rates their monthly electrical use would have been:

- Winnipeg ..... 721 kWh,
- Cities  
  (eg. Dauphin) ... 633 kWh,
- Towns  
  (eg. Neepawa).... 604 kWh.

Yet a third way of determining the comparability of the diesel rates with other rates is the average price per kWh paid through a monthly bill on the representative quantity of 380 kWh. On an average price basis, the cost per kWh for 380 kWh of electricity is 4.0¢/kWh in Winnipeg; 4.64¢ in other Cities; 4.8¢ in Towns; and 6.3¢ in diesel areas.

The February 1st, 1979 rate increase represents an increase in the levels of bills generally, an increase in the average cost of a kilowatt-hour of electricity, and a restructuring of fee schedules. The first

block of power has been expanded from 150 kWh to 225 kWh for Winnipeg; and from 130 kWh to 200 kWh in Cities and Towns. Under both the old and new rates the charge for the second block of energy used is uniform throughout the province. This charge has increased from 2.21¢/kWh to 2.53¢/kWh. As of the new tariff, the rate for the second block has been raised relative to the rate on energy in the first consumption block. Thus for Towns, the charge on the second block of power as a percentage of the charge on the first has gone from 40 to 53 per cent; in Cities from 44 to 57 per cent; has been increased from 61 to 70 per cent in the Winnipeg tariff; but has been adjusted only slightly on the diesel rate, up to 51 per cent from 49 per cent.

An excerpt from Manitoba Hydro's response to the Public Utilities Board Interrogatory Number 17, prepared for the January, 1978 PUB hearing into rate increases, explains:

" . . . Manitoba Hydro's rate design direction in the Residential, General Service and Farm is to eliminate the declining block structure within the next two years. The rate structure will be a service charge and an energy charge. The basic service charge will represent customer cost and basic distribution costs and the energy will represent average costs for the class back to the generator. "

For some years diesel residential rates have been set equal to rural rates, so that diesel customers pay the same rate as rural customers in southern Manitoba. As a matter of policy, then, residential diesel rates have not been designed to reflect diesel cost of service. As a compromise solution, they have instead been set equal to the highest



rates paid elsewhere in the province. At today's rates this means that both the customer in the diesel community and the rural customer pay about 6.3¢/kWh for the monthly use of about 380 kWh of energy. But in as much as the rural customer faces no service limitation, that customer pays less than this amount for a unit of electrical energy. If, for example, the rural customer used 670 kWh<sup>38/</sup> of electricity per month, the total bill would amount to \$31.13 at current rates and the average cost of a kWh of electricity would be reduced to 4.6 cents.

The existing service limitation prevents diesel customers from reaching as far into the second, lower-rate consumption block, as the rural consumer. Therefore neither the current diesel rate, nor the proposed rate direction (outlined in the quotation above) are designed to limit consumption in the fixed-generation diesel communities. Rather, the service limitation itself is intended to serve this function. If the service limitation were removed, it would seem to call for the design of a residential rate specific to the diesel communities and an end to the use of the rural rate as the level at which to peg the diesel rate.



2-1.5 Ancillary Question: Accuracy Of Load  
Assumption Used To Determine Generation  
Contributions For New Connections

It has been shown that, given the difference in the level of service available to diesel residential customers and to other customers in Manitoba, the diesel residential market returns nearly two-thirds more rate revenue per kWh of electricity used. The diesel customer pays the same amount for between 70 per cent and 90 per cent of the energy consumption covered by an equal expenditure elsewhere in the province. On the basis of current rates and equivalent consumption, a monthly diesel bill of 380 kWh would be 156 per cent of the level of the bill paid in Winnipeg. At the very least it would exceed bills elsewhere in the province (i.e. Towns, with the next highest tariff) by thirty per cent.

Measured against residential customers elsewhere the diesel customer is at a one-third to two-third cost disadvantage as a result of rates. Minimum service installed elsewhere in the province is either 100 or 200 amps, as compared with the 15 amp service provided at diesel sites. Relative to the cost of generating and distributing electricity at the community level it can also be said that, depending on the community, the residential user's rates are subsidized from 66 to 90 per cent. While the latter point is significant from the perspective of providing service, *it is not a tangible subsidy to the consumer*, who may have no opportunity to move from the Reserve community to areas where lower electrical rates prevail. Residential consumers who remain in these communities therefore face high rates, a service limitation and are pro-

hibited from using heavy appliances such as full ranges or washing machines.

Electrical service at remote sites, regardless of location in Canada or elsewhere, is prone to interruption for maintenance and at times when the community load is being switched to a larger engine or when an ancillary engine is being brought on stream to share the load. The economics of supplying electricity to small markets from diesel engines also may not justify 24 hour surveillance of equipment, or it may be difficult to ensure that paid operators do attend to machinery on an around-the-clock basis. Dissatisfaction with high rates is likely to be compounded in a diesel situation because of service factors such as these.

While all customers in the communities are affected to much the same degree by these conditions of service, the Indian residential consumer sustains the inconvenience while making use of a 15 amp service. Others, such as personnel housed in teacherages or other government housing, may have 100 or 200 amp service and so do not sustain the same overall inconvenience as the limited service residential customer. Despite the fact that energy used by a 100 or 200 amp customer is charged at a higher rate, the existence of a level of higher service could be expected to create dissatisfaction with the lesser service.

Other utilities have prevented this situation from arising by adopting a different rate design and allowing no discrepancy in service levels.

North-Sask. Power Ltd. in Saskatchewan provides 200 amp service to all customers but disallows the use of heavy appliances. No customers are exempted from the rule. A 'balloon' rate is applied in conjunction with the appliance prohibition; that is, the second block of electrical consumption is charged at a higher rate than the first to discourage electrical consumption.<sup>39/</sup> The reverse is true in Manitoba, where the declining block tariff arrangement is in use.

Residential customers who pay for their own utilities (i.e. non-government residential customers) appear to use approximately the same amount or slightly less electricity than their counterparts in Manitoba. The application of the balloon rate seems to allow customers in northern Saskatchewan to adjust their consumption and monthly electrical costs to their ability to pay. Customers limit their own electrical use on account of price rather than having a physical service limitation, such as a 15 amp circuit breaker, do this on their behalf. The advantage of using price as the control on consumption is that customers are less likely to trigger circuit breakers on the residential connection at the moments of their highest consumption. Waiting periods for repairs to breakers are therefore eliminated.

The necessity for dampening the highest instantaneous level of demand (the peak load at, say, the supper hour) by the residential market is a practical and necessary concern to any utility operating in a remote region using isolated capacity. Capacity on hand must be sufficient to meet demand, and planning normally must meet all contingencies for a full twelve months. Capacity must be sufficient since additional

energy cannot simply be channelled to the specific area through transmission lines, as would be done in a similar situation on the line power system.

In communities which are predominantly residential markets, the residential load is likely to be the most volatile factor in terms of the degree of fluctuation in daily and monthly peak loads. The greater the year-to-year stability there is in the maximum (peak) loads of individual components and the community as a whole, the less rapidly will additional generation capacity have to be added and the less cost incurred. Also, the more constant the daily load and the lower the peak load relative to the total energy generated and sold, the more efficient the operation of generating units will be in terms of the amount of fuel used versus kilowatt-hours of electricity sold.

As noted above, energy use and peak loads can be restricted either by the device of price, or service limitation. In either case, average consumption is restricted to approximately the same level. The main advantage to the price restriction is the continuity of service, and not that the overall cost of monthly electrical use is reduced significantly. To cite the case in Saskatchewan, a monthly bill for 380 kWh of electricity would be \$20.95 at current rates, or just \$2.84 less than the current cost in Manitoba. The only real cost advantage available to a customer in Saskatchewan over a customer in Manitoba is in the amount of the minimum monthly bill: the bill in Saskatchewan is substantially lower, at \$2.45, than the current eight dollars levied in Manitoba.

Eliminating the service disparity between Indian and government residential customers in Manitoba and shifting to an increasing charge arrangement on the residential tariff would be a costly procedure in Manitoba at the present time under the financing arrangements stipulated in the electrical agreements.

At the present time Manitoba Hydro assumes the peak load per 15 amp service to be 1kW. For generation planning purposes this means that 1kW, plus another kilowatt of capacity for standby, must be in place per residential connection under normal conditions. The generation contribution requested per kilowatt of connected load (2kW per 15 amp connection, including standby) varies from \$452 to as much as \$1,228. The actual charge for each community is as given in Table Five.

The values shown represent the average cost per kW of installed generation capacity at each site, given the total installed capacity at the present time and the following costs associated with commissioning the existing capacity:

- haulage to site, plus trailer, wiring, fire protection, installation, auxiliary equipment, alternators, heating and foundation supports for engines;
- fuel storage facilities and on-site work;
- overhead on labour, interest, special engineering and commissioning input from Hydro personnel.

The important point respecting the calculation of the contribution is that generation cost is calculated against the above costs for genera-

Table Five

Cost Per Installed kW of Generation  
Isolated Northern Sites  
(Generation Contribution)<sup>1/</sup>

<u>Community</u>	<u>Cost Per kW</u>
Berens River	\$ 708
Bloodvein	680
Brochet	500
Dauphin River	575
Garden Hill	810
God's Lake Narrows	576
God's River	800
Granville Lake	750
Jackhead	674
Little Grand Rapids	660
Moose Lake	733
Oxford House	452
Pauingassi	700
Poplar River	600
Pikwitonei	463
Pukatawagan	744
Red Sucker Lake	506
Ste. Therese Point	585
Shamattawa	1,228
Thicket Portage	716
Wasagamack	650

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source: Manitoba Hydro, Eastern Region;  
costs are valid until June, 1979, and  
include standby capacity. Large var-  
iances in cost are due to the type of  
machines used, the type of installa-  
tion (mobile or building), and the  
date of the last installation.

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<sup>1/</sup> Appendix Four illustrates the procedure  
which Manitoba Hydro uses to calculate  
generation contributions.

tion equipment in place. Cost is therefore equal to replacement cost of existing equipment at past prices for materials, labour, parts, and engines. Presumably, the generation contribution will then be greater for a 15 amp connection following a major site expansion program if additional capacity has recently been added, because a higher proportion of the calculated generation cost per kW will then be based on current, rather than past, replacement prices. The contribution will rise even further if old equipment is replaced when new capacity is added.

An increase in the generation contribution should have occurred at least three times in some communities since fiscal 1969/'70.<sup>40/</sup> In 1976 alone, old engines were replaced or augmented with additional capacity in at least seven communities. These were Brochet, Little Grand Rapids, Moose Lake, Poplar River, Pukatawagan, Red Sucker Lake and Thicket Portage. No upgrading has occurred in only three communities, all of which have been in service for five years or less. These include Pauingassi, in service only two years as of March 31st, 1978, and Granville Lake and Shamattawa (in service three and five years, respectively).

For 100 amp residential service Manitoba Hydro assumes a peak load of 9.6kW and 19.2kW of incremental capacity, including standby. Obtaining new 100 amp service, therefore, requires a generation contribution of 9.6 times the figures shown in Table Five, while upgrading service from 15 amps requires the contribution of 8.6 times the figures shown. The figure is lower for upgraded service because the cost of 1kW plus standby is subtracted from the 9.6kW figure for a new 100 amp service.



Obtaining 200 amp service requires a capital contribution in advance of 19.2 times (38.4kW including standby) the figures shown. The cost of a new 200 amp connection is high, and would be as much as \$24,000 in the most expensive community (Shamattawa). Upgrading all existing 15 amp residential services in Status communities to 100 amp service would cost approximately \$7.8 million and the cost of upgrading to 200 amp service would be slightly more than twice this figure.

The foregoing figures for generation contributions are high. In the case of 100 amp service, this is chiefly because the incremental peak load associated with the individual connection anticipates the use of the full range of appliances and household equipment in use in the south, and also assumes a coincident peak among the various component loads in an individual community.

It is unlikely that the residential peak will coincide with the peak load of commercial and general purpose connections. The residential peak is likely to occur at, or slightly later than, the supper hour; a time when the residential use of rangettes, radios, lights, and other appliances is at a maximum. The load created by general purpose and commercial connections, logically, would by that time have declined from its peak with the closure of schools, businesses and government offices. Neither is it likely that the residential connections will reach their individual peak loads simultaneously.

In practice, it is even difficult to set a pattern of energy use in a home to create an instantaneous demand of 9.6kW on a 100 amp service.

This is supported by statements by Manitoba Hydro and by a simple calculation of an aggregate appliance load.

An estimate prepared and presented to the Canadian Electrical Association in 1975 by Manitoba Hydro personnel stated that the typical customer, whose electrical consumption does not include use for space heating, uses about 8,400 kWh of electricity per year and creates residential demand of 4.1 kW per connection at the time of noncoincident demand (the time of the residential peak) and only 2.4kW per connection at the time of annual system peak.

Table Six shows the appliances which would have to be in simultaneous operation to produce a load of 9.6kW per connection, the peak suggested for connections in diesel communities. Water heating is not available in most diesel communities because home plumbing systems are not yet a reality. The exclusion of the 3,000 watt water heating load would reduce the peak to 6,575 watts.

In fact there are only three or four appliance loads which will create a 9kW peak in conjunction with simultaneous use of a wide range of common appliances and lighting fixtures. Of these three or four, only one is of special significance. A water heater, as noted, will create a 3kW demand and a clothes dryer, 5kW. Small room heaters will create individual loads of from 1 to 3kW per unit. A full range with all top elements, the stove, stove light, range light, clock, and ancillary plugs in operation will create an instantaneous demand of 12.0kW. Dishwashers, too, can create large individual loads of about 1.4kW.

Table Six

Component Appliance Loads On a Single Phase 100 amp 120/240V  
Service Which Will Produce a Peak Load of 9.6kW

<u>Appliance</u>	<u>Appliance Load</u>
Car Block Heater .....	400 watts
Clothes Washer .....	400 watts
Lighting <sup>1/</sup> .....	1,725 watts
Rangette .....	1,650 watts
Refrigerator .....	900 watts
Toaster .....	1,100 watts
Vacuum Cleaner .....	400 watts
Water Heating .....	3,000 watts
<u>TOTAL</u>	<u>9,575 watts .</u>

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<sup>1/</sup> This assumes a 15 amp lighting circuit for the exclusive use of light fixtures. In this case, at least two floor lamps of 400 watts (two 200 watt bulbs) and four or five 200 watt bulbs in ceiling fixtures would have to be in simultaneous operation. Alternatively, the circuit might handle record players, tape recorders and other small equipment of this type, together with a slightly smaller lighting load. Two hundred watt bulbs are, of course, not normally used indoors; the equivalent would be any combination which would total 200 watts, such as two 100 watt bulbs; one 160 watt and and one 40 watt bulb, etc..

With a prohibition on the use of full ranges, room heaters and dryers and other heavy appliances, the maximum expected peak load can be assumed to be from one-third to one-half the level which Manitoba Hydro projects. The implication of this is that the generation contribution and dedicated capacity per 100 amp connection could be reduced a full third below present levels requested, if not by one-half.

The illustration of appliance loads in Table Six also suggests that 200 amp service to a residential connection is unnecessary unless a residence is to be heated electrically. A continued prohibition against heavy appliances is clearly one way to accommodate at least 100 amp service without the cost otherwise associated with such service. Consideration might also be given to 60 amp residential service as an alternative to both 15 amp and 100 amp service, although this level of service would become inadequate when plumbing is introduced and water heating is required, and would have to be viewed as an interim measure.

During meetings held with Indian representatives, it was suggested that one reason why upgraded service was desirable was the possibility of retrofitting homes for electric heat. Various estimates available, prepared both by Manitoba Hydro and other agencies and individuals, demonstrate that the consumer cost of electricity used for space heating is as much as twice the cost of heating with other energy sources. It is significant that, quite apart from any consideration of electrical costs, current dissatisfaction with residential electrical service is at-

tached to a considerable degree to the quality of housing and wiring, and in particular to wiring maintenance as houses shift on unstable ground<sup>41/</sup>. However, it is not the purpose of the present study to assess the comparative cost of home heating using electricity as opposed to fossil fuels, and therefore it will only be noted here that the maximization of the efficiency of electric heating equipment and minimization of energy costs depend on rigorous attention to insulation, building and wiring code standards. The cost of repairing and maintaining existing, as well as new, housing stock to the high standards required for electric heat should be foreseen and weighed before an across-the-board shift to electric heat is initiated in the diesel communities.

2.0 Policy Shifts Toward Rates And  
Capital Contributions: Service  
To Government Of Canada Connec-  
tions And General Capital Fund-  
ing Obligations

Rates and level of service applicable to Department of Indian Affairs connections were also specified in community contracts. Unlike rates for residential and general purpose limited services, Government of Canada rates were accompanied by clauses defining the circumstances under which the rates could be adjusted, together with the specific rate adjustment formula that would be used.

In the interval since the contracts were signed, the average cost of providing electricity has, in most communities, exceeded the maximum level at which the Government of Canada rates can be set. In order to reduce revenue losses on energy sales to these connections, Manitoba Hydro has developed a two-part policy: it permits no new connections at the Diesel General Service Government of Canada Contract Rate and is converting the charges on the consumption of existing connections to a higher rate based on full operating cost. The old rate is tied to the increase or decrease in the average gallon price of fuel oil delivered to the community; whereas the new rate is an estimated figure for the expected average cost of operating in the community in the coming year, taking all costs into account.

If DIAND requires new service connections or requires that existing connections be upgraded to a higher amperage, it is required to make the appropriate capital contribution to cover the full cost of the additional

value of generation and distribution equipment that would be needed to handle the additional load.

All DIAND contributions recorded to August, 1978<sup>42/</sup> were compared with gross investment recorded to March 31st, 1978. The slight discrepancy in the dates of the two records may overstate DIAND's participation slightly to the end of the fiscal 1977/'78 fiscal period, but in this way the maximum theoretical ratio of DIAND investment to gross investment was determined. Even with this intentional overstatement of DIAND funding, overall these contributions appear to amount to just fifty-six per cent of aggregate gross investment in diesel communities and from four to seventy per cent in the individual sites. Table Seven presents the contribution data on a community basis.

Several conclusions can be drawn from DIAND's participation in capital funding. First, while it supplied the capital to establish generation facilities in the communities initially, and while it entered into a contractual agreement respecting the price range for rates on energy used in its own installations, it finds today that its energy rates have been revised and that the responsibility to furnish capital requires continuous and substantial outlays of money. Also, DIAND's initial financial support of the electrification program in remote communities has made it possible for all subsequent and future residents to receive service. The significance of this role was, unfortunately, not recognized in the agreements; perhaps because the influx of new customers following electrification was not foreseen by Manitoba Hydro.

Table Seven

Maximum DIAND Investment in Diesel Facilities  
Comparison, DIAND Contributions to August, 1978 &  
Gross Investment to March 31st, 1978

Community	DIAND Investment	As Percentage of
	(\$)	Gross Investment
		(%)
Berens River	213,450.00	41.4
Bloodvein	147,435.50	68.5
Brochet	51,305.50	14.8
Dauphin River	27,100.00	19.2
God's Lake Narrows	164,306.00	50.0
God's River	154,560.00	60.0
Granville Lake	36,400.00	39.3
Island Lake	1,333,063.72	69.5
Jackhead	4,530.95	4.1
Little Grand Rapids	201,502.98	47.7
Moose Lake	10,535.63	3.2
Oxford House	174,368.06	53.5
Pauingassi	392,413.00	200.7
Pikwitonei	-----	0
Poplar River	190,293.24	54.1
Pukatawagan	246,738.84	48.6
Red Sucker Lake	194,370.70	51.7
Shamattawa	211,006.23	83.2
Thicket Portage	-----	0
TOTAL	\$ 3,753,317.35	56.0 % <sup>1/</sup>

<sup>1/</sup> DIAND investment as a percentage of aggregate investment in all communities, with the exception of Pikwitonei and Thicket Portage. Aggregate gross investment in all communities to March 31st, 1978 was \$6,945,768; exclusive of Pikwitonei and Thicket Portage, was \$6,668,952.40.



Last, the DIAND agreements are no longer the only agreements operative in the communities, and contributions are required from all new diesel customers. Item six, page one, of Manitoba Hydro Procedure Directive PD 150A is specific in the need for individual contracts:

" Contracts

It should be noted that all new customers will be required to enter into a contract with the Corporation which will specify the maximum amount of power available to the customer and the minimum monthly bill. "

In summary, the importance of the Federal role in making remote service possible has been diminished both by natural factors, such as in-migration, and by specific design (by Manitoba Hydro).

2.1 Degree Of Cost Recovery Achieved  
On Services To Federal Installations

In fiscal 1977/'78, Manitoba Hydro provided about 2.7 million kWh of electricity to Government of Canada connections. In the same year, the total energy generated for sale in all twenty-one communities was 17.1 million kWh. Twenty-six per cent of diesel electrical output was therefore used in facilities such as kindergartens, schools, teacherages, and in rinks; and was used to power sewage pumphouses, water pumphouses and standpipe water systems.

Hydro revenues on this class amounted to \$515,641.67, representing one-third (31.7 per cent) of its revenues for the year.

The Government of Canada rate is a flat-rate charge for energy used as opposed to a series of either increasing or decreasing charges on successive blocks of energy used. Rates return substantial sums in revenues because the types of connections (schools, for example) which fall into this category tend to be the largest, or among the largest, users of electricity in communities. Rates are set for each community individually and there is a significant spread between the highest and lowest community rates in any given year.

When total electrical use by federal government connections over the year in any location is compared with the year's billings and average operating costs, the resulting figure for the average price paid per kilowatt-hour is frequently below the average cost of supplying power. The average price paid commonly returned only one-third to three-

quarters of average cost. Table Eight gives this comparison.

Current Manitoba hydro policy is that no further connections shall be accepted under this rate and that service to Federal Government installations shall be charged at Diesel General Service Full Cost Contribution Paid Rates:

Item 6, page 1, of Manitoba Hydro Administrative Directive AD 150, dated 77 03 17, states:

" Diesel Full Cost Government of Canada Contract rates are applicable only to existing services provided to the Government of Canada under contracts existing prior to April 1, 1976. "

Item 2, page 1, of Manitoba Hydro Procedure Directive PD 150B, dated 78 07 01, states:

" Diesel Government of Canada Contract rates are applicable only to existing services provided to the Government of Canada under contracts existing prior to 1976 04 01. When a contract expires, renewal will be at the Diesel Full Cost Contribution Paid Rate. "

Table Eight

Average Rate Revenue v. Average Cost of Supplying Power  
Government of Canada Consumption Fiscal 1977/'78

Community	Average Price Paid Per kWh Used (¢/kWh)	Average Cost Of Supplying Power (¢/kWh)	% Return
Berens River	12.4	16.3	76.1
Bloodvein	16.3	14.9	109.4
Brochet	15.3	20.8	73.6
Dauphin River	11.6	20.5	56.6
God's Lake Narrows	10.8	13.4	80.6
God's River	13.2	39.5	33.4
Granville Lake	21.6	59.9	36.1
Island Lake			
-Garden Hill	11.9	14.8	80.4
-Ste. Therese Point	10.1	14.8	68.2
-Wasagamack	10.0	14.8	67.6
Jackhead	13.6	11.6	117.2
Little Grand Rapids	11.0	16.8	68.5
Moose Lake	---- 1/	----	----
Oxford House	12.6	12.1	104.1
Pauingassi	13.6	34.2	39.8
Pikwitonei	---- 1/	----	----
Poplar River	10.0	13.6	73.5
Pukatawagan	12.7	16.3	77.9
Red Sucker Lake	15.8	27.1	58.3
Shamattawa	13.7	19.1	71.7
Thicket Portage	---- 1/	----	----

1/ No consumption was recorded for the Government of Canada service classification in these three communities.

2-2.2 Type Of Charges Levied On  
Federal Government Services

In the fiscal year 1977/'78, there were one hundred and fifty-six Government of Canada Contract Rate connections spread throughout the diesel communities. The average monthly electrical use per connection appears to be about 2,376 kWh, or approximately 28,500 kWh annually. By comparison, the average annual consumption of No Contribution Paid connections (primarily Provincial government services) was about 10,000 kWh less than this, at 17,900 kWh, and private commercial and general purpose connections in the Full Cost Contribution Paid category used approximately 21,600 kWh of electricity.

Consumption by community, the number of connections and the average consumption per connection for Federal services were determined from monthly consumption records prepared by Manitoba Hydro, and these data are consolidated in Table Nine.

Based on sales and billings to the Government of Canada throughout the diesel communities, the cost of electricity to this particular class was 11.6¢/kWh. Total charges on energy used were \$515,641.67. The lowest average price paid at the community level was 10.0¢/kWh, at Poplar River, and the highest was 21.6¢/kWh (at Granville Lake). Calculated on a year's average electrical use per connection of 28,510 kWh the average annual bill was approximately \$3,300, although the average was as high as \$10,000 in some communities.

Table Nine

Consumption of Diesel General Service  
Government of Canada Connections  
Fiscal 1977/'78

Community	Total Community Sales	Sales To Class	Gov't. of Can Consumption As % of Total	Number Of Customers	Average Annual & Monthly Consumption Per Connection	
	(kWh)	(kWh)	(%)		[Annual] (kWh)	[Monthly] (kWh)
Berens River	1,345,967	753	0.05	1	753	63
Bloodvein	645,800	2,060	0.32	3	687	57
Brochet	892,195	39,917	4.50	8	4,990	416
Dauphin River	300,018	44,665	14.89	2	22,332	1,861
God's Lake Narrows	1,255,231	563,181	44.87	6	93,864	7,822
God's River	256,922	95,134	37.03	3	30,711	2,559
Granville Lake	56,823	12,605	22.18	2	6,303	525
Island Lake						
-Garden Hill	2,579,829	1,032,741	40.03	36	28,687	2,391
-Ste. Therese Point	1,298,046	434,299	33.46	15	28,953	2,413
-Wasagamack	975,805	530,273	54.34	15	35,352	2,946
Jackhead	552,343	61,520	11.14	1	61,520	5,127
Little Grand Rapids	512,469	192,122	37.49	6	32,020	2,668
Moose Lake	1,118,488	-----	-----	--	-----	-----
Oxford House	1,427,108	466,921	32.72	15	31,128	2,594
Pauingassi	160,652	62,403	38.84	8	7,800	650
Pikwitonei	329,358	-----	-----	--	-----	-----
Poplar River	1,057,201	327,497	30.98	4	81,874	6,823
Pukatawagan	897,169	370,102	41.25	16	23,131	1,928
Red Sucker Lake	588,710	109,827	18.66	5	21,965	1,830
Shamattawa	499,587	101,574	20.33	10	10,157	846
Thicket Portage	395,285	-----	-----	--	-----	-----
TOTAL	17,146,077	4,447,594	25.90	156	28,510	2,376

Rates are adjusted up or down once a year, usually on July 1st. This means that a second rate goes into effect at the beginning of the second quarter of each Hydro fiscal year. Actual rates in the first quarter of fiscal year 1977/'78 ranged from 9.3¢/kWh at Poplar River to 22.3¢ at Granville Lake. For the remainder of the year following the July 1st, 1977 implementation of the new tariff, the range was between 9.8¢/kWh (Island Lake) and 20.3¢/kWh (Granville Lake).

Total energy billings to the Government of Canada in each community are given in Table Ten. Revenues on Government of Canada electrical use provided between 45 and 55 per cent of total Hydro revenues in seven communities. Revenues on sales to Government of Canada connections in Island Lake, the largest of the communities, totalled \$219,976.13. Government of Canada rate revenue was substantial also in God's Lake Narrows and Oxford House, where total billings were in the neighbourhood of sixty thousand dollars. Revenues in Pukatawagan were \$47,000 and revenues elsewhere were \$21,000 or less for the year.

The procedure to be used in adjusting rates is written into the tariff schedule appended to the community contracts. At the time that contracts were signed, a basic energy charge was calculated. This charge appears to represent the estimate at the time of the cost of producing a kWh of electricity given the efficiency of generation equipment (i.e. the number of kWh of electricity produced per gallon of fuel oil<sup>43/</sup>), inventory costs and the cost per gallon of fuel oil f.o.b. the community. The fuel adjustment formula consists of adding or subtracting a tenth

Table Ten

Revenues on Diesel General Service  
Government of Canada Connections  
Fiscal 1977/'78

Community	Total Community Revenues	Revenues On Class	Gov't. of Can. Revenues As % Of Total	Avge. Rate Revenue Per kWh	Average Annual & Monthly Payment Per Connection	
					[Annual] (\$)	[Monthly] (\$)
	(\$)	(\$)	(%)	(¢/kWh)		
Berens River	118,818.90	99.92	0.08	13.27	99.92	8.32
Bloodvein	60,091.47	335.86	0.60	16.30	111.95	9.33
Brochet	116,465.83	6,103.84	5.20	15.29	762.98	63.58
Dauphin River	22,198.40	5,167.92	23.30	11.57	2,583.96	215.33
God's Lake Narrows	117,579.13	60,786.00	51.70	10.79	10,131.00	844.25
God's River	26,987.35	12,593.81	46.70	13.24	4,197.94	349.83
Granville Lake	8,488.74	2,726.78	32.10	21.63	1,363.39	113.62
Island Lake						
- Garden Hill	250,259.87	123,108.18	49.2	11.92	3,419.67	284.97
- Ste. Therese Pt.	100,809.69	43,630.40	43.30	10.05	2,908.69	242.39
- Wasagamack	99,392.83	53,237.55	53.60	10.04	3,549.17	295.76
Jackhead	55,322.83	8,360.26	15.10	13.59	8,360.26	696.69
Little Grand Rapids	41,571.69	21,190.91	51.00	11.03	3,531.82	294.32
Moose Lake	81,461.36	-----	-----	-----	-----	-----
Oxford House	127,650.02	58,642.57	45.90	12.56	3,909.50	325.79
Pauingassi	14,194.12	8,488.22	59.80	13.60	1,061.03	88.42
Pikwitonei	31,301.21	-----	-----	-----	-----	-----
Poplar River	86,544.86	32,883.53	38.00	10.04	8,220.81	685.07
Pukatawagan	84,958.87	47,067.68	55.40	12.72	2,941.73	245.14
Red Sucker Lake	73,581.44	17,311.89	23.50	15.76	3,462.38	288.53
Shamattawa	65,528.99	13,906.35	21.20	13.69	1,390.64	115.89
Thicket Portage	44,064.56	-----	-----	-----	-----	-----
TOTAL	1,627,272.16	515,641.67	31.70	11.59	3,305.40	275.45



of a cent for every one cent increase or decrease in the fuel price f.o.b. the community from the price per gallon set then.

The actual rate adjustment clause reads:

" The rate for electrical power and energy supplied by Manitoba Hydro to Her Majesty for the premises constituting [the names of schools, teacherages, water and sewage stations are listed here for each community] shall be [x] ¢ per kWh per month for all power used. The energy rate of [x] ¢ net per kWh is based on a cost to Manitoba Hydro for diesel fuel oil f.o.b. [name of the community] of [x] ¢ per Imperial gallon and shall be increased by .1¢ per kWh for each one cent that the cost to Manitoba Hydro for diesel fuel oil decreases from [x] ¢ per Imperial Gallon. There shall be no increase or decrease in the said energy rate for increases or decreases in the cost of diesel fuel oil to Manitoba Hydro of less than one cent per Imperial gallon. "

Community location, the variety in the reliability and means of access (air, barge, winter road) require that a reserve inventory of fuel oil be on hand to cover normal contingencies as well as the expected volume needed over the period between fuel deliveries. Tanks are dipped regularly and fuel consumption recorded.

Detailed accounts are kept of the size of fuel deliveries and the price per gallon by delivery. Cumulative fuel consumption is compared against delivery volume and cost and fuel inventory records so that fuel cost assigned to the consumption between tank dippings reflects the price of fuel oil at an earlier time. That is, the fuel cost will reflect the cost at the time of delivery of the equivalent volume remaining from

previous deliveries.

In short, the cost of fuel at the time of generation is the delivered cost of that volume, given inventories prior to delivery and subsequent fuel consumption. Consumption for each period between dippings is multiplied by its inventoried price to produce a total fuel cost for the period between dippings. At the end of the fiscal year, these are summed and divided by total consumption to obtain the average price per gallon of fuel used in that year.

Assigning cost on a 'first in/first out' basis avoids the effect on rates of attributing the cost of all fuel delivered in that year to that year's operations. If done, this would cause fuel price per gallon to fluctuate more widely from year to year, and the Government of Canada rate as well.<sup>44/</sup>

Government of Canada rates in effect since July, 1976 are shown in Table Eleven. While rates fluctuate widely from year to year even with the present method of assessing the year's average fuel and fuel haulage cost, the use of an average price per gallon figure based on fuel purchases would produce even greater fluctuations.

The present method works to the customer's benefit also by delaying the effect of increases in fuel price and fuel haulage cost on rates. This is so since Government of Canada Rates are adjusted retroactively. The rate is adjusted annually in July so as to allow sufficient time in which the necessary inventory inspections and price reconciliations can be prepared for fuel consumption to the end of the past fiscal year, ended

Table Eleven

Diesel General Service Government of Canada Rates  
In effect July 1976; 1977 and 1978

Community	1976 Rate (¢/kWh)	1977 Rate (¢/kWh)	1978 Rate (¢/kWh)	Change: '76/'77 (%) <sup>1/</sup>	Change: '77/'78 (%) <sup>1/</sup>
Berens River	9.6	10.4	10.7	8.3	2.9
Bloodvein	10.6	11.1	11.6	4.7	4.5
Brochet	12.2	14.8	15.4	21.3	4.1
Dauphin River	10.8	11.7	12.2	8.3	4.3
God's Lake Narrows	9.6	11.0	11.8	14.6	7.3
God's River	9.8	14.1	10.7	43.9	(24.1)
Granville Lake	22.3	20.3	22.8	( 9.0)	12.3
Island Lake					
- Garden Hill	10.5	9.8	10.5	6.7	7.1
- Ste. Therese Pt.	10.5	9.8	10.5	6.7	7.1
- Wasagamack	10.5	9.8	10.5	6.7	7.1
Jackhead	12.8	13.7	14.1	7.0	2.9
Little Grand Rapids	10.8	10.6	11.0	( 1.9)	3.8
Moose Lake	----	----	----	----	----
Oxford House	12.2	12.6	13.4	3.3	6.3
Paungassi	----	13.5	9.5	----	(29.6)
Pikwitonei	----	----	----	----	----
Poplar River	9.3	10.1	10.5	8.6	4.0
Pukatawagan	11.5	12.7	13.3	10.4	4.7
Red Sucker Lake	13.4	16.6	16.3	23.9	( 1.8)
Shamattawa	12.0	13.6	14.4	13.3	5.9
Thicket Portage	----	----	----	----	----

<sup>1/</sup> Percentage change figures in brackets are negative i.e. the rate declined from one year to the next.

three months previous. Thus, the rate set in July, which will prevail for twelve months, is actually adjusted to reflect the cost of fuel over the previous year.

Government of Canada connections also benefit if community access is improved, since rates are tied to fuel cost f.o.b. the individual community. In 1977/'78 the freight cost per gallon of fuel oil approached or exceeded the actual cost per gallon of fuel itself in nine communities. Fuel haulage cost exceeded fuel price in three of these, while it was between 63 per cent and 92 per cent of fuel price in the other six.

The Government of Canada Rate in the more remote communities can therefore be expected to increase relative to those less isolated communities to which freight cost declines per gallon shipped as access is improved. This is a generalization, but on the whole the less reliance that must be placed on intermittent or year-round high cost freighting means (air freight in particular), the lower the freight cost per unit of fuel delivered and the lower the Government of Canada rate.

Fuel haulage arrangements and fuel price attributable to Moose Lake, Pikwitonei and Thicket Portage were not examined. Data on these communities is kept under separate record, and was not accessible without permission of the Provincial government. If a Provincial government fuel subsidy or transport subsidy is available at these locations, it was not detected from aggregate fuel consumption and fuel expenditure figures which were on hand.

2-3.0 General Shifts In Hydro Policy And  
Practice Which Affect Residential  
And Government Of Canada Consumers

The electrical agreements entitle Manitoba Hydro to request capital contributions to meet the cost of providing new service for residential and general purpose connections. It has enforced the capital contribution requirement after having allowed this requirement to lapse for some time; has raised residential rates; and proceeded to shift Government of Canada rates to new levels determined by a different rate adjustment formula, in order to reduce the annual losses being experienced on its isolated diesel operations.

As of the fiscal year ended March 31st, 1979, all classes of rates levied in diesel communities have been disengaged from any existing, contractually binding rate adjustment clauses in contracts. This situation theoretically affords the utility considerable advantage in raising annual levels of rate revenue relative to annual operating expense. The advantage is reduced, however, by the fact that the largest single consumer block, the limited service residential market segment, is charged for energy at rates substantially below those paid by other diesel customers and below the cost of providing electricity.

Residential rates on limited service connections are uniform throughout the twenty-one Status and non-Status communities served from diesel capacity. The same residential rates are also paid by rural customers in southern Manitoba. Effective February 1st, 1979, limited service 30 amp general purpose connections are charged at the same rate as general purpose connections in

all towns in Manitoba.

Limited service 15 amp residential and 30 amp general purpose rates, being equal to those levied elsewhere in the province, rise whenever central station rates are adjusted. This may occur more than once in a twelve-month period. Rate changes (increases) are typically implemented on April 1st at the beginning of the fiscal year, but have recently been implemented prior to the end of the fiscal year. When mid-year revisions to revenue forecasts project higher deficits for the fiscal year than anticipated in forecasts prepared at the outset, rate increases are likely to occur before the close of the fiscal year.

Manitoba Hydro maintains records of all costs associated with diesel operations on an individual community basis. With the exception of rates for limited service connections, most rates are tied to the cost of service. These latter rates therefore differ from one community to another, and will increase or decrease by different amounts depending on the particular level of cost associated with providing service in the community. These rates are adjusted once a year, in July.

Over the period of years in which Manitoba Hydro has provided diesel-generated electricity to Reserve communities its electrical sales have failed to return the cost of service; yet it is only recently that the Corporation has made a concerted effort to reverse or minimize this situation. Planning toward this shift seems to have begun

in late fiscal 1975/'76 or early fiscal 1976/'77; policy was developed and given circulation within the Corporation in the latter part of fiscal 1976/'77; and changes were implemented and became visible to customers by fiscal 1977/'78. Aside from the enforcement of the capital contribution requirement, the primary measure introduced to reduce annual losses was the new method of rate adjustment for customers having service in excess of 15 or 30 amps. With limited service rates pegged below cost of service, this was clearly one logical avenue of approach: the burden of community losses was to be transferred to large general service customers.

Local community electrical markets had only recently come to consist of a large number of general purpose and commercial service of this size. Markets had essentially consisted of three service categories at the outset: limited residential service, limited general service, and larger services provided to the Government of Canada. Provincial government services and a variety of large private commercial services were gradually added; together with categories such as street lighting, seasonal cooking, flat rate signs and so forth. As a result of such additions, consumption came to be recorded under twenty-one service codes in 1977/'78. Still, the majority of these accounted for only minor proportions of overall sales and revenues. Table Twelve gives a complete breakdown of total consumption and revenue in 1977/'78 by each service classification code.

These figures were determined from computer records maintained by Mani-

Table Twelve

Electrical Sales and Rate Revenue  
By Customer Service Classification  
Diesel Communities, Fiscal 1977/'78

Service Code	Customer Service Classification	Sales 1977/1978 (kWh)	As Per Cent Of All Sales (%)	Rate Revenue 1977/1978 (\$)	As Per Cent Of All Revenue (%)	Average Revenue Per kW (¢)
0000 <u>1/</u>		1,071	00.01	170.17	00.01	15.89
0001 <u>2/</u>	Special Fees	-----	-----	135.00	00.008	-----
0002 <u>3/</u>	Undercharges	-----	-----	1,389.90	00.08	-----
0075 <u>4/</u>	Flat Rate Signs	-----	-----	200.00	00.01	-----
0910	Residential	29,268	00.20	1,155.90	00.07	3.95
1610	Residential	6,022,430	35.00	256,949.43	15.80	4.27
3410 <u>5/</u>	Residential SR	696	00.004	52.98	00.003	7.67
3510	Residential SR	876,290	05.10	39,058.96	02.40	4.46
5020 <u>6/</u>	General Purpose	13,774	00.10	533.34	00.03	3.87
5025 <u>7/</u>	General Purpose SR	33,784	00.20	1,243.45	00.08	3.68
5120	General Purpose	610,933	03.60	35,502.77	02.20	5.87
5125	Diesel GEN PURP SE	181,887	01.10	9,036.36	00.56	4.97
5320	Diesel GS FC NO CONT PD	1,917,297	11.20	330,448.15	20.30	17.24
5420	Diesel GS FC CONT PD	2,673,715	15.60	407,874.57	25.10	15.25
5520	Diesel GS GOVT CAN	4,447,594	25.90	515,641.67	31.70	11.59
6622 <u>8/</u>	Gen Purp Cook	4,707	00.03	169.91	00.01	36.10
7823 <u>9/</u>	Gen Serv All Elec	218	00.001	106.57	00.007	44.89
9904 <u>10/</u>	Dusk to Dawn FR 400	18,093	00.11	1,231.38	00.08	06.87
9905	Dk to Dn Rental 400	-----	-----	56.68	00.003	-----
9915	Dk to Dn Rental 175	-----	-----	1,109.33	00.07	-----
9917	Dusk to Dawn FR 175	314,320	01.80	25,205.64	01.50	8.07

- 1/. Occurs in Pukatawagan only.  
2/. Occurs in Dauphin River and Jackhead only.  
3/. Occurs in Ste. Therese Point, Little Grand Rapids and Red Sucker Lake only.  
4/. Occurs in Brochet only.  
5/. Occurs in Little Grand Rapids only.  
6/. Occurs in Red Sucker Lake only.  
7/. Occurs in Little Grand Rapids and Dauphin River only.  
8/. Occurs in Moose Lake only.  
9/. Occurs in Jackhead only.  
10/. Occurs in Brochet only.



toba Hydro. Revenues and sales calculated from these records do not total to the figures shown in operating statements, also prepared by Manitoba Hydro. Overall, the computer records overstate consumption by 4.7 per cent and 1977/'78 revenues by 6.8 per cent. The computer records and discrepancies in sales and revenue figures are discussed in detail in Appendix Five.

As the number of non-residential connections, sizes and types of service categories had multiplied, the process of adjusting rates from year-to-year for large service customers became more cumbersome. With the gradual phasing in of several diesel installations at a time, the isolation of each plant and the independence of one operation from another, Manitoba Hydro maintained separate records of operating costs for each community. A 'thirteenth billing' at the end of the year was commonly used to adjust consumers' payments in light of the actual cost of providing service and to correct for adjustments following verification of estimated billings. The new rate-setting procedure adopted in fiscal 1977/'78 eliminated this cumbersome method of rate adjustment.

Even as new billing procedures and enforcement of the contribution requirement were implemented, it was known that more radical means would be required to reduce annual losses. This can be understood by examining the twenty-one customer categories more closely.

With some exceptions, each service classification corresponds with a specific rate. The residential block of service categories consists of the four coded categories 0910; 1610; 3410 (self-read); and 3510

(self-read). These are coding distinctions used for data sorting purposes only<sup>45/</sup> and electrical consumption per connection in each of the four categories is charged at the same rate. The second exception is the limited service general purpose category. Consumption under each of the limited-service general purpose categories coded 5025, 5120 and 5125, is charged at the same rate. The category coded 5020 is a special purpose seasonal rate, occurs in Red Sucker Lake only, and differs from the others primarily because a substantially higher service charge is applied.

If the various residential and general purpose categories are consolidated, it becomes clear that only four of the twenty-one service categories account for the significant proportion of electrical consumption and rate revenues. These four categories are the Residential classification; Diesel General Service Government of Canada Contract Rate classification; Diesel General Service Full Cost Contribution Paid classification; and Diesel General Service Full Cost No Contribution Paid classification. Table Thirteen isolates the consumption and rate revenue statistics for these four categories. Total revenue and consumption per class is also shown as a percentage of all diesel sales and revenues throughout the twenty-one communities.

The average price<sup>46/</sup> paid for a unit of electricity by users of each category was: Residential 4.3¢; Government of Canada 11.6¢; 15.3¢ by Full Cost customers who had paid a capital contribution; and 17.2 ¢/kWh by Full Cost customers who had not paid a contribution. By contrast, the average cost of generating and distributing a kWh of elec-

Table Thirteen

Proportion of Electrical Sales and Rate Revenues  
Accounted for By the Primary Customer Service  
Classes: Residential, Gov't. of Canada, Cont. Pd.,  
and No Cont. Pd.

Customer Service Classification	Total Sales to Class  (kWh)	Percentage of All Sales <sup>1/</sup> Made in Diesel Communities  (%)	Rate Revenues On Sales To Class  (\$)	Percentage Of All Diesel <sup>2/</sup> Revenues  (%)
Residential <sup>3/</sup>	6,928,684	40.3	297,217.27	18.3
Diesel General Service Government of Canada Contract Rate	4,447,594	25.9	515,641.67	31.7
Diesel General Service Full Cost Contribution Paid Rate	2,673,715	15.6	407,874.57	25.1
Diesel General Service Full Cost No Contribu- tion Paid Rate	1,917,297	11.2	330,448.15	20.3
Total, Three General Service Categories Only	9,038,606	52.7	1,253,964.30	77.1
Total, Four Primary Service Categories	15,967,290	93.0	1,551,181.66	95.4

- 1/. Total Electrical Sales in Diesel Communities, fiscal 1977/'78 = 17,146,077 kWh.  
2/. Total Rate Revenue on All Electrical Sales, Diesel Communities= \$1,627,272.16.  
3/. Includes consumption and revenue of all four residential categories, i.e.  
Residential 0910/1610/3410/and 3510.

tricity to customers was 16.1¢/kWh<sup>47/</sup>.

The electrical energy which Manitoba Hydro provides is fairly evenly distributed between the residential and general service blocks in general. Residential use of electricity absorbed about 40 per cent of electricity, while demand on the part of the three large general service categories absorbed 53 per cent of the total. But whereas residential use of electricity gave rise to just 18.3 per cent of total revenues on sales, general purpose use by commercial and institutional connections with larger services was responsible for 77 per cent of the total revenues on sales to all categories of users.

Although large commercial and general purpose services were already contributing a large share of revenue relative to their consumption, further revenue gains were possible still from these categories. The possibility of a gain lay with the fact that only one of the three categories was required to meet both initial capital costs and energy rates reflecting full cost. In the other cases a contribution was required and rates were lower; or no contribution was collected and rates were higher.

These relationships are most easily demonstrated by reiterating the rate-setting basis for each of the four major rates. By the end of fiscal 1977/'78, the rate structure in the diesel communities consisted of the following four rates and rate adjustment procedures:

A Residential Limited Service Rate, which is considered a subsidized rate as the average charge for energy levied per kWh is substantially below the average cost of production. The rate is pegged to the rural rates.

The Diesel General Service Government of Canada Contract Rate, which falls short of equalling the average cost of providing a unit of electricity. In theory the rate cannot be adjusted to the full-cost level. Contracts stipulate that the only cost factor with which the Government of Canada rate can rise is fuel price and haulage.

The Full Cost Contribution Paid Rate, which is essentially the projected average cost of providing a kilowatt-hour of electricity in that year, reduced by a credit calculated annually on the value of capital contributions, plus or minus the average loss/profit experienced in the preceding year per kWh sold in the community.

The Full Cost No Contribution Paid Rate, which again is essentially the projected average cost of providing a kilowatt-hour of electricity in that year. The rate is not reduced by an annual credit, reflecting the fact that the customer did not initially pay a lump-sum contribution to receive service. The variance factor is then subtracted or added to account for the profit or loss on the previous year's operations, as is done for the Contribution Paid Rate.

Although the above four rates constituted the basic rate structure up to July 1978, more than one year previous (March, 1977) the Government of Canada and No Contribution Paid classes had been declared closed, with no new connections accepted. Preparatory to further rate adjustments, customer service classifications were reviewed over fiscal 1977/'78 and customers were transferred to the correct service category and rate if service classification errors were brought to light. This

occurred whether or not the service classification was now closed, although no *new services* were allowed under either of the two closed rates. The process of transferring Government of Canada services to the Full Cost rate began simultaneously in Brochet. In fiscal 1978/'79 the process of transferring Government of Canada services, and presumably No Contribution Paid services, was begun in earnest.

Thus the rate structure of any given community is gradually being pared down from a multiple rate structure to one consisting of three basic rates for service. These include the rate for limited 15 amp residential service; the full cost rate for all services in excess of service limitations regardless of the type of premises served (commercial, residential, institutional, private or government); and the limited service 30 amp general purpose rate, which is maintained to ensure small businesses access to service at reduced energy rates.

3.1 Review Of Annual Costs And Operating  
Losses 1969/'70 Through 1977/'78: The  
Fiscal Basis For Changes in Hydro  
Policies And Practices

Historical consumption and revenue data initially appear to support the necessity for modifying the rate structure and tightening capital requirements. Consumption increased rapidly in communities after fiscal 1969/'70 while profits on individual community operations became less frequent and the losses larger.

But the supposition no longer holds once gross figures are converted to figures for average loss per kWh. The evidence that average loss per kWh of electricity sold actually declined for the first half of the decade, suggested the possibility that one or more components of cost were responsible for the disproportionate growth in operating costs against increased sales. These findings are described next, together with the results of the examination of increases in component costs.

Over the first five years of the review period (1969/'70 through 1977/'78) annual electrical sales in the various communities doubled, tripled, quadrupled, and in some instances, grew to six times their original level. From fiscal 1974/'75 through 1977/'78, sales typically grew again by half their fiscal 1974/'75 level. Percentage growth figures are given in Table Fourteen for each community.

By 1977/'78 a total of 16,355,103 kWh of electricity were sold to the twenty-one diesel communities in total. The smallest electrical market

Table Fourteen

Rate of Growth in Consumption, Diesel Communities  
Fiscal 1969/'70 Through 1977/'78

Community	Consumption 1969/'70	Consumption 1974/'75	% Growth '70 - '75	Consumption 1977/'78	% Growth '75 - '78
	(kWh)	(kWh)	(%)	(kWh)	(%)
Berens River	541,596	917,027	69.3	1,328,523	44.9
Bloodvein	88,604	371,557	319.3	617,616	66.2
Brochet	239,828	597,781	149.3	875,389	46.4
Dauphin River	30,834	158,435	413.8	257,678	62.6
God's Lake Narrows	230,892	1,047,418	353.6	1,231,535	17.6
God's River	-----	183,432	-----	256,522	39.8
Granville Lake	-----	38,175 <sup>1/</sup>	-----	50,490	132.3
Island Lake	966,353	2,994,754	209.9	4,780,977	59.6
Jackhead	37,433	220,169	488.2	538,438	144.6
Little Grand Rapids	108,831 <sup>2/</sup>	334,110	206.99	479,448	43.5
Moose Lake	280,635	932,869	232.4	1,075,799	15.3
Oxford House	213,458	963,352	351.3	1,328,383	37.9
Pauingassi	-----	80,845 <sup>3/</sup>	-----	151,722	87.7
Pikwitonei	102,692	187,945	83.0	324,875	72.9
Poplar River	113,660 <sup>2/</sup>	846,431	644.7	895,591	5.8
Pukatawagan	171,775	653,256	280.3	862,400	32.0
Red Sucker Lake	-----	265,873	-----	426,032	60.2
Shamattawa	-----	262,664	-----	478,657	82.2
Thicket Portage	121,180	226,218	86.7	394,938	74.6

<sup>1/</sup>. first year of operation 1975/'76;

<sup>2/</sup>. first year of operation 1970/'71;

<sup>3/</sup>. first year of operation 1976/'77.



(Granville Lake) absorbed 50,490 kWh of electricity in that year. Energy sold in each of nine other communities amounted to between 150,000 and 550,000 kWh over the year. Sales in Bloodvein, Brochet, Little Grand Rapids and Pukatawagan were above 550,000 and as high as 906,000 kWh (this at Poplar River). Berens River, God's Lake Narrows, Moose Lake and Oxford House were the most significant markets, each yielding sales of between 1.0 and 1.5 million kWh. Island Lake, the largest single market, used 4.8 million kWh.

In that year Manitoba Hydro reported a net operating loss on every community operation. The aggregate net operating loss amounted to \$1,104,284 and the figure was projected to be higher still for the 1978/'79 year. Projections prepared at the outset of fiscal 1979 anticipated a 36 per cent rise in aggregate net losses, a rise of four hundred thousand dollars, up from the approximately \$1.1 million of the year previous to \$1.5 million.

Since the beginning of the decade the level of the highest annual loss on service in a single community had climbed sharply. In fiscal 1969/'70, the highest loss experienced was in Island Lake and amounted to \$51,153 dollars. Eight years later, in fiscal 1977/'78, the smallest reported loss on a single operation was \$8,086 (in Jackhead) and the Island Lake operation, still accumulating the largest excess of expense over revenue, incurred a net loss of a little more than a quarter of a million dollars.

While losses are sustained today at all locations, Manitoba Hydro initially experienced very modest net profits on its remote commercial diesel services. Net profits in the first year of the review period stood at

\$54.4 thousand dollars. With profits on operations in Churchill running between \$155,000 and \$180,000 annually, the net profit position was maintained through fiscal 1971/'72.

Total profits on Churchill and other sites reached a high of \$218,000 in the next year, declined to about \$113,000 the year after (and disappeared entirely thereafter.) In the space of these two years, several events occurred which contributed to the disappearance of annual net profits. First, profits from Churchill declined to less than half their former level; second, annual electrical sales in Island Lake jumped by 70 per cent between fiscal 1972/'73 and 1973/'74; third, the aggregate cost of service climbed to nearly 200 per cent of its former level over the '74 year alone; and new service was provided to God's River, Red Sucker Lake and Shamattawa. With these shifts occurring, the first aggregate net loss (\$54,000 approximately) was experienced in fiscal '73, followed by an increase in losses the next year of six and one-half times. Thereafter, annual aggregate net losses rose to above one million dollars annually.

Aside from the net profit obtained through the Churchill operation, the operations in the other diesel communities registered a net operating loss from the outset. From \$100,000 in fiscal 1969/'70 the annual net loss doubled to about \$227,000 by '72/'73, reached \$1 million by '74/'75 then declined slightly for two years, and finally returned to the \$1.1 million mark by 1977/'78. (All profit and loss figures cited in preceding paragraphs are shown in Table Fifteen.) While now merely of academic interest after the fact, the question might be posed whether elec-

Annual Net Profit/Loss  
On Diesel Community Operations  
Fiscal 1969/'70 Through Fiscal 1977/'78

Community	1969/'70	1970/'71	1971/'72	1972/'73	1973/'74	1974/'75	1975/'76	1976/'77	1977/'78
Stens River	<u>8,295.60</u>	1,225.82	<i>1,450.38</i>	2,521.85	22,741.95	55,828.91	43,124.78	48,441.29	98,898.57
Goodvein	<u>786.60</u>	4,263.15	<i>12,202.41</i>	14,337.15	24,496.44	29,205.65	24,851.02	14,738.42	34,027.42
Prophet	10,134.96	18,601.49	10,872.84	20,830.41	18,964.24	67,786.66	77,488.85	42,830.36	66,895.01
Staphin River	1,964.71	2,084.66	624.98	6,623.32	4,893.99	10,628.70	18,440.46	27,945.49	35,763.68
Good's Lake Narrows	12,273.75	21,417.14	6,477.33	<u>25,045.67</u>	<u>29,402.34</u>	34,171.60	66,187.38	28,503.37	49,482.97
Good's River					<u>7,773.30</u>	14,145.87	38,905.85	47,074.41	74,364.42
Stansville Lake							6,962.10	20,264.75	22,743.32
Island Lake	51,153.44	14,214.50	58,666.56	177,052.52	233,951.11	514,908.82	284,273.70	234,370.57	279,896.89
Blackhead	2,260.36	4,481.73	2,892.31	7,338.10	7,738.58	10,683.11	27,589.43	29,468.36	8,086.28
Little Grand Rapids		8,147.74	8,739.21	17,379.50	23,227.96	49,371.96	31,094.66	54,886.53	40,728.94
Loose Lake	6,391.58	6,263.53	16,748.13	14,148.47	<u>5,972.99</u>	24,825.49	40,660.05	26,347.27	64,726.89
Oxford House	2,508.87	5,967.65	10,842.32	<u>12,202.95</u>	<u>71,331.73</u>	54,882.72	47,856.91	40,192.71	41,648.07
Quaingassi								21,790.50	38,688.06
Wikwitonei	3,182.56	498.82	1,974.13	4,555.33	3,333.42	6,004.13	19,811.43	18,890.01	15,771.17
Opplar River		4,160.99	6,283.51	<u>5,771.93</u>	<u>3,122.00</u>	24,948.60	39,533.44	51,016.99	50,411.78
Okatawagan	9,631.56	17,591.22	13,336.18	6,570.42	437.17	7,812.23	13,104.80	33,502.12	58,633.95
Red Sucker Lake					6,661.62	90,395.57	52,963.96	50,028.58	74,511.61
Shamattawa					31,495.81	1,607.34	31,129.04	81,548.73	27,937.36
Thicket Portage	9,028.77	1,900.47	<u>1,165.69</u>	<u>1,827.81</u>	7,104.48	15,135.66	19,759.47	29,421.24	21,068.24
Churchill	<u>155,426.56</u>	<u>150,437.05</u>	<u>177,145.35</u>	<u>172,727.71</u>	<u>74,521.77</u>	167,034.24	548,322.68	564,343.33	693,780.41
Aggregate With Churchill	<u>54,405.00</u>	<u>39,618.14</u>	<u>30,101.51</u>	53,781.00	351,132.70	1,179,377.26	1,432,066.01	1,465,605.03	1,798,065.04
Aggregate With- out Churchill	101,021.56	110,818.91	147,043.84	226,508.71	425,654.47	1,012,343.02	883,743.33	901,261.70	1,104,284.63

Bold Face = Net loss; Italic Face = Net Profit.

trification would have taken place in remote locations at the pace it did, and on the conditions it did, if the Churchill market had been less lucrative or non-existent.

In any case, while the pattern of annual community and aggregate loss over the decade is dramatic when reviewed as a series of single annual figures, it is considerably less dramatic when assessed as loss per kilowatt-hour of electricity sold. The loss per kWh sold in fiscal 1969/'70 was about 3.3 cents. It declined over the next two years and did not rise above its 1969/'70 level until 1974/'75. By the end of the review period, it stood at 6.9¢/kWh sold. In constant dollar terms this was a rise of 13.7 per cent over eight years.

Since fiscal 1969/'70 certain components of the cost of service have increased at a faster pace than others. In addition, several changes have taken place in the manner in which specific cost items have been calculated annually.

The various component costs rolled into the overall cost of service per community are of two kinds, direct and indirect costs. Direct costs include labour and maintenance of generation equipment, parts; travelling expense, contract labour, fuel and lube oil, and fuel haulage. Indirect costs include regional administration costs, overhead, depreciation and interest charges.

Indirect costs have risen twice as rapidly as direct costs, and are rising more rapidly yet at the present time. Total costs for the 1978/'79

year are projected to rise from \$2,628,402 to \$2,778,859. Direct cost, that is, the cost of operations in the community specifically, accounts for \$1,814,112 of the projected expenses as compared with \$1,776,371 in the year previous. This is a projected two per cent rise over the previous year. Indirect costs on the other hand, are expected to rise by 13 percent to \$964,747 from the 1977/'78 level of \$852,030.

In absolute percentages over the 1970 - 1978 review period, direct cost rose to 509 per cent of its initial level and indirect cost rose to 1,102 per cent of its level at the end of 1969/'70. (The dollar values of direct and indirect costs for the first and last years are presented in Table Sixteen.) By measuring the annual direct and indirect cost as a dollar value per kWh of electricity generated, it is possible to determine the extent of the efficiency with which electricity has been produced relative to dollars expended on supplying the electricity or administering the maintenance and operation of the utility.

To this end, Tables Seventeen through Twenty show depreciation and interest costs, direct maintenance cost, fuel oil and haulage costs, and administrative costs since fiscal 1969/'70. The aggregate figures for each cost component are divided by the number of kWh of electricity sold in each year, and the resulting unit costs for each year are adjusted to 1970 dollars<sup>48/</sup>. Constant dollar unit costs are also shown plotted in graph form in Figure 2.

Table Sixteen

Comparison, Aggregate Direct & Indirect Cost  
Diesel Operations, Fiscal 1969/'70 & 1977/'78

<u>Cost Category</u>	<u>Fiscal 1969/'70</u>	<u>Fiscal 1977/'78</u>
Direct Cost	\$ 255,785.63	\$ 1,776,371.38
Indirect Cost	69,559.85	852,030.27
*Depreciation & Interest Portion of Indirect Cost	31,192.03	769,600.28
*Administration & Overhead Portion of Indirect Cost	38,367.82	82,429.99
TOTAL EXPENSE	\$ 325,345.48	\$ 2,628,401.65

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Table Seventeen

Fuel & Fuel Haulage Cost/kWh Generated  
Fiscal 1969/'70 Through Fiscal 1977/'78

Fiscal Year	Total Fuel Cost	kWh Generated	Cost/kWh	Cost/kWh Adjusted 1970 \$'s
	(\$)		(¢/kWh)	(¢/kWh)
1969/'70	138,033.81	3,025,280	4.56	4.56
1970/'71	181,312.87	4,350,502	4.17	4.06
1971/'72	219,694.04	5,701,524	3.85	3.58
1972/'73	312,775.63	7,261,378	4.31	3.77
1973/'74	606,015.70	9,145,860	6.63	5.14
1974/'75	1,058,572.64	11,163,291	9.48	6.53
1975/'76	960,308.63	13,593,635	7.06	4.43
1976/'77	902,367.26	14,973,212	6.03	3.52
1977/'78	1,020,108.29	16,055,013	6.35	3.48

Table Eighteen

Labour & Maintenance Cost/kWh Generated  
Fiscal 1969/'70 Through Fiscal 1977/'78

Fiscal Year	Total Cost Labour & Maintenance	kWh Generated	Cost/kWh	Cost/kWh Adjusted 1970 \$'s
	(\$)		(¢/kWh)	(¢/kWh)
1969/'70	99,473.53	3,025,280	3.29	3.29 <sup>1/</sup>
1970/'71	76,350.19	4,350,502	1.75	1.70
1971/'72	118,041.86	5,701,524	2.07	1.93
1972/'73	132,275.03	7,261,378	1.82	1.59
1973/'74	245,107.69	9,145,860	2.67	2.07
1974/'75	360,199.27	11,163,291	3.22	2.22
1975/'76	422,304.87	13,593,635	3.10	1.95
1976/'77	524,675.91	14,973,212	3.50	2.04
1977/'78	595,425.69	16,055,013	3.70	2.03

<sup>1/</sup> Includes costs associated with the following items: labor & maintenance of general equipment; parts; travelling expense. If contract labour is included as well, the adjusted cost/kWh becomes:  
1969/'70: 3.75¢/kWh; 1970/'71: 2.16¢/kWh; 1971/'72: 2.27¢/kWh;  
1972/'73: 1.90¢/kWh; 1973/'74: 2.38¢/kWh; 1974/'75: 2.59¢/kWh;  
1975/'76: 2.20¢/kWh; 1976/'77: 2.27¢/kWh; 1977/'78: 2.29¢/kWh.



Table Nineteen

Overhead & Administration Cost/kWh Generated  
Fiscal 1969/'70 Through Fiscal 1977/'78

Fiscal Year	Total Cost Overhead & Admin.	kWh Generated	Cost/kWh	Cost/kWh Adjusted 1970 \$'s
	(\$)		(¢/kWh)	(¢/kWh)
1969/'70	52,257.01	3,025,280	1.73	1.73 <sup>1/</sup>
1970/'71	62,610.19	4,350,502	1.44	1.40
1971/'72	72,525.24	5,701,524	1.29	1.18
1972/'73	94,716.97	7,261,378	1.30	1.17
1973/'74	163,435.69	9,145,860	1.79	1.39
1974/'75	271,287.53	11,163,291	2.43	1.68
1975/'76	303,012.05	13,593,635	2.23	1.40
1976/'77	324,392.12	14,973,212	2.17	1.27
1977/'78	384,137.29	16,055,013	2.39	1.31

<sup>1/</sup> Includes costs associated with the following items: regional administration; overhead; contract labour. If contract labour is excluded, the adjusted cost/kWh becomes: 1969/'70: 1.27¢/kWh; 1970/'71: 0.94¢/kWh; 1971/'72: 0.84¢/kWh; 1972/'73: 0.83¢/kWh; 1973/'74: 1.084¢/kWh; 1974/'75: 1.31¢/kWh; 1975/'76: 1.14¢/kWh; 1976/'77: 1.04¢/kWh; 1977/'78: 1.06¢/kWh.

Table Twenty

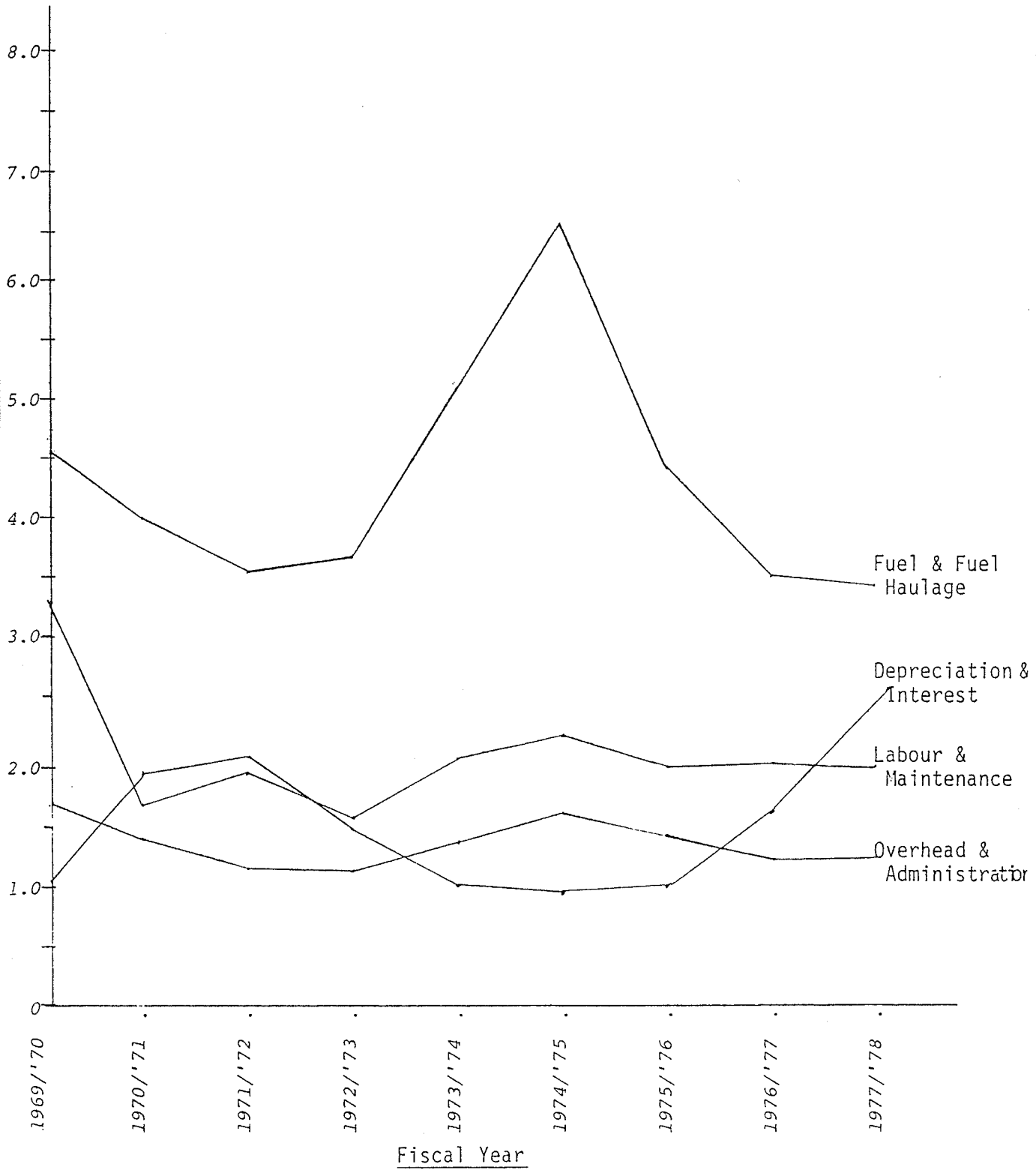
Depreciation & Interest Cost/kWh Generated  
Fiscal 1969/'70 Through Fiscal 1977/'78

Fiscal Year	Total Cost Dep. & Int.  (\$)	kWh Generated	Cost/kWh  (¢/kWh)	Cost/kWh Adjusted 1970 \$'s (¢/kWh)
1969/'70	31,192.03	3,025,280	1.03	1.03
1970/'71	86,350.68	4,350,502	1.98	1.93
1971/'72	126,500.86	5,701,524	2.22	2.07
1972/'73	123,656.09	7,261,378	1.70	1.49
1973/'74	119,308.05	9,145,860	1.30	1.01
1974/'75	158,315.07	11,163,291	1.42	0.98
1975/'76	235,023.36	13,593,635	1.73	1.09
1976/'77	452,970.67	14,973,212	3.03	1.77
1977/'78	722,917.23	16,055,013	4.50	2.47

Figure 2

Component Cost/kWh  
Fiscal 1969/'70 - Fiscal 1977/'78

[Derived from Tables Seventeen through Twenty]



In constant dollar terms, fuel and fuel haulage cost/kWh has declined from 4.55¢ to 3.48¢ and the input associated with maintenance programs has declined from 3.75¢ to 2.29¢/kWh.

The indirect cost inputs per kWh of electricity provided have either declined less dramatically, or have increased. Administrative cost has declined slightly from 1.27¢ to 1.06¢/kWh. However, if contract labour is not counted as a direct (maintenance) cost and is included instead in the overhead/administration component, then the average cost attributable to the category actually shows an increase, from 1.73¢/kWh to 2.24¢/kWh<sup>49/</sup>. Depreciation and interest costs have risen in real terms from 1.03¢ to 2.47¢/kWh<sup>50/</sup>.

On balance it seems that while the tangible inputs of parts, labour, fuel, fuel haulage and travelling expense to the production of electricity have decreased, the intangible inputs have risen relative to them per unit of electricity generated and sold.

2-4.0 Footnotes: Chapter Two

- 26/. The residential electrification programs pursued in the non-status communities were similar.
- 27/. The institutional electrification programs pursued in the non-status communities were presumably similar. Contracts could not be reviewed without special permission.
- 28/. Since all contracts are identical in form and content, a single contract is provided for reference. The contract for Berens River is provided in Appendix Two.
- 29/. Personal communication, B. Phillips (P. Eng.), UNIES Ltd.
- 30/. The total recorded by Manitoba Hydro in Diesel Data Sheets dated March, 1978, was 1,465 connections. All estimates of customer counts used throughout the report differ slightly from Hydro estimates. The figure chosen to represent the number of customers is the highest customer count in any service month in the fiscal 1977/'78 year.
- 31/. Some energy used for residential lighting, for cooking and running other household appliances is charged at a higher rate. This occurs in the instance of teacherages, the electrical consumption of which would be charged at the Government of Canada Contract rate.

The following excerpts from page five of Manitoba Hydro Procedure Directive PD 145A, dated 78 12 11, clarifies the rate status of residential service provided to government employees:

" Residential Diesel

[excerpt f]

Federal and Provincial Government employees responsible for the payment of their residential accounts will be charged for service at the Diesel Residential Standard rate subject to the service limitation when connected after 1974 04 01, regardless of any house rental subsidy or northern allowance they may receive;

[excerpt g]

Where an employee of the government, government agency and Crown corporation pays an account on behalf of the government but the account is the responsibility of the government agency, then the Diesel Full Cost rates would apply. "

- 32/. Manitoba Hydro Procedure Directive PD107, dated 78 01 30; Item 1, 'General Information', page 1.
- 33/. The figure is taken from the 1977/'78 consolidated operating statement for the diesel system, as opposed to monthly computer records of billings.

- 34/. The same residential rate is applied in all twenty-one diesel communities. A uniform rate was in effect before and after the February 1st, 1978 rate increase.
- 35/. Discontinued approximately 1976.
- 36/. The residential rate schedule which appears in agreements signed in the early 1970's differ in one minor respect: the charge on the first 75 kWh of consumption is listed as 8¢ per kWh, or one cent less than the charge that appears in earlier contracts for the same energy block.
- 37/. Diesel rates are set equal to rural rates. Rural rates rise whenever there are general rate increases. The most recent increases occurred on February 1st, 1979; February 1st, 1978; March 17th, 1977; April 1st, 1976; April 15th, 1975; April 1st, 1974; and August 1st, 1973.
- 38/. The monthly consumption assuming an annual use of 8,000 kWh of electricity. This figure is not meant to be taken as representative of the rural customer's monthly consumption. The average consumption of a residential connection in the province is between 8,000 and 9,000 kWh annually, for connections for which electricity is not used for space heating purposes. The specific figure of 670 kWh is used only to illustrate that when the service limitation is removed, the declining rate on the last block of power used will cause the average price paid for electricity to drop as more electricity is used.
- 39/. All information pertaining to the operations of North-Sask. Electric is contained in site inspection notes prepared by H. Westdal of Hildebrandt-Young & Associates Ltd. This information is contained in the formal report on the electrical agreements that was forwarded to DIAND.
- 40/. Capital contributions are also requested to meet the cost of any additional distribution facilities that may be required to service a new connection. The capital contribution for this purpose is assessed on the basis of the full cost of upgrading transformers if necessary, plus labour and expense associated with the work. A schedule of distribution contributions was requested; however, costs were said to vary with each situation and therefore were not provided. Distribution contributions can apparently equal or surpass the amount of a capital contribution.
- 41/. Personal communication, B. Phillips (P. Eng.), UNIES Ltd.
- 42/. Contributions specified in the agreements plus subsequent contributions for Federal services and indirect contributions through Reserve Band contributions.
- 43/. The average today is between 7 and 10 kWh per gallon of diesel fuel oil used, with 13 and 14 kWh achieved in the larger-load communities where diesel plants are manned at all times.
- 44/. This method was used prior to 1976.

- 45/. The service billing code shown on individual customer bills is a two-digit number, usually the last two of the four-digit service codes. An index to the billing code appears on the reverse side of the customer's monthly bill.
- 46/. Average price refers to the average over the year given total consumption and total billings on that consumption. It should not be confused with the specific rate in effect.
- 47/. Calculated on the basis of rate revenue and total operating expense for 1977/'78 shown in the document titled "Consolidated Diesel Generation Statement of Operations for the Year Ended March 31st, 1978", dated 78/07/05. Total expense was \$2,628,401.63 and total kWh consumption was 16,355,103.
- 48/. Dollar value as of the end of the first quarter of 1970.
- 49/. It is probably more accurate to include the contract labour item in the overhead/administration category. Contract labour expense is the salary for local operators, normally a community resident. Prior to fiscal 1979/'80, the activities of local personnel were limited to minor tasks such as changing oil, starting back-up engines and relaying the need for maintenance when a problem occurs. Tasks were so minor that communities are essentially considered to be 'unmanned'.
- 50/. Interest and regional administration costs were not assessed against diesel operations until fiscal 1975/'76. Prior to that time they were absorbed by the Corporation through its major operation.

CHAPTER THREE  
PIVOTAL ISSUES IN RATE STRUCTURE AMENDMENT

-1.0 Conclusions Regarding The Efficiency  
Of The Present Rate Structure:  
Introduction

The preceding chapter has focussed on illustrating two factors:

- changes in the diesel market, rate structure, and operations over the review period; and
- the significance of the residential and Government of Canada classifications in terms of consumption, revenue, and the loss associated with their service.

It was shown also that:

- residential service and rates are equivalent in Status and non-Status communities;
- and that the diesel market consists primarily of four service categories at the present time.

It has been documented that the diesel market has developed considerably since fiscal 1970, and that Manitoba Hydro has responded to this change by instituting a new rate structure at the end of fiscal 1976. This rate structure has proved ineffective in preventing significant financial losses in all community operations. As a result, the current rate strategy is to unify the rates of all large commercial and general service customers. Government of Canada rates will be phased out entirely under this plan. To determine the impact of such a move, it was necessary to examine the revenue and consumption patterns of the other two categories of consumers to which the new unified rate would apply, namely the Contribution Paid and No Contribution Paid categories.



This examination revealed the following:

- converting rates paid by all large customers to Full Cost Contribution Paid rates will not eliminate operating losses. The dollar value of the 1977/'78 loss was \$1.1 million; the equivalent of a 41 per cent increase in total diesel sales billed at the prevailing Contribution Paid Rates;
- that while service and rates are equivalent in the residential category for Status and non-Status communities, the same is not true for rates to government facilities in Status and non-Status communities. The rate adjustment formula used to determine rates for provincial government services in fact is directly responsible for 30 per cent of the operating loss reported in fiscal 1977/'78. This contrasted with a 7 per cent loss on government of Canada service<sup>51/</sup>; and
- conversion to the Full Cost Contribution Paid rate does not address the problem of fluctuating rates between communities that is due to community-level cost accounting and rate setting procedures.

The examination procedure is now detailed below. The question of rate fluctuation has received some considerable attention (a) in view of the magnitude of change which is created from year to year and (b) because the Public Utilities Board has openly criticized rate-setting procedures which create such fluctuations.

3-1.1 Examination Of The Full Cost  
Contribution Paid Rate:  
Introduction

The Diesel General Service Full Cost Contribution Paid rate is the rate paid by local owner-operated businesses, Manitoba Telephone System and the Hudson's Bay Company; and by residential customers who request service in excess of the 15 amps to which they are otherwise limited. There were a total of about 124 electrical users paying the Full Cost Contribution Paid rate in the diesel-serviced communities in fiscal 1977/'78.

The Full Cost Contribution Paid rate is intended to recover the full cost of supplying power to customers in this rate category. While there are (in 1977/'78) only some 125 large consumers of electricity who have paid contributions and are paying monthly charges of this type, all other existing rates paid by large consumers are being phased out. It appears, then, that the Contribution Paid category rate will soon apply to some 400 connections. The following excerpts from Manitoba Hydro Procedure Directives outline the Corporation's policy toward the Contribution Paid service category:

From Provision of Corporation Electric Service  
Facilities, dated January 30th, 1978; Item 7  
from page 3:

" . . . In areas served by diesel generation, the Governments of Canada and Manitoba, wards of the Federal government, government agencies and Crown Corporations will be charged the apportioned cost of providing generation and distribution facilities necessary to supply the services which they require. . . "

From Diesel Full Cost Rate Application, dated January 7th, 1978; Items 2 and 5 from page 1:

"Diesel Full Cost rates are applicable for all services in excess of service capacity limitations and for services of Federal and Provincial Governments and their agencies and Crown Corporations regardless of their service capacity."

"Diesel Full Cost Contribution Paid rates are applicable to services where the customer has made a capital contribution for an appropriate proportion of the full cost of generation and distribution facilities."

-1.2 Consumption And Revenue Associated  
With Full Cost Contribution Paid  
Connections

About one-sixth of all electricity sold in the twenty-one diesel serviced communities in fiscal 1977/'78 was distributed to customers in the Full Cost Contribution Paid category. In that year there were from two to twenty customers in the 'Contribution Paid' class in any given community. Table Twenty-One shows the total consumption recorded for these customers; shows this consumption as a percentage of the total electricity sold in each community to customers of all service categories; and as well, shows the approximate number of customers in the service category, their average annual and monthly consumption per connection.

Certain installations obviously consume more electricity than others by the very nature of their function. The consumption by the Contribution Paid class will therefore be greater in the communities in which larger commercial installations have located.

The largest consumption in any community over the year occurred at Moose Lake, where sales totalled 442,000 kWh. More than 25 per cent of all electricity sold in the communities of Berens River, Bloodvein, Brochet, Jackhead, Moose Lake and Shamattawa was due to consumption by customers who belonged to the Contribution Paid category. In two instances (Bloodvein and Brochet) these customers formed the largest consumption block in the community.

Overall, Manitoba Hydro provided a total of 2,673,715 kWh of electricity

Table Twenty-One

Consumption Of Diesel General Service  
Full Cost Contribution Paid Connections  
Fiscal 1977/'78

Community	Total Community Sales	Sales to Class	Cont. Paid Consumption As % of Total	Number of Customers	Average Annual & Monthly Consumption Per Connection	
					[Annual] (kWh)	[Monthly] (kWh)
Berens River	1,345,967	368,361	27.4	19	19,387	1,695
Bloodvein	645,800	305,262	47.3	7	43,609	3,634
Brochet	892,195	367,118	41.1	16	22,945	1,912
Dauphin River	300,018	43,997	14.7	4	10,999	917
God's Lake Narrows	1,255,231	49,034	3.9	4	12,259	1,022
God's River	256,922	-----	----	--	-----	-----
Granville Lake	56,823	9,526	16.8	3	3,175	265
Island Lake						
-Garden Hill	2,579,829	272,179	10.6	16	17,011	1,418
-Ste. Therese Point	1,298,046	46,820	3.6	2	23,410	1,951
-Wasagamack	975,805	59,844	6.1	2	29,922	2,494
Jackhead	552,343	220,714	40.0	3	73,571	6,131
Little Grand Rapids	512,469	31,598	6.2	3	10,533	878
Moose Lake	1,118,488	441,550	39.5	20	22,078	1,840
Oxford House	1,427,108	126,281	8.8	4	31,570	2,631
Paungassi	160,652	-----	----	--	-----	-----
Pikwitonei	329,358	-----	----	--	-----	-----
Poplar River	1,057,201	5,818	0.6	1	<sup>1/</sup>	5,818
Pukatawagan	897,169	108,819	12.1	3	6,273	528
Red Sucker Lake	588,710	27,856	4.7	2	13,928	1,161
Shamattawa	499,587	129,089	26.0	7	18,441	1,537
Thicket Portage	395,285	59,849	15.1	8	7,481	623
TOTAL	17,146,077	2,673,715	15.8	124	21,562	1,797

<sup>1/</sup>Consumption in Poplar River recorded for one month only, the final month of the year.

to Diesel General Service Full Cost Contribution Paid customers. Services in excess of 30 amps to private customers therefore accounted for at least one-sixth of the 17.1 million kWh generated and sold by the diesel systems.

While annual consumption per connection ranged from 3,175 kWh in Granville Lake to a high of 73,571 in Jackhead, the average electrical use in 1977/'78 was about 21,562 kWh.

Aggregate revenue on consumption among these customers was \$407,875. Revenues are shown in Table Twenty-Two. Total consumption figures for each community were taken from Table Twenty-One and applied to the revenue figures in order to determine the average price paid for electricity during the year.

Contribution Paid category revenues formed as much as two-thirds of income from electrical sales in individual communities. In Bloodvein, Brochet, Jackhead, Moose Lake and Shamattawa, where at least one-quarter of total consumption was due to this one category, the resulting revenues were in each case more than 50 per cent of the total collected. Taken together, Contribution Paid connections in all communities yielded 25 per cent of the \$1.6 million<sup>52/</sup> realized from all diesel sales.

Table Twenty-Two

Revenues on Diesel General Service  
Full Cost Contribution Paid Connections  
Fiscal 1977/'78

Community	Total Community Revenues	Revenues On Class	Cont. Paid Revenues As % Of Total	Avge. Rate Revenue Per kWh
	(\$)	(\$)	(%)	(¢/kWh)
Berens River	118,818.90	45,580.81	38.4	12.37
Bloodvein	60,091.47	39,888.87	66.4	13.07
Brochet	116,465.83	69,107.86	59.3	18.82
Dauphin River	22,198.40	7,834.80	35.3	17.81
God's Lake Narrows	117,579.13	6,372.08	5.4	13.00
God's River	26,987.35	-----	----	----
Granville Lake	8,488.74	3,105.37	36.6	3.26
Island Lake				
-Garden Hill	250,259.87	43,491.36	17.4	15.98
-Ste. Therese Pt.	100,809.69	7,465.20	7.4	15.94
-Wasagamack	99,392.83	9,579.99	9.6	16.01
Jackhead	55,322.83	35,093.53	63.4	15.90
Little Grand Rapids	41,571.69	6,506.95	15.7	20.59
Moose Lake	81,461.36	49,476.01	60.7	11.21
Oxford House	127,650.02	17,028.91	13.3	13.48
Pauingassi	14,194.12	-----	----	----
Pikwitonei	31,301.21	-----	----	----
Poplar River	86,544.86	808.70	0.9	13.90
Pukatawagan	84,788.70	15,172.43	17.9	13.94
Red Sucker Lake	73,581.44	6,131.04	8.3	22.01
Shamattawa	65,528.99	34,852.00	53.2	26.99
Thicket Portage	44,064.56	10,378.60	23.6	17.34
TOTAL	1,627,272.16	407,874.57	25.1	15.25

-1.3 Impact Of Full Cost Contribution Paid  
Rate Setting Formula On Level of Con-  
sumers' Annual Electrical Costs

The charge for energy to Full Cost customers is tied to the local cost of generating and supplying power, as opposed to the aggregate average cost of producing power in the twenty-one diesel systems. In any given year the Full Cost Contribution Paid rate for energy used is intended to approximate the average cost of providing a kilowatt-hour of electricity taking into account maintenance, fuel, labour, administrative, depreciation, overhead and interest costs associated with the operation of the diesel system *in the community in which the consumer receives his electricity*. Costs differ from community to community and the rate varies accordingly. This variation can be observed from the average prices paid shown in the preceding table.

The year's energy bill<sup>53/</sup> for a connection which used 21,562 kWh would have been in the order of \$4,440 in Little Grand Rapids, whereas the bill on the same consumption at the rates effective in Berens River would have been about \$2,667. These are only two examples of many comparisons which could be drawn. The largest annual cost for the same consumption would have accrued to a customer in Shamattawa; paying nearly five hundred and eighty dollars monthly (an electrical rate of 26.99 cents per kWh), the user of 21,560 kWh would have contributed some \$5,819 to Hydro revenues.

These comparisons are useful for demonstrating that the principal of setting rates on the basis of generation cost at the community level imposes



substantial cost disadvantages/advantages on electrical consumers, depending on their location.

In 1977/'78 the absolute differential between the highest and lowest average community rates for electricity sold to Contribution Paid services was nearly fifteen cents per kilowatt-hour. This is the differential that existed between the rate of 26.99¢/kWh in Shamattawa and the Berens River rate, of 12.37¢/kWh<sup>54/</sup>. *The average rate in eight communities was actually less than the 14.6 cent differential itself.* Judged on the basis of the spread in the average rates paid in the one year, the possible saving in electrical expenditure that was available to a business (a small restaurant, for example) which had the flexibility to locate in the least-cost community, would have been substantial. Using 10,000 kWh, the electrical cost would have been \$1,500 less in the least-cost community. The dollar saving on the year's energy bill for a large connection typical of the Contribution Paid category would have been \$3,200 if the installation could have located in the least-cost, rather than the highest-cost community.

The average rates paid used in producing these illustrations were determined by dividing the year's rate revenues on the service classification by electrical sales. They represent the average consumer cost of electricity over the year, given a price change at the beginning of the second quarter of the fiscal year, and should not be construed as being the actual rate in effect either prior to, or after, July 31st, 1977.

The representative annual costs for the examples of Berens River, Little

Grand Rapids and Shamattawa therefore do not make clear the extent of the shifts in rates to which consumers are subject annually. To take these three communities only, the rate in Little Grand Rapids rose by 41.9 per cent and the rate in Shamattawa, by 70.6 per cent. The increase was less severe in Berens River, where it rose to just 107.7 per cent of its former level.

Whether average prices paid over the year are used to calculate similar examples, or whether actual rates are used, it seems clear that *energy costs to identical commercial operations are sufficiently disparate between communities that the influence of electrical rates on the location and continued operation of retail, service and other facilities in remote communities deserves review.*

-1.4 Rate Setting Procedure: Diesel  
General Service Full Cost Con-  
tribution Paid Rate

The Contribution Paid rate for a twelve-month period is established by calculating and summing three components:

- the total of the next year's amortization and interest credits, calculated for each contribution made to that date;
- the projected total local cost of generating electricity minus the credits, divided by the projected local sales of energy to the entire community;
- the variance factor or estimate of revenue overage/underage against the previous fiscal year's costs, calculated by subtracting the rate in effect for the July-March portion of the previous fiscal year from the actual average local cost of providing electricity.

Each capital contribution paid in the community is amortized over a thirty year period. The practice seems to be to record each contribution, its amortization year and the amount of the amortization; and then, each year, to sum the individual amortization values to determine the year's total amortization credit for the Full Cost Contribution Paid class. Therefore, the annual amortization credit will change from one year to the next only if a new contribution is made in a community.

In fiscal 1977/'78, the Contribution Paid class rate was reduced by a credit based on all contributions paid to that date in the community. The rate reduction enjoyed by the Full Cost Contribution Paid class was therefore largely due to the amortization on DIAND contributions<sup>55/</sup>.

The evidence that Federal contributions are used to subsidize

energy rates to the commercial sector suggested that Provincial contributions should be reviewed to establish whether they are employed in the same way and for a similar purpose.

Eastern Region personnel have stated that the capital contributions for non-Reserve communities such as Pikwitonei, Moose Lake and Thicket Portage, are borne by the Provincial government. Contributions paid by the provincial government are not shown amortized on the ledger records reviewed and neither are interest credits calculated or shown in rate-adjustment records.

While Contribution Paid customers receive the benefit of a reduction in rates due to the inclusion of DIAND contributions in calculating amortization and interest credits on the year's rates, they therefore receive no such benefit from contributions forwarded by the Provincial government.

A difference in the accounting stance taken toward Provincial contributions was viewed as a significant matter, and necessitated confirming the practice. In Moose Lake the listing of contributions shows that DIAND forwarded approximately \$5,224.00 and the Reserve Band \$5,311.63, for a total of direct and indirect DIAND contributions of \$10,535.63. Other contributions, made by the Provincial Departments of Northern Affairs, Mines and Resources, and the Manitoba Telephone System, totalled \$7,362.44. The total of all contributions paid by August of 1978 was \$17,898.07. By contrast, one contribution item only is shown in the ledger record, and this is the sum of \$13,613.00. This item is a recent contribution, since 1977/'78 is noted as the first year of depreciation and amortization.

The community of Moose Lake used about 1.1 million kWh of electricity in 1977/'78. Communities using about the same amount of electricity were God's Lake Narrows (1.3 million kWh) and Oxford House (1.4 million kWh). Total site capacity at all three sites is between 650kW and 775kW, and gross investment to March 31st, 1978, was between \$325,000 and \$330,000 per site. But whereas the total contributions recorded in the Manitoba Hydro ledger record for God's Lake Narrows and Oxford House were \$156,000 and \$167,000 respectively and \$231,000 and \$201,000 in a second record (kept by the Eastern Region), the contributions recorded for Moose Lake were, as described above, just \$13,631.00.

The year's depreciation expense is calculated both on generation and distribution equipment in place and on work in progress. The net depreciation expense for the year is this expense, minus the amortization credit. The interest credit extended to the Full Cost Contribution Paid class is calculated separately for each contribution. The interest on the unamortized balance of each contribution is summed to arrive at the total interest credit for the Contribution Paid class in that community for that year. The net interest expense is determined by subtracting this credit from the interest on the value of net investment in the community (i.e. the value of gross investment to March 31st, 1978 minus accumulated depreciation to March 31st, 1978.)

The net interest and depreciation expenses projected for the forthcoming year are calculated in this way and added to the amounts projected for corporate overhead, maintenance, labour, fuel and fuel haulage, and administration. The resulting total cost figure is then divided by pro-

jected sales of energy in the community to determine the expected average cost of providing a kilowatt-hour of electricity in the fiscal year. This forms the base rate for the Full Cost Contribution Paid class, to which the variance factor is added to determine the final rate.

The variance factor is the amount by which the rate in effect from July onward in the past year exceeded or fell short of the average cost incurred per kWh sold in the community. The variance factor can be either negative or positive. If the rate charged in the previous fiscal year was higher than reported average cost, then the figure for projected average cost in the forthcoming fiscal year is reduced by this amount, in which case the variance is negative. If the average cost figure for the actual year's operations is found to have been lower than the July 1st rate instituted in the previous year, then the differential is positive and is added to the base rate for the coming year.

The entire rate adjustment procedure is demonstrated below, in Table Twenty-Three. The sample rate which is determined there is the rate which went into effect in Brochet on July 1st, 1978. Table Twenty-Four then shows the same procedure and all community rates developed for July 1st, 1978.

In any given year the rate adjustment formula produces substantial variations between communities in the rates charged, in the year's expenditure for electricity by an individual customer, and in the amount by which both have increased or decreased over the previous year. Variability in customers' expenditures in the same year were illustrated in

Table Twenty-Three

Illustration: Derivation of Rate Increase  
And New Community Rate, Contribution Paid Class  
(Actual Rate, Brochet, July/'78)

\* Determine Net Projected Cost of Service

- project total cost of service, fiscal 1978/'79 .....[\$195,938.27]
  - includes labour, parts, travelling expense,  
contract labour, fuel and lube oil, fuel  
oil, fuel haulage, regional administration;  
corporate overhead, depreciation and inter-  
est expense.
- project amortization and interest credits 78/79.....[\$ 6,387.60]
- net projected cost of service, fiscal 1978/'79.....\$189,550.67

\* Determine Projected Average Cost of Service  
In the Community

- projected net cost of service, 1978/'79, Brochet,...[\$189,550.67]
- projected community electrical consumption 1978/'79 [ 956,417kWh]
- average projected cost of service ( = 1978/'79 base rate) $\frac{1}{\div}$ ..... 19.9¢/kWh

\* Determine Variance Factor For Preceding Year  
(i.e. fiscal 1977/'78)

- actual (net) cost of service, 1977/'78.....[\$181,931.01]
- actual community electrical consumption, 1977/'78...[ 875,389kWh]
- average cost of service, 1977/'78.....[ 20.8¢/kWh]
- Contribution Paid Rate implemented July 1st, 1977...[ 19.0¢/kWh]
- variance factor ( = avge. cost of service - rate)..... 1.8¢/kWh

\* Determine Proposed Rate, July 1st, 1978

- Add variance factor [1.8¢/kWh] to projected cost  
of service, fiscal 1978/'79 [19.9¢/kWh]
- New Diesel General Service Full Cost Contribution Paid rate..... 21.7¢/kWh

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1/. Add one mill (1/10¢) to projected cost of service  
for contingency reserve.

Table Twenty-Four

Illustration: Derivation of Rate Increase  
And New Community Rate, Contribution Paid Class  
Diesel Community Rates, July, 1978

Community	Actual Cost Of Service 77/78	kWh Sold 77/78	Avg. Cost of Service	July 77 Rate	Var- iance	Projected Cost Of Service 78/79	Projected kWh Con- sumption 78/79	Avg. Cost of Service	Var- iance	July 78 Rate
	(\$)		¢/kWh	¢/kWh	¢/kWh	(\$)		¢/kWh	¢/kWh	¢/kWh
Berens River	\$215,925.57	1,328,523	16.3	12.6	3.7	193,759.76	1,665,100	11.7	3.7	15.4
Bloodvein	92,288.42	617,616	14.9	12.0	2.9	83,624.18	619,507	13.6	2.9	16.5
Brochet	181,931.01	875,389	20.8	19.0	1.8	189,550.67	956,417	19.9	1.8	21.7
Dauphin River	52,911.68	257,678	20.5	18.5	2.0	50,706.07	163,812	31.1	2.0	33.1
God's Lake Narrows	165,205.97	1,231,535	13.4	12.5	0.9	166,691.64	1,117,776	15.0	0.9	15.9
God's River	101,329.42	256,522	39.5	29.2	10.3	88,984.96	280,320	31.8	10.3	42.1
Granville Lake	30,248.32	50,490	59.9	31.9	28.0	34,835.85	49,932	69.9	28.0	97.9
Island Lake	708,262.89	4,780,977	14.8	16.0	(1.2)	840,428.47	5,534,568	15.3	(1.2)	14.1
Jackhead	62,573.28	538,438	11.6	15.9	(4.3)	71,343.93	437,299	16.4	(4.3)	12.1
Little Grand Rapids	80,437.94	479,448	16.8	23.0	(6.2)	95,086.15	465,331	20.5	(6.2)	14.3
Moose Lake	143,554.89	1,075,799	13.3	10.2	3.1	154,799.81	1,310,846	11.9	3.1	15.0
Oxford House	160,578.07	1,328,383	12.1	13.4	(1.3)	168,922.24	1,329,768	12.8	(1.3)	11.5
Pauingassi	51,925.06	151,722	34.2	42.5	(8.3)	56,960.15	134,554	42.4	(8.3)	34.1
Pikwitonei	46,658.17	324,875	14.4	15.9	(1.5)	48,035.66	309,578	15.6	(1.5)	14.1
Poplar River	122,125.78	895,591	13.6	13.9	(0.3)	124,903.92	1,250,928	10.1	(0.3)	9.8
Pukatawagan	140,624.95	862,400	16.3	14.4	1.9	149,902.03	796,284	18.9	1.9	20.8
Red Sucker Lake	115,412.61	426,032	27.1	22.4	4.7	103,707.51	350,596	29.7	4.7	34.4
Shamattawa	91,297.36	478,657	19.1	30.7	(11.6)	88,460.45	418,603	21.2	(11.6)	9.6
Thicket Portage	65,112.24	394,938	16.5	17.7	(1.2)	68,155.10	390,871	17.5	(1.2)	16.3



the preceding section using selected communities, a representative figure for energy consumption in the 1977/'78 fiscal year, and the average rate revenue returned in the year as the average price of a kilowatt-hour of electricity. The actual rates that went into effect on July 1st of 1976, 1977 and 1978 are now compared in Table Twenty-Five to illustrate the year-to-year variability in the rates themselves.

Table Twenty-Five

Diesel Full Cost Contribution Paid Rates  
In Effect July 1976, 1977 and 1978

Community	1976 Rate (¢/kWh)	1977 Rate (¢/kWh)	1978 Rate (¢/kWh)	Change: '76/'77 (%)	Change: '77/'78 (%)
Berens River	11.7	12.6	15.4	7.7	22.2
Bloodvein	14.4	12.0	16.5	(16.7)	37.5
Brochet	18.3	19.0	21.7	3.8	14.2
Dauphin River	12.7	18.5	33.1	45.7	78.9
God's Lake Narrows	14.4	12.5	15.9 <sup>1/</sup>	(13.2)	27.2
God's River	14.7	29.2	42.1	98.6	44.2
Granville Lake	33.5	31.9	97.9	( 4.8)	206.9
Island Lake					
- Garden Hill	15.8	16.0	14.1	1.3	(11.9)
- Ste. Therese Pt.	15.8	16.0	14.1	1.3	(11.9)
- Wasagamack	15.8	16.0	14.1	1.3	(11.9)
Jackhead	15.9	15.9	12.1	0.0	(23.9)
Little Grand Rapids	16.2	23.0	14.3	41.9	(37.8)
Moose Lake	14.3	10.2	15.0	(28.7)	47.1
Oxford House	14.4	13.4	11.5	( 4.9)	(14.2)
Pauingassi	----	42.5	34.1 <sup>1/</sup>	----	(19.8)
Pikwitonei	17.6	15.9	14.1 <sup>1/</sup>	( 9.7)	(11.3)
Poplar River	10.8	13.9	9.8	28.7	(29.5)
Pukatawagan	12.7	14.4	20.8	13.4	44.4
Red Sucker Lake	20.1	22.4	34.4	11.4	53.6
Shamattawa	18.0	30.7	9.6	70.6	(68.7)
Thicket Portage	15.7	17.7	16.3	12.7	( 7.9)

<sup>1/</sup> Computerized revenue and consumption records show no consumption for the Contribution Paid category in these communities, although a rate had been determined.

Percentage change figures in brackets are negative i.e. the rate declined from one year to the next.

3-1.5 Arguments Against The Inclusion Of  
Indirect Cost In The Rate Setting  
Formula

The rationale for including indirect cost in the calculation of Full Cost Contribution Paid rates can be questioned. The overhead item in indirect cost is calculated as 15 per cent of all projected direct cost for the year, including regional administration. This means that the overhead cost rises automatically with rise in fuel price and engine overhauls. But a direct correlation does not necessarily exist between administrative cost and fuel cost increases, or between administrative cost and maintenance programs of the common variety.

Second, full cost rates cannot function as they are intended (to meet the full cost of power supply and cross-subsidization of the residential rate). To compensate for revenues foregone in crediting Contribution Paid rates with interest and depreciation charges, the credits are assigned instead to the No Contribution Paid class. The following occurs: the Contribution Paid class contributes the capital necessary to establish plants; the depreciation and interest costs associated with these contributions are passed on to another class, the No Contribution Paid class, through their rates; contrary to intent, actual sales result in too little revenue being raised to meet both average cost and credits; and this in turn contributes to annual operating losses, a further tightening of cost accounting procedures and itemization of all costs associated with service, and further rate increases to the Contribution Paid class whose members had originally furnished the capital contributions.

Third, diesel engines are frequently old engines purchased and used at Manitoba Hydro construction sites, subsequently overhauled, and installed at diesel sites. Whether this equipment is depreciated while in use at construction sites is a matter that requires clarification, as current depreciation rates may be too high if previous depreciation has been defrayed or disregarded when the engines are put into commercial use. Depreciation practises might also be holding capital contribution levels at artificially high levels.

Fourth, customers pay high and fluctuating rates over the years in which they receive service, yet are not granted the value of interest and amortization credits remaining at the time that communities are transferred to central station power. At the time of such a transferal, Manitoba Hydro retains ownership of equipment and is the beneficiary of a saving equal to the remaining unamortized balance of capital contributions.

Fifth, it is arguable whether indirect costs should be included as items in annual operating expense against the total of which revenues, and therefore annual profits or losses, will be measured. The procedure used now is ineffective in returning revenues sufficient to meet costs and overall this procedure of accounting appears to be unduly rigorous in the light of the market size and revenues that can be expected to obtain in any given year.

The extent to which it is relatively impossible to recover costs fully through the present rate structure is demonstrated by Table Twenty-Six,

Table Twenty-Six

Additional Sales to the Contribution Paid Category  
Necessary in 1977/'78 to Recover All Loss

Community	Community Loss 1977/'78	Rate	Additional Sales Required	% Increase Necessary Over Actual Sales
	(\$)	(¢/kWh)	(kWh)	(%)
Berens River	98,898.57	12.37	799,503	60.2
Bloodvein	34,027.42	13.07	260,348	42.2
Brochet	66,895.01	18.82	355,446	40.6
Dauphin River	35,763.68	17.89	199,909	77.6
God's Lake Narrows	49,482.97	13.00	380,638	30.9
God's River	74,364.42	39.50 <sup>1/</sup>	188,264	73.4
Granville Lake	22,743.32	32.60	69,765	138.0
Island Lake	279,896.89	15.98	1,751,545	36.6
Jackhead	8,086.28	15.90	50,857	9.4
Little Grand Rapids	40,728.94	20.59	197,809	41.3
Moose Lake	64,726.89	11.21	577,403	53.7
Oxford House	41,648.07	13.48	308,961	23.3
Paungassi	38,688.06	34.20 <sup>1/</sup>	113,123	74.6
Pikwitonei	15,771.17	14.40 <sup>1/</sup>	109,522	33.7
Poplar River	50,411.78	13.90	362,674	40.5
Pukatawagan	58,633.95	13.94	420,617	48.8
Red Sucker Lake	74,511.61	22.01	338,535	79.5
Shamattawa	27,937.36	26.99	103,510	21.6
Thicket Portage	21,068.24	17.34	121,500	30.8
TOTAL	\$1,104,284.63		6,709,929	41.0

<sup>1/</sup>No consumption was recorded for the Contribution Paid category in these communities in fiscal 1977/'78. Rates for all other communities are not actual rates but average rate revenues, given the two different rates which were in effect in each community over the fiscal year. In the three communities in which no consumption was recorded, the average cost of generating and distributing electricity was used instead.

which shows the number of additional kWh which it would have been necessary to generate and sell at the Full Cost Contribution Paid rate in order to recover all expense in fiscal 1977/'78. Average rate revenue from fiscal 1977/'78 was used in tabulating this data. The additional sales required are then compared with the total sales actually made in the communities and shown as a percentage of actual totals.

As indicated by the table, an additional 6,709,929 kWh of electricity would have to have been generated and sold in fiscal 1977/'78; 40 per cent more than the actual quantity of energy generated and sold to all categories of customers. Even if such an increase in demand were feasible and losses were theoretically reduced to zero by the additional sales, the further cost associated with generating the incremental energy would then create a new level of loss.

3-2.0 Examination Of The Full Cost No  
Contribution Paid Rate: Introduction

There were 107 customers in the Diesel General Service Full Cost No Contribution Paid service category in fiscal 1977/'78. Their energy demand accounted for 11.2 per cent of all electricity sold in diesel markets. Revenues on their consumption totalled \$330,448.15; 20.3 per cent of diesel revenues in that year.

The Full Cost No Contribution Paid category consists primarily of Provincial government connections<sup>56/</sup>, and, like the Government of Canada rate, is closed to new customers. Its closure is referenced in a document titled Manitoba Hydro Electric Service Tariff Schedule No. 60-02, "Diesel Full Cost - No Contribution Classification" effective July 1st, 1977:

" Available to existing customers only. All existing customers requiring power and energy in excess of diesel residential or diesel general service limitations and who have not paid a capital contribution as determined by Manitoba Hydro. "

The No Contribution Paid rate is applicable only to existing customers and will consequently become of diminishing importance as customers are disconnected or shifted to another service classification and rate. This transferral may have been initiated in the 1978/'79 fiscal year, as have transferrals of Government of Canada connections.

No Contribution Paid connections were in place in fifteen of the twenty-one diesel communities in the past year. The exceptions were Dauphin

River, Granville Lake, Jackhead, Little Grand Rapids, Moose Lake and Pauingassi.

Tables Twenty-Seven and Twenty-Eight show the consumption and revenues for this service classification for each community in 1977/'78. No Contribution Paid service connections used an average of 17,917 kWh of electricity over the year. The greatest number of kilowatt-hours used in any community by this class was 312,416 kWh, in Berens River. There were from one to seventeen No Contribution Paid connections in the various diesel communities.

Sales of energy to such customers produced 20 per cent or more of community revenues in Berens River, Brochet, God's Lake Narrows, Waasagomach, Pikwitonei, Poplar River, Red Sucker Lake and Thicket Portage. This classification was particularly significant in Pikwitonei and Thicket Portage: about two-thirds of rate revenues in Pikwitonei and fifty-three per cent of those in Thicket Portage resulted from the energy used by No Contribution Paid services.

On the basis of consumption and billings to customers, the average rate revenue per kilowatt-hour realized by Manitoba Hydro from this block was 17.2¢/kWh. At this level, average rate revenue was 1.13 cents above the overall average cost of supplying power throughout its diesel operations.



Table Twenty-Seven

Consumption of Diesel General Service  
Full Cost No Contribution Paid Connections  
Fiscal 1977/'78

Community	Total Community Sales	Sales To Class	No Cont. Paid Consumption As % Of Total	Number of Customers	Average Annual & Monthly Consumption Per Connection	
					[Annual] (kWh)	[Monthly] (kWh)
Berens River	1,345,967	312,416	23.2	15	20,828	1,736
Bloodvein	645,800	36,778	5.7	2	18,389	1,533
Brochet	892,195	123,831	13.9	6	20,639	1,720
Dauphin River	300,018	-----	----	--	-----	-----
God's Lake Narrows	1,255,231	210,538	16.8	13	16,195	1,350
God's River	256,922	24,870	9.7	1	24,870	2,073
Granville Lake	56,823	-----	----	--	-----	-----
Island Lake						
-Garden Hill	2,579,829	189,779	7.4	13	14,598	1,217
-Ste. Therese Pt.	1,298,046	104,182	8.0	4	26,046	2,170
-Wasagamack	975,805	144,976	14.9	4	36,244	3,020
Jackhead	552,343	-----	----	--	-----	-----
Little Grand Rapids	512,469	-----	----	--	-----	-----
Moose Lake	1,118,488	-----	----	--	-----	-----
Oxford House	1,427,108	135,826	9.5	4	33,957	2,830
Puingassi	160,652	-----	----	--	-----	-----
Pikwitonei	329,358	117,929	35.8	17	6,937	578
Poplar River	1,057,201	215,474	20.4	5	43,095	3,591
Pukatawagan	897,169	21,693	2.4	5	4,339	362
Red Sucker Lake	588,710	141,004	24.0	3	47,001	3,917
Shamattawa	499,587	11,228	2.2	2	5,614	468
Thicket Portage	395,285	126,773	32.1	13	9,752	813
TOTAL	17,146,077	1,917,297	11.2	107	17,919	1,493

Table Twenty-Eight

Revenues on Diesel General Service  
Full Cost No Contribution Paid Connections  
Fiscal 1977/'78

Community	Total Community Revenues	Revenues On Class	No Cont. Paid Revenues As % Of Total	Avg. Rate Revenue Per kWh
	(\$)	(\$)	(\$)	(¢/kWh)
Berens River	118,818.90	42,761.82	36.0	13.69
Bloodvein	60,091.47	5,378.86	9.0	14.63
Brochet	116,465.83	24,788.06	21.3	20.02
Dauphin River	22,198.40	-----	----	----
God's Lake Narrows	117,579.13	30,170.09	25.7	14.33
God's River	26,987.35	8,067.22	29.9	32.44
Granville Lake	8,488.74	-----	----	----
Island Lake				
-Garden Hill	250,259.87	33,789.36	31.5	17.80
-Ste. Therese Pt.	100,809.69	18,475.98	18.3	17.73
-Wasagamack	99,392.83	25,699.14	25.9	17.73
Jackhead	55,322.83	-----	----	----
Little Grand Rapids	41,571.69	-----	----	----
Moose Lake	81,461.36	-----	----	----
Oxford House	127,650.02	21,476.06	16.8	15.81
Paungassi	14,194.12	-----	----	----
Pikwitonei	31,301.21	20,878.42	66.7	17.70
Poplar River	86,544.86	32,120.90	37.1	14.91
Pukatawagan	84,788.70	3,464.84	4.1	15.97
Red Sucker Lake	73,581.44	36,427.60	49.5	25.83
Shamattawa	65,528.99	3,566.99	5.4	31.77
Thicket Portage	44,064.56	23,382.81	53.1	18.44
TOTAL	1,627,272.16	330,448.15	20.3	17.24

3-2.1 Rate Setting Procedure: No  
Contribution Paid Rate

The rate adjustment procedure for the Contribution Paid rate was illustrated in section 3-1.4 of this report using the community of Brochet as an example. The illustration is now reworked (Table Twenty-Nine) for the Brochet No Contribution Paid rate. The rate determined in the example is again the rate which went into effect on July 1st, 1978. Also as provided before, a table (Table Thirty) consolidates the rate adjustment calculations for all communities, and rates set on July 1st of 1976, 1977 and 1978 are compared (Table Thirty-One).

No Contribution Paid rates are calculated in the same way as the Contribution Paid rates, except that the amortization and interest credits are not deducted from the projected amount of the depreciation and interest items for the forthcoming year. This raises the calculated value for the projected average cost of a kWh of electricity in the forthcoming year, which is the 'base rate'. A variance factor is then applied in the same way as it is applied to the Contribution Paid rate. The variance factor will differ for the No Contribution Paid rate because the previous year's total costs in this instance will include full depreciation and interest costs.

When No Contribution Paid connections are converted to Contribution Paid rates, their energy use will then be charged at lower rates.

Table Twenty-Nine

Illustration: Derivation of Rate Increase  
And New Community Rate, No Contribution Paid Class  
(Actual Rate, Brochet, July/'78)

\* Determine Projected Cost of Service

- determine projected cost of service, fiscal 1978/'79  
as for Contribution Paid Class.....[\$195,938.27]
- amortization and interest credits for fiscal  
1978/'79 are not extended
- projected cost of service, fiscal 1978/'79.....\$195,938.27

\* Determine Projected Average Cost of Service  
In the Community

- projected cost of service, 1978/'79, Brochet.....[\$195,938.27]
- projected community electrical consumption 1978/'79 [ 956,417kWh]
- average projected cost of service ( = 1978/'79 base rate)<sup>1/</sup> ..... 20.6¢/kWh

\* Determine Variance Factor For Preceding Year  
(i.e. fiscal 1977/'78)

- cost of service, 1977/'78; credits not extended..... [\$188,764.01]
- actual community electrical consumption, 1977/'78....[ 875,389kWh]
- average cost of service, 1977/'78.....[ 21.6¢/kWh]
- No Contribution Paid Rate implemented July 1st, 1977.[ 19.7¢/kWh]
- variance factor ( = avge. cost of service - rate)..... 1.9¢/kWh

\* Determine Proposed Rate, July 1st, 1978

- Add variance factor [1.9¢/kWh] to projected average  
cost of service, fiscal 1978/'79 [20.6¢/kWh]
- New Diesel General Service Full Cost Contribution Paid rate..... 22.5¢/kWh

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<sup>1/</sup>. Add one mill (1/10¢) to projected cost of service  
for contingency reserve.

Table Thirty

Illustration: Derivation of Rate Increase  
And New Community Rate, No Contribution Paid Class  
Diesel Community Rates, July, 1978

Community	Actual Cost Of Service 77/78 (\$)	kWh sold 77/78 (%)	Avg. Cost of Service (¢/kWh)	July 77 Rate	Var- iance (¢/kWh)	Projected Cost Of Service 78/79 (\$)	Projected kWh Con- sumption 78/79 (¢/kWh)	Avg. Cost of Service (¢/kWh)	Var- iance (¢/kWh)	July 1978 Rate (¢/kWh)
Berens River	\$242,441.56	1,328,523	18.2	13.9	4.3	\$204,075.24	1,665,100	12.4	4.3	16.7
Bloodvein	106,532.42	617,616	17.2	14.0	3.2	96,926.26	619,507	15.7	3.2	18.9
Brochet	188,764.01	875,389	21.6	19.7	1.9	195,938.27	956,417	20.6	1.9	22.5
Dauphin River	56,536.68	257,678	21.9	19.8	2.1	54,092.91	163,812	33.1	2.1	35.2
God's Lake Narrows	179,304.97	1,231,535	14.6	13.5	1.1	179,851.76	1,117,776	16.2	1.1	17.3
God's River	118,507.42	256,522	46.2	33.4	12.8	105,047.28	280,320	37.6	12.8	50.4
Granville Lake	34,349.32	50,490	68.0	36.1	31.9	38,669.73	49,932	77.5	31.9	109.4
Island Lake	806,213.89	4,780,977	16.9	17.8	(0.9)	931,954.83	5,534,568	16.9	(0.9)	16.0
Jackhead	66,282.28	538,438	12.3	17.0	(4.7)	74,807.61	437,299	17.2	(4.7)	12.5
Little Grand Rapids	111,537.94	479,448	23.3	26.6	(3.3)	124,147.43	465,331	26.8	(3.3)	23.5
Moose Lake	145,128.89	1,075,799	13.5	11.3	2.2	156,271.65	1,310,846	12.0	2.2	14.2
Oxford House	176,845.07	1,328,383	13.3	14.4	(1.1)	179,805.24	1,329,768	13.6	(1.1)	12.5
Paungassi	77,605.06	151,722	51.1	----	-----	80,973.27	134,554	---	---	----
Pikwitonei	47,244.17	324,875	14.5	17.0	(2.5)	48,583.46	309,578	15.8	(2.5)	13.3
Poplar River	145,544.78	895,591	16.3	15.8	0.5	146,782.16	1,250,928	11.8	0.5	12.3
Pukatawagan	165,556.95	862,400	19.2	15.7	3.5	180,746.31	796,284	22.8	3.5	26.3
Red Sucker Lake	133,451.61	426,032	31.3	25.7	5.6	120,566.55	350,596	34.5	5.6	40.1
Shamattawa	112,889.36	478,657	23.6	34.8	(11.2)	108,640.29	418,603	26.1	(11.2)	14.9
Thicket Portage	69,338.24	394,938	17.6	18.8	(1.2)	71,863.58	390,871	18.5	( 1.2)	17.3

Table Thirty-One

Diesel Full Cost No Contribution Paid Rates  
In Effect July 1976; 1977 and 1978

Community	1976 Rate (¢/kWh)	1977 Rate (¢/kWh)	1978 Rate (¢/kWh)	Change: '76/'77 (%)	Change: '77/'78 (%)
Berens River	12.8	13.9	16.7	8.6	20.1
Bloodvein	16.5	14.0	18.9	(15.6)	35.0
Brochet	21.0	19.7	22.5	( 6.2)	14.2
Dauphin River	13.8	19.8	35.2	43.5	77.8
God's Lake Narrows	17.2	13.5	17.3 <sup>1/</sup>	(21.5)	28.1
God's River	27.0	33.4	50.4	23.7	50.9
Granville Lake	47.2	36.1	109.4 <sup>1/</sup>	(23.5)	203.0
Island Lake					
- Garden Hill	17.5	17.8	16.0	1.7	(10.1)
- Ste. Therese Pt.	17.5	17.8	16.0	1.7	(10.1)
- Wasagamack	17.5	17.8	16.0	1.7	(10.1)
Jackhead	17.0	17.0	12.5 <sup>1/</sup>	0.0	(26.5)
Little Grand Rapids	25.1	26.6	23.5 <sup>1/</sup>	2.0	(11.7)
Moose Lake	14.3	11.3	14.2 <sup>1/</sup>	(21.0)	25.7
Oxford House	20.4	14.4	12.5	(29.4)	(13.2)
Pauingassi	----	----	----	----	----
Pikwitonei	18.7	17.0	13.3	( 9.1)	(21.8)
Poplar River	12.3	15.8	12.3	28.5	(22.2)
Pukatawagan	16.0	15.7	26.3	( 1.9)	67.5
Red Sucker Lake	29.4	25.7	40.1	(12.6)	56.0
Shamattawa	22.3	34.8	14.9	56.1	(57.2)
Thicket Portage	16.8	18.8	17.3	11.9	( 8.0)

<sup>1/</sup> Computerized consumption and revenue records show no consumption for the No Contribution Paid category in these communities, although a rate had been determined.

Percentage change figures in brackets are negative i.e. the rate declined from one year to the next.

3.0 Arguments For And Against Community  
Level Cost Accounting: Introduction

The application of high electrical rates in diesel communities stems from the policy that diesel customers' rates should reflect cost of service at remote locations. Whereas approximately the same policy applies to rates levied in Winnipeg and other cities and towns in the province, costs are spread over larger markets in those areas and result in lower rates.

Limited service diesel rates are exempted from this policy in as much as rates for these connections are set equal to the rates paid by customers in other areas of the province<sup>57/</sup>. As previously noted, the service categories charged at rates designed to return the full cost (more or less) of service are the Diesel General Service Government of Canada Contract Rate; the Diesel General Service Full Cost Contribution Paid Rate; and the Diesel General Service Full Cost No Contribution Paid Rate.

Whereas residential and general service rates for limited 15 and 30 amp service are uniform throughout the communities, the foregoing rates are designed on a community-by-community basis. Arguments justifying this practice include:

- the fact that Manitoba Hydro experiences net operating losses in each community, but that these losses vary through a considerable range. In fiscal 1977/'78, for example, the community losses varied from a low of 1.5¢/kWh sold, to 45¢/kWh; and

- that the electrical market in the various communities is served from local generation capacity and therefore annual costs and losses are a reflection, in part, of the local ratio of consumption by residential customers to full cost customers. The additional revenue which should be obtained from full cost customers to compensate for the loss on residential customers will therefore be different in each community, justifying a community level emphasis in cost accounting and rate setting; and
- that community operating and maintenance costs reflect community isolation, type and reliability of access. These are unique to each community and such differences should be reflected in rates; and
- that community isolation effectively means that individual diesel plants are separate utilities from the perspective of generation planning. This fact, and the fact that diesel service is neither phased into, nor phased out of, communities at the same point in time makes the annual accounting of costs on a community basis a convenient method of administering individual capital and operating budgets.

In summary, community location and market size give rise naturally to variation in the local cost of service in any given year. For administrative convenience and to avoid the inequitable distribution of costs against customers and customer sales, full cost rates are adjusted annually against each community's costs, rather than against aggregate diesel costs for that year.

Despite the measure of community level cost accounting and the intent to recover the full cost of service through rates in an equitable manner, the full cost rates recover the full cost of service from the customer with less regularity and consistency throughout the diesel operations than is desirable and do not succeed in apportioning the cost of



service equitably against customers. Particularly where the full cost customers are in the minority in terms of the size of their consumption block, the full cost rates return an amount greater than the average cost of service that could be attributed to them.

The matter of rate fluctuation deserves as much stress as the question of equitability. Full cost rates are high, display a wide variation from community to community in any given year, and fluctuate up or down from year to year by different amounts in each community. While electrical expenditures paid by government facilities are ultimately borne by taxpayers across the province, fluctuations in commercial rates will be passed on in the price of goods and services purchased by local patrons, eroding the cross-subsidization benefit which the current rate structure presupposes for limited service residential customers.

A precedent exists for the argument against annual fluctuations and against the rigidity of attributing all costs against the operating year in which they are expected to accrue. Public Utilities Board Order 238/78, arising from hearings held on October 17th and 18th, 1978 on matters relating to rate increases of the previous February, deals with these topics.

The PUB comments in its Order on the matter of unrealized losses on borrowings due to a decline in the value of the Canadian dollar against currencies of countries in which major Hydro borrowings have been undertaken. The position of the Canadian Institute of Chartered Accountants, as cited

in the Order, is that 'unrealized gains or losses arising from the translation of foreign debt should be amortized over the remaining life of that debt in each specific case. The current year would be charged with only the proportion applicable, with the balance being amortized over future periods.' Manitoba Hydro described its discretionary power in complying with the practice as being sufficient that the foreign exchange reserve provision would not be enforced for the year so as not to create a necessity for raising rates further at that time.

The portions of the Order and the Public Utilities Board's comments which are of interest here consist of a commentary on Manitoba Hydro's decision to forego implementing the foreign exchange reserve requirement (the italics have been added to demonstrate the relevance of the remarks to the present report, and do not appear in the original):

" . . . The Board concurs with Manitoba Hydro that, while the recommendation of the Canadian Institute of Chartered Accountants *may well be acceptable for accounting purposes, it is not necessarily appropriate for rate-setting purposes. If the rates were set each year to recover in full amortized unrealized losses or gains, undesirably wide fluctuations in rates would occur as flexible exchange rates can be subject to such fluctuations. . . .*

*The Board agrees with Manitoba Hydro that concern for its customers requires responsible moderation in rate practice; in practical terms, phasing of responses to contingencies rather than excessively abrupt reaction makes better sense and provides for more equitable rate impact on consumers in all categories. "*

While it is true that the costs which create yearly fluctuations in dies-

el rates might properly be argued as being different in nature than the contingency costs on which the PUB order comments, nevertheless the PUB describes very clearly the nature of the rate discrimination which is ongoing in diesel communities. That is, that while certain practices of assessing costs attributable to operations *"may well be acceptable for accounting purposes, [they are] not necessarily appropriate for rate-setting purposes."*

3-3.1 Summary, Implications Of Community-Level  
Cost Accounting On Full Cost Diesel Rates

Government of Canada Rates. Government of Canada rates are adjusted with increases/decreases in fuel and fuel haulage costs. In communities in which the year's electrical consumption by Government of Canada connections comprises a substantial, or the largest portion of community consumption, the rate set will more nearly approximate the actual average fuel cost incurred in meeting the electrical demand of these connections. But the reverse is true in those communities in which the Government of Canada service classification is not the dominant consumer block in the community. In fiscal 1977/'78 sales to Government of Canada connections varied through a wide range as a percentage of total community sales. Consumption by these connections comprised less than twenty-five per cent of community sales in the communities of Berens River, Bloodvein, Brochet, Dauphin River, Granville Lake, Jackhead, Red Sucker Lake and Shamattawa.

In addition, Government of Canada rates do not benefit from possible annual credits calculated on the basis of DIAND contributions for government and residential services. (Neither is the credit directly intended to be passed on to the residential customers, since the customers' subsidized rate is not adjusted annually to a level equal to the cost of service minus a credit. Yet it is on the residential customers' behalf that a large portion of DIAND contributions have been made.)

The Government of Canada rate is now a closed rate, with Federal services being transferred to the Full Cost Contribution Paid rate. A point pertaining to the transition is whether any compensation arrangement will be devised to account for the number of elapsed years in which no amortization or interest credits have been passed on to Federal customers.

The salvage value of equipment removed in any given year is apparently deducted from the value of the additional investment in the community in that year. It is not clear, however, how salvage values and the value of net investment are treated in the instance of communities which are converted from diesel service to central station power. Over the last decade several communities have undergone such a transfer, and those which will receive consideration next as to such a transfer include Moose Lake, Jackhead, Dauphin River, Pukatawagan; and possibly Thicket Portage, Pikwitonei and Bloodvein.

The aggregate value of net investment in communities considered for conversion is substantial at the present time, as is the amount of the aggregate unamortized balance of DIAND contributions. Since the amortization credit on the contribution base is calculated for a thirty year period, the large contributor (such as DIAND) is likely to have theoretically supplied a greater proportion of capital toward the construction of line power into the communities than toward the diesel sites themselves, over the life of their operation. The value of this contribution should be included in assessments of a further contribution at the time of conversion.<sup>58/</sup>

Contribution Paid Rate. Contribution Paid rates are set equal to the projected average cost of providing a kWh of electricity, reduced by a credit factor equal to the net depreciation and interest factor averaged over projected community sales, and increased or reduced by a factor representing the average loss/profit experienced in the previous year on overall sales in the community. The average cost factors in this formula will overstate or understate the portion of cost incurred in providing service to the Contribution Paid class specifically, depending on the proportion of sales to this customer category relative to total community sales. In fiscal 1977/'78, electrical sales to Contribution Paid customers as a percentage of community sales varied through a range of 3.6 to 47.3 per cent.

Also, the use of average cost as the basis for energy charges assumes that the average cost of meeting the peak load created by Full Cost Contribution Paid customers is equal to the average cost of meeting peak load in the community. This may not be the case. Contribution Paid customers, consisting of small businesses and industries, would seldom create a load factor identical to that of the entire community. (The load factor is a measure of the efficiency with which generation equipment is used in meeting the electrical demand for all, or part of the electrical load. The lower the maximum instantaneous demand (peak) created by customers relative to the number of kWh of energy used by the types of consumers creating the load, the less generation capacity must be dedicated to meet that load and the lower the cost of servicing the load.)

The variance factor in the rate adjustment formula will similarly overstate or understate loss/profits attributable to the Contribution Paid class.

The present rate adjustment formula induces significant rate fluctuations from year to year for customers in any one community, and creates large disparities between rates in different communities. It can be assumed that this

raises problems for businesses as they attempt to budget for their expenditure on electricity, and also that fluctuations are passed on to patrons. Since rates may fluctuate up or down, but are certain to rise one or two years following, rate decreases may not necessarily be accompanied by a reduction in the prices set on goods sold.

Interest and amortization credits allocated to Contribution Paid customers are based on the total value of contributions made by all categories of customers from the inception of diesel service. The actual benefit, when translated into the reduction in the rate in cents per kWh, is unlikely to balance the amount by which the Contribution Paid customer is overcharged by virtue of the use of average cost of service figures in the rate adjustment formula.

No Contribution Paid Rate. The Full Cost No Contribution Paid rate is calculated in the same way as the Contribution Paid rate except that the amount of the amortization and interest credits is not deducted from past or projected cost of service figures. When not included in past and projected cost figures, a higher base rate and variance factor result.

The No Contribution Paid Rate should function to recover the amount of the credits granted to the Contribution Paid class. This does not, in fact, occur. In 1977/'78 the amount of rate revenue collected and due solely to the inclusion of the interest and amortization expense in the base rate amounted to approximately \$37,373.53. By contrast the total value of the credits extended to Contribution Paid customers was \$355,571 and the rate revenue foregone on Contribution Paid consumption as a result of lower rates, amounted to \$43,329.

Therefore, of the aggregate net loss of \$1,104,285 recorded in 1977/'78 on all diesel operations, at least \$318,297 or roughly 30 per cent, was due to the fact that this additional cost factor had been spread over a customer classification whose consumption could not be expected to return revenues sufficient to meet all other costs plus the full amount of the depreciation and interest expense.

Revenues from the No Contribution Paid class fell short of counterbalancing revenues foregone on the Contribution Paid class by about \$6,000. In order for the No Contribution Paid rate to have returned costs, the amount of the credit, and the amount of

revenue foregone by reducing the Contribution Paid rate, a further 14,989,499 kWh of electricity would have to have been sold to No Contribution Paid customers<sup>59</sup>. If made, these sales would have represented 92 per cent more than the total number of kilowatt-hours of electricity than were otherwise sold in diesel communities in 1977/'78, and about eight times more electricity than was otherwise used by the No Contribution Paid class.

As with the Contribution Paid class, the variance factor in the rate adjustment formula does not represent the actual profit or loss of serving this customer class specifically.

From the observations made respecting the Government of Canada rate and the two Full Cost rates, it is concluded in general that (a) the present rate structure creates economic incentives/disincentives to businesses and budget projection difficulties to private and public operations alike in remote communities; (b) the use of average cost figures in applying individual rates does not allocate costs in the same proportion as costs are incurred in providing service, although the practice has assumed that costs would be equitably distributed; and (c) the rate structure and rate adjustment procedures employed in determining rates for full cost customers are not appropriate to the size of the diesel electrical market to which they have been applied.

-4.0 Grounds For Investigating Alternative  
Rate Structures For Equivalent Or Up-  
graded Service At Less Cost

The weaknesses of the present rate structure have been documented in preceding sections, together with arguments for reduced capital charges on new and upgraded services. In order to determine the legitimacy of a negotiating strategy requesting a re-examination of the present rate structure, the present rate structure was modified to incorporate three basic changes and tested for revenue and profit/loss impacts.

The three matters addressed were high residential rates; fluctuating full cost rates due to the practice of community level cost accounting; and the practice of assessing both indirect and direct costs against community operations. Without being a comprehensive review of rate structure alternatives, these three tests alone indicate that the negative impact of high and fluctuating rates can be diminished even through fairly simplistic and conservative alterations; and that this can occur without necessarily diminishing rate revenues. There is even some evidence that a different rate structure can incorporate certain rate reductions and reduce rate fluctuations while actually generating a higher level of rate revenue.

The desirable modifications tested were:

- residential rates equalized with Town rates; all full cost rates set equal to the average aggregate cost of diesel service; and
- residential rates equalized with Town rates; all full cost rates set equal to the average cost of service minus indirect cost; and



- residential rates equalized with Town rates;  
rates for all government services set equal  
to the average aggregate cost of service;  
Full Cost Contribution Paid rates for large  
private commercial customers set equal to  
projected administrative and overhead cost,  
plus direct cost attributable only to service  
to that class.

3-4.1 Revenue And Loss Implications Of  
Alternative One (Equalized Resi-  
dential Rates and Full Cost Rates  
Based on Aggregate Average Cost)

Residential customers currently pay electrical rates equal to rural rates. These rates are the highest levied in the province. But whereas there is no service limitation on rural connections, a 15 amp circuit breaker limits use on diesel residential connections.

The application of the next lowest rate tariff (Town rates) in diesel communities would partially compensate consumers for the inconvenience of the service limitation. Based on 1977/'78 consumption, revenues on residential electrical use would have been \$227,147 if charged at Town rates, or \$20,000 below the actual revenue for that year.

The average cost of service throughout the twenty-one diesel communities was 16.07¢/kWh. If the aggregate cost figure had been applied in lieu of existing full cost rate, the increase in revenues on Government of Canada services, alone, compensates ten-fold for the decline in residential revenue. The combination of the two modifications would have reduced aggregate operating loss for the year 1977/'78 by at least 25 per cent. If it is assumed that the Government of Canada rate is modified with all other full cost rates, the potential reduction in net operating losses is 43 per cent.

All calculations are shown in Table Thirty-Two.

Table Thirty-Two

Aggregate Diesel Rate Revenue 1977/'78  
Under Hypothetical Rate Structure Alternative One

Service Class	Actual 77/78 Rate Revenue	Consumption 1977/'78	Hypothetical Revenue Calculated @ 16.07¢ / kWh
Government of Canada	\$ 515,641.67	4,447,594 kWh	\$ 714,728.36
Contribution Paid	407,874.57	2,673,715	429,666.00
No Contribution Paid	330,448.15	1,917,297	308,109.63
*Total Revenue	<u>\$1,253,964.39</u>		<u>\$1,752,503.99</u>
Residential (@ Town Rate)	\$ 297,217.27	6,928,684	\$ 277,147.36
*Total Revenue	<u>\$1,551,181.66</u>		<u>\$2,029,651.35</u>

Gain in Revenue Over  
1977/'78 Levels:

- (1) Gain with Government of Canada rate modified..(43%)... \$ 478,532.69
- (2) Gain if all rates are modified except the  
Government of Canada Rate.....(25%)... \$ 279,383.00

3-4.2 Revenue And Loss Implications Of  
Alternative Two (Equalized Resi-  
dential Rates And Full Cost Rates  
Based On Aggregate Average Direct  
Cost)

A table similar to Table Thirty-Two is now presented for the case in which full cost rates would be set equal to the aggregate average cost of service, based on direct cost components only. Aggregate direct cost per kWh sold was 10.9¢/kWh in fiscal 1977/'78.

The features of this alternative include the reporting of losses against direct cost only, as opposed to direct and indirect costs<sup>60/</sup>; and the continued use of the variance system, modified so that overages/underages in revenues be measured against direct costs of operation only. It also assumes that the remaining portion of expense, including interest, depreciation, administrative and overhead cost, would be borne by consumers elsewhere in the province. In fiscal 1977/'78, this move *would have added less than 1 per cent (0.75%) to the overall cost associated with the operation of the integrated system.*

Residential customers report problems with unattended low wires and infrequent home wiring inspections. All customers appear to be inconvenienced by power outages due to equipment failure. A further modification of the rates presented might therefore have been a charge in the order of an additional 1 mill (one-tenth of one cent) increase in all rates for each additional \$20,000 increment of cost earmarked for community maintenance programs in a forthcoming year.

Under the assumptions used, the reported loss on diesel operations would have been approximately 2.4¢/kWh for the 1977/'78 fiscal year. Projected direct cost for 1978/'79 was estimated as \$1,814,112 and electrical sales as 16,385,090 kWh. The 1978/'79 base rate for all full cost customers would have been set at 11.1¢/kWh, and including a variance factor, would have been 13.5¢. This rate would have been substantially below most full cost community rates that went into effect on July 1st, 1978.

Although the inequities associated with the use of the average cost and variance method would not have been eliminated using this approach, rates in general would have been reduced<sup>61/</sup>. Calculations are shown in Table Thirty-Three.

Table Thirty-Three

Aggregate Diesel Rate Revenue 1977/'78  
Under Hypothetical Rate Structure Alternative Two

Customer Class	Actual 77/78 Rate Revenue	Consumption 1977/'78	Hypothetical Revenue Calculated @ 10.9¢ / kWh
Government of Canada	\$ 515,641.67	4,447,594 kWh	\$ 484,787.75
Contribution Paid	407,874.57	2,673,715	291,434.94
No Contribution Paid	330,448.15	1,917,297	208,985.37
Residential @Town Rate	297,217.27	6,928,684	277,147.36
*Total Revenue	<u>\$1,253,964.39</u>		<u>\$1,262,355.42</u>

Decline in Revenue Over  
1977/'78 Levels:

- (1) Decline over actual 1977/'78 levels assuming  
Government of Canada Contract rate is modified.....\$ 288,826.24
- (2) Decline over actual 1977/'78 levels assuming  
Government of Canada Contract rate is not modified.....\$ 257,972.32

Total Revenue, Including  
Revenues on All Other  
Miscellaneous Categories  
At Former Levels = \$76,090.50:

- (1) Total assuming Gov't. of Canada rate is modified.....\$1,338,445.92
- (2) Total assuming Gov't. of Canada rate is not modified...\$1,369,299.84

Hypothetical 1977/'78  
Operating Losses, Re-  
ported Against Direct  
Expense Only:

- (1) Assuming Government of Canada rate is modified.....\$ 437,925.46
- (2) Assuming Government of Canada rate is not modified.....\$ 407,071.54

Variance factor carried forward under (1).....2.6¢/kWh  
Variance factor carried forward under (2).....2.4¢/kWh

3-4.3 Revenue And Loss Implications Of  
Alternative Three (Equalized Res-  
idential Rates, Government Rates  
Based on Average Aggregate Cost  
And Private Commercial Rates Based  
On Indirect Costs Less The Portion  
Of Direct Cost Not Attributable To  
Providing Private Commercial Service

If the present system of accounting for direct and indirect costs were retained but the intent of the practice were the encouragement of the location of business, local industry, and employment opportunities, then an additional alternative might consist of:

- equalizing diesel residential rates with Town rates;
- setting all rates for government services, Federal and Provincial alike, equal to the projected average cost of service on direct and indirect costs against aggregate sales;
- setting the private commercial rate (the Contribution Paid rate) according to the formula:
$$\frac{\begin{array}{l} \text{expected aggregate administra-} \\ \text{tive and overhead costs} \\ + \\ \text{percentage of direct cost rep-} \\ \text{resented by the ratio of pro-} \\ \text{jected Contribution Paid sales} \\ \text{to all sales} \end{array}}{\begin{array}{l} \div \\ \text{expected consumption by the} \\ \text{Contribution Paid class.} \end{array}}$$

This rate arrangement would have had the effect of reducing Contribution Paid energy rates by a little more than one-half on average, to about 7.5¢/kWh. While this would continue the practice of collecting interest and depreciation charges from diesel customers, it would convert the collection into a subsidy for non-government enterprises.

Against aggregate total expense of \$2,628,201, losses would have been \$1,049,124; or approximately the level of actual reported losses (\$1,104,284) for fiscal 1977/'78.

All calculations are presented in Table Thirty-Four.



Table Thirty-Four

Aggregate Diesel Rate Revenue 1977/'78  
Under Hypothetical Rate Structure Alternative Three

* From Government of Canada .....	\$ 1,022,858
* From Contribution Paid class .....	203,202
* From Residential class (at Town rates) .....	277,147
* From Limited Service General Purpose and all others .....	76,090
TOTAL	\$ 1,579,277

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3-5.0 Footnotes: Chapter Three

- 51/. 6.3 per cent measured against aggregate losses; 6.9 per cent measured against the aggregate losses of communities in which the Government of Canada was a customer.
- 52/. Based on computer records of service classifications, consumption and billings.
- 53/. Calculated using the average rate revenue per kWh sold in each community to the Contribution Paid class in 1977/'78.
- 54/. The rate at Granville Lake (3.26¢/kWh) was lower still. This was an anomalous case and was not considered in calculating the operative differential in 1977/'78 rates between the highest and least-cost communities.
- 55/. The main ledger record of contributions which is followed in calculating amortization credits is not identical to other available records of contributions. A list of contributions prepared by the Eastern Region office and dated 78 08 24, shows an additional \$1,104,602.88 not recorded in the March 31st, 1978 main ledger record of contributions. It might be assumed that the additional \$1 million was collected between March and August. This does not satisfactorily explain all discrepancies, however: the main ledger record actually overstates the amounts shown in the Eastern Region record in three instances. The amount of the overstatement in total is much less than the understatement (at \$28,336); but that any inaccuracy exists is, perhaps, grounds for a thorough review at this time to ensure that records are complete and up to date.
- 56/. Personal communication, Rates Department personnel; also Manitoba Hydro Administrative Directive AD 150, dated 77 03 17.
- 57/. Service for street lighting and other miscellaneous uses in diesel communities is charged at rates equal either to Town or Rural rates. Rates for limited service general purpose connections are the same. Only customers in Brandon, Dauphin, Flin Flon, Portage, Selkirk, Thompson and Winnipeg pay lower general service rates.
- 58/. The duration of diesel service in communities is likely to be fifteen years or less on average, and the value of remaining credits becomes a consideration in as much as a portion of the new line is written off against the value of diesel plant remaining in the community at the time of removal. While this is largely a speculative assumption, it is clear that engines retain a significant residual value: equipment may be removed from the community and stored, sold, or re-used at Hydro construction sites or other diesel communities.
- 59/. If it was Manitoba Hydro's objective to recover all potential community operating losses and cross-subsidies from Full Cost category customers, the argument is valid. Cost recovery objectives require clarification.

- continued -

60/. Reporting losses against direct cost reduces net losses to pre-1974 levels; a period in which the capital contribution requirement was not enforced for new limited service connections.

61/. No variance figure was included in the initial rate applied to fiscal 1977/'78 consumption figures, and so the rate is slightly understated for that year.

### 3-6.0 Findings And Recommendations

#### Findings: Discrepancies Between Rates Charged and Rates Indicated by Community Electrical Agreements

- [1]. Both Residential limited service rates and Government of Canada rates have been disengaged from the rate schedules and rate adjustment formula outlined in the electrical agreements, although the process of revising all Government of Canada rates has not yet been completed. Contractual residential rates were eliminated in the early 1970's, while the elimination of the Government of Canada rate commenced in fiscal 1977/'78.
- [2]. Despite the elimination of contractual residential rates, the terms of service and rates to Indian consumers in Reserve communities is consistent with those in Non-Reserve diesel communities.
- [3]. Limited service residential rates are set equal to rates charged in rural Manitoba; however, customers paying the rural rate in rural areas are not subject to service limitations.

#### Findings and Recommendations: Requirements for Capital Contributions

- [1]. Capital contributions required for residential service in excess of 15 amps are based on assumed levels of incremental capacity per connection which are inconsistent with appliance loads to be expected in remote communities. Analysis of the assumptions suggests that reductions of at least one-third (and as much as one-half) could be made.
- [2]. In the light of this evidence, the extent of past overpayments deserves investigation.
- [3]. All rates for large services have been declared closed with the exception of the Contribution Paid rate. The process of converting Government of Canada and No Contribution Paid rates poses the following questions: whether No Contribution Paid customers will be required to make retroactive capital contributions and whether these would be calculated at the replacement cost of installed capacity at the date at which service was received, or at current values; how Manitoba Hydro will account for amortization and interest credits once the No Contribution Paid category is eliminated; and how DIAND will be compensated in future for amortization and interest credits from which it did not benefit while the Government of Canada rate prevailed.

- [4]. Records of capital contributions are maintained by several departments of Manitoba Hydro. These records should be reviewed to establish their accuracy, and subsequent records might be monitored to ensure that updated figures appear in all records.
- [5]. The amount and treatment of amortization and interest credits remaining at the time of conversion to central station power, deserves further investigation.

Findings and Recommendations:  
Rate Structure Design

- [1]. Tests performed indicate that dissatisfaction with high residential rates (in the face of service limitations) and fluctuating rates for unlimited general services can both be minimized by modifications to the rate structure. Depending on the approach taken, a modified rate structure may either increase or decrease Hydro revenues.
- [2]. Commencing in 1976, Manitoba Hydro replaced or augmented diesel capacity in many communities. Administrative and interest costs were incorporated in annual diesel costs at approximately the same time. Simultaneous with these shifts, the contribution requirement for new service contributions was enforced, after have been allowed to lapse for some years.

The measures to improve cost recovery while expanding service were accompanied by the development of a rate structure which segregated Federal, Provincial, and private customers into individual rate categories. Tests applied to data for fiscal 1977/'78 suggest that the diesel market is not large enough to generate the cost recoveries and cross-subsidies which the rate structure appears to imply.
- [3]. It is not clear why the diesel rate structure has been designed without reference to revenues (and costs) accruing to the Integrated System: for example, if indirect costs, alone, had been excluded from the rate-setting formula for full service customers in 1977/'78, rates might have been reduced by one third; yet this move would have added less than 1 per cent to the overall cost borne by customers on the Integrated System.
- [4]. It is desirable that a distinction be made in future between employing accounting procedures as indicators of cost of service, and employing accounting procedures as rate-setting instruments per se.

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- APPENDIX ONE

Signing and commissioning dates  
of DIAND - Manitoba Hydro  
electrical agreements.

The ten-year binding term is  
calculated from the commis-  
sioning date of service in  
the community, rather than  
from the date on which the  
agreement was signed.



[Appendix One/ Table 1 of 1]

Signing & Commissioning Dates  
Diesel Contracts

<u>Community</u>	<u>Date Shown On Contract</u>	<u>Plant Commissioning Date</u>
Berens River	- Apr. 16th, 1968	- in place in fiscal 1969/'70
Bloodvein	- Feb. 18th, 1969	- in place in fiscal 1969/'70
Brochet	- Jul. 21st, 1965	- in place in fiscal 1969/'70
Dauphin River	- blank on contract	- in place in fiscal 1969/'70
God's Lake Narrows	- _____, 1967	- in place in fiscal 1969/'70
God's River	- _____, 1972	- November 23rd, 1973
Granville Lake	- <i>Signatures missing</i>	- in place in fiscal 1969/'70
Island Lake <sup>1/</sup>	- Aug. 9th, 1966	- in place in fiscal 1969/'70
Jackhead	- Apr. 3rd, 1969	- in place in fiscal 1969/'70
Little Grand Rapids	- Mar. 12th, 1970	- in place in fiscal 1969/'70
Moose Lake	- <i>Non-Status Community</i>	- in place in fiscal 1969/'70
Oxford House	- <i>Signatures missing</i>	- in place in fiscal 1969/'70
Pauingassi	- Mar. 7th, 1973	- in place in fiscal 1969/'70
Pikwitonei	- <i>Non-Status Community</i>	- in place in fiscal 1969/'70
Poplar River	- Mar. 12th, 1970	- in place in fiscal 1970/'71
Pukatawagan	- Jul. 11th, 1967	- in place in fiscal 1969/'70
Red Sucker Lake	- Nov. 10th, 1972	- September ____, 1972
Shamattawa	- _____, 1972	- September ____, 1973
Thicket Portage	- <i>Non-Status Community</i>	- in place in fiscal 1969/'70

1/ Island Lake: Includes Garden Hill, Ste. Theresa Point, and Wasagamack.  
- Commissioning dates for each sub-community would be different.

APPENDIX TWO

Sample electrical agreement:

Berens River.

BETWEEN:

[156]

*Manitoba Hydro*

THE MANITOBA HYDRO-ELECTRIC BOARD,  
a Corporation having its head office  
in the City of Winnipeg, in the  
Province of Manitoba, (hereinafter  
referred to as "Manitoba Hydro")

OF THE FIRST PART

- and -

HER MAJESTY THE QUEEN in right of  
Canada, (hereinafter referred to as  
"Her Majesty"),

OF THE SECOND PART

WHEREAS Her Majesty has requested Manitoba Hydro to undertake the  
generation and distribution of electrical power and energy at the Berens River  
Indian Reserve in Manitoba.

AND WHEREAS Manitoba Hydro has agreed to Her Majesty's request  
subject to the terms and conditions hereinafter set forth.

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of  
the premises and the covenants and agreements herein contained, the parties  
agree as follows:

1. In this Agreement,
  - (a) "consumers" means Indian users and potential Indian users of  
power on the Berens River Indian Reserve;
  - (b) "Berens River Indian Reserve" means those areas which appear  
on the drawings attached as Schedule B1, B2, B3, B4, B5, B6.

(c) "schools and teacherages" means the Berens River Schools and the teachers' residences and staff quarters associated with each school;

(d) "water and sewage stations" means the water supply treatment and pumping plant and sewage pumphouse.

2. Manitoba Hydro shall supply electric power and energy at Berens River Indian Reserve for Her Majesty and consumers at the locations shown on the drawings attached as Schedules B1, B2, B3, B4, B5, B6.
3. The electric power and energy to be supplied by Manitoba Hydro pursuant to this Agreement is to be generated by diesel electric generators installed at Berens River and is to be in the form of 60 cycle alternating current at nominal pressures of 120/240 volts single phase and 120/208 volts, three phase.
4. Subject as hereinafter provided, the maximum twenty minute integrated demands shall not exceed the following:

Berens River Schools and Teacherages	100 kilowatts
Water Supply Treatment and Pumping Station	10 kilowatts
Sewage Pumphouse	15 kilowatts

5. If, from time to time, during the term of this Agreement, Her Majesty wishes to increase any of the aforesaid maximum demands, Manitoba Hydro shall provide the additional capacity required, on condition that:
  - (a) prior notice shall have been given to Manitoba Hydro not later than the first day of September in the year preceding the opening of the water navigation season to Berens River;
  - (b) Her Majesty shall have first agreed to contribute the capital

cost of the additional generating capacity and distribution facilities; and

(c) Her Majesty shall have first agreed to an adjustment in the energy rate set forth in Schedule 'A' hereto.

6. Manitoba Hydro shall use reasonable diligence in providing Her Majesty with a regular and uninterrupted supply of power, but is not to be liable for any loss, costs, damages or expenses directly or indirectly resulting from any fluctuations, interruptions, reduction or failure in the supply of power.
7. Manitoba Hydro is to have the right to interrupt the supply of electric power and energy at any time for the purpose of safeguarding life or property and for the purposes of inspecting, maintaining, repairing, replacing, adding to or improving Manitoba Hydro's equipment and facilities, without being liable to Her Majesty or consumers for any penalty or for any loss, costs, damages or expenses caused by or resulting from any such interruption, but all such interruptions are to be of a minimum duration and whenever possible shall be made after reasonable notice has been given to the Customer and at a time least inconvenient to Her Majesty.
8. Her Majesty shall provide at her expense and deliver to Manitoba Hydro, all necessary right-of-way easements in a form satisfactory to Manitoba Hydro required to enable Manitoba Hydro to construct, operate and maintain the distribution lines to serve the Berens River Indian Reserve as shown on Schedules B1, B2, B3, B4, B5, B6 hereto.

9. Manitoba Hydro shall not construct or place any power line, or other structures elsewhere than on the right-of-way referred to in Paragraph 8 hereof, without prior approval by Her Majesty. Manitoba Hydro shall submit to Her Majesty three copies of the plans of any power lines or other structures it may wish to construct or place on such property, and if the work shown on said plans is satisfactory to Her Majesty, Her Majesty shall endorse her approval on such plans and return one copy thereof to Manitoba Hydro, whereupon Manitoba Hydro may proceed with such work.
10. Subject to the appropriation of funds therefor by the Parliament of Canada, Her Majesty shall pay Manitoba Hydro at Winnipeg, Manitoba:
- (a) on June 1, 1963, the sum of One Hundred and Eighty-Four Thousand Six Hundred Dollars (\$124,600.00) as a capital contribution toward the cost of supplying service to the consumers, schools and teacherages, water and sewage stations including service wires to individual buildings and meters as required;
  - (b) the cost in such amount as may be agreed to by the parties hereto of future additions or extensions to the electrical distribution system not shown on Schedules B1, B2, B3, B4, B5, B6;
  - (c) the charges for the electric power and energy supplied to the schools and teacherages, water and sewage stations and other Indian Agency facilities pursuant to this Agreement at the rates set forth in Schedule 'A' attached hereto.
11. Her Majesty shall:
- (a) provide convenient, accessible and safe space in locations approved by Manitoba Hydro for meters required for metering

the electricity used in the various buildings belonging to Her Majesty at Berens River Indian Reserve;

- (b) undertake at her own expense all tree and brush clearing of all rights-of-way obtained by Her Majesty for Manitoba Hydro pursuant to Paragraph 8 hereof; and
  - (c) not use the electric power and energy supplied pursuant to this Agreement for the primary heating of any building without first obtaining permission from Manitoba Hydro so to do.
12. Consumers shall be supplied with three wire, 120/240 volt service, and service capacity is to be limited by the installation of service boxes equipped with 15 ampere circuit breakers of the common trip type.
13. Service to consumers is to be available for lighting, small appliances, washing machines, refrigerators, motors up to one horsepower in rating and inductive equipment up to 800 watts in capacity, but the use of electric ranges, clothes dryers, water heaters and space heating appliances and equipment shall not be permitted.
14. The rates for energy supplied to consumers for domestic and commercial purposes pursuant to this agreement are to be as set forth in Schedule 'A'.
15. This agreement is to continue in force for a term of ten years computed from the date on which Manitoba Hydro first delivers power to Her Majesty pursuant to this Agreement, and thereafter it is to continue in force from year to year upon and subject to the same terms and conditions as are herein contained but subject to termination by either party by notice in writing given to the other party at least six months prior to the date of termination stated in such notice.

16. Any notice required to be given pursuant to this agreement shall be in writing and shall be sent by registered mail, addressed, if to Manitoba Hydro, to it at P.O. Box 615, Winnipeg 1, Manitoba, and if to Her Majesty, to The Minister of Indian Affairs and Northern Development, Centennial Tower Building, Ottawa, Ontario.

17. This agreement is subject to the Manitoba Hydro Act and all regulations from time to time made under said Act to the extent that Her Majesty the Queen in right of Canada may be bound thereby.

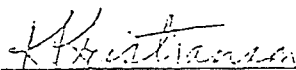
18. No member of the House of Commons shall be admitted to any share or part of this agreement or to any benefit to arise therefrom.

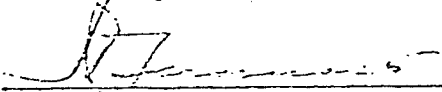
19. This Agreement shall enure to the benefit of and be binding upon the parties hereto their and each of their successors and assigns.

IN WITNESS WHEREOF the Deputy Minister of Indian Affairs and Northern Development on behalf of Her Majesty the Queen in right of Canada has hereunto set his hand and seal and the Manitoba Hydro-Electric Board has affixed its corporate seal.


THE MANITOBA HYDRO-ELECTRIC BOARD

Per:

  
General Manager

  
Secretary

HER MAJESTY THE QUEEN IN RIGHT OF  
CANADA

  
Deputy Minister of Indian Affairs  
and Northern Development



This is Schedule 'A' referred to in the attached Agreement made [162]  
between the Manitoba Hydro-Electric Board of the First Part, and Her Majesty  
the Queen in right of Canada of the Second Part, dated the                      day of  
19 .

1.        The rate for electric power and energy supplied by Manitoba Hydro  
to Her Majesty for the premises constituting the Berens River Schools  
and Teacherages, Water and Sewage Stations and other Indian Agency  
facilities as shown on Schedule 'B' shall be 8.5¢ per kwh per month for  
all power used. The energy rate of 8.5¢ net per kwh is based on a cost  
to Manitoba Hydro for diesel fuel oil f.o.b. Berens River of 25¢ per  
Imperial gallon and shall be increased by .1¢ per kwh for each one cent  
that the cost to Manitoba Hydro for diesel fuel oil increases from 25¢  
per Imperial gallon and shall be decreased by .1¢ per kwh for each one  
cent that the cost to Manitoba Hydro of diesel fuel oil decreases from  
25¢ per Imperial gallon. There shall be no increase or decrease in the  
said energy rate for increases or decreases in the cost of diesel fuel  
oil to Manitoba Hydro of less than one cent per Imperial gallon.

2.        The rate for electric energy supplied by Manitoba Hydro to the  
consumers for use in their residences, each metered separately, shall  
be:

First 50 kwh used each month	9¢ per kwh
Next 100 kwh used same month	2¢ per kwh
Balance of energy used same month	1½¢ per kwh
Prompt payment discount	10% of gross bill
Minimum monthly bill	\$3.60 net

3.        The rate for electric energy supplied by Manitoba Hydro to the

consumers for use in their commercial premises, each metered separately,  
shall be:

First 100 kwh used each month	7¢ per kwh
Next 200 kwh used same month	3½¢ per kwh
Balance of energy used same month	2½¢ per kwh
Prompt payment discount	10% of gross bill
Minimum monthly bill	\$1.00 net

APPENDIX THREE

1977 'General Amending Agreement'  
which formally deletes Residential  
rates contained in electrical ag-  
reements.

THIS AGREEMENT made this 1st day of April, 1977  
BETWEEN:

THE MANITOBA HYDRO-ELECTRIC BOARD,  
a corporation having its head office  
in the City of Winnipeg in the Province  
of Manitoba,

(hereinafter referred to as "Manitoba  
Hydro")

MANITOBA HYDRO-ELECTRIC BOARD  
AMENDING AGREEMENT

OF THE FIRST PART,

- and

HER MAJESTY THE QUEEN IN RIGHT OF CANADA  
(hereinafter referred to as "Her Majesty")

OF THE SECOND PART.

WHEREAS Manitoba Hydro and Her Majesty have entered into a number of agreements for the generation, distribution and supply of electrical power and energy to a number of Indian reserves in the Province of Manitoba, which agreements are listed in Schedules "A", "B", and "C" hereto;

AND WHEREAS the parties desire to amend said agreements as herein-after set forth;

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the premises and the covenants and agreements herein contained, the parties hereto agree as follows:

1. Section 14 of the agreements respecting the Indian Reserves listed in Schedule "A", Section 15 of the agreements respecting the Indian Reserves listed in Schedule "B" and Section 16 of the agreements respecting the Indian Reserves listed in Schedule "C"

"The rates for residential consumers shall be as set forth in the Residential-Diesel electric service tariff and the rates for non-residential consumers shall be as set forth in the General Service-Diesel electric service tariff, each as published from time to time by Manitoba Hydro."

2. In all other respects, the said agreements are hereby confirmed.

IN WITNESS WHEREOF the Deputy Minister of the Department of Indian Affairs and Northern Development on behalf of Her Majesty the Queen in Right of Canada has hereunto set his hand and seal, and The Manitoba Hydro-Electric Board has affixed its corporate seal, duly attested by the hands of its proper officers in that behalf, as of the day and year first above written.

THE MANITOBA HYDRO-ELECTRIC BOARD

Per:

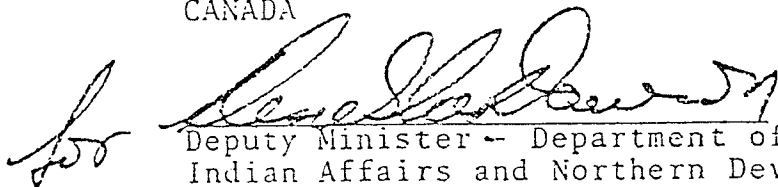


General Manager - Corporate Resources



Assistant Secretary

HER MAJESTY THE QUEEN IN RIGHT OF  
CANADA



Deputy Minister -- Department of  
Indian Affairs and Northern Development

Derek W. Dawson,  
Director, Community Housing & Facilities

This is Schedule "A" to the attached Agreement dated the day of April 1, 1977, between The Manitoba Hydro-Electric Board of the First Part, and Her Majesty the Queen, in Right of Canada, of the Second Part.

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Berens River

Bloodvein

Gods Lake Narrows

Gods River

Little Grand Rapids


Oxford House

Pauingassi

Poplar River

Red Sucker Lake

Shamattawa



- (b) undertake at Her own expense all tree and brush clearing of all rights-of-way obtained by Her Majesty for Manitoba Hydro pursuant to Paragraph 8 hereof; and
- (c) not use the electric power and energy supplied pursuant to this Agreement for the primary heating of any building without first obtaining permission from Manitoba Hydro so to do.

Consumers shall be supplied with three-wire, 120/240 volt service, service capacity is to be limited by the installation of service boxes equipped with 15 ampere circuit breakers of the common trip type.

Service to consumers is to be available for lighting, small appliances, washing machines, refrigerators, motors up to one horsepower heating and inductive equipment up to 800 watts in capacity, but the use of electric ranges, clothes dryers, water heaters and space heating appliances equipment shall not be permitted.

The rates for energy supplied to consumers for domestic and special purposes pursuant to this Agreement are to be as set forth in Schedule A.


This Agreement is to continue in force for a term of ten years commencing from the date on which Manitoba Hydro first delivers power to Her Majesty pursuant to this Agreement, and thereafter it is to continue in force year to year upon and subject to the same terms and conditions as are contained but subject to termination by either party by notice in writing given to the other party at least six months prior to the date of termination stated in such notice.



This is Schedule "B" to the attached Agreement dated the day of April 1 , 1977, between The Manitoba Hydro-Electric Board, of the First Part, and Her Majesty the Queen in Right of Canada, of the Second Part.

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Island Lake





13. Consumers will be supplied with three wire, 120/240 volt service and, service capacity will be limited by the installation of service boxes equipped with 15 ampere circuit breakers of the common trip type.
14. Service to consumers will be available for lighting, small appliances, washing machines, refrigerators, meters up to one horsepower in rating and inductive equipment up to 800 watts in capacity, but the use of electric ranges, clothes dryers, water heaters and space heating appliances and equipment will not be permitted.
15. The rates for energy supplied to consumers for domestic and commercial purposes pursuant to this agreement shall be as set forth in Schedule 'A' attached hereto.
16. This Agreement shall continue in force for a term of ten years computed from the date on which Manitoba Hydro first delivers power to the Customer pursuant to this agreement, and thereafter it shall continue in force from year to year upon and subject to the same terms and conditions as are herein contained but subject to termination by either party by notice in writing given to the other party at least six months prior to the date termination stated in such notice.
17. Any notice required to be given pursuant to this Agreement shall be in writing and shall be sent by registered mail, addressed, if to Manitoba Hydro, to it at P.O. Box 815, Winnipeg 1, Manitoba and if to the Customer, to it at Ottawa, Canada.
18. This Agreement is subject to The Manitoba Hydro Act and all Regulations from time to time made under said Act to the extent that Her Majesty the Queen in Right of Canada may be bound thereby.

This is Schedule "C" to the attached Agreement dated the day of April 1 , 1977, between The Manitoba Hydro-Electric Board, of the First Part, and Her Majesty the Queen in Right of Canada, of the Second Part.

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Dauphin River

Jackhead

Pukatawagan



- 5 -

(c) the charges for the electric power and energy supplied to the school and teacherages, pursuant to this Agreement at the rates set forth in Schedule A attached hereto.

3. Her Majesty shall:

- (a) provide convenient, accessible and safe space in locations approved by Manitoba Hydro for meters required for metering the electricity used in the various buildings belonging to Her Majesty at Dauphin River Indian Reserve;
- (b) undertake at her own expense all tree and brush clearing of all rights-of-way obtained by Her Majesty for Manitoba Hydro pursuant to Paragraph 10 hereof.

4. Consumers shall be supplied with three-wire, 120/240 volt service, and service capacity is to be limited by the installation of service boxes equipped with 15 ampere circuit breakers of the common trip type.

5. Service to consumers is to be available for lighting, small appliances, washing machines, refrigerators, motors up to one horsepower in rating and inductive equipment up to 800 watts in capacity, but the use of electric ranges, clothes dryers, water heaters and space heating appliances and equipment shall not be permitted.

6. The rates for energy supplied to consumers for domestic, general purpose and commercial purposes pursuant to this Agreement are to be as set forth in Schedule A.

APPENDIX FOUR

Illustration, prepared by Manitoba Hydro, of procedure followed to determine generation contributions applicable at individual sites.

J. Farquison

Distribution Engineering

Eastern Region

Mr. E. Bigan

Business Department

Eastern Region

0 03 06

## RASH ESTIMATE - DIESEL GENERATION COSTS

The following estimate is based on a hypothetical location, assuming the following:

Location accessible by winter road and by air with approved landing strip.  
 Location not more than 500 road miles from Selkirk.  
 Local accommodation for crews available.  
 Some local equipment available, i.e., small crawler tractor or tractor with a front-end loader.  
 Location does not require rock-sets for fence.  
 Haulage only will be completed in winter.  
 Site clearing will be completed by local people, as in the past.

x 200 kW Units in Trailer

Basic trailer cost -	\$ 24 000.00
Grading material -	4 000.00
Fire Protection -	1 000.00
Mechanical Installation -	5 000.00
Electrical Installation -	5 000.00
Military Equipment -	5 000.00
Tools c/w alternators -	50 000.00
Watering system -	600.00
Reinforcement for foundation -	<u>1 000.00</u>
Basic unit cost -	\$ 95 600.00

Oil Storage System - (assumed base load of 80 kW)

x 10 000 gallon tanks -	\$ 33 600.00
x bases -	4 900.00
Piping, meter, unloading lines -	2 000.00
Gravel material (120 yards @ \$10.00) -	<u>1 200.00</u>
Total	\$ 41 700.00

On Site Work

Site preparation -	\$ 3 000.00
Dyke installation -	2 000.00
Fence material and labour -	20 000.00
Accommodation building -	6 000.00
Setting up tanks -	24 000.00
Set up mobile -	1 000.00
Step-up bank -	4 000.00
Surveys and property -	<u>3 000.00</u>

Total \$ 63 000.00

Haulage Costs

Diesel units -	\$ 2 000.00
Fuel tanks -	8 000.00
Fencing, step-up bank, & auxiliaries -	<u>2 000.00</u>

Total \$ 12 000.00

Miscellaneous Expenses

Equipment rental -	\$ 2 000.00
Travelling expenses -	5 000.00
Temporary operational facilities -	<u>1 000.00</u>

Total \$ 8 000.00

Overheads on labour -	\$ 12 000.00
Interest -	15 000.00
Engineering -	10 000.00
Commissioning -	<u>2 500.00</u>

Total \$ 39 500.00

Total cost for 2 x 200 kW units complete,  
not including distribution costs - \$259 800.00

Cost per kilowatt installed, including  
standby - 1 300.00

[175]

BF/m4a

APPENDIX FIVE

Discussion of inconsistencies between records of sales and revenues shown in monthly computer records and in the 1977/'78 consolidated statement of operations.

Cost data needed for the study were available in the basic form required. Rate revenue and consumption data given in the 1977/'78 consolidated annual statement of diesel operations were shown in the aggregate for each community, whereas it was necessary to obtain a breakdown of these by service class. Additional monthly records of sales and billings were obtained to fulfill this purpose.

These records consisted of monthly computerized listings of sales of electricity and billings in each community showing the name of each service classification and its billing code together with the number of service connections active in that billing period and the consumption and charges attributable to each class. These records did not list the electrical consumption and billings for the individual connection. Therefore, the confidentiality of individual customer credit records was maintained by obtaining relevant data on the consumption and revenues characteristics of customer classes.

The customer service count for each customer service category was compared with the total monthly and annual consumption, and average consumption was in turn compared with monthly and annual billings. The apparent average electrical use and revenue contributed by a typical customer in each category was determined in this way. Variation between communities in average figures was noted.

The figures developed in this way are used extensively throughout the report. They are, for example, used as a bench mark with which to compare the expense of the service enjoyed by customers on the Integrated



System. They are also used to illustrate the differential in the expense between communities for non-residential customers whose service is similar but whose rates are set to reflect the cost associated with providing service in the individual community.

In preparing the estimates it was necessary to assess the number of connections to attribute to each service classification. As the customer service count fluctuates from month to month, the estimate of their number might have been determined in several ways. The count at the first or last month of the fiscal year might have been used, the lowest over the year might have been chosen, or the number of customer-months might have been divided by twelve. The highest monthly count registered was the figure chosen when it was found that the revenue and consumption data themselves overstated actual sales and revenues for the year.

The origin of fluctuations in the monthly service count can be explained by temporary disconnections and reconnections due to arrears on bills, and by seasonal disconnections where customers request that service be discontinued for a period of time in their absence. New connections, too, are made from time to time. Also, Manitoba Hydro has been reviewing customer classifications and shifting customers to the correct service classifications and rate if customers are found to have been classified incorrectly.

A brief demonstration of the month-by-month variability in the number of customers illustrates the precision problem involved. In Brochet,

for example, the customer count for the standard 15 amp limited service Residential standard (1610) category fluctuated in the following way: 76 / 76 / 71 / 73 / 73 / 72 / 68 / 67 / 66 / 72 / 71 / 71. In Moose Lake, the service count for the Contribution Paid service category of large private commercial and general purpose connections was: 20 / 20 19 / 19 / 19 / 18 / 18 / 18 / 18 / 18 / 18 / 19. The variation in the customer count of non-residential service classifications tends to be less noticeable, possibly since commercial or institutional connections are, by their nature, likely to be in use on a regular daily and year-round basis. Permanent and temporary disconnections nevertheless occur, as in the case of some schools or kindergartens over the summer months.

As noted, the highest average monthly customer count was chosen when it was found that the revenue and consumption data themselves overstated actual sales and revenues for the year. A cross-check of the year's total sales and revenues from the computer records with those shown in the year's statement of operations, showed the extent of the overstatement. These differences were calculated for each community and are provided in the two tables which follow.

[Appendix Five/ Table 1 of 2]

Comparison, Community Consumption (Fiscal 1977/'78)  
Figures Shown in Operating Statements and Diesel  
Site Reports

Community	Consumption Shown In Operating Statements	Consumption Shown In Diesel Site Report CB271	Absolute Difference	Percentage Difference
	(kWh)	(kWh)	(kWh)	(%)
Berens River	1,328,523	1,345,967	17,444	1.3
Bloodvein	617,616	645,800	28,184	4.6
Brochet	875,389	892,195	16,806	1.9
Dauphin River	257,678	300,018	42,340	16.4
Gods Lake Narrows	1,231,535	1,255,231	23,696	1.9
Gods River	256,522	256,922	400	0.16
Granville Lake	50,490	56,823	6,333	12.5
Island Lake	4,780,977	4,853,680	72,703	1.5
Jackhead	538,438	552,343	13,905	2.6
Little Grand Rapids	479,448	512,469	33,021	6.9
Moose Lake	1,088,685	1,118,483	29,803	2.7
Oxford House	1,328,383	1,427,108	98,725	7.4
Pauingassi	151,722	160,652	8,930	5.9
Pikwitonei	324,875	329,358	4,483	1.4
Poplar River	895,591	1,057,201	161,610	18.0
Pukatawagen	862,400	898,240	35,840	4.2
Red Sucker Lake	426,032	588,710	162,678	38.2
Shamattawa	478,657	499,587	20,930	4.4
Thicket Portage	394,938	395,285	347	0.1
TOTAL	16,355,013	17,146,077	791,064	4.8

[Appendix Five/ Table 2 of 2]

Comparison, Community Revenue (Fiscal 1977/'78)  
Figures Shown in Operating Statements and Diesel  
Site Reports

Community	Revenue Shown In Operating Statements (\$)	Revenue Shown In Diesel Site Report CB 271. (\$)	Absolute Difference (\$)	Percentage Difference (%)
Berens River	117,027.00	118,818.90	1,791.90	1.5
Bloodvein	58,261.00	60,091.47	1,830.47	3.1
Brochet	115,036.00	116,465.83	1,429.83	1.2
Dauphin River	17,148.00	22,198.40	5,050.40	29.5
Gods Lake Narrows	115,723.00	117,579.13	1,856.13	1.6
Gods River	26,965.00	26,987.35	22.35	0.1
Granville Lake	7,505.00	8,488.74	983.74	13.1
Island Lake	428,366.00	450,462.39	22,096.39	5.2
Jackhead	54,487.00	55,322.83	835.83	1.5
Little Grand Rapids	39,709.00	41,571.69	1,862.69	4.7
Moose Lake	78,828.00	81,461.32	2,633.32	3.3
Oxford House	118,930.00	127,650.02	8,720.02	7.3
Pausingassi	13,235.00	14,194.12	959.12	7.2
Pikwitonei	30,887.00	31,301.21	414.21	1.3
Poplar River	71,714.00	86,544.86	14,830.86	20.7
Pukatawagan	81,991.00	84,788.70	2,797.70	3.4
Red Sucker Lake	40,901.00	73,581.44	32,680.44	79.9
Shamattawa	63,360.00	65,528.99	2,168.99	3.4
Thicket Portage	44,044.00	44,064.56	20.56	0.04

The two reports of electrical sales differ by more than 10 per cent in four instances. In all cases, totals from computer records are higher than totals which appear in operating statements, but are noticeably higher in Dauphin River (by 16.4 per cent); Granville Lake (12.5 per cent); Poplar River (18.0 per cent); and Red Sucker Lake (38.2 per cent). Similarly, totals for revenue in fiscal 1977/'78 are high in these communities. The discrepancy for Dauphin River was calculated as 29.5 per cent; at Granville Lake, 13.1 per cent; 20.7 per cent for Poplar River; and a differential of nearly 80 per cent existed between the two records for Red Sucker Lake.

Rates Department personnel were contacted on the matter of these inconsistencies. The explanation offered was that site reports contain 'double reportings' of the energy use and charges of certain connections. This arises in instances where bills are estimated for a period and then followed by an actual meter reading. If the subsequent reading determines that the estimated billing was low, then the additional consumption and charges reported would appear in the billing period in which the second reading occurred. The same would be true if an actual reading determined that the estimate was high. However, the figures are not netted out. Figures used in operating statements are net figures.

While the customer would be aware of credit or debit notations on subsequent bills, the netting-out procedure is apparently not performed on the monthly site records. Since adjusted totals could not be obtained, it was necessary to use these records for data on the characteristics

of each customer service class.

In summary, these derived estimates are used extensively throughout the report despite the inaccuracies noted. While other data would have been desirable, the range of discrepancy is sufficiently narrow overall that it does not seriously affect the conclusions reached about the operation of the present rate structure, the proportion of cost borne through customer rates, nor the efficiency or weaknesses of the cross-subsidization mechanism built into the rate structure.