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CROSS-CURRENTS
The development of the hydro-electric system in northeastern Ontario, 1911-1966

by
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of the University of Ottawa in partial fulfillment
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Abstract

This dissertation combines and adds to the methodologies of many historians and sociologists. The most noteworthy methodological influences come from the works of Thomas P. Hughes, who represents the systems approach to technology; sociologists Michel Callon and John Law, who are representatives of the actor-networks approach to the study of technology; and from J.M.S. Careless, L.D. McCann, and William Cronon, who acknowledge the importance of the environment in shaping metropolitan/hinterland relations.

To date, the historiography on this subject reveals that systems' studies of hydro-electric development have focused on urban/industrial conditions. Secondly, the environment and First Nations are portrayed as victims of development. Thirdly, the metropole dominates the hinterland resulting in an exploitative relationship between the two at worst or a mutually beneficial one at best. Finally, in many studies, the metaphor used to conceptualize the process of development connotes images of conquest and control.

Examining hydro-electric development, as it occurred in northeastern Ontario, sheds a new and different light on the history of technology and development in Canada. The northeastern Ontario hydro-electric system (Mattagami and Abitibi watersheds) developed over a period of fifty years. It developed through a process of interaction between technology and the

environment, native and non-native relations, metropolitan business and political interests and northern natural resources.

Once Aboriginal rights and environmental obstacles had been removed through treaty negotiations and technical innovations, early hydro-electric development took place under private auspices by individual entrepreneurs such as Frank Cochrane or big concerns such as Nesbitt Thomson, operating out of Montreal. Their activities, for the most part, established a series of independent generating stations serving specific customers in northeastern Ontario, with some interconnection with Quebec.

After 1944, with the entry of Ontario Hydro into northeastern Ontario and the elimination of Nesbitt Thomson and other private developers, the amalgamation of the northeastern Ontario system into the southern Ontario system began in earnest. Amalgamation resulted from the interweaving of various factors not the least of which was continued drought in the northeast rendering the system incapable of supplying the region's power needs.

Studying the influence of rivers on the development of technical systems proves that nature does interact with technology and therefore should not be ignored. In the example provided by this dissertation, the river influences the shape of the hydro-electric system significantly. Studying the interaction between hydro-electric developers, the environment and First Nations illustrates that, even though they are harmed by development, the latter two actors are not helpless. To

portray them as victims denigrates their ability to shape development and adapt to adverse conditions. Also, studying the interaction between the metropole and the northeastern region demonstrates that the hinterland is more than a backdrop to metropolitan development. It too influences the decisions of the metropolitan systems builders. Because the hinterland, the environment and the First Nations retain their own identity and shape the system's development, the metaphor used to describe systems development should acknowledge turmoil or conflict but additionally convey an image of adaptation and continuity; hence the metaphor of cross-currents. Turmoil occurs when cross-currents intersect in a river's course but this act of intermingling also includes adaptation thus allowing for continuity.

Including the rivers themselves in the study of hydro-electric development also illuminates a feature of development that has rarely been discussed: co-operation. In the northeast, co-operation in certain areas proved necessary to allow and further the hydro-electric system's growth. This element of co-operation is a timely characteristic to note. In to-day's environment of limited energy resources, increasing criticism of the ideology of "Progress" and increasing respect for First Nations' rights and the environment, co-operation is a more acceptable approach to development than conquest and domination.

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INTRODUCTION

The motivation for this study was the publication by Ontario Hydro of its demand/supply plan in 1989. The two volume document entitled "Providing the Balance of Power," outlined the utility's forecasts for energy requirements in Ontario for the next twenty-five years. Curiously, it seemed to convey only a superficial understanding of the changes in public attitudes towards the environment or of the Supreme Court rulings giving greater recognition to aboriginal rights. What it did illustrate was the corporate thinking of Ontario Hydro about its energy system and its preoccupation with technical considerations and economic forecasts.

Further pondering over Ontario Hydro's insensitivity to environmental and aboriginal concerns led to a broader inquiry into the role of hydro-electric development in Canadian history. Given the Demand/Supply Plan's detachment from environmental and aboriginal issues, it was necessary to investigate why Ontario Hydro's system builders remained so out of touch with current political, legal and social trends. Furthermore, it seemed appropriate to study the hydro-electric system focusing on the actual sources of power themselves-- the rivers. In this study, the focus will be on the rivers of northeastern Ontario, in particular the Mattagami River. (See Map 1, Appendix I) This river was chosen rather than a southern one because the 1989 demand/supply plan called for further development of it and it offered an opportunity to examine to what extent the plan, written by Toronto-based engineers, reflected a southern Ontario

bias.

Aside from answering questions arising out of a personal interest, this study will be of interest to others because it includes many themes relevant to Canadian history. For example, for historians and sociologists who study technology, the northeastern power system gives them an ideal opportunity to investigate how the social, political and natural environment shapes technological systems. Historians studying regionalism or metropolitan/hinterland relations will learn about the interactions between Ontario's north and south that resulted from the development of the northeastern power sources by southern power developers. They will also learn how technical and environmental conditions affected these interactions. Historians, lawyers, government officials interested in native issues and First Nations themselves will broaden their understanding of how historical interpretations of the Common Law excluded a recognition of aboriginal uses of river systems, thereby limiting the ability of the northeastern Anishnabek[1] and Cree to practice their traditional ways of life. Finally, historians, anthropologists and environmentalists who have studied the effects of hydro-electric development on river systems, will learn conversely, how rivers, and the environment generally, can affect technological development. Before we study these themes within the context of northeastern Ontario, we must first examine the current historiographic debates and existing methodologies.

The historiography of electrical systems in Canada, written between the 1880s and the 1950s, is regional in scope and concentrates on the political economy of their development. Every province west of the maritimes has its histories of hydro-electric development.[2] The political discussions of "Hydro" have centred largely on the issue of public or private ownership. This has been especially true for Ontario, where early histories, such as E.B. Biggar's, Hydro-Electric Development in Ontario, W.R. Plewman's, Adam Beck and the Ontario Hydro, Merrill Denison's, The People's Power, and James Mavor's Niagara in Politics, were essentially propaganda pieces arguing either for or against public power. Though it avoided propaganda, Kenneth Dewar's doctoral thesis, State Ownership in Canada: the Origins of Ontario Hydro, concentrated on the beginnings of the Hydro Electric Power Commission, again focusing on the public power movement. Even Keith Fleming's Power at Cost, published within the last three years, again examines public power in Ontario, this time its expansion into rural regions.

Economic studies of hydro-electric development are best exemplified by John Dales and Peter Wylie. Dales's Hydroelectricity and Industrial Development, Quebec 1898-1940, examines the importance of hydro-electricity in developing the Quebec economy as compared to coal. Wylie's Electrification and Technical Adaptation in Canadian Manufacturing, 1900-1929" examines the importance of electricity in the manufacturing sector of Ontario. All of these studies focus on a hydro-

electric system that serves urban and hence, southern needs.

General works about northern Ontario focus on the role of government in resource exploitation. H.V. Nelles's Politics of Development examines resource development in northern Ontario, but it details the development of the public ownership campaigns that were encouraged and supported by southern business elites. Nelles concludes that the provincial government became an agent of these elites, who desired government assistance when it aided their efforts in developing resources and eschewed such assistance when it did not. Bruce Hodgins's and Jamie Benidickson's book, The Temagami Experience argues that the Ontario government lacked the political will, or nerve, to deal with the conflicting interests over land use within the Temagami forest. Most of the other studies about northern Ontario take one of two views. The first view, as exemplified in the work of Morris Zaslow, The Opening of the Canadian North, acclaims the positive benefits and accomplishments of Canada's expansion into the northern regions. The second view argues that these activities have benefitted southern interests more than northern communities.

Outside of Ontario, hydro-electric studies have focused increasingly on Canada's northern areas and on the environmental impacts of development. This coincides with provincial power systems expanding northwards and with public concerns about the impact of hydro-electric development on the northern environment and on the northern First Nations, who rely heavily on rivers for

their subsistence. Manitoba and Quebec, in particular, have become the focus of intense anthropological, historical and ecological scrutiny because the governments of these two provinces supported large scale diversion projects during the 1980s. James Waldram has criticized Manitoba's diversion of its northern rivers in various articles and in his As Long as the Rivers Run.[3] Boyce Richardson and Michael Posluns have used similar arguments in their critiques of Quebec's James Bay projects in their books, Strangers Devour the Land and Voices from the Odeyak, respectively. These recent studies have looked askance at the claim that hydro-electric development is "environmentally friendly" and stand in stark contrast to earlier historiography such as S.A. Pain's The Way North in which the engineers and developers are extolled for bringing nature under "control" to serve "mankind." They have also criticized the federal and provincial governments for dismissing as invalid aboriginal uses of the rivers and denying aboriginal rights in general.

Focusing on the environment and First Nations is an important theme but again the approach taken by these authors is still the approach of political economists and too prone to treat the First Nations as mere victims. There is more that can be learned about the interaction between the environment and technical systems than what is derived from studying the victimization of First Nations. In short, while these studies illustrate how technological systems affect Native People and the

environment, they provide little explanation as to why the technology as designed would be so harmful. A much broader perspective is needed to fully understand how technical systems grow and expand. For example, what technical or business exigencies existed that guided individuals, such as engineers, when making decisions about how the system or a component of it would develop? And secondly, what environmental characteristics affected the shape of development? Searching for answers to these sorts of questions can be useful to both native and non-native people when analyzing current proposals to develop new hydro-electric generating stations. For historians, the answers will highlight the importance of including technology in the study of electrical systems and the environment.

In sum, these studies have concentrated on political and economic factors that gave rise to hydro-electricity's development as a power source. They debate whether a public agency can represent the "public interest" in a capitalist society or whether hydro-electricity is the best power source for economic development. The shortcoming with these approaches is that they start with a political or an economic question, when a more appropriate starting point for studying the development of a technological system like hydro-power is the technology itself. Certainly, one must ask political questions and others such as economic, legal and environmental questions, -- but only after the technology is fully understood. Technological systems are social constructions created by human designers that respond to

and shape the political, economic and natural environments within which they work and the system grows.

H.V. Nelles and Christopher Armstrong have given some acknowledgement of technology's importance in their award-winning Monopoly's Moment. They argue that various factors in the utilities sector including technology, economic structure, entrepreneurial drive, and profit-making opportunities directed utilities development, from the beginning, towards monopoly and that the response to monopoly-- regulation-- varied greatly from city to city and region to region.[4] Within the theme of monopoly and regulation, the diffusion of technology throughout Canada is discussed as is the disturbance to social order these technologies create. The authors explain the concerns of the municipal governments who felt threatened by these powerful utilities in this way:

> It was as if city councillors suddenly woke up to discover that their streets had become forested with poles, the sky overhead darkened with dangerous wires, and the public thoroughfares turned into battle zones slit with trenches dug for competing private interests. Telegraph, telephone, district dispatch, fire alarm, and electric companies all fought for position on the streets and lanes, while gas companies ripped open the roadways and street railways neglected to repair them.[5]

Despite this technological gloss, the focus of Monopoly's Moment remains the interplay between monopoly and regulation, between economics and politics.

More must be done to put technology into the mainstream of Canadian historiography where it belongs. Technological systems are tangible, (sometimes brutal) links between the natural

environment and society, native and non-native peoples and the metropole and the hinterland: it is the actual physical hydro-electric dam that alters the riverine environment, inhibits the ability of First Nations to continue their traditional life ways and it is the transmission lines from those dams that tie the hinterland into the metropolitan energy network. Therefore a study of technology is crucial to our understanding of the historiographic themes of environmental history, native/non-native relations and the metropolitan/hinterland debate.

For guidance on how to study technological systems, we must look outside of Canada, to historians and sociologists in the United States and Europe who advocate the study of technology using either the "systems" or "actor-networks" approaches. Representatives of these schools are Thomas P. Hughes, Michel Callon and John Law.[6]

Thomas Hughes, the pre-eminent American historian of electrical systems and representative of the systems approach, examines how "inventor-entrepreneurs" shape urban industrial electrical systems and conversely, how these systems shape society. His approach is to focus on the engineers and company executives who developed the urban electrical network in a manner in keeping with their own values of efficiency, centralized control and profit.[7]

According to Hughes, technological systems consist of complex, problem-solving components that are socially constructed, that is, they are designed and shaped by people.

Systems designers prefer hierarchy and homogeneity; they design systems in order to force "unity from diversity, centralization in the face of pluralism, and coherence from chaos."[8] Components of a system are physical artifacts, such as generating stations, and non-physical artifacts, such as legislation. Each component is interconnected with the other components in such a way as to contribute to the realization of a common goal. Furthermore, if a component is removed from a system or altered in some fashion, the other artifacts in the system will be affected by this change and will have to adapt to meet the new conditions. For example, if alternating current is introduced to a direct current operating system then generating stations, transmission lines, etc. will have to be changed to accommodate the technological conditions of the new current.

Hughes also argues that technological systems shape society. Technological changes, in other words, will bring about social changes. Alternating current increased the transmission capabilities of the system thereby allowing the system to expand into areas not proximate with the central generating station, such as rural communities. Also, systems are competitive-- the advance of one system leads to the retreat of another: thus, the spread of hydro-electricity caused the retrenchment of gas and steam machines.

Finally, technological systems exist within an environment that Hughes defines as those "intractable factors not under the control of the system managers."[9] Over time, the number of

"intractable factors" decreases causing the incorporation of the environment into the system. For example, in the contest between public and private ownership of hydro-electricity, legislation can be instrumental in influencing the result. Legislation that favours public ownership is an intractable environmental factor to private system operators; it is however but a component of the public system.

According to Hughes, the development of technical systems follows a recognizable pattern. Technological systems exist and grow by solving problems or fulfilling goals, using whatever means are available; the approach taken to solving problems has to do mostly "with the reordering of the physical world in ways considered useful or desirable."[10] The first stage in development is the invention and development of a technology by an "inventor-entrepreneur". An inventor-entrepreneur is someone who introduces a new technology into society and succeeds in replacing the old with the new. While Hughes recognizes that inventions are not created in "glorious isolation", he credits the key people who had the necessary economic vision to bring the inventions onto the market.

If we were to apply Hughes' model to the development of hydro-electricity in southern Ontario, then the inventor-entrepreneur would be Sir Adam Beck. Beck did not invent the light bulb nor did he invent the concept of public power but he was key in bringing the public power movement to fruition by establishing an integrated hydro-electric system run by a

provincially appointed commission and owned by the municipalities. As Nelles writes, "Beck was just what the public power movement needed-- assertive leadership unrestrained by modesty or self-consciousness."[11] In this way, Beck was the inventor-entrepreneur.[12]

The transfer of this technological system to other locations then takes place. Again using Ontario as a model, the idea of public power spread from the southwest to Georgian Bay and Eastern Ontario and beyond. After that, systems grow either by overcoming "reverse salients", which are components in the system that "have fallen behind or are out of phase with the others" or by adapting to new conditions.

Hughes borrowed reverse salients from military historians because the unevenness of an advancing military front exhibits "many of the irregularities and unpredictable qualities of an evolving technical system." Reverse salients become identified by engineers as critical problems needing to be solved.[13] Improvements in long distance transmission that allow for greater voltages to be sent from one location to another mean that transformer stations have to be revamped to take the higher voltages and then to step down these voltages so that the power can be accepted by lower voltage home and factory electrical receptacles. The transformer stations act as reverse salients until they are updated to meet the new requirements of the higher voltage.

If the system survives these initial challenges, momentum

sets in and the system begins to expand into the social fabric surrounding it; private power is eliminated by public power legislation, or greatly curtailed. Sometimes this results in redirection, sometimes not; ultimately it leads to social integration as society changes to adapt itself to the new conditions imposed by the system-- municipalities become the owners of the system, not private businesses. It is important to note that these "stages" of development are not always sequential, they often overlap and backtrack.[14]

Hughes, in his award-winning Networks of Power offers as examples of his approach, the histories of the development of the American electrical system, focusing on various locations such as Chicago and Pennsylvania, and the systems of Berlin and London. He also gives a brief discussion of long-distance transmission that allowed the expansion of the system into more remote areas of the country. However, despite this brief foray into the hinterland, Hughes's systems and the systems of the other authors that have followed this approach reflect the needs of urban-industrial constituencies only.

Furthermore, because Hughes ignores the natural environment, his approach limits our understanding of systems development in two very important ways: first, we gain little understanding of how the system affects the waters from which power is drawn nor how they affect the shape of the system and secondly, we have no understanding of how a system designed to serve metropolitan interests shapes the relationship between it and the regions in

which the waters flow.

It is interesting that Hughes would virtually ignore the environment in his analysis of system's development since Hughes acknowledges that "geography invariably figures prominently in accounts of hydroelectric projects" by engineers.[15] Also, Hughes himself states that the history of hydro-electric development in California, characterized by long distance transmission, served as a "striking example of human beings using technology to mediate between themselves and nature, a relationship as old as human history."[16] Yet having acknowledged that, he ignores the natural world thereafter.

Hughes's focus is on the material world[17] and this he clearly states in his introduction to Networks of Power: "Scientists have done much to enlighten us about the nature of dynamics of the structures of the natural world, but historians have as yet only barely penetrated the surface of the highly organized and evolving systems of the man-made world." Hughes chooses to study the various people who have ordered the "man-made world of this energy network" because to him the "creation of the material environment shaped by and shaping mankind is not a peripheral subject."[18] However neither is the environment. As Aldo Leopold, an American preservationist stated in 1949:

> Ability to see the cultural values of wilderness boils down, in the last analysis, to a question of intellectual humility.... It is only the scholar who understands why the raw wilderness gives definition and meaning to the human enterprise.[19]

Analyzing the creation of the material world is indeed worthy of

study but ignoring the natural world leaves the analysis skewed.

There are systems analysts who have recognized the importance of the environment in shaping technological systems. Many of these analysts are sociologists interested in the process of scientific and technological development. They offer an alternative approach to studying systems: actor-networks. Actor-networks has an advantage over the systems approach because the environment can be a component or an actor in the network's development. Advocates of this approach argue that systems consist of a series of heterogeneous elements, animate and inanimate, that interact with and link to one another for a certain period of time.[20] Technological systems are the result of this interaction. The underlying assumption of actor-networks is that technologies develop as a result of one actor-network attempting to persuade other actors to join it in seeking a solution to a scientific or technical problem.

Michel Callon, a French sociologist, uses the actor-network approach to study a community's response to the decline of the scallop populations in St. Brieuc Bay. The key to understanding how actor-networks come together to serve a single purpose is, to Callon, the process of "translation". As Callon explains, "translation is the mechanism by which the social and natural worlds progressively take form." To him, translation results in "a situation in which certain entities control others." Thus translation "permits an explanation of how a few obtain the right to express and to represent the many silent actors of the social

and natural worlds they have mobilized."[21] In his case study, Callon argues that three marine biologists defined the decline in the scallop population as a problem to be solved by the community of St. Brieuc because the loss of the scallops threatened the livelihood of the St. Brieuc fishermen. The marine biologists determined, through research, that the scallop population could be revitalized by providing artificial breeding habitats.

After drawing that conclusion, they then set about to persuade the fishermen that their solution was the best one to alleviate their "problem" and enlisted the support of outside scientific communities to assist their campaign. The fishermen accepted this technical solution and a plan was implemented to establish the artificial breeding habitats. Unfortunately for the community, after the first year, the scallops refused to enter the new habitats. The marine biologists in proposing their scientific and technical solution had formed a community of actor-networks consisting of themselves, the fishermen of St. Brieuc Bay and outside scientists. However, time was to prove that the scallops, another actor in the "problem", did not become part of the network because they refused to breed in the artificial habitats; thus, the proposed solution to the problem failed.[22]

Another example of actor-networks comes from John Law, an American sociologist. He studies the technical innovations that helped the Portuguese overcome the environmental difficulties in crossing the Atlantic in the fifteenth and sixteenth centuries.

Law argues that technological systems[23] are "associations" of heterogeneous engineering that is to say, technological systems are formed when a variety (hence, his description of them as heterogeneous) of components-- technological, social, economic, political and environmental-- are fitted together (associated) through human agency (engineering) in such a way as to achieve a common goal. When this occurs stability is reached. Stability continues until the system collides with a stronger environment or system, natural or otherwise. The system then collapses or breaks down as its components "disassociate."

For both Callon and Law, the environment figures prominently because to them, systems develop through constant struggle with their environment.[24] If we were to apply their models to hydro-electric development in Northeastern Ontario, we would look at the components that fitted to-gether or "translated" to make the first system: rivers with many rapids, public control of waterways, transmission lines, mining companies, and private power development, to list a few; we would then examine the point of vulnerability where these components failed to translate or where they became disassociated-- perhaps, the points where the system fell vulnerable to drought-- and discuss why the latter proved to be such a formidable force.

In these "actor-network" examples of Callon and Law, the importance of the natural environment is clearly shown. The scallops and the Atlantic either join in a proposed actor-network or do not. Their allegiance or quiescence is pivotal to the

network's existence. Thus just as technology is important to understanding Canadian development so too is the environment crucial to understanding technological development. Actor-networks avoids the Hughesian pitfall of neglecting or ignoring the natural environment.

Also, because the actor-networks approach recognizes the fluidity of systems development, that is their potential to associate or translate at any given moment, they have an advantage over the Hughesian approach, which focuses on stability and control. Systems development is described in a dynamic way and can follow "the passage from one configuration to another."[25]

The criticism of actor-networks as an approach is that it can go to extremes in analyzing the impacts of dissension on development rather than support. As Mikael Hard argues, actor-networks illustrate a process not of problem solving but a "process of problem removal" and he uses Bruno Latour's work to prove his point. Latour argues that scientists and engineers repeatedly remove problems from their agenda when designing a complex system, in order not to be overwhelmed by them. As a result, the system designers conceptualize their systems as black boxes instead of constantly changing processes of interaction.[26] A prime example of the removal of problems would be how scientists and engineers deal with nature. If nature can be incorporated into the system, then the system builders acknowledge its importance to the system. If it cannot be incorporated, then it is ignored. The resemblance between

systems builders' attitudes towards nature and Hughes's is striking but not coincidental.

Actor-networks, as an approach to systems analysis, has one other shortcoming. Both Callon and Law stress the idea of conflict and struggle and use words such as control and power to describe the process of interaction between the system and its environment; in this, they are like Hughes-- both approaches assume a conflictual interaction between components that make up a system. In particular, Law's metaphor of associations and disassociations and Hughes's "reverse salients" create an image of systems as entities that compete with each other, resulting in the destruction of one by the other. However, John Law at least recognizes that other words may be more appropriate. An examination of the development of the hydro-electric system in northeastern Ontario proves the inappropriateness of military and Darwinian analogies. Networks and systems, hydro-electric ones at least, are much more co-operative in origin and function than these analogies convey.

Despite the shortcomings of the actor-network approach, the point is well taken that the role of the environment can be pivotal to our understanding of how systems develop. Changing our study of hydro-electric development from the urban milieu of southern Ontario to the northeast, where the rivers from which power is derived cannot be so easily ignored, will add much to our understanding of how the environment interacts with electrical systems.

But first, we should ask how the environment has been treated within Canadian historiography. Reference has already been made to the works of James Waldram and Boyce Richardson, who in analyzing hydro-electricity's effects on First Nations, have portrayed nature as a victim of technological progress.[27] Another approach to the environment appears within the context of the metropolitan/hinterland historiographic debate. Here the environment or "wilderness" is discussed in terms of natural resources; it is treated as not much more than an economic resource.

Donald F. Davis has provided a useful synopsis of the metropolitan/hinterland relationship as it pertains to urban history. He points out that there is not one metropolitan thesis but several. Davis divides the contrasting metropolitan theses into five schools of thought: the entrepreneurial, the hinterland variant on the entrepreneurial, the ecological, the dependency-exploitation and the heartland-hinterland.[28] Metropolitan theorists are either boosters or ecologists, they either condemn the relationship as being exploitative of the hinterland or believe that the relationship is mutually beneficial. The metropolitan/hinterland relationship, as manifest in the northeastern hydro-electric system, cannot easily be categorized under any one of these schools of thought. In fact, it exhibits characteristics of them all. However since the environment figures so prominently within the relationship, the analyses provided by adherents of the ecological and hinterland/heartland

schools seems to hold the most promise in providing a framework for the study of this relationship. J.M.S. Careless and L.D. McCann respectively are well-known representatives of these schools.

J.M.S. Careless, considered by many to be the father of the Canadian metropolitan thesis, believed in a complementary relationship between the metropolis and its hinterland. Careless entered the metropolitan/hinterland debate in an effort to draw a distinction between Canadian and American development. At the time he first enunciated his thesis, in 1954, a few Canadian historians such as Frank Underhill and Adam Shortt had been applying Turner's frontier thesis to the Canadian experience. Careless disagreed with this approach, cognizant of the ever present influences of the British and French metropolitan culture in Canadian history.

According to Careless's interpretation, Canadian history had been one of expansion into successive frontiers of natural resources carried out by the "impelling, directing power of cities"-- above all by the metropolis. The vehicle that carried the metropolis into the hinterland was the communications system. Careless gave communications a broad definition: it included transportation, intellectual ideas, religion, technology, finance, legislation-- anything that carried the metropolitan influence into the hinterland. The Toronto-based Hydro-Electric Power Commission of Ontario (the HEPCO) operating in northeastern Ontario would be one such metropolitan influence.

Careless did not condemn this predominance of the metropolis in shaping the hinterlands, not only economically but politically and culturally as well, but rather insisted that the relationship was an interdependent one. He argued that the interaction between metropole and hinterland produced "systems of interdependent communities in town and country, not disparate sets of opposed elements linked only through the exploitation of the weaker by the stronger...."[29] He noted that the metropolis received goods and profits from the hinterland, while the hinterland, in return, received capital investment and jobs. He gave as an example the "pulpwood frontier" which was closely linked to the metropole through the development, by metropolitan financiers, of hydro-electric power used to operate the mills. Also, the "hard-living lumberman" was not only a frontier archetype but he was also the hinterland employee of an intensively organized and capitalized metropolitan business enterprise.[30]

In some ways, Careless's explanation of development mirrors Hughes's. The metropole dominates the hinterland and changes it, just as the electrical system dominates and changes its surrounding environment. There is another parallel between these two approaches. Both of them emphasize the importance of technological systems in shaping society-- Careless discusses the communications system as the vehicle for shaping metropolitan/hinterland relations, Hughes speaks of electrical systems and how they change society; both speak of dominance or

control, both speak of interaction-- Hughes within the system, Careless between the metropole and the hinterland. Dominance and interaction are also key concepts in the actor-network approach. Careless, but not Hughes, shares one other view of development with the actor-networks advocates. Careless also agrees that the environment is an important component of the metropolitan/ hinterland relationship, although he does not fully analyse its role beyond that of providing a backdrop for consequent metropolitan activity.

It is one of Careless's strengths that he recognizes that regions, whether they be urban or frontier, are shaped, not only by human agency, but by their geography as well. Careless argues that this interaction between geography and society helped define the history of the regions. However, notwithstanding the role of geography, Careless's conceptualization of interdependency, as applied to the metropole/hinterland relationship, implies a weakening of the hinterland identity. With the expansion of the metropole into the hinterland, it is incorporated into the metropole. In fact, the hinterland as a conceptualization only exists as a counter image to the metropolis.

This conceptualization is one-sided and critics of the metropolitan thesis have questioned its accuracy. Historians of the New Rural History school such as John McCallum have argued that industrialization occurred in Ontario to a much greater extent than in Quebec because it had a stronger agrarian sector. His argument contradicts Careless's idea about the dominance and

strength of the metropole relative to its rural hinterland.[31] Other flaws in this conceptualization are: it ignores the original inhabitants of the so-called hinterland; it views the hinterland as an economic resource only, thus the hinterland region has no culture, no technology, no identity, save that received from the metropole and finally, the northern ecosystem is merely a backdrop for the real basis of the hinterland/metropolitan relationship and that is the economic exploitation of its natural resources. This portrayal is a shallow one. As John Wadland argues, treating "nature simply as the stage upon which the human play is enacted [betrays] our ignorance of its ultimate power over us."[32]

Despite the criticisms of the metropolitan thesis, interest in it remains. Careless himself has continued to develop the concept throughout his lifetime. Others also have contributed much to the discussion of metropolitan/hinterland relations. The historical geographer, L.D. McCann followed up on Careless's ideas and those of Harold Innis. In so doing, he strengthened the geographical component of Careless's thesis. McCann argued, in Heartland and Hinterland, that metropolises have geographical advantages over hinterlands; they are often located in more favourable climes relative to hinterlands and have a greater population density as well as access to efficient transportation corridors. These advantages work to the benefit of the metropolis and the disadvantage of the hinterland.[33] Secondly, McCann agrees that the metropolis has the power or ability to

exploit the hinterland and leave it dependent but he also recognizes that the metropolis has the power to address these inequities through government support of regional development.[34] McCann's contribution to our understanding of metropolitanism is significant; he gives substance to the terms metropole and hinterland by emphasizing their geographic characteristics and the environmental factors that shaped metropolitan/hinterland relations.

More recently, several historians have expanded Careless's ideas about metropolitanism. Old Ontario, a book published in 1990 to honour Careless, contains a collection of articles by various authors that apply the metropolitan thesis to various aspects of Ontarian society. For example, Allan Smith writes about the metropolitan influences in shaping society's perception of non-urban environments, in particular farms and forests, and Tony Hall discusses how metropolitanism worked against a recognition of Aboriginal People as separate entities.

In the United States, the idea of metropolitanism has become of great interest to environmental historians. William Cronon published an award-winning book in 1991 entitled, Nature's Metropolis. He applies an ecological interpretation to the metropolitan/hinterland relationship arguing that the relationship is one of markets for natural resources and thus the relationship is the interweaving of first and second nature.[35] Technology and science too is an interweaving of the material and the natural. Corn fields grow natural products that have been

scientifically engineered and socially organized. The epitome of the metropolitan/hinterland relationship is the city. The relationship defines the city's place in nature.[36] To Cronon, cities and country have a common history and so "their stories are best told together."[37] Cronon's approach to metropolitan/hinterland relations is a significant improvement over the approaches in earlier works. Nature comes into its own with Cronon and is seen as an actor in the relationship instead of a passive bystander or a victim.[38]

Certainly, discussions of the metropolitan/hinterland relationship have dominated much historical research in Canada and elsewhere. From Careless to Cronon, the various interpretations and slants have merely served to illustrate the enormous complexity of the relationship and for this reason, any definitive explanation is impossible. Certainly, it is beyond the scope of this dissertation to even attempt such a definition; however technological development is an important component of the relationship and we would be remiss not to acknowledge that. The metropolitan theses, particularly those of Careless, McCann and Cronon, are of interest to this study not just because the area chosen for examination is a "hinterland" area but because they stress the interactions between the metropole and the hinterland. Secondly, they provide a structure in which to place a discussion of technological systems: most hinterland technologies originate in the metropole, or at least are designed by metropolitan system designers. Consequently, they reflect

metropolitan interests and needs, that are for the most part urban and industrial. Thirdly, they acknowledge the importance of the environment in shaping the relationship, again providing a launch point from which to discuss the importance of the environment in shaping a technological system.

To sum up, interweaving various components of the methodologies used to study technological systems and metropolitan/hinterland relations gives a comprehensive approach to the study of technological systems and demonstrates the importance of adding technology to our investigations of Canadian development. From Hughes, we get an ability to view the system for its internal dynamics and the goals and attitudes of the systems designers. From the actor-network school, we get the view of the systems from the "outside" and how environmental influences interacting with technical exigencies create a system. From the metropolitan theorists, we get a framework from which to gain an understanding of a specific component of metropolitan/hinterland relations, in this case the interaction between southern system builders and the northern rivers.

The greatest weakness in all these approaches is their conceptualization of the process of the interactions amongst the components of the system, as especially exemplified by the organizing metaphors of John Law and Thomas Hughes.[39] Every one of the authors stresses the importance of interaction yet all conceptualize that interaction within the framework of dominance and control, competition and destruction. These qualities do

exist in the shaping of the northeastern hydro-electric system but so too do qualities of co-operation and adaptation and in so doing convey an image of continuity that the prevailing military and Darwinian metaphors lack. For example, in northeastern Ontario, though there is evidence of competition between public and private power systems in their quest for customers, it is also evident that their response to certain environmental constraints imposed by the nature of the river system was co-operation.

Co-operation existed for two reasons. First, because the river was used for a variety of purposes, such as transporting of logs, supplying water to mines for mineral processing and to towns for drinking water, the hydro-electric developers, as a result, could not alienate the river for their exclusive use; they had to share it with the other users. Thus the excessively dyadic, manichean approach to the study of hinterland hydro-electric history is too simplistic. Power companies did not always compete with each other for control of the water resources; sometimes they co-operated with each other. Therefore more levels of interaction exist here. Systems develop through a process of interaction and interweaving among internal components and through interaction between them and the external environment-- political, economic or natural. The interaction of these components can lead to turmoil within the system as it tries to adjust to the new conditions but, the adjustment process is often one of adaptation, not wholesale destruction, and many

components of the original system are left intact, after the adaptation is complete.

Co-operation also existed because the river, as a part of a powerful natural system, hindered the ability of the system designers to predict the amount of water that could be generated as electricity in any given season. When drought limited the amount of power available, the HEPCO had to negotiate with other hydro-electric producers to share their power loads, in order to make up for the lost energy. Engineers could not say "let there be rain" and there was rain. As a result, the system builders had to adapt to the conditions of the northeastern environment when designing their system.

Thus even though the types of interconnections, as described by technology and metropolitan theorists, can be found in this particular development, a different metaphor should be used in order to incorporate the capacity and the need for co-operation and in order to recognize the degree of continuity that existed among some components of the system.

If military and Darwinian analogies are not adequate to explain hydro-electric development, what is? The necessary metaphor must go beyond exploitation and victimization; beyond dominance and progress; beyond economics and politics. It must represent turmoil and change yet also interaction and continuity. It must be fluid. The place to find such a metaphor is not in the corporate world of the system builders nor on the field of battle but rather in the natural world, at the actual principal,

physical location of the hydro-electric system itself, the river. There we can witness order in the midst of turbulence and the co-existence of change and continuity. There, we can draw an appropriate metaphor for hydro-electric development. That metaphor is cross-currents.

Cross-currents intersect, intertwine and intermix with other components in the river and with the river itself. When they meet, there is turbulence self-evidently on the surface of the river but also deeper down, where the thermoclines mingle (see glossary); but this turbulence is diminished as the water is carried downstream. Sometimes the turbulence remains for a long time depending on the roughness of the river channel or sometimes it is not easily seen and remains hidden in the river's depths but the interaction and intermingling is a continuous process.

Sub-surface cross-currents, even though they may be invisible at times, have the potential to interact or impact upon the surface currents in such a way as to alter fundamentally their original behaviourial characteristics. For example, the river, despite the changes wrought by hydro-electric development still exists within its own cycle/system. First Nations too despite the changes hydro-electric development brought to their lives continue to adhere to their customs and beliefs as much as possible.

Because the environment and First Nations exist as entities outside of hydro-electric development, they continue to affect the system or at least have the potential to do so profoundly.

During the time period studied, the effects of the natural characteristics of the river on hydro-electric development are amply illustrated. First Nations, on the other hand, did not have the same ability to affect development between 1911 and 1966; however, they are important to this study because the denial of their rights allowed hydro-electric development to take place in the first place. Secondly, the denial of their rights illustrates that technical systems are not deterministic but are social constructs.

Studies about technological systems and Aboriginal People have concluded that they become victims of the systems and remain peripheral to them. Why this has been so will become apparent in the dissertation. Suffice it to reiterate that technological systems are designed by people who have their own cultural conceptions about how to shape the system. The hydro-electric system was designed by non-native people to meet non-native needs and despite the fact that the First Nations were affected by hydro-electric development, historically, there was no recognition by system designers and their supporters that native needs would differ from their own nor that their specific needs should be accommodated. As C.S. Lewis observed: "What we call Man's power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument."

Ultimately, the exclusion of Native Peoples from participating in the design of the system was not viable as changes in environmental and aboriginal legislation and protests

from Native People themselves allowed the northern Cree and Anishnabek to effectively block further hydro-electric development in northeastern Ontario in 1990. Thus the historic decisions of the system designers and all those who supported their efforts, are important to today's issues of aboriginal rights and self-government.

Hence, in the hydro-electric system, cross-currents represent events or people in time that changed the shape of the system, some examples of which are drought, provincial premiers, and technological innovations. The metaphor aptly describes the process of interaction between technical, social and environmental components. While it recognizes turmoil, it does not emphasize conquest and domination to the exclusion of adaptation and co-operation.

This study illustrates the numerous political, economic, social and technical interactions going on throughout the system's development between the HEPCO and private power companies, the hydro-electric system and First Nations, and between power developers and the natural environment. Using cross-currents as an organizing metaphor for systems development, the dissertation will analyze the history of the hydro-electric system in northeastern Ontario with a special emphasis on the developments along the Mattagami river. Since this is a study about hydro-electric systems, it will focus on those organizations dedicated to building systems rather than individual plants. Thus Nesbitt Thomson and the HEPCO will be

featured but not the pulp and paper companies, despite the fact they were major power producers in their own right. The pulp and paper companies will not be entirely ignored however because they too shape the system and interact with Nesbitt Thomson and the HEPCO. On those occasions, the pulp and paper companies will be incorporated into the analysis.

The hydro-electric system in northeastern Ontario started out as a collection of independent local water-power generators servicing mines and pulp and paper companies. E.A. Wallberg, operating out of Montreal, started construction on the first hydro-electric site, Wawaitin Falls, in 1911. The Northern Canada Power Company then took over its construction, completing it in the following year. The hydro-electric station generated power for the Hollinger gold mine in the Timmins area, twelve miles to the south. Other hydro-electric stations on the Mattagami river soon followed to meet ever increasing demands for power for mining. While the mining companies would argue that these activities were of benefit to themselves and the people of Ontario generally, the dams and generating stations altered the riverine environment to such an extent that the First Nations in the area noticed a decline in the quality and quantity of fish and fur-bearing animals. This impeded their ability to follow their traditional ways of life. Furthermore, Northern Canada Power raised the level of its Wawaitin dam in 1923, thereby flooding a portion of Mattagami Indian Reserve #71.

By 1926, the Nesbitt Thomson Corporation had purchased the

assets of Northern Canada Power, including the Mattagami river sites. No longer was the Mattagami river isolated from other hydro-electric developments. From this point on, the Mattagami river became part of an interprovincial system that utilized power sources on the Montreal, Matabitchuan and Mississaga rivers and that obtained direction and financing from Montreal.

In the early 1930s, the Hydro-Electric Power Commission of Ontario, familiarly known as Ontario Hydro, entered northeastern Ontario, by purchasing Sudbury's municipal generating facilities and by taking over the development of the Abitibi Canyon power source from the Abitibi Pulp and Paper Company. The next two decades were marked by duopoly, as Nesbitt Thomson and the HEPCO concentrated power sources in their hands. Each organization alternately competed aggressively for customers and co-operated on the sharing or exchanging of power loads as a result of environmental or business exigencies. These organizations also co-operated with other interests using the rivers, especially the lumber companies, because of legal imperatives that protected their rights of access to the waterways.

Systems duopoly was replaced by monopoly when Nesbitt Thomson sold its Ontario power generating stations, including those on the Mattagami river, to the HEPCO in 1944. The incorporation of the Nesbitt Thomson assets into the HEPCO system meant that the shape of the northeastern system changed. The HEPCO, with its political and financial allegiances in Toronto, downgraded the interprovincial link in favour of an intra-

provincial one between southern Ontario and the northeast. This was especially true during the post-war boom, when power demand surpassed the capacity of the northeastern hydro-electric system. The HEPCO responded to this shortage by centralizing its generating and distributing operations in Toronto and by diversifying its power supplies and by building fossil-fuel and nuclear generating stations in southern Ontario.

The final development on the Mattagami river took place in 1966 with the construction of the Kipling power generating facility upriver from the Smoky Falls. Further plans for development were proposed in the 1990 Demand/Supply Plan but, using changes in legislation that favoured environmental protection and aboriginal rights to their advantage, the Cree and Anishnabek of northeastern Ontario persuaded Ontario Hydro to place a moratorium on further construction until they have negotiated terms of development that are sensitive to the needs of the northern First Nations.

The dissertation's structure will follow the linear progression of the system as it develops from its beginnings in 1911 through its period of expansion and end with the final hydro-electric development on the Mattagami river basin in 1966. As the system grows, various cross-currents that shaped its development will be discussed. It is after all, their interactions that explain the process of systems development.

The first chapter will describe the Mattagami river system and the various ways in which it was used by First Nations and

others. Focusing on the user groups will illustrate that hydro-electric development did not take place in a vacuum. The presence of others on the waterways meant that system designers had to accommodate or eliminate the other users' rights of access when their use conflicted with hydro-electric development. Legal issues such as aboriginal rights and navigation rights had to be addressed. The turmoil arising therefrom resulted in government legislation that established guidelines favouring hydro-electric development.

The second chapter will detail the early hydro-electric developments up to the period of Nesbitt Thomson's takeover of the Northern Canada Power Company in 1924. It will focus on the interactions between technology and the environment posed by a river located in a remote location with a harsh climate. The third chapter will detail the arrival of the systems builders, Nesbitt Thomson and the HEPCO, between 1926 and 1933. It will show the distinction between an interprovincial private power company and an intraprovincial public power company and how the cross-currents of politics and systems planning in particular affected the shape of hydro-electric development.

Next will be a discussion of how these two systems interacted with each other and with the northern mining and lumbering companies. The interweaving of political factors such as the Second World War and economic factors such as the post war boom with system dynamics such as technical innovations will feature prominently in the rest of the chapters, as will the

intertwining of the northeastern hydro-electric system and the southern one. The final chapter will illustrate that co-operation, instead of competition, was a common method of operating the system in the north and that this co-operation was one of the many adaptive strategies system builders used in response to constraints imposed upon the system by the natural environment.

The evidence presented in these chapters will prove that studying technology is pivotal to our understanding of Canadian development. Because technology is the principal link between the natural and material world in our culture, studying it, and the people who affect its design, gives us insights into how technology interacts with social, political, economic, and environmental conditions. In northeastern Ontario, the interactions took place within the context of competition and co-operation, technical innovations and environmental constraints, economic considerations and political agendas. All of these cross-currents intersected with the aims and goals of the systems' designers forcing them to both act and re-act when planning the next stages of hydro-electric development. The result produced an example of development that sought to reduce rivers to energy sources, denigrate Aboriginal rights and encourage the absorption of the northeastern region into southern Ontario yet fell short of realizing these goals because the hydro-electric system proved vulnerable to environmental conditions, to political interference and to other interests who

used the rivers for purposes apart from obtaining hydro-electric energy.

NOTES

1. Anishnabek (Anishnabe for singular) is the preferred nomenclature for the peoples Anthropologists and others have previously referred to as Ojibway.

2. See for example, John H. Dales, Hydroelectricity and Industrial Development: Quebec, 1898-1940, (Cambridge: Harvard University Press, 1957), Merrill Denison, The People's Power, (Toronto: McClelland and Steward Ltd., 1960), James Waldram, As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada, (Winnipeg: University of Manitoba Press, 1988), Clinton O. White, Power for a Province: A History of Saskatchewan Power, (Regina: University of Regina, 1976), W.E. Hawkins, Electrifying Calgary: A Century of Public and Private Power, (Calgary: University of Calgary Press, 1987) and Neil Swainson, Conflict Over the Columbia: The Canadian Background to an Historic Treaty, (Montreal: McGill Queen's University Press, 1979).

3. For another example of this approach to technology and the environment see: Martin Loney, "The Construction of Dependency: The Case of the Grand Rapids Hydro Project," in The Canadian Journal of Native Studies, Vol. VII: No.1, (1987), pp.57-78.

4. H.V. Nelles and Christopher Armstrong, Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930, (Toronto: University of Toronto Press, 1988), p.4.

5. Ibid., p.45.

6. For representative examples of these approaches see the collection of articles in Wiebe Bijker, et al., The Social Construction of Technology: New Directions in the Sociology and History of Technology, (Cambridge: MIT Press, 1987), and its supplement, Wiebe Bijker, et al., Shaping Technology, Building Society: Studies in Sociotechnical Change, (Cambridge: MIT, 1992).

7. There is also an interesting historiography on the initial impacts of electricity on social structures. See for example, David Nye, Electrifying America: Social Meanings of a New Technology, 1880-1940.

8. Thomas P. Hughes, "The Evolution of Large Technological Systems," in Wiebe Bijker, et al., The Social Construction of Technology: New Directions in the Sociology and History of Technology, (Cambridge: MIT Press, 1987), p.52.

9. Ibid.

10. Ibid., p.53.

11. H.V. Nelles, The Politics of Development: Forests, Mines and Hydro-Electric Power in Ontario, 1849-1941, (Toronto: Macmillan of Canada, 1974), p.247.

12. Nelles and Armstrong use the word "econotechnologists" instead of inventor-entrepreneur in Monopoly's Moment.

13. Thomas P. Hughes, Networks of Power: Electrification in Western Society, 1880-1930, (Baltimore: Johns Hopkins University Press, 1983), p.14.

14. Hughes, "Large Technological Systems," pp.51-82.

15. Hughes, Networks of Power, p.266.

16. Ibid., p.265.

17. In this, I mean socially constructed world.

18. Ibid., pp.1-2, 5.

19. Roderick Nash, Wilderness and the American Mind, (New Haven: Yale University Press, 1967), p.182.

20. Michel Callon, "Sociology in the Making: The Study of Technology as a Tool for Sociological Analysis," in Wiebe Bijker, et al., The Social Construction of Technology, op.cit., p.93.

21. Michel Callon, "Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieuc Bay," in John Law, (ed.), Power, Action and Belief: a New Sociology of Knowledge?, (London: Routledge and Kegan Paul, 1986), pp.196-233, p.224.

22. Ibid., p.196.

23. Law prefers the word "network" to system. This distinction is an interesting one given the connotations of the two words. Hughes's system is dominating and strives for homogeneity. Law's network emphasizes heterogeneity and shifting associations.

24. John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in The Social Construction of Technology, op.cit., pp.111-134, p.114.

25. Callon, "Sociology in the Making," p.100.

26. Mikael Hard, "Technology as Practice: Local and Global Closure Processes in Diesel-Engine Design," in Social Studies of Science, Vol.24: no.3, (August: 1994), pp.549-585, p.550.

27. Sean McCutcheon in his Electric Rivers, tries to offer a more balanced view of the impact of technology on the environment. Referring to the opinions of scientists, he states that there is simply not enough information available to make a final determination of the effects of the James Bay hydro-electric developments on the natural environment.

28. Donald F. Davis, "The 'Metropolitan Thesis' and the Writing of Canadian Urban History," Urban Historical Review, Vol. XIV: No.2, (October, 1985), pp.95-113, p.97.

29. J.M.S. Careless, "Metropolis and Region," in Frontier and Metropolis: Regions, Cities and Identities in Canada before 1914, (Toronto: University of Toronto Press, 1989), p.149.

30. Ibid., p.154.

31. John McCallum, Agriculture and Economic Development in Quebec and Ontario to 1870, (PhD: McGill University, 1977).

32. John Wadland, "Wilderness and Culture," in Bruce Hodgins and Margaret Hobbs, (eds.), Nastawgan: The Canadian North by Canoe and Snowshoe, (Toronto: Betelgeuse Books, 1985), pp.223-226, p.226.

33. L.D. McCann, Heartland and Hinterland: A Geography of Canada, (Scarborough: Prentice-Hall Canada Inc., 1987), p.4.

34. Ibid., p.23.

35. William Cronon, Nature's Metropolis: Chicago and the Great West, (New York: W.W. Norton and Co., 1991), p.xix.

36. Ibid., p.9.

37. Ibid., p.xvi.

38. Donald Worster is another well-known American environmental historian. His research on the impact of electrification on the environment and on American society takes a decidedly negative view. His Rivers of Empire: Water, Aridity and the Growth of the American West would stand in good stead with Arthur Lower's Colony to Nation and all other works that depict the metropolitan relationship with the hinterland as an exploitative one.

39. For a full discussion on how systems could be conceptualized metaphorically, see: Gareth Morgan, Images of Organization.

Chapter One

First, there was the river. Then came the First Nations who used the river for transportation and sustenance. After that, came the fur traders. Then the surveyors and prospectors, loggers and miners. The surveyors and prospectors eyed the land for timber and mineral wealth. The loggers and miners harvested it. Each of these groups, like the First Nations, used the rivers as transportation corridors and sources of food. By the commencement of this study, 1911, no successive user of the rivers in northeastern Ontario had displaced its predecessors nor had the uses of the rivers by any group come to an end. The rivers themselves continued to follow their courses much as they had before human contact. These pre-established patterns of use and the nature of the rivers themselves played a fundamental part in shaping the development of the northeastern Ontario hydro-electric system, from the very beginning.

Rivers are part of a natural system that does not always cater to the demands of hydro-electric system designers. The linear progression of the Mattagami from headwaters to the sea takes place within the framework of a system that follows a cyclical pattern. The seasonal cycle is well-known, with the rivers unfreezing from their winter locks to bursting over during spring freshets, warming in the summer, emptying in the fall and freezing over again in winter and, in the process, giving shelter and food to fish and wildfowl and nourishment to wildlife. Also, rivers are part of another cycle: the hydrological cycle. Rivers fill with rainwater and run-off and then drain by discharging

into the sea or through evaporation that can occur at any time and any place along the river. The water that is evaporated into the air later returns to the river in the form of precipitation and the cycle begins again. These cycles are life-giving cycles; they are enduring cycles, as enduring as the world.

System designers appreciated this cycle to the extent that they viewed hydro-electricity as a "renewable" resource; however, their ideas about renewability clashed with the reality that the hydrological cycle was an unpredictable one: recurring droughts in northeastern Ontario were a persistent problem for system designers throughout the twentieth century. Hence, the environment was more than a mere backdrop for development; it was a significant actor in the drama.

System designers and their utilitarian views of rivers also clashed with aboriginal views, views that preceded Thomas Edison and the electric light bulb. As one Aboriginal person defined them, rivers are the veins of Mother Earth.[1] As such, they give the Earth its life-blood, they function as the Earth's circulatory system, transporting waste and nutrients from one area to another, and participating in the circulation of vital materials such as oxygen.

Because the river was a component of a natural system and because groups other than power companies used the river, hydro-electric development could not take place until a social environment supportive of such development was created. It was not enough that the river contained rapids that were suitable for

power generation: systems designers had to know if the other environmental factors, such as hydrology and storage capacity, were also suitable for hydro-electric development. Also, a pattern of use and occupation had already been established by the Cree and Anishnabek, by fur traders, and by loggers who used the rivers as transportation corridors.[2] Hydro-electric dams would interfere with these pre-established patterns of use. Therefore, before hydro-electric development could begin, environmental conditions had to be investigated and aboriginal title and the rights of other users had to be acknowledged and accommodated.

Environmental preconditions will be discussed in the next chapter. This chapter will focus on the legal issues surrounding hydro-electric development: the question of aboriginal and treaty rights, federal/provincial jurisdictional disputes and the Common Law rights of private citizens. Even though First Nations themselves had very little effect on the development of the system, aboriginal title will be examined in great length because it was by far the most sizeable obstacle, potentially, the system designers had to surmount. It is probable that had aboriginal title and land use been respected, the system may not have developed at all or at least would not exist as it does today. Thus, the system needed a certain interpretation of the law and of justice to develop as it did.

Secondly, the rights of other users to the river will be discussed. Both these issues are legal "problems"-- as the system designers would tag them-- and had to be resolved before

the technical questions arising out of environmental conditions could be addressed. The intertwining of these legal cross-currents connected the rivers and their past users with the newly arrived hydro-electric developers. Intertwining happened in such a way that the legal parameters that were established regulated rivers so that non-native uses were favoured over native ones and principles of co-operation were established among non-native users. The Mattagami River provides an excellent example of how these legal currents assisted hydro-electric development.

The Mattagami River flows north out of Lake Mattagami just east of Gogama and drains into the Moose River at a point ninety-six kilometres upstream of James Bay.[3] Survey records from the late nineteenth and early twentieth centuries reveal much about the Mattagami and other rivers of the Hudson Bay lowlands. They also represent a particular way of viewing the river, a way that gives little recognition to it as part of a natural cycle or to its uses by First Nations.

The surveyors who recorded this information were commissioned by provincial and federal governments eager to promote the development of Canada's northern regions. The surveyors were instructed to view the river with a critical eye; they were ordered to assess the northern areas for natural resource potential. While surveying the rivers, they noted agricultural landscapes, timber stands, mineral finds and hydro-electric potential. These reports conveyed the impression of the Mattagami river as one of many rapids, travelling through a

variety of landscapes. As a result of the surveyors' reports, various business groups, including power companies, became very interested in the Mattagami.

J.M. Bell's survey of 1902 is indicative of the type of information contained in a surveyor's report and offers a detailed description of the Mattagami river. According to Bell, the country inland from Lake Mattagami, the source of the Mattagami river, was "covered with thick moss, is dotted here and there with small lakes and swamps and timbered principally with spruce, pine, balsam and birch."[4] He noted that the largest pine and spruce along the river's length could be seen at Lake Mattagami and that there were several stands of poplar and aspen in various parts all along the river, most of which, with some notable exceptions, were of small growth and some of which was ideal for pulpwood. Bell also recorded that granite was the most common form of rock, where rock outcroppings could be seen; with the exception of some iron tracings here and there, the rock seemed to be devoid of mineral potential.[5] The survey so far showed some promise for logging operators but not for miners. The surveyor's description of the various rapids and falls along the way was also promising because loggers used the river for hydro-electric generation at their sawmills and pulp and paper operations. According to Bell, at Kenogamissi Falls, "the river drops about 30 feet in a few yards and as it is very narrow would be a very good source of power."[6]

At Wawaitin Falls, the surveyor noted that "the river is swift for a short distance with two or three small rapids, which are easily run.... The portage is about a mile in length and the rock dips at a high angle and strikes northwest."[7] The banks along the falls were high once again and well wooded down to the water but they became lower as the river descended. Pigeon rapid had to be run on the east side and below the rapid, there was hardly any current in the river, the clay banks were low and no exposures of rock were seen until the surveyors got near the Sandy Portage. Large sized poplar, which was good for pulp and paper, was the principal forest tree.[8]

The Sandy Portage consisted of three portages over a series of rapids. The fall of the second rapid was greater than the first, being about twelve feet, and the third was even greater. The surveyor commented that "the river being very much confined, ... would be a good source of power."[9] Opposite the third portage was the Water Hen creek, used by paddlers as a short cut to avoid the great bend in the Mattagami river. In the section of the great bend, the current was very slow and the clay banks were low. No rock exposures were seen until the survey party reached the mouth of the Kamistokoia. About three miles above Sturgeon Falls, the bed of the river was filled with large boulders and the current was swift. Even more rapids were forded as the surveyors proceeded downstream, passing Sturgeon Falls, Loon rapids and Davis rapids.

After Sturgeon Falls, the river became "wide and shallow and in places there [was] not more than a foot of water in the channel."[10] Iron purites were seen along the west shore of the river, just above Loon rapids, and at Davis rapids, the water was low, the river widened and the bed was filled with large boulders, making navigation difficult. Pine by this time had been replaced by poplar, spruce and birch. Bell reported that "the northern limit of red pine was reached at Loon Portage where one pine stands all alone at the north end."[11]

On the ninth day of the survey of the Mattagami river, the surveying party reached Yellow Falls and was impressed with its hydro-electric potential. According to the surveyor, "The river here is divided into three parts by two small rocky islands and there is a nearly perpendicular drop of 12 or 15 feet." The river after Yellow Falls became swift once again "with an occasional riffle."[12] Island portage was the next white water after about two miles and this stretch of river was divided into "four channels by small rocky islands, with a drop of 10 feet." The southern channel was narrow and the drop was nearly perpendicular "affording good facilities for water power."[13]

Smooth Rock Falls was the third rapid the surveyors encountered that day. The recorder noted that "the river here is split into two channels with a drop of about 18 feet. The main channel, which is the west one, is very narrow, at one point being only about six or seven feet [in width]." According to him, "these falls afford much better facilities for water power

than I have seen yet on the river."[14] Sturgeon were spotted rising above the rapids. The surveyors were also impressed with the resource potential of the surrounding countryside:

> Altogether the country travelled through is of a rolling character, thickly wooded with spruce, with here and there a thick undergrowth of alders and willows. The timber was of a very fair size; the largest tree measured was 20 inches in diameter.... The whole country is covered with a thick moss, underneath which there is a good clay soil, suitable for agriculture. Tracks of moose and caribou were frequently seen and there seems to be an abundance of wild fruit....[15]

After Smooth Rock Falls, the terrain changed again. Clay banks began to appear, rising to fifty feet in some places; the timber was "of an inferior quality"[16]; and going downstream, the river widened, became much shallower and was filled with large boulders. The river then bent to the northwest for about five miles and then swung due west to Poplar river. Below Poplar river, the river wound again to the north.[17]

At Cypress Falls, the banks were low once again and wooded with spruce, poplar, banksian pine and tamarack. From Cypress Falls to the Ground Hog River, the current was swift with one rapid and beyond it the river widened out a good deal, was filled with sand bars and had only an occasional rapid. The banks rose once again but were composed largely of sand instead of clay.[18]

The last rapid along the Mattagami river route of significance to hydro-electric development was the Smoky Falls. J.M. Bell's second surveying party in 1901 recorded this description of them:

> The soil on the portage is very good indeed. Timber is nearly all of secondary growth but a few large spruces

> indicate the possibilities of the soil. The Mattagami River here has a drop of 95 feet and runs through a deep canyon of nearly 150 feet in depth divided at the top by an Island, with almost perpendicular walls of solid rock. At the top of the canon [sic] the drop is about 60 feet over a perpendicular ledge... and the further drop occurs in rapids and lesser falls below.... Undoubtedly much of the land here may ultimately be of agricultural value, but the richest belt would seem to have passed.... The forest growth of Banksian Pine, Black and White spruce and Tamarack... will make good pulpwood.[19]

As may be gathered from their reports, several areas along the route were promising timber areas and the many rapids were, in the surveyors' opinions, suitable for conversion into hydro-electric power sites. What the surveyors did not remark upon, nor were they instructed to do so, was the place of the river within its natural setting, apart from whatever needs it could provide them. Nevertheless, the river was much more than a source of electric energy. Besides being part of a natural system, it was a transportation corridor for logs and boats and it provided important sustenance-- spiritual and economic-- for First Nations. Hydro-electric system designers could not proceed with development until the rights of access of these other users were acknowledged and defined.

Determining the law of water rights was not an easy task. First, there were difficulties in transferring the Common Law, rooted as it was in English experience and history, to a new environment. Secondly, there were Constitutional disputes. At the turn of the century, several questions and arguments arose between the federal and provincial governments over which level of government had jurisdiction over inland waters. Underlying

these disputes was the fundamental question of how waterways were to be regulated so that users with competing interests, such as power developers and loggers, could still have access to the resource. For instance, would use be allocated on the basis of private property rights (provincial) or the public right of navigation (federal)? The vehicle that brought these disputes into focus was the *Constitution Act of 1867*. Each level of government had differing interpretations of the relevant clauses in the Act dealing with navigable waters, public lands, and fishing.

Complicating the situation further, from the governments' viewpoint, was the issue of aboriginal rights. Not only did the federal and provincial governments have to decide how their responsibilities were to be divided between themselves but they also had to decide how to define their rights vis-a-vis aboriginal rights. Within the context of resource development defining the rights of the groups involved began with a discussion between the two governments about the terms for treaty negotiations with the Anishnabek and Cree for access to their lands and waters. The sources of contention between the federal and Ontario governments over treaty negotiations were the amount and type of land to be allocated to First Nations as reserve land and the level of government that would legislate surrendered lands. Settling the question of aboriginal title would allow hydro-electric development to proceed; settling constitutional disputes would determine which level of government regulated

waterways and by extension, hydro-electric development. How did these legal issues affect hydro-electric development on the Mattagami River? An examination of the interactions of the actors involved-- First Nations, government officials, bureaucrats and judges and legal principles-- will answer that question.

In early contact times, the Cree and Anishnabek relied on hunting, fishing and gathering for their food supplies. The seasonal availability of these food supplies contributed to the mobile existence of the bands, as they travelled to their traditional lakes and rivers to fish in the warmer months of the year and inland to their traditional lands to hunt for game in winter.[20]

By the late eighteenth century, fur traders from both the North West Company and the Hudson's Bay Company had entered the territories of the Cree and Anishnabek and were trading regularly with them. It is not known what sort of environmental impact this new trade had on the rivers themselves. Anthropologists and historians have argued that the intense competition between the two fur trading companies pressured Native People to increase their trapping activities,[21] thereby decimating certain animal species, in particular the beaver. Doubtless this depletion affected the riverine environment. Also, surveyors who were part of the J.M. Bell survey party in northern Ontario in 1901 reported that the Mattagami River was a busy waterway.[22] Numerous people travelled that route to and from the Hudson Bay

post of Fort Mattagami and the CPR railway. The HBC maintained the several portages along the route and provided equipment and men for the surveying parties, while the Anishnabek and Cree of the region served as paddlers and guides.[23] Still, the First Nations did not abandon their traditional pursuits and were able to depend upon the land and waters for their survival. It would seem therefore that the possible impacts of the fur trade on the riverine environment were minimal, even from the aboriginal perspective.[24]

Meanwhile, farther to the south, rivers were also transportation corridors and sources of food. However, they were used in additional ways as well-- ways that were far more intrusive on the environment than the fur trade. Lumbermen used the rivers to carry vast amounts of timber to sawmills; sawmills used the rivers to generate electric power; and miners used the rivers to assist their chemical processes. These activities were sometimes complementary and sometimes not. For example, both sawmill operators and mining companies used the rivers to generate power; however, a hydro-electric dam built in the river channel would impede logging drives down the river from the bush to the mill.

Southern entrepreneurs became interested in Ontario's northern resources as early as the 1880s. Co-incident with this increasing interest was the public ownership movement in southern Ontario that called for government control of the province's

mineral and timber wealth. Public power was also a part of this movement.

Proponents of public power argued that Ontario's waterways were a common property resource and that development should be undertaken in the public interest, that is for the "common good."[25] The state was obligated to assure, they affirmed, that the wealth of the land and its resources were distributed equitably amongst all the citizens of the province.[26]

In 1906, Adam Beck and other public power promoters persuaded the government to establish the Hydro Electric Power Commission of Ontario with the purpose of providing the municipalities in southwestern Ontario with power at cost. Under the Power Commission Act, cost would include such charges as depreciation, contingencies, orderly financing and stabilizing rates.[27] The Commission was to be concerned with distributing power rather than generating it and was to manage the day to day operations of its transmission lines free from government interference. Yet it was to be responsible to the Legislature and depended upon it for loans and grants.[28] Even though the public power promoters had focused their efforts on securing government control of the Niagara Falls generating stations, then held by private interests, some of whom were American, the public ownership issue also touched on northern power developments because the question of public ownership of public waterways extended to the northern rivers.[29]

E. B. Borron, Stipendiary Magistrate and representative of the Government of Ontario for the District of Nipissing, endorsed public ownership as early as 1888. In his report on water-powers within the province, Borron recommended that:

> in all future sales of land the water, whether of lakes or rivers (with the exception of that which may be required for domestic and sanitary purposes), should be reserved to the Crown as trustee for the benefit of the people of the Province generally. And that the water powers should not be sold, but leased for a term of years, the rent charged varying according to circumstances.[30]

The public power movement touched the core of the dispute over which level of government held rights to the ownership and control of waterways. Both governments had differing interpretations of the clauses in the *Constitution Act of 1867* pertaining to waterways. The federal government claimed jurisdiction over navigable waterways-- including those suitable for hydro-electric development-- because they were responsible for navigation. Ontario, along with Quebec, Nova Scotia and British Columbia, claimed jurisdiction over the same waterways because of their responsibility for fish and fisheries. Furthermore, the federal government claimed jurisdiction over surrendered Indian lands because Section 91.24 gave the federal government responsibility for "Indians and lands reserved for Indians", while Ontario claimed surrendered lands were within its purview because Section 109 gave provinces responsibility for public lands.

These disputes over Indian lands and federal and provincial responsibilities were settled, at least temporarily, through

treaty negotiations and court decisions. The concept of equality featured prominently in the settlements. In fact, it was the guiding principle from which Canadian and English jurists and legislators derived policies and frameworks for regulating industrial development.

The legal concept of equality had its origins in the struggle in England against privilege and is a basic tenet of Western liberal democracies.[31] It did not proclaim that all people were created equal but rather that one body of law, English Common Law, would be applied to all British subjects (with the only exception being the people in Quebec who were regulated by French civil law); it negated "separate" rights for specific groups of people. This construct has been (and is) antithetical to aboriginal rights because it has denied the legitimacy of specific laws for specific peoples or circumstances.[32] Furthermore, the denial of separate rights meant that aboriginal title, if given any recognition at all, would be interpreted within the customs and confines of English Common Law by Canadian and British judges, not as independent from Canadian authority. Given that the Crown, that is, the federal and provincial governments, was interested in resource development, these interpretations of aboriginal rights and title insured that the rights of developers would supersede the rights of First Nations. The negotiations and interpretations of Treaty #9 by the two governments is a case in point.

Discussions for negotiating a treaty with the First Nations of northern Ontario began in the early 1890s largely because an increase in mining, lumbering and railway building, coupled with a decline in the fur trade in the Lake Mattagami area, had disrupted the traditional lifestyles of the Anishnabek and Cree to a far greater degree than had the fur trade. E.B. Borron, in his 1890 report, "Social Conditions of the Natives and Others", wrote:

> The Canadian Pacific Railway for upwards of a hundred miles passes through their [the Aboriginal People's] hunting grounds, and will unquestionably lead, sooner or later, to the destruction of the larger game, the fur bearing animals, and to some extent also of the fish, on which they are solely and entirely dependent for a living.[33]

At the request of the Anishnabek and Cree in the North, he strongly advised "that the matter... be brought to the notice of the Superintendent General of Indian Affairs, and that a treaty... be made, granting to these Indians [Missinaibi, Flying Post and Mattagami First Nations] that measure of justice to which I conceive they are fully entitled."[34]

Staff of the Department of Indian Affairs, who were familiar with the Mattagami district, also advocated that a treaty be negotiated with the Indian people north and northeast of the area included in the 1850 Robinson Superior and Robinson Huron Treaties. J. Macrae, Federal Inspector of Treaty areas and reserves, in a memo of June 3, 1901, to the Honourable Clifford Sifton, Superintendent General of Indian Affairs, recounted an 1899 meeting between himself, Duncan Campbell Scott, Secretary,

in the Accountancy Branch of the Indian Department, and Aboriginal People:

> These Indians had come from considerable distances and asked what the Govt. proposed to do about the rights of Indians residing between James Bay and the Great Lakes who had not been treated with by the Hon. Mr. Robinson in 1850, saying that they heard that railroads were projected through their country, and that already miners, prospectors and surveyors were beginning to pass through it in such largely increased numbers that game was disturbed, interference with their means of livelihood had commenced, and their rights were being trespassed upon.[35]

In concluding his memo to Sifton, Macrae recommended that the time had arrived, in the opinion of the Aboriginal People, to "have their title considered."[36]

In that same year, the report of an Ontario survey party on the Mattagami river demonstrated the importance of the resources to the Anishnabek and Cree, who were continuing to practice their traditional way of life. The survey party reported:

> There was good soil around Fort Mattagami and northwards and over to the east along the Grassy River there were many cabins belonging to Indians who made their summer homes there and were attempting to grow their own supplies. They were not too successful at this because they had to delay planting until the finish of their hunting season in June. But they did well with fish. Whitefish spawned in the river just before the Indians went out again to their hunting grounds for the winter and they caught great quantities in nets.[37]

This report also confirmed that the Mattagami area had an abundance of timber lands and showed good mineral potential. The Mattagami River was listed as a prime location for hydro power development, its elevation and length providing the necessary combination of volume of water and speed.[38] The latter comments provide an example of the contrasting uses of the river and lands

between native and non-native people. They also indicate that the link between aboriginal title and resource development was a direct one: removing the former would allow the latter.

The Department of Indian Affairs began in 1904 to make preparations for Treaty #9. In June, Frank Pedley, Deputy Superintendent of Indian Affairs, explained the government's motivations in a letter to his superior, Clifford Sifton. Pedley stated that:

> The strong reason by which this Government is actuated in the making of the treaty is the old and well-established rule that a way must be smoothed for exploration, location of railway lines and construction, by extinction of the Indian title.[39]

Indian Agents in the area covered by the Robinson Superior and Robinson Huron Treaties were asked to submit reports outlining the approximate populations and geographical locations of the Indian people residing north of the territory covered by their agencies. These Agents were also asked to find out the First Nations' attitudes with respect to the making of a treaty, as suggested by Macrae in his June 7, 1901 memo.[40] Indian Agent William Nichols met with Aboriginal People living near Biscotasing, Chapleau, and Missinabi and reported that many of them were facing a difficult winter because of the numerous bush fires in the area that had destroyed the wildlife and the encroachment of prospectors and fishermen on their hunting and trapping grounds. He noted that they would have to rely on the Hudson's Bay posts for their subsistence.[41] As a result of these difficulties and threats to their traditional way of life,

many Native leaders sought some form of protection for their hunting, trapping, and fishing rights.[42]

The Department of Indian Affairs also corresponded with the Ontario Government in preparation for the negotiation of Treaty #9. This consultation was necessary because of an 1894 federal/provincial agreement that was based on reciprocal federal/provincial legislation in 1891. The 1894 Agreement stipulated that: "any future treaties with the Indians in respect to territory in Ontario to which they have not hitherto surrendered their claim aforesaid, shall be deemed to require the concurrence of the Government of Ontario."[43]

On July 3, 1905, an agreement between the federal government and the newly elected government of J.P. Whitney was signed by Frank Oliver, Superintendent General of Indian Affairs and Francis Cochrane, Ontario Minister of Lands, Forests and Mines. The agreement delineated the specific duties and conditions of each government with respect to the proposed treaty. The government of Ontario assumed the responsibility of paying for the treaty presents and future annuities and agreed to approve "the setting apart and location of reserves within any part of the said territory, as surrendered" provided that the area set aside was not greater than one square mile for each family of five.[44] The agreement also included a clause that specified that no site suitable for hydro-electric development exceeding 500 horse-power would be included within the boundaries of any reserve.[45] This clause reflected the great interest on the part

of the Ontario government in the north's water power resource potential and the need for the government to ensure that hydro sites were placed under its control.[46] It also meant that from the earliest stages of hydro-electric development, Native People would be excluded from participating in or shaping that development.

The Treaty Commissioners, D. C. Scott, Samuel Stewart, an Ottawa lawyer, and Daniel G. MacMartin, a lawyer from Perth, Ontario, who was the Ontario representative,[47] toured the northern areas during the summers of 1905 and 1906. They met with various Indian bands at regular meeting points, often Hudson's Bay Posts, to inform the Chiefs and headmen of the governments' terms. There were brief discussions and then the treaty was signed. A typical meeting occurred at Fort Mattagami, on July 7, 1906, during the second summer of the Treaty #9 negotiations. In their report, the Commissioners described their negotiations at Fort Mattagami:

> The Indians at Mattagami gave a cheerful hearing to the terms of the proposed treaty, which was fully explained to them through Mr. Miller, who acted as interpreter. They, like the other Indians visited, were given an opportunity to ask any questions or to make any remarks they might desire with reference to the propositions made to them.
>
> The Indians held a short conversation among themselves, and then announced, through Joseph Shemeket, one of their number, that they were fully satisfied with the terms of the treaty and were prepared to have it signed by representatives of the band.[48]

On that same afternoon, the Treaty Commissioners distributed money, representing a "present" of $8.00 to each Band member and land was selected by the Mattagami First Nation and the Treaty #9

Commissioners, to be identified as Mattagami Indian Reserve #71.[49] During the negotiations, there was some discussion of resource development; this is evident by the wording of the text. However there is no indication that the idea of development was fully conveyed by the Treaty Commissioners to the First Nations nor its implications for their way of life. In fact, the commissioners apparently reassured the Chiefs that they could continue to live in the same manner as they had in the past.

When some concerns were raised by Indian leaders at other negotiating venues, the commissioners responded with reassurances and sometimes oral promises. Chief Missabay at Osnaburgh was afraid that the treaty would consign them to live on the reserves set aside for them and prevent them from fishing and hunting. The commissioners assured him that "their fears in regard to both of these matters were groundless, as their present manner of making their livelihood would be in no way interfered with."[50] Chief Moonias at Fort Hope could not believe that the treaty, as explained, could be so favourable to the First Nations. Scott wrote that Moonias:

> had his suspicions maybe that there was something concealed in a bargain where all the benefits seemed to be on one side. "Ever since I was a little boy," he said, "I have to pay well for everything, even if it was only a few pins or a bit of braid, and now you come with money and I have to give nothing in exchange." He was mighty pleased when he understood that he was giving something that his great father the King would value highly.[51]

Clearly, in light of succeeding events, there was a great deal of misunderstanding about the terms of the treaty and what it really

meant for the First Nations vis-à-vis their ability to follow their traditions.

Doubtless, the First Nations, who were directly affected by resource development and who had occupied their territories and governed themselves for centuries, had their own contrasting views of the meaning of the treaty and their aboriginal rights, but these views were never solicited.[52] Given the fact that the non-native governments usually had the upper hand in their dealings with First Nations, aboriginal rights in the nineteenth and early twentieth century were reduced to the barest recognition and given limited scope-- First Nations' protests notwithstanding.

In 1905, when Ontario and the federal government agreed to enter into negotiations with the northern First Nations, government officials believed that the Treaty's purpose was to extinguish aboriginal rights to make way for development.[53] This development included agriculture, mining, lumbering and hydro-electric power. To government officials, aboriginal rights were usufructuary only and limited to specific activities and locales;[54] once the treaty extinguished these rights, then the federal government would regulate "Indians and lands reserved for Indians" as delineated under section 91.24 in the *Constitution Act of 1867*.

The basis for this interpretation of aboriginal rights was the *St. Catherine's Milling Lumber Company* case of 1888.[55] This seminal case involved a dispute between the federal and Ontario

government over which level of government had the authority to manage unsold surrendered Indian lands, in this instance, the surrendered lands of the Northwestern Anishnabek of Treaty #3. The Anishnabek were never consulted about the case nor participated in it, even though the income accrued from the sale of these lands was to be for their benefit.[56]

According to Kent McNeil and Patrick Macklem, law professors at Osgoode and the University of Toronto respectively, the Canadian government, then aligned with the St. Catherine's Company against the Province of Ontario, argued in this case that aboriginal title represented a complete proprietary interest, limited only by the restriction that alienation of aboriginal lands could only take place by surrender to the Crown.[57] Lord Watson, who delivered the judgment, rejected the federal government's argument on the ground that it was inconsistent with the terms of the Royal Proclamation issued by George III on October 7, 1763.

According to Lord Watson, the possession of land by the Aboriginal Peoples then living under "the sovereignty and protection of the British Crown" could only be acknowledged as delineated in the provisions of the Proclamation, which inferred "that the tenure of the Indians was a personal and usufructuary right, dependent upon the good will of the Sovereign."[58] Lord Watson declined to express any opinion on the "precise quality of the Indian right", but stated that it was the Privy Council's view that "there has been all along vested in the Crown a

substantial and paramount estate, underlying the Indian title, which became a plenum dominium whenever that title was surrendered or otherwise extinguished."[59] He did however at least acknowledge that a "burden" that is to say, aboriginal title, lay on the Crown's "present proprietary estate in the land."[60] This title had to be extinguished or surrendered to the Crown before alienation of that land to private hands could occur.[61] Conversely, the Aboriginal People who had the title had a right to occupy and use the land and hold it as against third parties, but their interest was at the pleasure of the Crown which had the underlying title.[62]

Canadian and provincial governments interpreted this judgment to mean that the Crown could alienate land for development, providing they negotiated with the First Nations for surrenders, and providing they gave adequate compensation for lost usufructuary rights. The custom of compensation had been established by the *Royal Proclamation of 1763* and confirmed with the transfer of Rupert's Land to Canada. The *Rupert's Land Act* had stipulated that:

> ...upon the transference of the territories in question to the Canadian government, the claims of the Indian tribes to compensation for land required for the purposes of settlement will be considered and settled in conformity with the equitable principles which have uniformly governed the British Crown in its dealings with the aboriginals.[63]

Herein lies the importance of treaties for systems builders. Rather than protecting aboriginal rights and lands, they served

as vehicles for surrender and compensation, thereby clearing the way for development.

The treaties also-- from the federal and provincial viewpoint-- served to assimilate First Nations into the legislative framework of the non-native society. This incorporation is evident in the written text of Treaty #9. The Aboriginal People were to have the right to "pursue their usual vocations of hunting, trapping and fishing throughout the tract surrendered" *subject* to "such regulations as may from time to time be made by the government of the country."[64] Their reserves were to be held for the benefit of the bands *subject to* the right of appropriation by the government for "public works, buildings, railways, or roads" in exchange for "due compensation."[65] Always, the non-native governments reserved for themselves the paramount power over land use.

Ontario further believed that the treaty legitimized the province's right to control land and resource use. In the "Schedule of Reserves" appended to the Treaty #9 document, Mattagami Indian Reserve #71 was described as being:

> In the province of Ontario, on the west side of Mattagami Lake, three-quarters of a mile north of a point opposite the Hudson's Bay Company's post, thence north following the lake front a distance of four miles, and of sufficient depth to give an area of twenty square miles.[66]

Before Mattagami Indian Reserve #71 was surveyed, a disagreement arose between the Mattagami First Nation and the Federal and Ontario Governments. In a letter dated January 5, 1908, James Miller, the Hudson's Bay Company agent at Fort Mattagami, writing

on behalf of the Indian signatories of the Mattagami First Nation, explained the problem to Treaty #9 Commissioner, D.C. Scott:

> On reading the report of the transactions at Metagami to the men of the tribe, I found them unanimous in disgust and indignation at the reserve laid aside for them within the boundaries mentioned in the report. I myself was as certain as they that this was not the tract of land promised and to convince myself I communicated with three of the witnesses of the Treaty, ... and found them all of our opinion here. ... Their reserve promised lies East of the Metagami River immediately north of the [Hudson's Bay Company] Post.[67]

The description of the Indian Reserve selected was recorded in the diary kept by the Treaty Commissioners during the treaty negotiations. The July 7, 1906, entry stated that the reserve selected was "towards Grassy River" which is east of the Mattagami River, not west of that river as described in the Treaty #9's "Schedule of Reserves".[68] The three Treaty Commissioners, Scott, Stewart and MacMartin, attributed the confusion to a "clerical error", and in their letter of January 1908 to the Deputy Superintendent General of Indian Affairs, wrote:

> We beg to submit that no clerical error should operate to deprive the Indians of the land which they themselves chose and which was confirmed by the Commissioners and promised them on the spot as the consideration under which they gave their adherence to the terms of the Treaty.[69]

The Department of Indian Affairs complied with the request of the Mattagami First Nation and the Treaty #9 Commissioners to have the Indian Reserve at Mattagami changed to the east side of the Mattagami River. The Ontario Government also agreed to this change but only after securing the rights to all timber over

eight inches in diameter on those lands for a period of ten years, effective from 1907.[70] The new description of the location of the Mattagami Indian Reserve was given as:

> In the Province of Ontario, beginning at a point three-quarters of a mile north of the Hudson Bay Company's Post on the North shore of the Mattagami River, thence east a distance of four miles and of sufficient depth to give an area of 20 square miles.[71]

This description was recognized and approved by joint Orders in Council and stated that "the Committee advise that [the new description of Mattagami Indian Reserve #71] be approved of in lieu of the land covered by the erroneous description."[72]

In approving the new description of the reserve, the provincial government had exerted some control over reserve land and resources by insisting that it retain the rights to dispose of any timber on the reserve over eight inches in diameter. This control came in addition to the provision in Treaty #9 that prohibited First Nations from choosing reserves that would contain water power sites of over 500 kilowatts within their boundaries.[73]

Because of the interpretations placed on Treaty #9 by the federal and provincial governments, it would not be a vehicle of protection for the aboriginal way of life or for aboriginal rights. It would instead, contrary to the intentions of the northern Cree and Anishnabek, allow the development of mining, lumbering and hydro-electric industries. It would also act as an agent of assimilation by attempting to bring First Nations under the same legal framework as applied to any non-native citizen.[74]

It is unfortunate that the philosophy of treating Aboriginal People "equally" before the state led to the denigration of their rights and their disadvantaged circumstances. The antipathy to special rights explains in large measure the government policies and court rulings that denigrated aboriginal title. Because of the limitations placed on aboriginal title by the courts and governments, any treaties negotiated between Aboriginal People and the Crown could not be interpreted as nation-to-nation but rather as a Crown policy that professed to smooth relations between two groups of subjects.[75] Aboriginal rights were usufructuary rights to land and were "special" only in so far as recognized initially by the *Royal Proclamation of 1763* and then by the *Constitution Act of 1867*. Thus because aboriginal title was usufructuary only and not title in fee simple, in effect, aboriginal rights were defined only in ways that entrenched an inferior status of those rights, relative to the rights of others, notably resource developers.

Other legal disputes further undermined aboriginal rights and secured Ontario's rights to control and administer its inland waterways. These disputes, such as the arbitration cases between the federal and provincial governments over matters arising from disparate interpretations of the *Constitution Act of 1867*, dealt with inland waterways and fishing rights. The usual result in these disputes favoured the provinces. They gained control of inland waterways and the harvesting of fish.[76]

In many respects, the decisions that resulted from these court challenges harmed First Nations more than the disputes over land. Much literature to date has focused on the hunting practices of Aboriginal Peoples but some notable exceptions argue that fishing was more important to the aboriginal diet than game. Tim Holzkamm, Victor Lytwyn and Leo Waisberg argue that "many rivers and lakes in the [Rainy River] region contained large scale fisheries that were an important part of the seasonal round of resource activities for Native people."[77] According to John Van West, "Their study ... asserts that riverine sturgeon fishing by the Ojibway [Anishnabek] people was not undertaken only when big game was scarce. Rather, it was an activity of great significance to Ojibway subsistence, commerce, society and religion."[78] And James Waldram notes that:

> The rivers, like the land ... were not unoccupied or unused. They were used by the native people, and they represented a resource of immense value. In fact, it could be easily argued that the true backbone of the northern native economy was not, and is not, the land, but rather the lakes, rivers and streams. Their service as transportation corridors was evident; but perhaps less evident was the inter-relationship among the waterways, the Natives, and the animals [and fish] they hunted.[79]

Once the provincial government obtained ownership and control of waterways, it attempted to make aboriginal waterway rights the same as those enjoyed by individual citizens: that is, aboriginal rights to waterways were largely limited to fishing rights, and these rights were further limited to the right to harvest fish only at particular places and only for personal consumption, not for commerce.[80] This limitation of fishing

rights was significant for hydro-electric development, inasmuch as the latter inherently damaged fish stocks and would have been drastically curtailed had subsistence fishing been given the same kind of priority by governments as Aboriginal People accorded it. Also, development could proceed without concern for protecting aboriginal fishing spots, the locations of which were often the very rapids the power companies sought to transform into energy.[81] This practice of limiting aboriginal fishing rights was almost de facto government policy even before Treaty #9 was signed.[82]

Another area in which the equality principle influenced development was through the doctrine of the common good. This doctrine had the effect of denying aboriginal rights because it was invoked to assist in the exploitation of natural resources, such as timber and water powers for economic development. In fact, Treaties 8, 9, 10 and their adhesions have been referred to as "northern resource development treaties" and "were designed to obtain Indian title to lands which, largely unsuitable for agriculture and settlement, nevertheless possessed great value as a result of mineral discoveries and other natural resources."[83] This type of development, it was believed, would be of benefit to "all the people" rather than a few individuals. For instance, the massive extraction of natural resources would provide employment and tax dollars.

It should be noted that "all the people" did not generally include Aboriginal People. They rarely found permanent

employment in these industries and because they were a federal "responsibility," they received no benefit from provincial tax dollars (until recently). The doctrine of the common good also meant that the exploitation of the natural resources resulted in the degradation of the environment, destroying or altering fish habitats and habits.

Thus the legal framework, complete with cultural biases, being put in place by federal/provincial wrangling over land and resources worked to the advantage of system builders and to the disadvantage of First Nations. Certainly the system builders, most notably the engineers, supported the equality principle in general and the common good doctrine specifically. Their *Weltanschauung* included a strong desire to serve society by improving the material conditions of Canadians through the technological transformation of the "wilderness" into an ordered industrial civilization.[84] How the law was applied to the cross-current of native/non-native relations will become clearer in the following chapters.

For now, the point should be emphasized that the relationship remained a point of turbulence. Even though aboriginal rights had been subsumed within the Common Law, the northern Cree and Anishnabek continued to harvest the resources from the land and waters as much as they could and continued to press the governments and system builders for a recognition of their aboriginal rights. Therefore, contrary to the images of conquest conveyed by other metaphors of systems development,

First Nations, even though they were harmed by hydro-electric development, were not vanquished or destroyed.

The enormous amount of effort and energy the provincial and federal governments put into obtaining ownership and control of the land and waters of "Canada" and the wide-ranging court decisions illustrate the point that hydro-electric development could not have proceeded without a supportive social environment. First, governments had to limit aboriginal rights (treaties), then determine which level of government had responsibility for public lands and waterways (court decisions) and finally promote policies that favoured development over subsistence (doctrine of the common good). After accomplishing all of this, the governments still had to decide how to regulate the waterways so that various users could have access to them. In this instance, aboriginal rights were not under consideration but rather mutuality of rights.[85] The decisions made about regulation once again favoured non-native uses over native ones.

Mutuality of rights stood in stark contrast to a fundamental concept of Western culture: that land can be owned and divided among individuals, subject to certain restrictions determined by the Crown (state). This concept of ownership and divisibility even extended to waterways, through riparian rights. Court cases, when determining property rights to rivers and lakes, often considered who had the best claim to the beds of the disputed waterways; a common phrase in the legal proceedings of the 1880s arbitration disputes between the federal and provincial

governments over fisheries was "the waters and the lands under the waters" and whoever owned the land under the water, owned the water too.[86] Thus, private property rights were a fundamental principle of Western water law. This characteristic is best expressed by the *ad medium filum aquae* rule.[87]

The *ad medium filum aquae* rule is found in both English Common Law and French civil law. In England, this rule goes back at least to the Magna Charta.[88] In England, shoreline owners whose lands abutted fresh water rivers, that were also non-tidal rivers, had fishing rights in those waters. These fishing rights were in fact "property rights incidental to their land ownership."[89] It is important to note the distinction between tidal and non-tidal rivers because in England, non-tidal rivers also tended to be non-navigable rivers. Under Common Law, the application of the *ad medium filum aquae* rule was applied on the basis of tidal and non-tidal waters. The beds of tidal waters were vested in the Crown while the beds of non-tidal waters were passed *ad medium filum aquae* to the grantee.[90] Therefore if the rules of application in England were applied to Canada, with its large navigable but non-tidal waters such as the Great Lakes and the Ottawa river, individuals or single interests could control huge areas of important navigation routes.[91] Canadian courts, therefore, had to decide whether a further distinction between navigable and non-navigable waters could be used, as was the case under French civil law.

Under French law, the King owned the foreshore, beds and banks of all navigable waters subject to the public right of navigation.[92] During the late eighteenth and early nineteenth centuries, Canadian courts were not agreed on whether this additional distinction needed to be made. The balance was tipped in favour of making the additional distinction with the Supreme Court decision *Re Provincial Fisheries 1895*. In this case, Chief Justice Strong agreed with the cases that had held that the *ad medium filum aquae* rule was not applicable to the Great Lakes nor to rivers that were *de facto* navigable.[93]

This was a necessary decision because the application of individual property rights to waterways conflicted with the reality that waterways were used for a variety of purposes. For instance, if a power company owned a stretch of land bordering a power site, it could build a dam and obstruct the passage of water to the detriment of loggers who needed to drive their logs through the same stretch of water to a sawmill. Canadian courts and governments came to believe that private property rights in navigable waterways had to be restricted in order to recognize the mutual rights of others.

As a result, most of these interests were given some form of legislative protection that secured their rights to the use of the waterways to meet their particular needs.[94] For example, in Ontario, rival lumbermen disagreed widely regarding who had rights of navigation or access to certain waterways, as the lumberman or other individual who had originally improved

navigation on a river by the removal of rocks or the construction of booms, piers, and slides claimed prior and sometimes exclusive rights. As a result, the Ontario legislature passed "The Streams Bill" in 1881, granting all operators the right to use such improvements and have passage along the banks of any driveable stream, provided they paid a toll to the original developer, the toll-rate to be approved by the Lieutenant-Governor-in-Council.[95] The Streams Bill asserted the idea that each user group had mutual rights to the province's waterways. Thus was established the principle that waterways were a rescurce that could not be alienated exclusively to individuals but had to be shared. Therefore, anyone blocking the passage of water in a river used by people for transporting goods would hereinafter be obligated to supply alternative means of transport, such as a log chute for the passage of logs.

Additionally, the Ontario government passed the *Waterpower Regulation Act 1898* to ensure that hydro-electric development would be subject to Crown review. The act declared that all major waterpowers would remain vested in the Crown and any development of provincial waterpowers would be negotiated under terms of lease rather than outright sale.[96] Now, not only waterways but waterpowers themselves could not be alienated into private hands. Despite federal protestations, Ontario confirmed its rights to control and regulate waterways and waterpowers in 1911 when it passed the *Beds of Navigable Waters Act*. This act reserved title of all navigable waters to the Crown in right of

Ontario. These protective policies for waterways and waterpowers placed control of the northeastern rivers firmly in the hands of the provincial government.[97] They were similar to policies already developed for forestry and mining and were in keeping with goals of private interests and urban citizens who wished resource development to take place under the auspices of the "common good." Because the principle of mutuality of rights regulated development it became linked with the concept of the common good, which promoted development.

What effect did the mutuality of rights doctrine have on the development of hydro-electric systems? First, the advance of a hydro-electric system would be tempered by the legal obligation to recognize the rights of others to use the waterways for their own needs. Secondly, notwithstanding the previous point, because mutuality of rights was tied into the common good principle, it would not acknowledge the rights of Aboriginal People to use the waterways to pursue their traditional vocations. The common good principle looked after the interests of the metropolitan community not the "few" Aboriginal People who lived in the north. Therefore aboriginal fishing grounds and traplines would not be protected from damage caused by hydro-electric development. Thirdly, power development from the start would be susceptible to government interference because the province would regulate water use and determine who would get what license for which site and under what circumstances.

From the late nineteenth century until 1911, the northeastern rivers of Ontario and the northern Cree and Anishnabek were incorporated within a legal system that supported an economy based on industrial development. This meant that hydro-electric and other industrial development would take place in the northeast to the detriment of the northern environment and First Nations. Despite this seeming initial advantage to system builders that the law provided, the environment and First Nations would continue to be actors in the process of development. The ability to actually shape the system however rested solely with the environment while First Nations had minimal effect, at least during the time period covered by this dissertation.

The next chapter will examine the technological advances in generating station construction, detail the growth of the system in response to increasing power demands by the northeastern gold and silver mines and finally, it will discuss the impact of hydro-electric development on the Mattagami First Nation. In the first instance, the interaction between technology and the natural environment are highlighted, in the second, the interaction between demand and supply and between the mines and power companies and in the third, the interaction between native livelihoods and non-native ideas of development. These cross-currents will illustrate the complexity in the relationship between the natural and the built environment, they will place the hydro-electric system's development within its economic and

political contexts and they will illustrate the inequities that result from disregarding alternative economies.

NOTES

1. James Waldram, As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada, (Winnipeg: University of Manitoba Press, 1988), p.5.

2. It should be noted that loggers often developed waterpower sites in order to drive their sawmills or later pulp and paper mills. However, they still had to be watchful that their waterpower sites and the sites of others did not block the navigation of logs downstream.

3. See Appendix I, Map I.

4. National Archives of Canada (NAC), Records of the Geological Survey of Canada, RG 45, Vol. 182, Field Notebook N.S. 1168, J.M. Bell, "Route from Biscotasing to Moose Factory," 1901.

5. Ibid.

6. Ibid.

7. Ibid.

8. Ibid.

9. Ibid.

10. Ibid.

11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid.

16. Ibid.

17. Ibid.

18. Ibid.

19. NAC, GSC, RG 45, Vol. 182, Fieldbook 1173, J.M. Bell, 1901.

20. E.S. Rogers, "Southeastern Ojibwa," in Handbook of North American Indians, Vol. 15, Northeast, Bruce G. Trigger, (ed.), pp.760-762.

21. E. A. Mitchell, Fort Temiskaming and the Fur Trade, (Toronto, 1977) p.94.

22. NAC, Records of the Geological Survey of Canada, RG 45, Vol. 182, Field Notebook N.S. 1168, J.M. Bell, "Route from Biscotasing to Moose Factory," 1901.

23. Ibid.

24. This statement is controversial because the debate over environmental and cultural impacts of the fur trade is by no means closed. Some historians and anthropologists point to the extinction of the beaver in numerous locations as a result of over-hunting by Native or non-native trappers. Calvin Marten in his Keepers of the Game and Charles Bishop in his The Northern Ojibwa and the Fur Trade are two academics who would support this view. Conversely, the research of Edward and Mary Black Rogers questions the accuracy of fur trade records that mention "starving" Indians. For more information on the views offered by the Rogers see The Hunting Group-Hunting Territory Complex among the Mistassini Indians. For a micro-view of this debate, consult the court transcripts of the Teme-Augama land claim case, *Ontario vs. Bear Island Foundation* in the Supreme Court of Ontario, 1982.

25. James B. Waldram, As Long as the Rivers Run, p.6.

26. Ibid.

27. OH, Corporate Records Archives, Speeches, "Address by W. Ross Strike, Chairman, OH to the Rotary Club of Toronto," January 4, 1963.

28. The original purposes of the HEPCO soon changed for impending power shortages forced the HEPCO to construct generating stations and the Chairman, Beck, was determined to operate without accountability to the government. OH, Corporate Records Archives, Speeches, "Report of the Committee on the Organization of Government in Ontario," The Ontario Municipal Electric Association, September, 1959.

29. H.V. Nelles, The Politics of Development: Forests, Mines and Hydro-Electric Power in Ontario, 1849-1941, (Toronto: Macmillan of Canada, 1974), p.252.

30. OH Public Reference Centre (PRC), OH/DSP Environmental Assessment Hearing Documents, Exhibit #870, Kent McNeil and Patrick Macklem, "Aboriginal, Treaty and Riparian Rights in the Moose River Basin: The Potential Impact of the Ontario Hydraulic Plan," (December, 1992), p.14.

31. Michael Asch, Home and Native Land: Aboriginal Rights and the Canadian Constitution, (Toronto: Methuen, 1984), p.75f.

32. Ibid., p.42.

33. Ontario, Sessional Papers, E. B. Borron, "Report on the Basin of the Moose River and Adjacent Country belonging to the Province of Ontario," 1890, 53 Victoria, No. 87, pp.3-6, 85-89. See also Morris Zaslow, "Edward Barnes Borron, 1820-1915, Northern Pioneer and Public Servant Extraordinary", in Aspects of Nineteenth Century Ontario, F. H. Armstrong et al, (eds.), (Toronto: 1974), p.297-311.

34. Ibid.

35. NAC, RG 10, Indian Affairs Records (Red Series), Vol. 3033, File 235,225, pt.1A, J. Macrae, Federal Inspector, Treaty Areas and Reserves, to Clifford Sifton, Superintendent General Indian Affairs, June 3, 1901.

36. Ibid.

37. S.A. Pain, The Way North, (Toronto: The Ryerson Press, 1964), p.99.

38. Pain, pp.218-20.

39. NAC, RG 10, Vol. 3033, File 235,225-1, Frank Pedley, Deputy Superintendent General of Indian Affairs to Clifford Sifton, Superintendent General of Indian Affairs, June 10, 1904.

40. Ibid., J. D. McLean, Secretary of Indian Affairs to Indian Agents, Robinson-Huron Treaty Area [Port Arthur, Manitowaning, Thessalon, Parry Sound, Sault Ste. Marie], April 8, 1902.

41. NAC, RG 10, Vol. 3033, File 235,225-1, William Nichols to J.D. McLean, July 24, 1902.

42. McNeil and Macklem, "Aboriginal, Treaty and Riparian Rights," p.11.

43. NAC, RG 10, Vol. 3883, File 95,721, "Agreement Between the Government of Canada and the Government of Ontario", dated April 16, 1894, as per enabling legislation "An Act for the settlement of certain questions between the Governments of Canada and Ontario respecting Indian Lands," Statutes of Ontario, 54 Victoria, Cap.3 and Statutes of Canada 54-55 Victoria, Cap.5, 1891.

44. NAC, RG 10, Vol. 3033, File 235,225, pt.1A, "Agreement Between the Dominion of Canada and the Province of Ontario", July 3, 1905.

45. Ibid., The Government of Ontario added that clause, with the intention of ensuring it would retain the future revenues accruing from any water power development to be established in the area covered by Treaty #9. Similar concern was shown in subsequent Ontario legislation, such as the 1915 Act to Confirm the Title of the Government of Canada to Certain Lands and Indian Lands (5 George V. Ch. 12) and the 1924 Indian Lands Act.

46. Public power had been a part of Whitney's campaign platform in the election of 1905. Merrill Denison, The People's Power, (Toronto: McClelland and Steward Ltd., 1960), p.46.

46. NAC, RG 10, Vol. 3033, File 235,225, pt.1A, Canada Order-in-Council, June 29, 1905, appointing the three Treaty #9 Commissioners.

48. Ibid., Canada, Treaty #9, James Bay Treaty, Report by Treaty Commissioners, October 5, 1906.

49. Ibid.

50. McNeil and Macklem, "Aboriginal, Treaty and Riparian Rights," p.30.

51. Ibid., p.30f, Task 3.

52. Ibid., p.281.

53. James Waldram, As Long as the Rivers Run, p.31.

54. Barry Cottam, "The Twentieth Century Legacy of the St. Catherine's Case: Thoughts on Aboriginal Title in the Common Law," in Bruce Hodgins, et al. Co-Existence? Studies in Ontario/First Nations Relations, (Peterborough: Trent University, 1992), pp.118-127, p.118.

55. Barry Cottam, "Twentieth Century Legacy," p.118.

56. Anthony Hall, "*The St. Catherine's Milling and Lumber Company versus the Queen*: Indian Land Rights as a Factor in Federal-Provincial Relations in Nineteenth-Century Canada," in Kerry Abel and Jean Friesen (eds.), Aboriginal Resource Use in Canada, (Winnipeg: University of Manitoba Press, 1991), pp.267-286, p.281.

57. McNeil and Macklem, "Aboriginal, Treaty and Riparian Rights," p.16, Task I.

58. Ibid.

59. Ibid.

60. Ibid., p.16f.

61. Ibid., p.17, Task II.

62. Ibid.

63. Michael Asch, Home and Native Land, p.58.

64. Canada, Treaty #9, James Bay Treaty, emphasis added.

65. Ibid.

66. Ibid., "Schedule of Reserves", 1906.

67. Ministry of Natural Resources (MNR), Indian Land File #39414, "Mattagami Indian Reserve #71", James Miller, Hudson's Bay Company (H.B.Co.) Agent, Fort Mattagami to D. C. Scott, Acting Deputy Superintendent General of Indian Affairs, January 5, 1908.

68. NAC, RG 10, Vol. 3033, File 235,225, pt.2, Diary of Treaty #9 Commissioners, entry dated July 7, 1906.

69. MNR Indian Land File #39414, Treaty #9 Commissioners Scott, Stewart and MacMartin to Frank Pedley, Deputy Superintendent General, Indian Affairs, January 22, 1908.

70. Ibid., Ontario Order-in-Council #3291/09 dated January 20, 1909. It should be noted that the Mattagami First Nation had chosen this eastern location with the intention of harvesting the timber themselves. See James Morrison, Treaty #9, The James Bay Treaty, (DIAND, 1986), p.56. The ten year time limit elapsed before Ontario was able to remove the timber. Ontario requested an extension but was turned down by the Department of Indian Affairs at the request of the Mattagami First Nation. Memorandum re Indian Reserves Treaty No. 9, dated October 17, 1919, from L. V. Rorke, Director of Surveys, Dept. of Lands, Forests, and Mines to Albert Grigg, Deputy Minister of Lands, Forests and Mines, p.4. MNR Indian Land File #91551.

71. Ibid., Ontario Order-in-Council #3291/09, dated January 20, 1909 and Canada Order-in-Council, P.C. #364, dated March 9, 1909.

72. Ibid.

73. Canada, Treaty #9, James Bay Treaty, (Ottawa, 1905).

74. Sidney Harring in his investigations of U.S. nineteenth century law and American Indians argues that the law was used as a means of eliminating American Indian sovereignty by assimilating them into the U.S. justice system. The same could be argued for Canada. Sidney L. Harring, Crow Dog's Case: American Indian Sovereignty, Tribal Law and United States Law in

the Nineteenth Century, (Cambridge: Cambridge University Press, 1994), p.23.

75. Barry Cottam, "Indian Title as a 'Celestial Institution': David Mills and the *St. Catherine's Milling* Case," in Kerry Abel and Jean Friesen, Aboriginal Resource Use in Canada: Historical and Legal Aspects, (Winnipeg: University of Manitoba, 1991), pp.247-266, p.260f.

76. John J. Van West, "Ojibway Fisheries, Commercial Fisheries Development and Fisheries Administration, 1873-1915: An Examination of Conflicting Interests and the Collapse of the Sturgeon Fisheries of the Lake of the Woods," Paper given at Canadian Historical Association Annual Meeting, Victoria, 1990, p.21.

77. Tim E. Holzkamm, Victor P. Lytwyn and Leo G. Waisberg, "The Rainy River Sturgeon: an Ojibway Resource in the Fur Trade Economy," in Kerry Abel and Jean Friesen, Aboriginal Resource Use in Canada: Historical and Legal Aspects, (Winnipeg: University of Manitoba Press, 1991), p.119.

78. John J. Van West, "Ojibway Fisheries," p.5.

79. James Waldram, As Long as the Rivers Run, p.5.

80. Lise C. Hansen, "Treaty Fishing Rights and the Development of Fisheries Legislation in Ontario: A Primer," in Native Studies Review, Vol. VII: No.1, (1991), pp.1-22, p.7. Commercial fishing rights were not recognized because the Department of Fisheries at the turn of the century refused to allow commercial fishing by aboriginal people unless they had a license to do so. Indian agents acting on behalf of "their charges" pleaded for a exemption of the license fee, claiming that many Aboriginal People were in a destitute state and could not afford to pay it. Individual compromises were worked out between the Department of Fisheries and the Department of Indian Affairs but the waiver of fees and licenses was never accepted as Fisheries policy. Fisheries officials were convinced that unregulated fishing by the First Nations would lead to overfishing by them. The issue became moot in the Lake of the Woods and Winnipeg areas by the 1920s because of a collapse of the fish stocks due to overfishing by American companies. See John Van West, "Ojibway Fisheries," and Jean Manore "Power and Performance: Indian Agents and Agencies in the West, 1876-1896," (University of Ottawa: MA thesis, 1986).

81. Edward S. Rogers, "Northern Algonquians and the Hudson's Bay Company, 1821-1890," in Aboriginal Ontario: Historical Perspectives on the First Nations, Edward S. Rogers and Donald B. Smith, (eds.), (Toronto: Dundurn Press Ltd., 1994), p.315.

82. Jean Manore, "Power and Performance," p.160f.

83. James Waldram, As Long as the Rivers Run, p.31.

84. J. Rodney Millard, The Master Spirit of the Age: Canadian engineers and the politics of professionalism, 1887-1922, (Toronto: University of Toronto Press, 1988), p.13.

85. This phrase is not part of the legal lexicon. It is my way of characterizing the regulation of multi-use resources such as public waterways.

86. See Arbitration rulings of the Chief Justice of the Supreme Court of Canada re Fisheries.

87. *Ad medium filum aquae* means to the water's midpoint.

88. Rose Boyko Wuerscher, "Title to the Water Bed: The Legal History of the Ad Medium Filum Aquae Rule," (Department of Indian and Northern Affairs, 1982), p.1.

89. Ibid., p.3.

90. Ibid., p.12f.

91. Ibid., p.6.

92. Ibid., p.2.

93. Ibid., p.6.

94. This course of action was also taken in response to land disputes that involved multi-use areas such as forests. The Land Act of 1841 gave the settler ownership in all respects except to the pine growing on his property. This caused a frequent clashing of interests between settler and lumberman. As a result, the government developed a policy that prohibited settlement in certain areas, lands which were considered generally unsuitable for agriculture, and reserved these lands for non-agricultural development, most particularly for logging. This process of classifying land for single use purposes was adapted by the late nineteenth century. In 1898, the Forest Reserves Act was passed which set aside several prime logging areas, among them the Temagami Forest Reserve of 5,900 square miles. Despite this favouritism towards logging interests in the legislation, there was a recognition that the reserved areas were valuable for other activities. An article in the September issue of the Canadian Lumberman illustrates this point. The article states that the forests of northern Ontario are:

> dedicated to multiple use, that is, the use of forest, water and soil for the purposes for which they are best fitted.

> This, however, is only part of the value of the forest to Ontario. The hydro-electric system depends upon preservation of forests for its water supply. The tourist industry is dependent upon game and fish which require good forest cover. Protection of soil from erosion and other important economic factors call for adequate forest stands.

95. Archives of Ontario, (AO) MU 1585 E.E. Johnson Papers, "Report of the Ontario Royal Commission on Forestry," 1947, Major-General Howard Kennedy, Chairman, Toronto, p.7.

96. Ontario, An Act respecting Water Powers, 61 Victoria, Chapter 8, January 17, 1898.

97. This same is not true for other rivers in Ontario. The federal government continued its jurisdictional disputes with the province over the St. Lawrence, the Ottawa and the Ogoki rivers. See Christopher Armstrong, The Politics of Federalism: Ontario's Relations with the Federal Government, 1867-1942, (Toronto: University of Toronto Press, 1981).

CHAPTER TWO

The settling of legal issues did not remove all obstacles to hydro-electric development on the Mattagami river. System designers next had to develop technological strategies to overcome environmental obstacles and then to meet increased demands for electricity from the booming gold and silver mining industry in the Timmins and Cobalt areas. Trying to meet the increased demands was complicated by the occurrence of drought in northeastern Ontario during the 1920s. Nevertheless, the augmented energy requirements for the mines created an opening in the northeast for large power companies that focused on building hydro-electric systems, rather than individual generating stations. Accordingly, Nesbitt Thomson, a large securities firm headquartered in Montreal, entered the region by purchasing Northern Canada Power and in its early years spent much of its time fending off complaints from its principal customers, the mining companies. The mining companies aware of the HEPCO's success in southern Ontario, used it as a weapon against Nesbitt Thomson in order to secure better service and lower rates. They also resorted to the courts.

The actions of the mining companies, despite their criticisms of the power companies, supported expansion of the hydro-electric system to such an extent that the amount of power generated grew tremendously during the 1920s. Growth and expansion was necessary, in the minds of the systems builders, to meet the increasing power needs of the mining companies. This meant that the mining companies encouraged a course of action

that was directly opposed to Cree and Anishnabek uses of the land and waterways. Specifically, when Northern Canada Power raised the output of its generating station at Wawaitin Falls, a portion of Mattagami Indian Reserve was flooded. The Mattagami First Nation objected to the loss of their land but unlike the mining companies, they had no effective weapon to use against Northern Canada Power: as explained in the previous chapter, neither the HEPCO nor the courts could be used as leverage in instances where aboriginal rights were at stake.

The growth of logging and mining industries in the northeast stimulated interest in utilizing waterpower as an energy source. However before hydro-electricity could become a feasible source of power, designs for generating stations had to be adapted to meet the harsh climatic conditions of the northeastern region. In 1911, water-power plants were straightforward constructions. They all had a turbine or water-wheel to which water was fed from a higher level and from which the spent water was discharged at a lower level. The water, after passing through the turbine, was discharged through the tailrace as gently as possible, so that all the energy was taken from it and transferred by the runner to the shaft driving the generator. The water turbine used in most HEPCO plants consisted of a rotating part known as the runner and a stationary part. The runner took various forms, but was in essence a propeller in a pipe. Adjacent to and surrounding the turbine runner were a number of guide vanes that directed the water, in the most efficient way possible, onto the blades of the

runner portion. These guide vanes acted as gates opening or closing the water passages. The movement of these gates was controlled automatically by a governor.[1]

Despite this commonality of design characteristics, system designers encountered many obstacles to the profitable development of hydro-electricity in northeastern Ontario, not the least of which was the bias of most industries in favour of coal. The bias was understandable for coal did have certain advantages over water. As one energy expert noted in 1916: "Steam power is movable and flexible.... Steam power can be taken to the factory in small or large units as may be required."[2] Also, coal could be used for both heating and for lighting, whereas hydro-electricity was not an efficient heat source. This was an important factor for industries that needed heat to refine their materials.[3] Furthermore, the initial capital costs in hydro developments were usually more than those for coal furnaces and seasonal changes in water levels could make power supply unreliable.

Thus, at the turn of the century, hydro-electric generation was limited to areas that ensured adequate water supply at all times of the year and that had a proven market within economical transmission distance.[4] These points were raised in an article published in The Canadian Engineer that attempted to reassure industries about the usefulness of hydro power. The article stated: "The lessons which the failures should undoubtedly teach are the necessity of careful planning by experts in this line of

work, and a proper design to best make use of the power available, as well as the most careful study of the possible market."[5] According to the unidentified author, "of all the factors entering into such an enterprise, the last-mentioned is probably the most important."[6] The author gave as an example of success the hydro-electric development on the Saluda River, near Greenville, South Carolina. This plant proved to be economically successful because the developers considered initial capital costs to be of secondary importance compared with the advantages of a proper location: "the plant was erected at a point not only favourable to profitable disposal of its product, but also of strategical importance to the development of the water-power monopoly of that section...."[7]

In addition to these general concerns, there were special considerations in northern Ontario: generating stations had to be built with specific design features that respected the rights of others to use the water-ways and that addressed the environmental conditions of the north. For instance, special log chutes had to be built to allow the passage of logs during drives. The log chute design at Watageshick Falls on the Vermillion River was a typical construction for hydro dams in the early twentieth century. Stop-logs regulated the amount of water going down the chute. The entrance to the log chutes was shaped in such a way as to increase the velocity of the water going down the chute, thereby preventing logs from jamming in the chute or entering it cross-wise. To lessen the velocity of logs after

they left the chute, its incline was adjusted so that it was no greater than twenty per cent. This measure prevented the logs from pounding the bottom of the chute or the channel and being damaged.[8]

Another typical problem for systems designers of northern dams was ice. The ice problem was more complicated than one might imagine, for as the Canadian Engineer noted, there were three types of ice to guard against: anchor, frazil and sheet ice. Anchor ice formed on the beds of the waterway and then at times became detached and made its way to the surface where it could become a block to the passage of water over the dams.[9] Frazil ice took the form of frozen crystals and collected in areas of fast moving open water. This ice was the most threatening to dam builders and did the most damage to dams because it adhered to colder objects, such as iron screens and racks, and could completely block the passage of water through these if not removed.[10] Sheet ice was usually only a problem during spring break-up when ice jams could form around the dams and cause flooding. Ice overflow areas had to be constructed enabling these ice blocks to move out of the main channel. Sheet ice also caused problems when it trapped frazil or anchor ice and formed an underhanging dam that could then block the water flow through the generating station.[11]

Engineers attempted to develop new dam designs in order to overcome these ice hazards. Testing conducted by a Swiss firm resulted in a spillway gate innovation. The gate was mounted on

a horizontal axis at right angles to the stream, and was adjusted so that a counterweight just balanced the pressure of the water at normal levels. Any slight rise in water levels would increase the pressure on the counterweight and tilt the gate, thus permitting a much greater quantity of water, and consequently ice, to pass through the spillway.[12]

Backwater, that is water that backs up from the dams, was a particular problem in northern dams during the winter. It was the result of dams blocking or reducing the flow of the river. Backwater was most likely to occur if there were rapids up river from the dam that had not been drowned out. These rapids would give rise to frazil and anchor ice. When the ice floated down to the poundage area, the usual blockage would occur at the dam and the land above the dam would be flooded, causing considerable damage and reducing the capacity of the plant because of lost water.[13] By 1919, research indicated that the standard multi-runner turbines that were used in southern dams were unsuited to deal with ice. Vertical, single runners did however ameliorate the problems caused by ice.[14] Dam builders also adopted other simple procedures, such as enclosing the gate house to trap the warmer air near the water and keep the cold air out.[15]

Seasonal changes in northern Ontario also contributed to changes in river flows thus creating the need for extensive water storage reservoirs. River flows varied during the seasons: freezing temperatures reduced the flow during the winter and low precipitation and high evaporation reduced it in the late summer.

On the other hand, during the spring thaw, river flows would be so great as to cause flooding. Because the energy derived from the high flows was temporary, the power potential of the river could only be assessed on the basis of the low flow periods. However, with the construction of storage areas, some of the overflow water was impounded and saved for low flow periods, thus increasing the river's overall power potential. The creation of storage areas was difficult for those generating stations operating in populated areas because land was an expensive commodity. In northeastern Ontario, the storage lakes could easily be located on remote lands far from population pressures or settlement.[16]

Drought was a constant threat to power suppliers in the north. Power consumers, such as mining companies, initially overcame this difficulty by having on hand secondary sources of power, such as coal furnaces. The Hollinger gold mine, for example, built a central compressed air plant with sufficient boiler capacity for use during water power shortages. The style of compressor selected had the advantage of being multi-purpose, that is, the compressors could be converted into steam engines, if necessary and their motors used for generating electric power.[17]

By the First World War, engineers had overcome many environmental obstacles through technological innovation and, despite those that remained, hydro-electric generation became increasingly attractive to industrialists. For one thing, some

of hydro's appeal was based upon the ideal of water power. J.M. Robertson, in his presentation to the Canadian Society of Civil Engineers in March 1918, discussed the benefits of hydro-electric power in relation to steam power. He concluded his remarks by observing: "The development and utilization of our water power reserves is a measure of our economic advance in the scale of civilization."[18] There were other reasons as well.

While engineering innovations made it technically possible by 1911 to develop the hydro-electric potential of northern Ontario, the growing scarcity and rising price of coal made it economically attractive as well. The "coal famine of 1902" that hit southwestern Ontario as a result of the Pennsylvania coal strikes caused the price of coal to rise from $5.00 per ton in the spring to $9.50 per ton by September.[19] Also, H.E.M. Kensit, in a paper presented to the New York Electrical Society, provided a comparative analysis of coal and hydro-electric prices in 1920-21. He noted that coal cost between ninety cents and one dollar and twenty cents per kilowatthour whereas hydro-electricity, with a comparable load factor, cost between forty-three cents and seventy-one cents per kilowatthour.[20] Also, from a conservationist standpoint, it made sense to promote water power as the prospect of coal becoming scarcer and more expensive loomed larger. As early as 1918, some conservationists were arguing that they could see coal shortages becoming a regular occurrence in the near future.[21]

More importantly, the new resource extraction industries of northeastern Ontario required lots of inexpensive power: initially to offset transportation costs of getting their product to their buyers, but then to operate electrical machinery. Because of innovations in electrical technology, electricity was finding wider applications in mines with each passing year: from electrical air compressors, hoists, and drills to transformers and induction motors.[22] At the same time, traditional sources of fuel were increasingly hard to come by.

When the Porcupine and Cobalt mining camps were first established, the mine-owners relied on wood fuel to work their prospects. This source of fuel was soon exhausted as a result of clearing for settlement, use in the mines, and forest fires. The companies also used coal to power their machinery and process their ore but because it had to be transported in from the United States, particularly Pennsylvania, freight costs were expensive and the reliance on foreign controlled, strike-prone sources of energy was disquieting for many miners.[23] Hydro-electric power was abundant in Ontario and offered the possibility of being less expensive than coal and free from labour strife.[24]

Proof of hydro-electricity's popularity could be seen in the increase in the number of hydro-electric generating stations in the early twentieth century. In northeastern Ontario, hydro-electric developments under private enterprise increased rapidly. Several companies established sites on the Wanapitae River. The Spanish River Pulp and Paper Co. built a generating station in

1904 at Espanola and the Wanapitae Power Co., (in which Frank Cochrane was a partner), built its station in 1905. That same year, the Huronian Power Co. built a generating station at High Falls, and then the Lorne Power Co. built an additional station in 1909. British Canadian Power Co. built its own generating station in 1909 at the Matabitchuan site on the river of the same name and in that same year, the Nipissing Power Co. started operations on the Nipissing River. The Cobalt mining camp, needing additional power than that supplied from the Wanapitae plant, helped establish three hydro-electric generating stations on the Montreal River and one on the Matabitchewan. In 1911, three of these stations merged under one company: the Northern Ontario Light and Power Company, which supplied a total of approximately 20,000 horsepower. In the process, coal imports were reduced from the United States to 44,000 tons per year from a previous high of 105,000.[25]

Private companies were not the only businesses interested in northern power. The HEPCO too had considered developing hydro sites in northeastern Ontario and had sent out surveyors to the area as early as 1906[26] but the HEPCO's hydraulic engineer, H.G. Acres, remained sceptical about hydro power possibilities, positive surveyors' reports notwithstanding. Acres noted that the price of power varied widely according to several factors, including market conditions, topography, transmission distance and available capacity. Despite the optimism that others, especially members of the provincial government and individual

entrepreneurs, held about the rivers in northeastern Ontario, Acres felt that there was still too little knowledge available about their characteristics to risk hydro-electric development stations on them, the Mattagami and Abitibi rivers excepted.[27]

Acres' assessment of the Mattagami River apparently coincided with those of other hydro-electric developers. In 1911, the Hollinger Consolidated Gold Mining Co. built its first generating station on the Mattagami River at the Sandy Falls, six miles northwest of Timmins. A timber dam of approximately 1500 feet in length diverted the water into a wooden flume. Water from the flume was taken directly to the wheels in the power house by means of short lengths of ten foot pipe. The power house was made of wood covered with asbestos and corrugated iron, and contained two 1200 horsepower wheels which operated under a head of thirty-three feet, directly connec ed to two 950 kilovolt alternators. During the summer of 1913, the power company made extensive improvements to the plant. The timber dam was replaced with a concrete one and the wooden flume with steel pipes. Power was supplied to consumers at approximately 12,000 volts, on twenty-five cycles.[28]

Ontario issued a lease authorizing water power development at Wawaitin Falls in the same year as the Hollinger lease. Wawaitin Falls, located up-river from the Sandy Falls, is sixteen miles southwest of Timmins. Crown lease #1830 was issued to Emil Andrew Wallberg of Montreal, for a period of twenty years. The lease included the right to two further renewals of ten years

each for "those parcels or tracts of land and land covered with water situate, lying and being at Wawaitin Falls on the Mattagami River in the Township of Thornloe, District of Sudbury"... to "develop and utilize the water privilege situated on the lands hereby demised... for the generation of electricity."[29]

The Northern Canada Power Company, owned and operated by Alexander Fasken and his brother David, took over construction of the Wawaitin generating station and completed it in 1912. The Fasken brothers were the first to supply power to the gold and silver mines of northeastern Ontario, starting with the Porcupine mines near Timmins. Alex was a fixture in the north until his death in 1944. A lawyer by profession and a businessman in practice, he served as President of the Nipissing mine in Cobalt, director of the Dome mine, and Vice-President of Beattie Gold Mines. He was also President of Excelsior Life Insurance Company and of several paper and tobacco companies.[30]

The Faskens' original Wawaitin Falls site included a concrete dam 1,000 feet long which diverted the water into a 1200 foot canal. From the intake at the foot of the canal, water was carried by 1500 feet of twelve foot iron pipe to a forty foot diameter surge tank on top of the hill overlooking the power house. Two eight foot iron pipes, 1300 feet long, led from this surge tank down the side of the hill directly to the wheels in the power house. The power house, built of reinforced concrete, contained two 3300 horsepower water-wheels operating under a head of 125 feet, directly connected to two 2500 kva alternators.[31]

From 1911-12 onwards, the demand for power steadily increased. In response, the Faskens' company,[32] increased the power generating capacity of its dams on the Mattagami River. In 1912, the company built a 6900 horsepower generator at Wawaitin Falls.[33] With the advent of the First World War, construction and production of munitions factories led to new opportunities and demands for expansion of the hydro-electric power supply.[34] In 1916, Northern Canada Power increased the production capacity of the Sandy Falls generating station to 5000 horsepower and in 1918, the generating capacity at Wawaitin Falls was increased again to 14,900 horsepower.[35]

These mining spurts left power companies racing to catch up with demand. The system of private power development undertaken by mines and pulp and paper industries rapidly expanded. In 1912, Hollinger had sold its Sandy Falls plant to Northern Canada Power. It then agreed to buy all its power needs from that company for the life of the mine. As power demands in the Porcupine camp increased, due to the arrival of other outfits such as the McIntyre mines, the power company could not resist the opportunity to negotiate more contracts. In the process, the power company oversold its supplies, as became painfully evident during the drought of 1919-1920. It was then that the environmental limits to the system's expansion became manifest. Whereas before, system builders had been able to interconnect the environment with technology to create hydro-electric energy, now the environment imposed limits on the amounts of that energy.

The natural environment severely constrained the system's ability to supply sufficient quantities of power: the reservoirs simply did not refill after the summer depletion.

In 1920, Northern Canada Power had to advise Hollinger that it could only supply it with 1700 kilowatts of power, instead of the expected 7500 kilowatts. Hollinger threatened to sue.[36] According to the mine's operators:

> Our information had always been to the effect that ample power would be available for the Hollinger's full requirements.... The power shortage is going to very seriously interfere with next year's profits by reason of the curtailment of output and excessive cost of generating power by the inefficient expedient of converted air compressors used as steam engines.[37]

Hollinger claimed that the steam plants were costing the mine an estimated $1,000 a day to operate.[38]

This drought had severe repercussions for other mines as well. As the Northern Miner noted: "The lack of water has already caused a curtailment of operations in all camps. In Cobalt and Kirkland the mines are taking turns and slowing up work for daily periods and somewhat the same situation prevails at Porcupine although it is not so bad there."[39] By January 1920, nine mines had shut down operations and the remaining ten had reduced their output by as much as twenty-five per cent. The mines that closed were ones completely dependent on hydro-electric energy. Those mines that operated steam plants were able to continue their production but at added expense.[40] By January 1921, the mines were confident that recent mild weather

and storms would ensure that power supplies would last the winter preventing further closings and slow-downs.[41]

Nevertheless, power shortages continued but by this time, drought was only part of the reason for them. Mining companies and their energy requirements continued to increase at a rate beyond the ability of the power companies to construct generating stations and keep up with the demand. For example, the Northern Miner pointed out that the Hollinger and McIntyre mines alone could consume the amount of available power in the Porcupine area, leaving the rest of the mines dependent on coal or wood.[42]

This increased need for power affected the development of the system profoundly. Large power demands could only be met by building large hydro-electric generating stations, at least according to engineering thinking at the time. The reasoning behind this maxim lay in the fact that the initial outlay in capital investment for hydro-electric generating stations was enormous but once built, the stations ran cheaply. Thus the economies of scale dictated that building more in the short run meant paying less in the long run. When the scale of hydro-electric generation increased, only large companies such as Nesbitt Thomson could afford the initial outlay in capital investment. Small companies did not have the financial resources to build large dams and lengthy transmission lines. With the booming mining industry, the small electric companies such as the Wahnapitae either had to amalgamate with other small companies or sell out to larger interests.

The failure to meet the increasing demands also led to law suits and counter-suits. Once again legal currents shaped the development of the system: the courts played a role in shaping the interactions of environment and technology, power development and consumers.

In late 1921, the Hollinger Gold Mine filed a lawsuit against Northern Canada Power, seeking damages for non-delivery of the contracted amount of power. During the winter of 1920-21, Hollinger had lost 126 days of production due to the power shortages. When the impending lawsuit was announced, an editorial in the Northern Miner commented that: "It will naturally be followed with great interest throughout the mining country, where power shortage has been general during the winter."[43]

Hollinger went even further. No longer content to rely on Northern Canada Power to supply it with all the hydro-electricity it would need, Hollinger applied, in 1921, to the Ontario government for a lease of the Long Sault Rapids on the Abitibi River as a site for its own power generation facility. The application was turned down because the site had already been promised to Abitibi Power and Paper Company. Hollinger then applied for and received the rights to the water-power at Island portage, a further fourteen miles downriver.[44]

To counter these moves by Hollinger, Northern Canada Power launched a countersuit against it for breach of contract. By seeking alternative power sources, the Hollinger company had

violated the clause in the contract that stipulated Northern Canada Power Company as the sole supplier of its power. This type of clause was common in contracts between power companies and suppliers. Because of the initial huge capital outlay in building generating stations, the power companies had to have a guaranteed long-term customer base in order to be able to recoup their investment and then make a suitable profit. Hollinger's alleged breach of contract was a serious threat to the approach power companies took in organizing their businesses. Not surprisingly, Alexander Fasken, president of Northern Canada Power, dismissed Hollinger's justification for building its own power plant. Fasken insisted that the power company had failed to supply power to Hollinger on two occasions only and that was not due to overselling of their power supply but due to drought, a circumstance, Fasken noted, entirely beyond the company's control.[45]

There was no clearcut victor in the first legal skirmishes. Hollinger lost its case in the lower court decision of 1924; the judge agreed with Northern Canada Power that the mining company had contracted with Northern Canada for the life of the mine and the contract had to be honoured.[46] In that same year, Fasken sold Northern Canada to Nesbitt Thomson of Montreal. When the Ontario Court of Appeal reversed the lower court decision a year later, awarding Hollinger extensive damages, the two sides set about preparing for their appeal to the Judicial Committee of the Privy Council. Neither side could afford to lose: Canada

Northern Power, as it was now called, was faced with the possibility of paying Hollinger several million dollars in compensation for breach of contract, while the mining company, if it lost, would be forced to take its power from Canada Northern, thus leaving its new plant at Island Falls useless and its investment in the plant wasted.

To ensure adequate supply in case it won, Canada Northern had built another hydro-electric facility just across the Quebec border on the Quinze River. Completed in August 1924, the plant had two 10,000 horsepower units. The power was transmitted the 124 miles to Porcupine through Elk Lake, Ontario, by a double circuit line on steel towers.[47] With the entry of Nesbitt Thomson into the power equation of northeastern Ontario, a negotiated settlement seemed likely, if for no other reason than the fact that Nesbitt Thomson was an important shareholder in both Abitibi Power and Paper and Hollinger Consolidated.[48]

Negotiations between Hollinger, Abitibi and Canada Northern Power did proceed quickly; the only snag being the question of what to do with Hollinger's useless transmission line from Island Falls to Porcupine. It was eventually agreed that Hollinger would absorb the cost of the transmission line; however, Canada Northern Power did pay Hollinger $500,000 in compensation. The Abitibi Company acquired the plant and assets at Island Falls for $5.5 million and proceeded to build its own line from Hunta to Iroquois Falls.[49] Hollinger and Canada Northern agreed to drop their respective appeals to the Privy Council and Hollinger would

thereafter take its power from Canada Northern's new Quinze facility.[50] This arrangement worked to the advantage of the power company because it now had a guaranteed customer for its new generating station[51] and the threat posed by Hollinger to systems design and operation was averted. This legal interaction was significant to hydro-electric development. It supported the need for large, complex systems in order to ensure supply that in turn promoted plant construction thereby accelerating system development.

While this massive construction activity assisted the systems approach to hydro-electric development, it also at the same time, increased environmental degradation and intrusions into Aboriginal livelihoods; Anishnabe and Cree lost traplines, fishing spots and even, in the case of the Mattagami First Nation, reserve land.

In 1921, during the building boom, Northern Canada Power had applied to the Ontario Department of Lands and Forests for permission to raise the level of water storage on Lake Kenogamisee an additional ten feet "to insure a sufficient power supply."[52] The raised water level flooded a portion of Mattagami Indian Reserve #71, the only reserve abutting the Mattagami river. In an internal memo to Albert Grigg, Deputy Minister of Lands, Forests and Mines, dated March 11, 1921, L.V. Rorke, Director of Surveys, while outlining the power company's request to raise the dam elevation an additional ten feet, to the 1,070 foot level, expressed concern that "the raising of the

waters would also damage certain timber, principally on the Mattagami Indian Reserve."[53] When offering preliminary approval, Grigg, in a letter to Alex Fasken, stipulated that the Company would have to file a plan of survey of the lake showing the proposed new water levels of the lake. Grigg commented that:

> If in the opinion of the Minister the benefit to be derived from the storage of these waters will offset the damage there is no reason why a License of Occupation should not be granted to store water in this lake.

He further stipulated that:

> Your company will also require to obtain the consent from the Department of Indian Affairs, Ottawa, in respect to the damage which will be done to the Mattagami Indian Reserve.[54]

Here the philosophy of development in exchange for compensation is amply illustrated. Grigg is indicating to Fasken that if the Minister judges that the benefits of further hydro-electric development will outweigh the damages to First Nations' land, then Fasken will be allowed to proceed.

When informed of Northern Canada Power's application, the Department of Indian Affairs requested H.J. Bury to make an appraisal of the timber on the Mattagami Indian Reserve and to inspect the land and foreshore that would be flooded by the raised water level. Bury submitted his report in August 1921 to the Acting Deputy Superintendent General. In his report, Bury concluded that a previous estimation of $169,000 for the timber on the Mattagami Reserve had been too high, largely because of the effects of the operation of the dams at Kenogamisee and Wawaitin Falls. Bury believed that the previous estimate had

been based on the assumption that the pine timber could have been taken to the shore of the reserve and driven down to the market at Timmins. He then stated that the previous surveyor had been:

> in all probability not conversant with the plans of the Northern Power Co. whereby they had already backed up the water on the Mattagami River by a 6 foot head dam at Kenogamisee and had also erected dams at Wawaitin and also at Sandy Falls.
>
> The Northern Power Co. are at present engaged in constructing a higher dam at Kenogamisee whereby the water will be raised an additional 10 feet....
>
> The construction of these dams [creates] three extensive bodies of still water without current, divided by dams, and total[s] 67 miles in length where before there had been a drivable river without obstruction.[55]

As a result of the added transportation difficulties caused by the dams and the depressed state of the timber market at the time, Bury concluded that the timber was now worth only $49,875.00 plus a bonus value of $16,700.[56] The decline in the value of the timber in this instance pointed out a strange paradox of the legal system: the more the system builders harmed the environment, the less they had to pay in compensation. Taken to the extreme, if the power company had made the rivers completely impassable for log driving, it could have made the lumber totally worthless as a commodity, and thus it might have had to pay no compensation at all.

Bury also commented on the effect the proposed flooding would have on the land and foreshore of the Reserve. He concluded that the raised water level would flood "the lower level lands, certain Indian houses and the Indian cemetery ...." Because the low level lands were ill suited for agriculture and had only scrub timber on them, Bury considered the lands to be of

"no value". However, he recommended that the Department insist "upon the clearing of occasional landings where the ten foot contour line approaches the shore" to ensure easy delivery of log timber to the river's edge. Bury concluded his report by commenting that four houses and gardens with the estimated value of $1600 were likely to be affected by the flooding.[57] Bury also noted that the cemetery would be flooded by the raised water level. Consequently, the bodies interred there would have to be exhumed and reburied at a higher point of land. Bury suggested that the best location for the new cemetery would be by the fire ranger's house and recommended that "an application be filed with the Lands Department of the Province of Ontario for permission to occupy two acres of land at this point, to be used for burial purposes only."[58] Finally, Bury recommended that Northern Canada Power be asked to "bear the expense of compensation to the Indians for their houses ... and also be responsible for the entire cost of removing the Indian cemetery to the new location."[59]

Bury's evaluation is indicative of the disregard government officials generally had for the Native subsistence economy. There is no evidence that Bury considered the value that the Native traplines and hunting and fishing spots held for the Mattagami First Nation. He also seems to have had little respect for the Mattagami peoples' houses, dismissing the land upon which they were built as having no value and then recommending minimal compensation for the loss of their homes. It must be pointed out

that Bury's views were representative of government thinking at the time. Increasing the amount of hydro-electric generation was the priority; houses and communities, aboriginal or not, did not stand in the way of its development. Inevitably, the Ontario government made its decision without comprehending how harmful hydro-electric development would be to the Anishnabek and Cree of the region.

The Department of Indian Affairs informed the power company of Bury's findings with respect to the timber on the Reserve. Because the timber on the low level lands was of very little commercial value, the Department stated it would not submit a claim for damage to timber, but would insist that certain lands be cleared in order to provide easy access to the shore for other lumbering operations. The Department would consider the offer made by the Company to purchase the timber on the Reserve as it would "tend to remove the much vexed question of compensation for flooding and the effect of such flooding on the proper and economical operating of the timber berth."[60]

In August, a further letter from the Department listed the four individual members of the Mattagami First Nation mentioned by Bury who were eligible for compensation as a result of the proposed flooding. A.F. MacKenzie, the Department's Assistant Deputy and Secretary stated that:

> The Department would be pleased to receive your assurance that these Indians would be compensated by your company for the full value of their shacks and gardens as shown above, so that they will be in a position to erect new houses or remove the material of

> the old ones to higher ground which will not be subject to flooding.[61]

The Northern Canada Power Company's offer to buy the reserve's timber was discussed by Bury in a memorandum to the Acting Deputy Superintendent General, dated August 11, 1921. Bury recommended that the company's offer to purchase the timber for $17,000 over and above tariff dues be accepted. Bury reminded the Department that the Mattagami Band members were dissatisfied with the Department for not selling the timber that had been surrendered in 1920, "as they are all in very impoverished circumstances and need the assistance they would receive by a distribution of a portion of the bonus derived from the sale of the timber."[62] The Acting Deputy Superintendent General concurred with Bury's recommendation.[63] However, it appears that the Company was unable to follow through with the offer. In October, 1921, A. F. MacKenzie informed Indian Agent T. J. Godfrey that "up to the present time no disposition has yet been made of the timber on the Reserve." MacKenzie added that:

> The Company have [sic] given an assurance to the Department that they will pay damage to Indian houses to the extent of $1600 and remove the present Indian cemetery to a high level point across the Bay, and also make suitable landing places along the shore line of the reserve to be designated by the Department.[64]

In the meantime, Chief James Naveau had written to J. A. Lougheed, the Superintendent General of Indian Affairs, on October 1, 1921 regarding the potential flooding:

> A Power Company is going to raise the water on the lake which borders our reserve, about (10) ten feet. This will drown about (1/5) one fifth of our Reserve and damage about the same amount or a little more of the

> Timber on the Reserve. We would like to have you ... take this matter up with the Power Company and see that we get a fair settlement for the damage done to the reserve.[65]

MacKenzie, in his reply to Chief Naveau, wrote: "I wish to assure you that the interests of your Indians will be fully protected by the Department, both in so far as the land and timber are concerned." However, MacKenzie added, "the Department has not considered furnishing additional lands in lieu of those which will be flooded by the Company."[66]

The "protection" of aboriginal "interests" by the Department of Indian Affairs meant that the Department would ensure that the Mattagami people received only financial compensation for the loss of their land and timber. Department officials did not feel obligated to replace the land if compensation was paid or to consider the socio-economic impacts the flooding would have on the Mattagami people's subsistence hunting, trapping and fishing activities; activities that had no intrinsic value to officials whose vision of what constituted natural resources was limited to the commercial exploitation of trees, rocks and rivers. The amount of wealth that could be garnered from fishing-- commercial or sports-- was puny compared to the investment and returns from logging, mining and hydro-electric generation. Because of this bias, mutuality of rights was not extended to include aboriginal activities, rather compensation was the chosen method of dealing with aboriginal complaints.

On October 27, 1921, Charles V. Gallagher, O.L.S., who had been instructed to survey the area of land likely to be affected

by the flooding wrote to J. H. Black, reporting that the field work of the traverse survey of the Mattagami River had been completed. Gallagher concluded that:

> the only apparent damage that will result from the raising of the water to the proposed elevation is the flooding of the Hudson Bay Company Post site, and small clearings and shacks belonging to various Indians, but, I am informed, in all these cases the owners have been liberally and satisfactorily recompensed.[67]

In a letter dated February 13, 1922, the Assistant Deputy and Secretary of the Department of Indian Affairs, J. D. McLean, requested compensation at the rate of twenty-five cents per acre, amounting to $272.25, from Northern Canada Power. McLean explained that:

> An examination of these plans [C.V. Gallagher's 1921 contour plan showing the 1,070 foot level with respect to Mattagami Indian Reserve #71] shows that an area of 1,089 acres of this Reserve will be permanently flooded at the 1,070 foot level, and the Department is therefore of the opinion that as this area will cease to be any portion of the land area of the Reserve, a certain amount of compensation is due to the band of Indians who own this Reserve, as representing their community interest in the lands of the reserve.[68]

One week later, Northern Canada Power forwarded payment of the requested amount of $272.25, to the Department of Indian Affairs with a covering letter in which J. H. Black stated that:

> I think we have conformed to all the requirements of your Department and would be glad if you would write me a letter saying that we have done so and that we are entitled to raise the water to elevation 1070 [feet].[69]

The following week, McLean wrote to Northern Canada Power acknowledging receipt of this payment. The compensation given

here was in keeping with Common Law practices. As Brad Morse and Stephen Aronson have explained:

> The fact that aboriginal title is an interest in land means that it benefits from the common law presumption favouring the payment of just compensation upon a compulsory taking. In the absence of clear words to the contrary, statutes that unilaterally extinguish aboriginal land rights should be interpreted as providing for compensation.[70]

With compensation paid, the power company proceeded with the addition to the storage dam. In 1924, the water level at Kenogamissi Falls storage dam was raised to the maximum 1,070 foot level. The flooding did considerable damage to the community of Mattagami Indian Reserve #71: band members reported that not all of the bodies had been removed from the cemetery, for some of their resting places had no markers; consequently, when the cemetery became an island subject to constant erosion, bodies were seen on occasion, floating down the river. The village itself was flooded out. Grey Owl reported visiting the site just after the water had been raised, noting that the water level had risen up to the church steps.[71] Most, if not all, the people left the reserve and went to Gogama after the flooding, returning to a new town-site only in the 1950s. Damage to traplines was also severe as those placed along shorelines became inaccessible because of protruding stumps.[72]

After the flooding, Chief James Naveau wrote to Indian Affairs to insist that something be done about the land and timber destroyed by the overflowing Mattagami River: "We ask that immediate steps be taken to investigate existing conditions, and

that some one be sent to view the whole situation and make an aprisement [sic] of the damage already done."[73] As Chapleau Indian Agent T. J. Godfrey explained, when forwarding Chief Naveau's letter to Ottawa:

> There is a lot of valuable timber that has been destroyed by the raising of the water level and they [Mattagami Indian Band] have received nothing for it and they are feeling very discouraged over this.[74]

A.F. Mackenzie replied on September 24, 1923, explaining "that the Department has not at present approached the question of general Band compensation for lands on the reserve."[75] MacKenzie apparently had no knowledge of the compensation paid by Northern Canada Power in 1922 to the Mattagami community.

Almost a year later, the question of compensation was still being bandied about the halls of government, this time at the provincial level. Charles McCrea, Minister of Mines and Member for the Mattagami area, wrote to James Lyons, Minister of Lands and Forests, on August 15, 1924, concerning compensation for the Mattagami First Nation. McCrea related that:

> Representatives on behalf of the Indians in the Northern part of my riding have complained that the Northern Canada Power [Company] have [sic] flooded Mattagami River up to Bear Lake [within the Reserve]; that they have destroyed large quantities of Crown Timber, and have otherwise injured the Indians by reason of the flooding.[76]

The "have otherwise injured" phrase in the above quotation perhaps hints at the real reasons the Mattagami people continued to complain to the Department. Doubtless their concerns went beyond timber destroyed, for they had been forced from their

homes and community and prevented from pursuing an important economic activity, namely trapping. The fact that timber was being stressed so much in the correspondence may reflect, to some extent at least, the views of the Indian agent who would have filtered the Band's complaints into something the Department could recognize as a legitimate grievance: timber had a far greater economic value than traplines.

W. C. Cain, Lyons's Deputy Minister, replied to McCrea in early September that a License of Occupation had been issued to the Northern Canada Power Company Ltd. for the flooding of 4,162 acres of Crown Ontario land, and that "the Power Company was advised that it would be necessary to secure the consent of the Department of Indian Affairs with respect to the flooding of the lands on the Reserve."[77] Still, nothing further was done.

Again, in 1925, members of the Mattagami First Nation asked the Department of Indian Affairs what money, if any, had been received by it from Northern Canada Power for timber destroyed on Indian Reserve land. In reply to this inquiry, J. D. McLean, wrote in a letter dated October 7, 1925:

> I have to state that although compensation has already been made to individual Indians of the band, the question of band compensation and sale of timber has not yet been finally decided. It is very probable that the timber will be sold in the near future and when this is done, the question of a distribution being made to the Indians will be given consideration.[78]

Several months would pass before the question was given further consideration. In the meantime, the power company continued to

supply power to Hollinger from the Wawaitin dam, Aboriginal protests notwithstanding.

The flooding of the Mattagami Indian Reserve illustrates how the legal and political framework established by the federal and provincial authorities worked to the advantage of the system builders and to the disadvantage of the First Nations. With the supposed extinguishment of aboriginal rights through Treaty #9, the power companies were obligated to recognize aboriginal rights only in so far as the Common Law stipulated the obligation to compensate people for lost land and chattels. That meant paying Mattagami band members a small amount of cash for what could have been, and in some cases was, a lost way of life.

Rather than offer compensation for the loss of rights, the federal and provincial governments could have chosen to deal with aboriginal rights within the framework of mutuality of rights. However, the mutuality of rights principle was never invoked in support of First Nations' rights to the waterways because the politicians, bureaucrats and system builders did not consider aboriginal subsistence activities to have any intrinsic value much beyond benefitting a few individuals on a very small scale. Certainly such activities did not benefit "all the people of Ontario" as hydro-electricity and lumbering purportedly did. When comparing aboriginal activities with the "great works" of the system builders, who were supplying the mining and lumbering companies with energy, neither the federal nor provincial government would be sympathetic to aboriginal traditions.

Northern Canada's application to raise the water levels of Lake Kenogamissi in 1921 had been an attempt to address the power shortage problems of the previous few years. It also provided a basis for a settlement of the dispute between the power company and the Hollinger Gold Mine. Eventually the two companies were able to resolve their difficulties but only at the expense of native lands, traplines and fishing spots. As a result, the difficulties between the power developers and aboriginal peoples were unresolved. The cross-current of cultural differences remained but for the power companies, it was virtually inconsequential.

First Nations were not the only ones affected by the increasing power demands of the mining companies. The actual process of hydro-electric development itself was undergoing a dramatic change. The activities of the Canada Northern Power Company and of the pulp and paper companies illustrate the enormous interest in hydro-electric development in northeastern Ontario. Environmental conditions continued to affect system design, causing engineers to devise technological solutions to counteract the ill effects of the northern climates on generating stations. Engineers also turned to technological solutions in order to meet the increased power demands; they promoted more building programs so that more and more water-power sites would be developed. As a result, hydro-electric generation expanded in northeastern Ontario.

However for the period 1911 to 1924, this expansion took place generally according to the needs of individual operators who were more interested in supplying their own specific needs than in broadening their customer base to people outside their area or outside their industry. Thus each operator had its own dam and power supply. No single agency directed power development in an effort to serve a variety of customers as the HEPCO was doing in southern Ontario. Consequently, during this time, the predominant structure of hydro-electric development in northeastern Ontario was one of individual operators controlling individual dams to serve individual purposes.

For example, pulp and paper companies, which were often re-named pulp and power companies, continued to build and maintain their own power generating stations and were probably the largest generators of power in the region. The Smooth Rock Falls generating station is one such example. The station, owned by the Abitibi Power and Paper Company, was of an interesting design because the construction followed the natural contours of the falls. As Jim Morrison describes it, the plant consisted of:

> a circular dam, starting at the west side above the break in the west channel and curving over the top of the island with the toe of the dam just above the break in the east channel. High rock on the west side above the falls made an excellent place to terminate the end abutment. The apron was carried over the gorge on a reinforced concrete arch, and the dam terminated in the power house, which was placed on the east side below the falls. By placing the power house at the bottom, less rock excavation was required.[79]

The engineers building the dam wanted to obstruct the river as little as possible because of the tremendous spring runoff. Thus

they included in their design construction as many large sluiceways as could fit in the river's channel.

The actual power house was ninety-eight feet wide and seventy-four feet deep. The original installation had two 4,500 horsepower generators. The builders installed ice racks and emergency stop log guides behind the large generators, while wooden ice racks were placed at an angle in front of the power house, to divert all submerged logs, driftwood and ice. The Abitibi Power and Paper Co. purchased the Mattagami mill and its other assets in 1927. It then created the Abitibi Fibre Company Ltd. to take over the mill's operations.[80]

In the spring of 1923, the Spruce Falls Power and Paper Company applied to the provincial government of E.C. Drury for the water power lease of Devil's or Otter Rapids, thirty-eight miles northeast of Kapuskasing on the Mattagami River, and of Smoky Falls, another twelve miles down the river. Smoky Falls, according to the company's own estimates, had a potential of 75,000 horsepower.[81]

The Smoky Falls themselves had a drop of about eighty feet. Jim Morrison also provides a description of this station:

> The natural head of water at the falls was 78 feet, but the rock formation on each side of the west channel enabled this to be increased, if necessary, to as much as 144 feet. Because an island divided the river in two, the engineers decided to build a control dam across the east channel and to erect the headworks dam and powerhouse across the west channel, which was to be deepened below the powerhouse. The control dam was approximately 1250 feet long and reached a maximum height of 65 feet. This was done so as to raise the water level 40 feet and secure the final head of 114 feet--the water level being controlled by ten steel gates 40 feet wide and 30 feet high set in a stoney sluice dam. The

> powerhouse was 500 feet long and towered 100 feet above the riverbed.[82]

Three vertical shaft turbines of 20,000 horsepower were installed in 1927 and a fourth was installed a year later. The Smoky Falls generating station was in operation by September of 1927. It was the largest facility to be constructed on the Mattagami River in this early period.[83]

The Spruce Falls Company also received permission from the Department of Lands and Forests to build a control dam at the headwaters of the Groundhog River between Horwood and Groundhog Lakes. Horwood Lake would thus be turned into a storage reservoir.[84] Both of these lakes were well over one hundred miles south of Smoky Falls, yet they became incorporated into the Spruce Falls hydro-electric system.

The pulp and paper companies were in the power generating business to supply their own needs first and then if there was a surplus, to sell the excess to outside customers, usually to local towns or villages. Independent entrepreneurs too, such as Frank Cochrane, the one-time Ontario Minister of Northern Development and a federal member of Parliament, also developed power sources but usually to supply local industries or municipalities. The one exception to this trend was those mining companies that had moved away from building and maintaining their own power supplies. By so doing, they created an opening for businesses, such as Canada Northern Power, owned by Nesbitt Thomson, that existed principally to produce and sell large

amounts of power thus too opening the way for a systematic approach to developing hydro-electricity.

Why the mining companies preferred to buy power rather than produce it themselves, especially given the history of Northern Canada Power's relationship with Hollinger is unclear. It is likely however that the mining companies were trying to reduce their financial risk. Mining companies had to invest several hundred thousand dollars in a mine before they even knew if it would be successful. Naturally they did not want to spend even more money building a power supply that might never be used.

Pulp and paper companies did not carry that level of risk in their operations because they could see their resource, the trees, without having to make any appreciable financial commitment. Because the mines were already risking a lot of money, having to invest further amounts in hydro-electric power would make a precarious situation even worse. Thus, if power companies were willing to share in the risk, the mining companies were more than willing to contract with them for power. Still, this arrangement did have its problems, at least from the mine-owners' point of view.

The mining companies had several complaints about the power companies' operations-- complaints that arose out of technical and business practices of the hydro system builders. In an effort to change these offensive practices, the mining companies wrote letters to the power companies and the provincial government. They also upheld the HEPCO as an example for

Northern Canada or Canada Northern to follow or as a potential competitor. In their campaigns for better service and cheaper rates, they also got support from northeastern municipalities, from northeastern newspapers and from the HEPCO chairman.

Many miner-owners complained that the rates charged by the private power companies were too high relative to rates the HEPCO charged companies in the south. Gordon Taylor of A.E. Osler and Company, a brokerage firm, wrote a letter to the Premier and members of the Ontario Legislature in March, 1923. He pointed out that the mines in northeastern Ontario were charged $50.00 per horsepower whereas the HEPCO was charging its southern customers $12.00 per horsepower. Taylor recommended that the government start supplying power, rather than private utilities. The government had a higher credit rating, which meant that it could get more favourable financing and it could "control and consolidate all the present Power Companies and arrange for proper storage of water, which is so essential for the continuity of Power in Northern Ontario."[85] Taylor's comments about consolidation and storage illustrate his support for a systems development instead of individual plants and his knowledge of environmental conditions in the northeast.

The Northern Miner took up the campaign for cheaper rates in 1926. The newspaper had plenty of ammunition when it learned that Hollinger was being charged $30.00 per horsepower by Northern Canada Power. The Northern Miner suspected Hollinger's favoured status was another component of the out of court

settlement that had been negotiated between the two companies.[86] Most of the gold and silver mines in the Timmins and Cobalt areas were paying between $50.00 and $60.00 per horsepower. This rate included a calculation of the capital cost the power companies invested when building the necessary facilities to supply power to the mines. The capital cost portion of the rates was amortized over ten years, the average life of a mine. If the mine were still operating after ten years, then theoretically its rates should no longer include a capital cost allotment and therefore should drop. Therefore, since these camps were still thriving after twenty years, the mining companies argued, their rates should no longer include a capital investment charge.

Kirkland Lake was in a similar position with the mining companies.[87] Its town council hired a consultant, H.G. Acres, to investigate power rates. Acres concluded that Northern Canada Power [Northern Ontario Light and Power Co] could profitably sell power at $39.00 per horsepower.[88]

In 1925, the Northern Miner criticized the power companies for not extending their transmission lines into the Gowganda area. It noted that mines were suffering from power shortages in that district "yet a few miles away two transmission lines controlled by the Montreal interests are carrying a fraction of their capacity." Nesbitt Thomson insisted that the mining companies build their own transmission lines to the power company's grid. Transmission lines were expensive and only big companies could afford to build them; therefore, smaller outfits,

such as the ones in the Gowganda area, had trouble meeting Nesbitt Thomson's condition. The Northern Miner recommended that the power company reverse this policy and build lines into the mining properties, noting that mining companies had already invested hundreds of thousands of dollars in building up their camps.[89]

In addition, with the building of new generating stations in both Ontario and Quebec and the linking up of various systems, the Northern Miner, fully cognizant of economies of scale,[90] argued for a reduction in power rates on that basis alone:

> If power costs were cut, much wider application of electricity would be possible and it would not be hard to visualize a consumption of 15,000 hp in Kirkland. Hydro electric power is one of those things the cost of which rapidly declines as production mounts and Kirkland operators hope this point will appeal to the Nesbitt Thomson interests, whose hope of big profits rests in selling as much energy as possible.[91]

With criticism levelled at Nesbitt Thomson, the other system operator in Ontario, the HEPCO, might have used this opportunity to enter the northeastern hydro-electric market; however, the HEPCO remained aloof from these complaints, despite the fact that some prominent residents of northeastern Ontario had been urging government involvement from the early 1920s. They supported Gordon Taylor in his belief that the government should replace the private developers in building the power infrastructure in northeastern Ontario. In 1924, the editor of the Cochrane newspaper, Otto Thorning, pointed out the Quebec policy of developing its northern hinterland and then chastised the

Commission for refusing to do the same. He was equally critical of a scheme promoted by Premier Howard Ferguson to divert water from the Moose or Albany river systems into the Great Lakes in order to provide more power for the Niagara Falls generating stations. Clearly, this proposal was an attempt to supply power to southern consumers at the expense of the north. The diversion did not take place during Ferguson's tenure but did occur ten years later when the Kenogami and Ogoki Rivers were diverted into Lake Nipigon and Lake Superior, both for hydro purposes and to raise the level of the Great Lakes.[92] Nevertheless, it illustrates that the HEPCO was aware of northern water power potential.

With the entry of Nesbitt Thomson into the northeastern region, northern citizens were aware that hydro-electric systems operated differently from individualized hydro-electric generating stations. They were concerned that eventually existing private power companies in the north would merge into one large corporation, thereby creating a monopoly over the power supply, leading to even higher power rates.[93] In order to avoid further increases, the Cochrane Board of Trade, in September 1924, passed a resolution urging the HEPCO to carry out all future development and distribution of water power in northern Ontario at cost and to prevent any further development of power in the region by private enterprise.[94]

Board representatives met with the Premier in early 1925 but to no avail. Ferguson's attitude towards public power was

ambiguous: while he believed that the HEPCO was a successful enterprise because hydro-electricity was a "natural monopoly," he was not convinced that public ownership in general was an effective way to promote northern resource development and create new jobs.[95] Ferguson wrote to Charles Magrath, the HEPCO chairman arguing that:

> ... Hydro is based upon the principle of municipal ownership, and in the north country organized municipalities are so few and scattered that the scheme could not possibly fit in to the conditions. To ask a few struggling communities to carry the whole cost of development would make prices prohibitive.
>
> I have never favored the development of power for the service of private corporations alone. That simply means you are loaning money to the corporations....[96]

Despite this rebuff from Ferguson, the Cochrane Board of Trade did have an important ally within the HEPCO organization: Charles Magrath, who succeeded Sir Adam Beck as chairman in 1925. Prior to his appointment, Magrath had served as chairman of the Canadian section of the International Joint Commission. A surveyor by profession, Magrath had mapped many of the rivers in Western Canada between 1878 and 1885 and investigated possible routes for highways in Ontario during Whitney's term as Premier. His appointment was characterized as "a waterways man for waterpower development." Indeed, upon accepting the appointment, Magrath agreed to pursue Beck's policy of ensuring "the development and putting to use of every feasible source of power for electrical energy to be distributed throughout the municipalities of this province."[97] Almost immediately after assuming the chair, Magrath began to take an

active interest in pursuing expansion of the HEPCO system into the northeast. There was though, one significant obstacle to northeastern expansion.

Before 1925, the Commission had adhered to its initial focus of supplying power to municipalities rather than to industries. Because of the paucity of municipalities in northeastern Ontario, the HEPCO was not structurally organized to supply power in this region. Consequently, despite a vigorous campaign by northerners for public power, the southern based urban/industrial hydro-electric system refused their entreaties. Interestingly, in 1921 the Commission had built a plant at the mouth of the Nipigon River on Lake Superior but this had not necessitated any organizational changes to the HEPCO because, just as in southern Ontario, this plant supplied power to organized municipalities, in this instance at Thunder Bay. Nevertheless, the Nipigon development represented the HEPCO's first entry into northern Ontario and Magrath tried to use it as a beachhead for further expansion into the north.[98]

In 1926, northern municipalities continued their campaign for cheaper rates, with some calling for the takeover of all power development by the HEPCO. The town of Timmins, which paid a gross lighting rate of twelve cents per kilowatthour as compared with two cents per kilowatthour in Toronto, hired an engineer to investigate the costs of power, heat and light in the municipality. In Cochrane, hydro rates became an election issue. The town council had negotiated with Abitibi Power and Paper for

a supply of power set at $50.00 per horsepower. The residents objected, stating that the power cost $30.00 per horsepower to purchase and therefore they should not be charged any more than $35.00 per horsepower. Proponents of the Abitibi deal feared that if the $50.00 rate was not accepted, the Abitibi company would refuse to set up its mill in Cochrane. During the municipal elections, the residents ignored this gloomy prediction and refused to ratify the deal, voting instead for cheaper rates. The Northern Miner commented that: "It is a pitiful thing that the north, advertised rightly as a land of unbounded waterpower wealth, should have to pay eight, ten and twelve cents per kilowatthour for domestic lighting against two, three or four cents per kilowatthour in Southern Ontario."[99]

Finally, the Northern Miner called upon the government to safeguard the rights of the public more than it had in the past. It declared that "there is one thing that the people of the North are thoroughly decided on and it is that no more water power sites" should be sold to private developers unless more security is given to the public interest. The newspaper recognized that "Northern people rejoice to see public water power sites handed over to pulp and paper people who erect huge mills, increase employment, and add to the wealth of the country" but, according to the editor, northerners were "fed up with the handing over to private developers of valuable power sites for the exploitation of the general public through high charges for industrial and domestic light and power."[100]

Meanwhile, the northeastern gold and silver mines continued to press the Canada Northern Power Company to lower its rates to the "Ontario average."[101] In February, the power company informed the Premier that it was going to lower the rates in order to make the prices "uniform in all the communities we are serving in the North Country." This was in spite of the fact that the companies had signed contracts for power at a set rate for the life of the mines.[102]

The mining companies also complained about poor service. Mr. D.R. Thomas, manager of Argonaut Consolidated Gold Mines, complained to Nesbitt Thomson on September 30, 1927:

> Today the power has been off five or six times. The last time at 3:25 in the afternoon and we are advised by the substation at Kirkland Lake that the trouble is probably caused by some leaky insulators on the Argonaut line....
>
> It may be recalled that the matter of these broken insulators was drawn to the attention of both Mr. Harrison and Mr. Cadman by the writer over the telephone at various times and as much as five weeks ago.
>
> We further understand that the first shut down this morning was caused by something wrong with the lightning arrestors at the Northland Mine. This trouble, we understand, is of long standing and we believe that if proper supervision is being exercised no doubt these troubles could be avoided, with the consequent saving of many hundred dollars in expense to us.

Mr. Thomas ended the letter by noting that a copy of it had been sent to the provincial government.[103] H.V. Harrison, General Manager of Ontario Light Heat and Power, responded to Thomas's complaints, stating that they had spent many hours and much money replacing defective insulators that had originally been installed by the Argonaut gold mining company before the power company took over the line.[104]

Despite these complaints and entreaties, both the government and the HEPCO, apart from Magrath, remained unmoved, although Premier Ferguson did respond to the correspondence from the north that came his way and wrote to Nesbitt Thomson several times asking for explanations of the complaints. After one such inquiry, A.J. Nesbitt, the Nesbitt Thomson president, informed Ferguson that during 1927, his company had spent over $1,000,000 on new lines and new equipment in the Kirkland Lake area and that in his opinion, "if it were not the desire of one or two parties in Kirkland Lake to make a political issue of this situation, for the sake of trying to reduce the rates, we would have no trouble whatever."[105] The government believed that the mining companies could see to their own interests and the HEPCO believed that there were neither enough municipalities in the region to pay for the cost of a government-run system nor enough businesses to warrant the operation of two large power systems in the field.[106]

From the 1920s onwards, hydro-electric development in northeastern Ontario began to change from a collection of individual generating stations to a system that came increasingly under the control of one company: the Nesbitt Thomson Corporation. This private organization, not a public one, was dedicated to serving customers in the north rather than diverting power to southern municipalities and factories. The HEPCO, as a municipally based organization, stayed out of the north country largely because of structural impediments. In the race to catch

up with increasing demands, and undoubtedly to prevent the intrusion of public power, private companies, such as Northern Canada and its successor, Canada Northern, attempted to meet the needs of the mining companies by building new generating and transmission facilities and interconnecting old ones. The Northern Canada Power Company had also raised water levels in its Wawaitin dams in order to obtain more generating capacity. In the process of expansion, the power companies had to contend with adverse environmental conditions, especially drought, and court challenges.

Thus, the interweaving of technology, the natural environment and legal decisions encouraged a systems approach to hydro-electric development. The engineers responded to drought and demand by placing more technology on the landscape-- more and larger generating stations, more and longer transmission lines. Yet technology could not solve all the problems engendered by hydro-electric development. It had no solutions for Native People, for hydro-electric technology catered to the needs of miners and pulp mill operators, politicians, bankers and investors, not to fish harvesters and trappers.

The demands for increasing amounts of power led to greater environmental intrusion into, if not degradation of, the north's water systems, disrupting Aboriginal lives and livelihoods. One example of this increasing intrusion was the flooding of the Mattagami Reserve. The power company and the Department of Indian Affairs responded by offering compensation, as was

required under Common Law, for loss of land to the Mattagami First Nation. The amount of compensation that the department deemed adequate was determined by the political influence, or lack thereof, of the First Nations and by the perceptions of the government of what the land was worth in its "undeveloped" state.

Notwithstanding the negative effects on the environment and First Nations, once certain environmental constraints were alleviated by technological innovation, waterpower became the cheapest and most abundant energy source available to the mining and pulp and paper companies of the region. With the growth of these industries, the demand for hydro power increased exponentially, opening the way for bigger consortia of power interests.

Nesbitt Thomson was the first large-scale power company to enter the northeastern region. Its entry, in 1924, into northern Ontario signified a new stage in the development of hydro-electricity in northern Ontario, for A.J. Nesbitt believing in empire building, sought to monopolize the power supply across northern Canada. Also, the Nesbitt Thomson Corporation already owned several generating stations in Quebec and planned to link them with stations in Ontario, thereby establishing an impressive electrical grid. Yet the complaints against Nesbitt Thomson brought forward to the government from mine-operators unhappy with supply or prices, coupled with the rise of the HEPCO in southern Ontario, always raised the spectre of government intrusion into the northeastern power market.

In 1926, Nesbitt Thomson appeared to have headed off the HEPCO's entry into northeastern Ontario, for a market large enough for two major electrical systems did not seem to exist. Certainly, this was the HEPCO's evaluation of the situation. Yet the position of the large privately-owned company was secure only for a short time. The mining companies, Nesbitt Thomson's biggest customers, continued to complain about its policies and protested vociferously whenever they did not get a secure source of supply at a reasonable price. When Nesbitt Thomson failed to meet these criteria for supply, advocates of public power campaigned to have the HEPCO move north. The HEPCO was slow to respond, believing that there was no market for its power.

Yet by 1930, Premier Howard Ferguson had a change of heart and finally pushed the HEPCO into the region as part of his strategy for northern development. Ferguson's initiative illustrates that technical systems, especially government sponsored ones, are created by politicians as well as by system builders. By this time, politicians, among others, believed hydro-electricity was the greatest engine of progress and a great symbol of civilization. Not everyone so enthusiastically embraced this development philosophy; the Mattagami First Nation pressed the HEPCO and the federal government for a redress of their grievances over the flooding of their lands. Neither agency did more than investigate the question of compensation; nothing more could be expected given that both agreed with the provincial government's goals of development and beliefs in

progress and civilization. It is these issues, the political currents, that will be discussed in the next chapter.

NOTES

1. Ontario Hydro Corporate Archives, Speeches, "Saving Hydro Power for Victory," Dr. T.H. Hogg at the Royal Canadian Institute, December 5, 1942.

2. "Hydro-Electric Development in Ontario," The Canadian Engineer, Vol. 30, March 23, 1916, p.383.

3. John Dales, Hydroelectricity and Industrial Development: Quebec 1898-1940, (Cambridge: Harvard University Press, 1957), p.193.

4. What was considered "economical transmission distance" would be determined by a variety of economic factors including cost of transmission poles and lines and the cost of clearing the right of way but also by technological capabilities of the transmission system. In 1911 when Sir Adam Beck connected Toronto with the generating station at Niagara Falls, the transmission distance was 130 kilometres, considered an extraordinary distance at the time.

5. "Hydro-Electric Development on the Saluda River, near Greenville, South Carolina," The Canadian Engineer, Vol. 20, May 11, 1911, pp.687-89, p.687.

6. Ibid.

7. Ibid., p.689.

8. "Hydro-Electric Plant on the Vermillion River, Ontario at Watageshick Falls, installed in 1908 by Allis-Chalmers-Bullock Co. for Mond Nickel Co.," The Canadian Engineer, Vol. 20, May 18, 1911, pp.699-706, p.702.

9. "Ice Troubles in Hydro-Electric Plants," The Canadian Engineer, Vol. 27, November 26, 1914, pp.693-4.

10. "Canadian Hydraulic Power Problems," The Canadian Engineer, Vol. 29, November 18, 1915, pp.584-85, p.585.

11. Ibid.

12. "Hydro-Electric Plant of Unusual Design," The Canadian Engineer, Vol. 32, January 25, 1917, p.88.

13. "R.M. Wilson Discusses Design of Hydro-Electric Power Plants for Combatting Ice Troubles," The Canadian Engineer, Vol. 36, February 20, 1919, pp.237-242, p.238.

14. Ibid., p.239.

15. "R.M. Wilson Discusses Design of Hydro-Electric Power Plants for Combatting Ice Troubles," The Canadian Engineer, Vol. 36, February 20, 1919, pp.237-242, p.239.

16. Lt.Col. C.H. Mitchell, "Canadian Hydraulic Power Problems," The Canadian Engineer, Vol. 29, November 18, 1915, pp.584-585, p.584.

17. T.W. Gibson, "Utilization of Water Power for Mining and Industrial Purposes in Ontario," The Canadian Engineer, Vol. 29, December 16, 1915, pp.698.

18. J.M. Robertson, "Possibilities of the Relief of Fuel Consumption in Canadian Industry by the Increased Use of Hydro-Electric Energy," The Canadian Engineer, Vol. 34, March 28, 1918, pp.280-81, p.281.

19. H.V. Nelles, The Politics of Development: Forests, Mines and Hydro-Electric Power in Ontario, 1849-1941, (Toronto: Macmillan of Canada, 1974), p.218.

20. H.E.M. Kensit, "Electric Energy from Large Power Plants," in The Canadian Engineer, Vol. 48, #15, April 14, 1925, pp.396-398, p.397. Load factor is the percentage of the average amount of power consumed during the entire day divided by the amount consumed during peak periods.

21. Editorial, "The Conservation of Water Power," in The Canadian Engineer, Vol. 34, April 4, 1918, p.305.

22. The Northern Miner, May 14, 1921, "More Power for Porcupine."

23. H.V. Nelles, The Politics of Development, p.217.

24. James Morrison, "Colonization, Resource Extraction and Hydroelectric Development in the Moose River Basin: A Preliminary History of the Implications for Aboriginal People," Report for the Moose River/James Bay Coalition, Intervenors in the Environmental Assessment Hearings of Ontario Hydro's Demand/ Supply Plan, November, 1992, p.38.

25. Ibid., p.38f.

26. See various letters in GSI OR-410.1 General, Hydraulic Water Storage (Watershed) Vol. 4, c1906-c1917. HEPCO sent out surveyors to investigate water powers throughout Ontario, for example, A.D. Griffin was sent out in 1906 to survey the Montreal, Blind, Agawa and Spanish river systems in the Sault Ste. Marie area.

27. Morrison, "Colonization," p.38f.

28. "The Wawaiten Falls and Sandy Falls Hydro-Electric Power Plants," The Canadian Engineer, Vol.27, July 23, 1914, pp.202-03, p.203. See Appendix II for photograph of Sandy Falls generating station.

29. Ministry of Natural Resources, (MNR), Land Management Branch, Titles Section, Ontario Crown Lease #1830, March 15, 1911.

30. The Northern Miner, "Alex. Fasken Dies in Accident," September 21, 1944.

31. "The Wawaiten Falls and Sandy Falls Hydro-Electric Power Plants," The Canadian Engineer, Vol. 27, July 23, 1914, pp.202-03, p.202. See Appendix II for photograph of the Wawaitin generation station.

32. The company's name was changed to Northern Canada Power after the Nesbitt Thomson buyout.

33. S.A. Pain, The Way North: Men, Mines and Minerals, (Toronto: The Ryerson Press, 1964), p.218.

34. H.V. Nelles, The Politics of Development, p.363.

35. Pain, The Way North, p.218.

36. Morrison, "Colonization," p.58.

37. The Northern Miner, "Gold Output Down One Half Million but Exchange makes Record Year," February 26, 1921.

38. The Northern Miner, "Hollinger Sues Power Company for Damages," March 5, 1921.

39. The Northern Miner, "Labour and Power Situation Better-- Zinc Find Made," November 6, 1920. The Northern Miner was a weekly newspaper devoted to publishing information on mineral finds and developments. The owners and editors were the Pearce brothers, influential businessmen, supporters of the Conservative party and boosters of northern resources and communities. Despite its motto: "On the level" the Pearce brothers used their newspaper to present their own political views on various subjects including private vs. public power development and mining legislation.

40. The Northern Miner, "What Power Shortage has done in Cobalt," January 8, 1920 and "To Cut at Porcupine," November 13, 1920.

41. The Northern Miner, "Normal Power Supply Returns to Kirkland Lake," January 22, 1921.

42. The Northern Miner, "Power Supply at Porcupine Must Be Increased," December 25, 1920.

43. The Northern Miner, "Hollinger Sues Power Company for Damages," March 5, 1921. The situation was even more serious in 1922 and 1922-23, when 305 days in all were lost. The company claimed that its total loss of production in 1922-23 alone was 522,778 tons, valued at $4,261,559, Morrison, "Colonization," p.66.

44. Ibid.

45. The Northern Miner, "Is Big Power Battle Warming Up?" September 15, 1923.

46. The Northern Miner, "Judgment says Hollinger Must Take Private Power," May 3, 1924.

47. Morrison, "Colonization," p.72.

48. Ibid., p.73.

49. The Northern Miner, "May Get $6 Millions in Power Settlement," May 9, 1925. See Appendix I for map illustrating the hydro-electric system in northeastern Ontario during the 1920s and 1930s.

50. Ibid.

51. Ibid.

52. MNR Land File #36881, Letter, Alexander Faskin, Northern Canada Power Company Ltd., to the Hon. Beniah Bowman, Minister of Forests and Mines, February 4, 1921. The Northern Canada Power Company Limited assumed Crown Lease #1830 covering the Wawaitin Falls power site from E. A. Wallberg.

53. MNR Indian Land File #39414, L. V. Rorke to Albert Grigg, Deputy Minister of Lands and Forests, March 11, 1921.

54. Ibid., Albert Grigg to Alexander Fasken, Northern Canada Power, March 18, 1921.

55. NAC, RG 10, Vol. 7835, File 30065-3, H. J. Bury, Supervisor of Indian Timber Lands to Acting Deputy Superintendent General, August 5, 1921.

56. Ibid.

57. Ibid.

58. Ibid.

59. Ibid.

60. Ibid., A. F. MacKenzie, Acting Assistant Deputy and Secretary to J. H. Black, Northern Canada Power Company Ltd., August 8, 1921.

61. Ontario Native Affairs Secretariat (ONAS) Files, A. F. MacKenzie, Acting Assistant Deputy and Secretary of Department of Indian Affairs to J. H. Black, Northern Canada Power, August 9, 1921.

62. NAC, RG 10, Vol. 7835, File 30065-3, H. J. Bury, Supervisor of Indian Timber Lands to the Acting Deputy Superintendent General of Indian Affairs, August 11, 1921.

63. Ibid., Acting Deputy Superintendent General of Indian Affairs to Sir James Lougheed, Superintendent General of Indian Affairs, August 12, 1921.

64. Ibid., A. F. MacKenzie, Acting Assistant Deputy and Secretary of Indian Affairs to T. J. Godfrey, Indian Agent, October 20, 1921.

65. Ibid., Chief James Naveau, Mattagami Reserve to Hon. Sir J. A. Lougheed, Minister, Department of Indian Affairs, October 1, 1921.

66. Ibid., A. F. MacKenzie to Chief James Naveau, October 6, 1921.

67. MNR Land File #36881, C. V. Gallagher to J. H. Black, Northern Canada Power, October 27, 1921.

68. Ibid., J. D. McLean, Assistant Deputy and Secretary of Department of Indian Affairs to Northern Canada Power, February 13, 1922.

69. Ibid., J. H. Black, Northern Canada Power to J. D. McLean, February 16, 1922.

70. Ontario Hydro Public Reference Centre, Brad Morse and Stephen Aronson, "The Potential Impact of Ontario Hydro's Demand/Supply Plan on Aboriginal and Treaty Rights," unpublished, November 1991, submitted to the Ontario Hydro Demand/Supply Plan Environmental Assessment Hearing, p.50.

71. Grey Owl, Pilgrims of the Wild, London: Lovat Dickson and Thompson Ltd., 1935, p.10. Many thanks to Donald Smith for this reference.

72. Meeting with Ray Baril, Manager, Aboriginal and Northern Affairs, Ontario Hydro, July 21, 1992, 2:00 to 3:30 pm.

73. ONAS Files, Letter, Chief James Naveau to T. J. Godfrey, Chapleau Indian Agent, August 17, 1923.

74. Ibid., T. J. Godfrey to A. F. MacKenzie, Acting Assistant Deputy and Secretary of Indian Affairs, August 24, 1923.

75. Ibid., A. F. MacKenzie to T. J. Godfrey, September 24, 1923.

76. MNR Land File #36881, Hon. Charles McCrea to Hon. James Lyons, August 15, 1924.

77. Ibid., W. C. Cain, Deputy Minister, Lands and Forests to Hon. Charles McCrea, September 6, 1924.

78. ONAS Files, Letter, James Ward and William Naveau to J. D. McLean, Assistant Deputy and Secretary, Indian Affairs, September 30, 1925; T. R. L. MacInnes to J. Ward, October 7, 1925. The timber was eventually sold to the Fesserton Timber Company in 1928. NAC, RG 10, Vol. 7835, File #30065-3, A. F. MacKenzie, Acting Assistant Deputy and Secretary to the Fesserton Timber Company, June 6, 1928.

79. Morrison, "Colonization," p.80.

80. Ibid.

81. Ibid., p.84.

82. Ibid., p.86f.

83. Ibid., p.81f. The Smoky Falls dam remained under the control of the Spruce Falls Power and Paper Company until 1989, when Ontario Hydro reached an agreement with the Company to acquire it, subject to certain environmental considerations. In the fall of 1991, the acquisition was confirmed as part of the worker buyout of the Spruce Falls mill.

84. Ibid., p.93f.

85. AO RG 35 Series 1 Box 7, General Correspondence of Colonel the Hon. D. Carmichael 1920-1923, OH File 23, Letter, Gordon Taylor of A.E. Osler and Co. to the PM and MPPs of Ontario, March 16, 1923.

86. The Northern Miner, "Is Price Cut in Mine Power Coming?" April 3, 1926.

87. The Northern Miner, editorial, "Its Time," May 1, 1926.

88. AO, RG 3, Ferguson Papers, Letter, H.G. Acres to Howard Ferguson, July 21, 1927.

89. The Northern Miner, "What about Power for the Smaller Mines?" April 25, 1925.

90. The importance of the economies of scale model was identified by Samuel Insull who argued that an increase in power consumption meant a decrease in the cost of hydro-electric generation, that is the more power customers used, the less they paid per unit of power. This costing arrangement favoured the larger companies because they could generate more power than smaller ones. See Harold L. Platt, The Electric City: energy and the growth of the Chicago area, 1880-1930, (Chicago: University of Chicago Press, 1991).

91. The Northern Miner, "Paying Too Much," May 22, 1926.

92. Morrison, "Colonization," p.109.

93. By 1925, the number of power developers, apart from pulp and power companies, had been reduced to Northern Canada Power, which operated in north Temiskaming and in Quebec and the Northern Ontario Light and Power Company which operated in the south of the Temiskaming district. Both these companies were owned by Nesbitt Thomson.

94. Morrison, "Colonization," p.110.

95. Peter Oliver, G. Howard Ferguson: Ontario Tory, (Toronto: University of Toronto Press, 1977), p.152.

96. AO MU 1027 Ferguson Papers Box 11, HEPC, Letter, Premier Ferguson to HEPCO Chairman C.A. Magrath, April 13, 1927.

97. GSI OR 901.01 Archives Biographical Files, C.A. Magrath.

98. Morrison, "Colonization," p.110.

99. The Northern Miner, "Power Prices," January 15, 1927.

100. The Northern Miner, editorial, "Water Power Must be Safeguarded," October 16, 1926.

101. The Northern Miner, "Towns Now After Cheap Light," July 3, 1926.

102. AO, MU 1028, Box 12, VIII HEPC, Ferguson Papers, Letter, A.J. Nesbitt, President, Thomson and Co. to Premier G. Howard Ferguson, February 5, 1927.

103. AO, MU 1028 Box 12 VIII HEPC, Ferguson Papers, Letter, D.R. Thomas to Northern Ontario Light and Power Co. Ltd., September 30, 1927.

104. Ibid., Letter, H.V. Harrison, General Manager, Northern Ontario Light and Power Company Ltd. to D.R. Thomas, Manager, Argonaut Consolidated Gold Mines, October 1, 1927.

105. AO, Ferguson Papers, MU 1028 Box 12, VIII HEPC, Letter, A.J. Nesbitt, President, Canada Northern Power Corporation to Premier G. Howard Ferguson, October 6, 1927.

106. Ibid., Letter, C.A. Magrath, HEPCO Chairman to Premier Ferguson, October 29, 1928.

CHAPTER THREE

So far we have seen how legal changes and technical innovations laid the framework for hydro-electric development to take place in northeastern Ontario. We have also seen how consumer demands encouraged greater development leading to the beginnings of a systems approach for hydro-electric development and to greater intrusion on First Nations and the environment. This chapter now intersects these currents with the decisions made by engineers and politicians that socially determined the shape of the system. System builders sought to consolidate the northeastern power resources into one big system and for them, the debate revolved around whether that system would be privately or publicly owned. Politicians wavered over supporting a northern power system to either assist regional development or to overcome power shortages in the south. This aspect of the system's development places the political quandary within the context of metropolitan/hinterland relations. If the politicians were to use hydro-electricity to promote northern development, then an argument could be made that metropolitan influences benefitted the north, at least according to those who supported an industrial economy. If, on the other hand, the politicians chose to use northern waters for southern needs, as they contemplated doing in northwestern Ontario, then there would be few tangible benefits for the north arising out of its connection to the south, through the networking of its waterpower resources.

A.J. Nesbitt, a director of Nesbitt Thomson and President of the Canada Northern Power Company, had big plans for developing

the north. He revealed his ambitions in a letter to Ontario's Premier in May 1926 where he stated that his company would take over the Northern Ontario Light and Power Company then operating in the Kirkland Lake District. When the takeover was complete, he would then merge that system with the Mattagami River plants, thus enabling Nesbitt Thomson to "have an interchange of power between the various systems, which should be beneficial to the different mining districts."[1]

Certain sectors in Ontario remained critical about the takeover of northeastern power companies by Nesbitt Thomson. Many northern mining companies continued to doubt that it would give better service than the previous power suppliers. Nesbitt informed the Premier that:

> I find that both this week and during my absence The Northern Miner seems to be carrying on a campaign against the Company, and which was never carried on while the property was controlled in the U.S. It seems rather unfortunate that when Canadians purchase a Hydro-Electric Company, 90% of which was owned in New York, a campaign should be carried on against it.
>
> I thought I would draw this to your attention and let you know that we are giving every consideration to the situation in the North Country with a view to giving the best service possible at as low a price as possible.[2]

Members within the HEPCO too were unenthusiastic, especially Charles Magrath. In August 1928, Magrath wrote Premier Ferguson once again proposing that the Ontario Government undertake the responsibility for developing hydro-electric power in northern Ontario. He argued that: "it is very generally accepted that Northern Ontario has vast undeveloped wealth, and Hydro electric power will play an important part in that development." While

admitting that the present structure of the HEPCO was ill-suited for expansion into "unsettled territory," he still advocated that it do so on the grounds that private development occurred only in locales of particular interest to private developers. To Magrath, the private companies would not "take a broad view of the entire field and seek a distribution of power which will enable the greatest amount of wealth being produced therefrom." This "criticism" may have been true of the smaller power producers or those interested in serving local needs. However, a large company such as Nesbitt Thomson was very much interested in and capable of designing a power system to secure "the greatest amount of wealth" possible. Given Magrath's long service in government agencies, it is not surprising that he would support the HEPCO over private development. His perception of the situation may have owed more, then, to his ideological commitment to public power or to empire-building than to the objective truth.

Magrath also noted that complaints had reached the Commission that power distribution in northern Ontario benefitted larger companies more than smaller ones. He criticized this feature of private development and noted that if the government were to develop the hydro powers, then all interests would be put on the same basis. Acknowledging that "the Government would doubtless have to carry interest charges on power plants for a few years and later on make good the shortages," Magrath commented that private companies would have to do the same thing

thus the Government's responsibilities in this regard would not be unusual.[3]

Chairman Magrath's campaign to move the HEPCO north did not always have the enthusiastic support of his engineering team. T.C. James, Assistant Engineer, informed the Chief Engineer about hydro-electric potential in the north; he pointed out there were already several private power companies in northeastern Ontario: the Wahnapitae Power Company operated three generating stations on the Wahnapitae river to supply power to the town of Sudbury and some of the mines; the Mond Nickel Company operated a generating station on the Vermillion River to assist in its own operations, while the Spanish River Pulp and Paper Company supplied its own power needs for its mills at Nairn and Espanola; finally International Nickel owned stations on the Spanish River that provided power to its mine at Copper Cliff. James also pointed out that the Northern Ontario Power Company had the "Cobalt, Kirkland Lake and Timmins mining areas completely within its grasp." With all of these private power companies already supplying power to the various municipalities and industries in northeastern Ontario, James did not see a potential market for the sale of HEPCO power if it were to move into the area, unless "the existing holdings of the Nesbitt Thomson Corporation, controlling this power corporation, [Northern Ontario Power] be obtained."[4]

Premier Ferguson himself was opposed to the HEPCO moving north because of the demographic and economic differences between

north and south. Responding to Magrath's proposal to move the HEPCO north, Premier Ferguson reiterated his reservations about northern expansion in a letter to Magrath in 1928. He stated:

> Of course you know the basic difference in introducing hydro in Northern Ontario is that there are very few organized municipalities that could assume the cost of any substantial load. Moreover, their distances apart are so great that the costs of transmission would add greatly to the price of power. As a matter of fact, in most cases it would simply mean that the Government was loaning the money necessary for power development to private corporations and industries, rather than to municipalities.... There is just at the moment a very large mining organization applying for a number of powers, in particular the Mississauga powers....[5]

In Ferguson's mind, any public power development in northeastern Ontario would constitute a direct subsidy to mining and paper companies that he thought should look after their own energy requirements.[6] He argued that the present government policy was adequate to support power development in northeastern Ontario. The government granted industries developing natural resources the right to develop, for their own use, any water powers that were conveniently located for their needs, provided the water powers were not required by any municipality.[7] For these reasons, Ferguson opposed the HEPCO's expansion into northeastern Ontario.

Still, the Chairman remained convinced about the necessity of moving north and continued to pressure the Premier. In November 1928, Magrath forwarded to the Premier a memo that had been drafted by Frederick Gaby, Chief Engineer of the HEPCO, concerning water power development in northern Ontario that urged that the water powers be developed into one system by one

developer, preferably, the HEPCO, in order to ensure the most efficient development of these sources and the most equitable distribution of the power generated.

Gaby was the HEPCO's chief engineer from 1912 to 1934. As chief engineer, he was in complete charge of engineering matters and reported directly to the Commission. Hired by Beck, Gaby was in effect the architect of the HEPCO's immense power plant developments and transmission systems and assisted Beck in warding off the many critics of public power by supplying him with technical papers and statistical data he could use as proof of his claims that public power was an asset to the Province. Along with Harry Acres, Gaby designed the Queenston-Chippawa plant (now Sir Adam Beck One) and the accompanying 110,000 volt transmission line from Niagara to Toronto, which was the first time 110,000 volt lines had been used for long distance transmission.

The transmission line was a marvel of electrical engineering at the time because of Gaby's and Acres's technological innovations in improved insulator and tower design and in the steel-cored aluminum cable employed to withstand wind-induced vibrations. For this and other constructions, both men were highly respected among their peers and both were given honourary doctorates by the University of Toronto in 1924. Principal Falconer in conferring the degrees stated that they had been responsible,

> both in the technical and administrative fields for making available for us in our daily life the great forces of

> nature that are among the assets of this Province. By the application of science these latent powers have been made contributory to the welfare of the people of the Province through its length and breadth....[8]

As a campaigner for public power from the earliest days of the HEPCO, it follows that Gaby would advocate a similar policy for northern Ontario.

Gaby advocated monopolistic development because he believed that the advantages particular to some power sites could be fitted together to counter-balance the deficiencies of others, to better regulate loads and co-ordinate the flow of water from the poundage area through the dams during peak periods, and to co-ordinate more customer loads within one system, thus balancing larger capacity plants with plants of lesser capacity.

Gaby went on to say that the benefits resulting from the complete control and development of the power sites of a single river by one organization would be magnified if a similar co-ordination of all the various rivers into a super power scheme were to occur. He argued that it was necessary to unite the planning for the development of this super power scheme as soon as possible, before individual power developments made the cost of system planning prohibitive.[9]

Ferguson remained unpersuaded by these technical arguments so in 1929, Magrath switched tactics; no longer did he argue about technical efficiencies. Instead, he informed the Premier that there was a growing concern on the part of southern Ontario municipalities about possible impending power shortages.

According to HEPCO analysts, Southern Ontario was going to need an additional 1,000,000 horsepower over the next twelve years. Doubtless, Magrath was aware of the political ramifications if the south were to run out of power. Magrath pointed out that approximately 400,000 horsepower was available in the northeast that was within reasonable transmission distance of the Sudbury District. If this power were to be developed, then it could be used first to supply the Sudbury and North Bay districts with their power needs with any surplus being sent to southern Ontario.[10]

Towards meeting the needs of both the northeastern region and the south, Magrath recommended that as a start, the HEPCO acquire the assets of the Wahnapitae Power Company.[11] This Company had been started by William McVittie in partnership with Frank Cochrane. McVittie had become wealthy through the sale of various mining properties and in the process had acquired the deed to the power site on the Wahnapitae River. The power site supplied the town of Sudbury with 120 kilowatts of power.[12]

Magrath's new proposal received the support of the engineers within the HEPCO who by 1929, had determined that power needs in the north itself were growing quickly-- Canada Northern Power supplied 17,800 horsepower to the mines in 1921 and 56,160 in 1930[13]-- but not so quickly as to warrant the initiation of further or new construction. Rather, they planned to enter the northern market incrementally by buying out those existing power suppliers who served both an industrial and a municipal market.

Hence their support for Magrath's proposal. This strategy was in keeping with the original purpose of the HEPCO to supply power to municipalities and in keeping with the previous policy of growing through acquisition, as the HEPCO had acquired the Toronto Electric Light Company and others in southern Ontario.

Magrath also got some support, if only vicariously, from mine-owners in the Kirkland Lake area who protested that their supply of ore was secure and therefore the rates set by Canada Northern Power on the basis of high risk were unfair. In response, Nesbitt wrote to the premier, arguing that his power rates were reasonable because risks were still a reality in other mining areas in which his companies supplied power. As examples, Nesbitt explained that the Argonaut Gold Company had purchased power at a cost totalling $3,284 a month and the Tough Oakes had paid them $4,195 a month; now that revenue was gone because these particular mines had closed down. He also informed the premier that his company's revenue in the Cobalt District had dropped nearly $20,000 a month in the last three years. With losses in revenue such as these, Nesbitt argued that he could not reduce his rates below what was already being offered without losing the confidence of his shareholders and of his creditors, many of whom resided in Toronto and Montreal. This last point was made no doubt to remind the premier that Canada Northern was supported by powerful members of the electorate. Furthermore, in keeping with the political bent of the letter, Nesbitt concluded by sounding the nationalist's horn:

> It is unfortunate that this trouble should have started when the control of the Northern Ontario Power Company was brought back from New York to Canada. The Company was formerly run from New York, but now we have a General Manager on the job with authority to act. We are spending money on plant, we are giving good service to our customers, we are trying to please them in every way, and we are building up a good strong prosperous Canadian Company....[14]

The recalcitrant mining companies refused to accept his arguments. The Kirkland Lake Gold Mining Co. pressured Canada Northern to lower its rates by writing to the premier in February, 1929. J.B. Tyrrell, managing director of the company, complained:

> We consider that we have been paying an exorbitant rate for power for a number of years past, but as the only alternative left to us is to develop our own power from high priced fuel, we have been obliged to submit. The "new" power rate offered to us by the Canada Northern Power Corporation, was found, after careful scrutiny, to offer little or no reduction in our present rates. On several occasions we wrote to the Manager of the Canada Northern Power Corporation, asking him to indicate to us wherein the contract, offered to us individually, improved our position, and he was unable to do it.

Tyrrell then informed Ferguson that his company had joined with several others in the Kirkland Lake district and had hired consulting electrical engineer (and by this time, former employee of the HEPCO), H.G. Acres, to make a careful examination of their power situation in order to determine whether or not they were being charged a fair rate. As a result of his examination and study, Acres negotiated with Canada Northern Power Corporation for a slight rate reduction.[15]

This direct lobbying of the Premier or other government officials was a common tactic adopted by businesses in an effort

to promote their own interests. Nelles in Politics of Development documents this quest for favouritism quite substantially. Given the businessmen's proclivity for running to the Premier for gratification of their needs, it is interesting to note that in none of the correspondence between Tyrrell and the government is there a suggestion on the part of the mining companies that the HEPCO take over power developments in the area. This lack of interest in the HEPCO was occasionally echoed in the Northern Miner. Throughout the late 1920s and early 1930s, as we have seen, several articles appearing in the newspaper commented on the rate problem but rarely was there a call for public power. In fact, on two occasions, the Northern Miner indicated that the HEPCO would be unwelcome.[16] The only consistent advocates of public power in the northeast seemed to be representatives of municipalities.

Meanwhile, the HEPCO continued to advocate its entry into the north with the Premier. In a position paper entitled "Power for Northern Ontario," the HEPCO reiterated that it would integrate the northeastern system into the Niagara system but this time, the HEPCO stressed that this integration was for the benefit of the north: "the System will constitute a valuable steadying feature in the development of northern power, contributing to its delivery to the consumer at low cost."[17] This argument was elaborated upon in a memo from Commissioner J.R. Cooke to Premier Ferguson, dated May 15, 1929. The HEPCO had undertaken a study to determine the cost of delivery of power

to the northeastern industries as well as to Toronto. The results were favourable and Cooke informed the Premier that:

> ... it is advisable to generate power in the northern districts at 25-cycles, so that these Northern Developments may be consolidated with and become part of the Niagara System, thereby resulting in a much lower rate to the users in the North section of the Province, where the loads are comparatively small and located long distances apart.[18]

This quotation epitomizes engineering thinking on systems development and the metropolitan concerns about acquiring northern power for its own needs. By 1929, sixty cycle generation was superseding twenty-five cycles. Any new hydro-electric developments were likely to be set up for sixty cycles. Yet Cook advocated that northeastern power be generated at twenty-five cycles-- the generation requirements of the Niagara (southern) system.

The HEPCO was interested in moving north because its engineers preferred systematic development, not haphazard development, and consolidation. According to their investigations, there was over 400,000 horsepower available within reasonable transmission distance of Sudbury "but of such a character that it is of the utmost importance that, for the ultimate and efficient economic use, all the power sites be co-ordinated under one administration." Such memos support Thomas Hughes' theory about hydro-electric development and illustrate one method in which the metropole comes to dominate the hinterland. The engineers at the HEPCO were trying to establish one centralized, hierarchical system in which controlling

authority rested with them and the power priorities lay with the metropole.

Systems had also to develop in such a way as to draw the maximum amount of power possible. This could only be done if all the power sources were developed under "one administration" instead of piecemeal. The HEPCO predicted that:

> however wide a distribution may be made of the power sites in the district under review, within, say, ten years the majority of these will have to be consolidated into one, or perhaps into a few great systems, and the organization controlling such system or systems will, to a large measure, have within its grasp a large control in the development of this northern district and, to a substantial extent this will be reflected in the southern portion of the Province, and therefore our northern power sites should be owned and operated by the citizens of the Province for the benefit of all concerned in the welfare of the Province.[19]

The co-ordination of all hydro developments by one agency would assure a continuous supply of power to industries, or, in the case of failure of one particular generator, would enable power to be transferred from other units at other sources in order to maintain a continuous supply to the consumers. Further, co-ordination with the other hydro-electric properties increased the likelihood of generating a surplus and this could be transferred to the southern system. The HEPCO believed it would be disastrous to allow any of the water power rights on the rivers in the north to be acquired or developed by independent private interests, rather they should be developed at cost by the HEPCO on behalf of all concerned.[20] However, regardless of these plans and opinions, the HEPCO refused to enter the northeastern market. Apparently, the engineers had taken to heart the advice

of experts who had insisted that hydro-electric development not take place unless there was a proven market for the generated power. It seems the engineers remained convinced that there was only room for one system operator in the northeast and Nesbitt Thomson was it, despite the fact it was a private producer. Accordingly, unless Nesbitt Thomson removed itself from northeastern Ontario, the HEPCO would stay out.

A new actor in the hydro-electric business entered the scene however causing a change of plans by the HEPCO. As a result, its first entry into northeastern Ontario would be as a purchaser and not as a producer. In May 1929, the HEPCO was considering a proposition put forward by the Abitibi Power and Paper Company for the purchase of power from the latter's Hudson's Bay Power development at Abitibi Canyon. Abitibi Power and Paper had large investments in northern Ontario: it owned mills at Iroquois Falls, Smooth Rock Falls, Sturgeon Falls, Espanola, Sault Ste. Marie and Fort William. Along with these mills went the power developments to supply them with power: Kaministiquoia Power at Fort William, and Abitibi Electric Development Co. at Island Falls, Twin Falls, Iroquois Falls and Smooth Rock Falls on the Mattagami River.[21] Alexander Smith, the president of the Hudson's Bay Power Company was hoping to persuade the HEPCO to buy a minimum of 100,000 horsepower from them when the power station at Abitibi Canyon was up and running. The HEPCO was to be sold this power at the rate of $15.00 per horsepower, a fantastically cheap rate for the time.[22] The cheap rate may

have illustrated the dire necessity of having the HEPCO on side for the project in order to interest other investors. Gaby later informed Magrath that the cost of power delivery from Iroquois Falls to Sudbury for 100,000 horsepower would be $23.72.[23] Despite this tempting offer, the HEPCO still declined to enter northeastern Ontario stating that as yet there was an insufficient market for Abitibi Canyon power.[24]

It is also likely that the HEPCO may have refused for another reason. It would not have wanted to support or encourage individual power developments. Again, HEPCO engineers believed that the northeastern waterpowers should develop systematically. This is made clear in an undated internal memo. In it, the HEPCO recognized that:

> The vast wealth of Northern Ontario is daily becoming better known. Especially is this true in respect to its timber and mineral resources.... All of this means that hydro-electric power can play a very important part in the development of such a considerable area of the Province. In order that that may be carried out to the best advantage of the entire area, the HEPC has been studying the field for a considerable length of time. The object being to determine the location of a system of power arteries through linking together the available power sites looking to the most economical supply of power, so as to eventually take care of the largest possible field as the country moves forward both industrially and agriculturally.[25]

The last sentence in the above passage is certainly an "eyeful" but it conveys much of the engineering mind to the reader. Engineers, like the surveyors before them, did not view the rivers as rivers. To engineers, rivers were power arteries and river systems (watersheds) were to be supplanted by a system of electrical generation and supply that would establish a technical

link among the regions in the province, a link that would remap the geophysical infrastructure of the province. Rivers above the height of land emptied into James and Hudson Bay, power lines were to run power south.

The word economical in this passage is also significant. Engineers were for the most part interested in efficiency which meant developing the power sources so that the most power available could be taken from them. Economical refers to the need to supply power at the cheapest possible cost. Efficiency and economy were not always the same thing. Efficiency is a technical consideration whereas economy is a business concern. However, because engineers were employed by businesses for the most part, they were trained to balance the technical concerns with those of business, even within the publicly supported HEPCO.[26] Finally, the memo illustrates that the HEPCO acknowledged its role as an agent of development. Its expansion would go hand in hand with the expansion of agriculture and industry into new regions of the province.

Even if northeastern Ontario was not ready to receive power on the scale of Abitibi Canyon, the HEPCO's studies revealed that some areas in the near north could support new hydro-electric developments, especially the area "extending from Mattawa on the upper Ottawa River westward through North Bay, Sturgeon Falls, Sudbury, and on through the Spanish river country to the Mississagi river, a distance of about 225 miles."[27] Power sources in this area included the upper Ottawa, the French, the

Spanish, the Vermillion, the Mississagi and Aux Sables rivers. It was estimated that power supplies from these sources could reach up to 400,000 or even 500,000 horsepower, provided they were developed efficiently as one system. The HEPCO anticipated that its developments in the North Bay and Sudbury areas would constitute "a nucleus with respect to which the plans for the new Hydro system will be devised."[28]

Developing power in the near north instead of on the Abitibi Canyon had an added advantage: it was within economical transmission distance of the HEPCO's Niagara system. The fact that this northerly territory, from the upper Ottawa to the Mississagi was within transmission distance of the Niagara system ensured the economic success of the proposed new northern system inasmuch as any surplus power in the new system could be absorbed by the Niagara System. The HEPCO viewed this plan as "long-range" and was confident that, by promoting development only when market conditions warranted, it would result in "the most economical distribution of the available power," all of which would play an important part in opening up the northeastern region, referred to as "that rich territory."[29]

Pressure from Cabinet ministers within Ferguson's government soon mounted on the HEPCO to advance its schedule for entering the north. Charles McCrea, Minister of Mines, sent a memo to Robert Cooke, the government appointee to the HEPCO, outlining present power demands in the northeastern region and anticipated increases. As indicated by McCrea, the area was headquarters for

the International Nickel Company, recently amalgamated with the Mond Nickel Company. The nickel company's operations included the Levack, Garson, Creighton, and Frood mines. It also operated three smelters: two at Copper Cliff and one at Coniston. Associated with it was the Ontario Refining Company, which comprised a group of interests including the American Metals, and the International Nickel and Consolidated Smelters. Also in the same general area was the Falconbridge mine. Other properties of importance were the zinc-lead mines of the Treadwell-Yukon Company and the subsidiary interests of the International Nickel Company which produced sulphuric acid from sulphur in the ores.

With all of these mining interests, McCrea urged the Commission in December 1929, to "lose no time in making general plans for large and cheap development for at least a minimum of 50,000 horsepower and construction so shaped as to take care of an additional 50,000 horsepower for the same area within five years."[30] The contrast between McCrea and the HEPCO's plans for moving north should be noted. McCrea spoke of supplying the mines in northeastern Ontario with power; the HEPCO spoke about integrating the northern system into the Niagara one. The HEPCO firmly rooted in the south, in this instance, thought primarily of southern needs.

Meanwhile, negotiations reopened between the HEPCO and Abitibi Power and Paper Company. Abitibi was still hopeful that the HEPCO, anxious to break into the Sudbury power market, would purchase 100,000 horsepower from the Canyon development, but the

HEPCO forecast power demands in the Sudbury area to be a maximum of 65,000 horsepower; therefore, the Commission was reluctant to commit to taking up Abitibi's offer. Alexander Smith replied that a purchase of 100,000 horsepower as a minimum was required from the HEPCO because without such guarantees, Abitibi would not be able to get proper financing for the development. The HEPCO therefore agreed to purchase the 100,000 horsepower if the Abitibi Electric Development Company Ltd., a subsidiary of Abitibi Power and Paper would agree to buy back 35,000 horsepower, if the Commission later required. Smith agreed to these terms.[31]

This preliminary agreement was sent to the Clarkson Gordon accounting firm for review. Its accountants expressed several concerns about the deal and concluded that the HEPCO and its financial guarantor, the Ontario government, would be entering into a risky proposition. The accountants did not believe that the HEPCO could dispose of all of the power for which it had contracted, even with the buy-back clause. They believed that the Commission would still have a surplus of approximately 27,000 horsepower from the 100,000 horsepower unless it could find new customers within the next year.[32]

The Commission would have to pay for this unused power at a cost of $351,000 per annum, plus approximately $50,000 unabsorbed transmission and other costs. The Province, having agreed to indemnify the Commission against any loss, would have to foot the bill. If the power company were to "be placed in the hands of

the receiver", then the HEPCO would lose its investment in the company and in transmission lines amounting to $1,075,000 per annum.[33] Again the Province would be responsible for recouping these losses. Clarkson Gordon accordingly recommended that the province seek securities from the Abitibi Company in the form of mortgages and bonds to ensure that the province's rights to the company's assets would be protected if the company were to go into receivership.[34] As it turned out, the Clarkson Gordon Company's concerns about financial insolvency were prescient.

Nevertheless, the final deal was struck at a meeting held on April 11, 1930, during which the HEPCO gave in to Abitibi's request to purchase 100,000 horsepower at $13.00 per horsepower from the Abitibi Canyon development. The Commission also agreed to build a transmission line about 180 miles long from the Cochrane area to Sudbury, with the Company building the line from Cochrane to the Canyon.[35]

The location of the transmission line proved somewhat controversial. Many northern communities were hoping that the HEPCO would build the line in a such a way as to give access of Abitibi Canyon power to as many northern municipalities or settled areas as possible. In this hope, they were disappointed. The HEPCO engineers remarked that any route other than a direct line to Sudbury would increase transmission costs and because the power being carried would be extra high voltage, "the cost of reducing it at intermediate points would be such as to make it prohibitive unless a big quantity was required..."[36]

In making cost the number one determinant of system development, the HEPCO engineers in their move north took a giant step away from its municipal roots/routes. Yet Premier Ferguson supported this rationalization:

> ...under the Hydro system, it is essential that we have a load sufficient to carry the cost of the undertaking before the Hydro can give a service. The rapid expansion of mining enterprises at Sudbury provided the opportunity of securing such a load... [and] the Government was extremely anxious to initiate a movement that would link up the north Country powers with Hydro....
>
> Of necessity it will be a very high voltage transmission line and could not be tapped [along the way to Sudbury]. It must take the shortest route to provide the transmission line at a minimum cost.[37]

The HEPCO was now operating on a scale that necessitated serving large numbers of customers with large blocks of power. Only in large urban centres or large industrial centres would the HEPCO find a sufficient number of customers to take its load. Consequently, the smaller communities or centres which abounded in northeastern Ontario would have to wait, perhaps indefinitely, to receive the benefits of hydro-electric development. Despite the government's desire to develop the north, large power loads biased the HEPCO towards southern Ontario thus reinforcing its metropolitan orientation.

Ironically, although the HEPCO justified this purchase in part on the basis of the anticipated demand for power in southern Ontario, it argued publicly that its principal justification was to support the government's policy of developing the north country. The introductory explanation on the contract between

the HEPCO and Abitibi Power and Paper Company noted that it was "necessary in order to secure the greatest and most economical development of the mineral, timber and other natural resources of the [northeast] that a plentiful supply of hydro-electric power should be available for such development upon reasonable terms and at reasonable rates...."[38] A proviso was added to this agreement that the provincial government would relieve the Abitibi company of the rental fees for the water power site until the load in the area had increased sufficiently to allow the company to earn a profit.[39]

Also, even though the HEPCO had previously favoured an incremental plan, it publicly denied that its purchase of electricity from Abitibi was a change in policy and presented as proof earlier memos and correspondence with northern industries. One memo noted that the HEPCO had received numerous applications for power contracts from such northeastern industries as International Nickel, the Treadwell-Yukon Co., Falconbridge Nickel, Abitibi Paper Co. at Espanola as well as the town of Sudbury, but having no surplus power to sell, it had had to refuse these applications.[40]

It is more likely however that the HEPCO entered northeastern Ontario for other reasons. Nesbitt Thomson's entry into the region had possibly alerted the HEPCO to the need to move north without further delay lest it lose out on the opportunity to be *the* managers of the northeast system. Furthermore, Nesbitt Thomson's entry had proven that the region

could now support a hydro-electric system rather than individual generating stations.

There were two reasons for this circumstance: first, high grade ore that required little power for extraction and processing was no longer available. Low grade ores were now being extracted and they required larger amounts of power for processing. Thus, they required larger scale businesses that could afford the capital outlay for more sophisticated machinery and deeper shafts. If extraction were to be economically feasible, power costs would have to fall. Large electrical systems could offer cheaper electrical rates because of the economies of scale but only if they could sell large amounts of power. Therefore large scale electric development both aided and depended on large scale mining development.

Also, many improvements in machinery designed for the mass handling of large quantities of earth and rock in connection with public works, such as highways and hydro-electrical developments, had been applied to the development of mining machinery, thus increasing their need for power.[41] The larger amounts of power could only be supplied by larger power companies. The economies of scale strategy adopted by the HEPCO and any other large scale hydro-electric company, such as Nesbitt Thomson, fit these new northern conditions of supplying power needs.

The second and most significant reason for the HEPCO's entry into northeastern Ontario by way of Abitibi Canyon was the personal interest Howard Ferguson took in developing northern

Ontario. The HEPCO was pivotal to northern development, both directly through employment and indirectly through supplying power. J.R. Cooke, Vice-Chairman of the HEPCO in 1930, pointed out to Ferguson that the HEPCO, by the end of year, would employ about 13,000 persons. This was an important consideration during the Depression. Furthermore, Cooke stated:

> it is confidently believed that if low-cost electrical energy is provided in large quantities for the future, the advantages of this power will continue to attract new industries as well as facilitate the expansion of existing ones. Thus there will be a progressive development in the Province consequent upon advanced development of its hydro-electric power.[42]

Ferguson was eventually persuaded by these arguments. He had also had several discussions with Alexander Smith, President of the Ontario Power Service Corp., during the negotiations between the HEPCO and the power company and these discussions seem to have been instrumental in persuading the HEPCO to agree to the deal. Ferguson's involvement explains why the HEPCO abandoned its original plans for incremental advances into the northern market and opted for the Abitibi contract. Opposition critics of the Abitibi buy-out were suspicious of these meetings but could find no wrong-doing on the part of Ferguson or Smith. Nevertheless the strong connection between Ferguson and the development of northern business could not be denied; it was an important policy of Ferguson's to promote the north. Thus the HEPCO became involved with the Abitibi Canyon development in response to the government's agenda of promoting northern development.[43]

Ferguson's involvement illustrates the complex relationship between the HEPCO and the provincial government. More often than not, the HEPCO ran its own affairs with a free hand, merely reporting its activities to the Commissioners, who then informed the government. Occasionally however, the government would intervene or block the HEPCO's decisions when they became politically unjustifiable. The province believed it was well within its rights to do so given that it was responsible for voting funds for HEPCO projects. Ferguson's attempt to promote northern development through the HEPCO reminded the system designers that they were always susceptible to political pressures.

In a broader sense, it also reminds historians that technological systems are not products of technological determinism but are shaped by the interweaving of many factors, not the least of which could be politics. In this way, the stark division between the system and the "environment" as defined by Hughes is misleading. Hughes argued that the environment consisted of those intractable factors not under the system's control. Yet the relationship between a public agency and the government render the boundaries between environment and system much more fluid as the actor-networks approach exemplifies. Sometimes politics remain inconsequential to the system-- Ferguson did not intervene in other HEPCO decisions-- and sometimes they are components-- the Power Commission Act was just as much a part of the system as transmission lines.

Shortly after reaching agreement with the HEPCO, the Hudson's Bay Power Company, renamed the Ontario Power Service Corporation, found itself in financial difficulties. Its president tried to persuade the Ontario government to take over the development. The government was open to the idea; in a press release, it recognized that it was important, in the interests of northern Ontario, to have an available supply of power from the Abitibi Canyon. Accordingly the government was prepared to give the request of the company "early consideration, in the hope that it [might] be possible to evolve a plan whereby the canyon power development [might] be taken over for the province on such terms as the Government [might] deem equitable."[44]

The government solution was to make an offer of HEPCO bonds in exchange for Ontario Power Service bonds, "guaranteeing the Commission against loss, both in the transaction and subsequent operation of the properties." D.M. Hogarth, MPP informed Premier George S. Henry of another reason to support the buy-out:

> As you know, the bonds of the Ontario Power Service Corp are widely distributed among important corporations and individuals who, I find, were influenced to make their investments in consequence of the success suggested through the fact that Ontario Hydro contracted for 100,000hp at a price which would mean the success of the proposition and the payment of the bond interest as it fell due.[45]

The government also proposed that all power developments acquired by or constructed by the HEPCO in northern Ontario would thereafter be placed in trust for the people of northern Ontario, with the HEPCO acting as the trustee on behalf of the province. The Order-in-Council establishing the "Northern Ontario

Properties" trust was approved on February 9, 1934. Initially the trust included the three power developments of the "Nipissing Properties" located on the South River serving North Bay and the surrounding area, the "Wahnapitae Properties" serving the Sudbury area, the Abitibi Canyon Development and the power developments at Ear Falls on the English River, in northwestern Ontario.

The Order-in-Council was straightforward; most of the clauses dealt with the financial arrangements of the trust. The Commission was to build and maintain power supplies in "anticipation of a future demand for power in the Territorial Districts of the province in Northern Ontario." It was also to submit an account of all expenditures and revenues, annually. The Province agreed to set up a consolidated revenue fund from which the Commission could draw its expenditures if a deficit arose and to which the Commission would apply its revenues. The fund was a loan to the Commission set at five per cent interest. In keeping with its municipal roots, clause eight stipulated that "the Commission may contract with any municipal or other corporation or with any person or firm for the supply of electrical power or energy from such Northern Ontario Properties...." as requested or required. The Thunder Bay municipal system was specifically excluded from this trust arrangement and "for the purposes of this agreement, all of the works comprising the Northern Ontario Properties as herein defined shall be treated as one unit and shall continue to be so

treated ... until the Commission shall hereafter otherwise determine."[46]

The buy-out of Ontario Power was another government decision that affected the development of the system in northeastern Ontario and Ontario generally. The first decision had meant that the planned incremental entry by the HEPCO was shelved and then, because of the trust conditions, so too was the idea of developing power in the north for use in the south. The trust meant that northern power was to be used by northern customers. Therefore, at this juncture, the efforts of the Toronto-based systems builders to utilize northern energy for southern needs was thwarted. The trust stipulation fitted into Ferguson's political agenda of promoting the north. If northern power was shipped south, northern development would not take place.[47]

Reaction to the deal ranged from lukewarm to hostile. The Northern Miner was sceptical that the HEPCO would find enough customers for its Canyon power. It noted:

> Outside the existing mines in Ontario, the only fields open to Hydro and Canyon energy are the suggested central compressed air stations, the Sudbury field (and International Nickel cannot find full use for its own power plants), the Swayze field (if it develops), and the Quebec mines.... However, the Hydro people are very enterprising and no doubt they will make bold bids to break into the mining power business. That is about the only place where there is encouragement at present, the paper business being what it is and other industries being almost non-existent in the North.[48]

The mining companies were interested in cheap power and the HEPCO initially forecast that it would be supplying power to the mines at a rate of $30.00 per horsepower, a decrease in the price of

approximately $20.00 per horsepower. The HEPCO also indicated that it would not ask the mining companies to bear the cost of building their own transmission lines to hook-up with the HEPCO lines.[49]

The HEPCO's buyout of Abitibi had ramifications for Nesbitt Thomson. The cosy monopoly it had enjoyed in the mining industry of northeastern Ontario was now threatened. Doubtless, Nesbitt Thomson was discomforted to learn that the HEPCO claimed it entered into northeastern Ontario because it believed it to be its duty to rescue northern consumers from rapacious private power interests. In an internal memo of October, 1933, J.A. McAndrews explained:

> Mines, municipalities and others desirous of purchasing electrical energy were forced to deal with those having a monopoly of supply, with the consequent inevitable result that when a contract was entered into, the terms thereof as to rates and otherwise, were of such an onerous character as to hamper the consumer and retard development of valuable natural resources. The entry of the Power Commission as a competitor in the market for power in the District will greatly benefit new power users and it is to be hoped will result in time in some relief to those new parties to onerous agreements.[50]

Nesbitt Thomson was not the only interest concerned about the takeover. The offer of HEPCO bonds in exchange for Service Corporation ones raised considerable controversy among taxpayers, thereby exposing the HEPCO to political attacks. Some critics speculated that the new Premier, George S. Henry was protecting his own interests and the interests of one of his clients, an insurance company that had invested heavily in Service Corp. bonds. Nevertheless, J.S. Cooke, now the HEPCO Chairman,

defended the purchase in a speech to the OMEA annual meeting where he explained that the uproar over the price of the bonds which had been set at $90.00 for every $100.00 was unjustified. He pointed out that although the bonds did sell for $90.00, the interest rate was two per cent lower and they were paid for in Canadian funds. As a result, the Commission's cost of developing the Abitibi Canyon site to completion would be at least $3,500,000 less than if the Hudson's Bay Power Co. Ltd. had continued with the project.[51]

Cooke went on to defend the government's involvement in the Abitibi deal. Ignoring all inferences to both Ferguson's and Henry's personal relationships with the bondholders, Cooke stressed that the government's only interest in taking over the Power Service Corporation had been to further the industrial development of the north through the extraction of mineral, timber and other natural resources. The Chairman concluded his remarks by claiming:

> Failure of the strong organization with which contracts were made could not have been foreseen in 1930. Through the action taken by the government when the companies defaulted in 1932, however, the future of the mining industry with regard to availability of low-cost power has been safeguarded and even improved. At the same time potential embarrassment through enforcement of contracts by receivers or others has been obviated, and the position of public ownership in Northern Ontario has been advanced.[52]

Cooke and other Hydro defenders were not successful in overcoming the criticism of the Abitibi deal but it would take a new government to fully investigate the circumstances surrounding the HEPCO's participation in the Abitibi affair.

The Abitibi deal and the HEPCO generally became an issue in the election campaign of 1934 as Mitchell Hepburn, the Liberal leader, in numerous speeches, accused the administration of allowing the HEPCO to have on hand too many "high-priced" engineers who supposedly did nothing but waste the taxpayers money on new generating stations and expensive contracts for power from Quebec.[53]

The HEPCO denied these allegations and Fred Gaby, its chief engineer, took the extraordinary step of publishing a response to Hepburn's accusations in a pamphlet entitled "Misleading Assertions that have been made relating to the Power Situation in the Province of Ontario, Examined and Corrected." The pamphlet outlined the power purchases the HEPCO had made with other power companies and then identified where the demand for this power lay within the province.[54] Gaby perhaps took this step because he had become used to assisting Adam Beck when he had had to defend hydro policies to the government and the public.

Gaby's efforts this time backfired when Hepburn won the election. Hepburn immediately ordered an investigation of the operations and the men at the HEPCO. H.H. Harry, the secretary of the Ontario Liberal Association was asked to comment on the HEPCO's engineering staff. He replied:

> With the exception of [T.H.] Hogg and R.T. Jeffery, they do not want to appear to be double-crossing their associates and yet their services to the System are very slight because they fear they may be let out at any time.... I am told that Hogg is an excellent man and is not overpaid, but that with the rest of them you could drop three out of four and improve the engineering service....

> Unless the Hydro is going to build both the Ogoki and the St. Lawrence plants at once, a good many of the high-priced people on the enclosed list have little to do except play golf in the summer and badminton or curling in the winter.[55]

Within a year of this assessment, Gaby was out as Chief Engineer and Hogg was in.

Thomas Hogg was a graduate of the University of Toronto with a bachelor of science degree; he was awarded his civil engineering degree in 1912. Following his graduation, he worked briefly for the Ontario Power Co. before joining the HEPCO in 1913 as assistant hydraulic engineer. During his career at Hydro, he was a part of the negotiating team on the St. Lawrence power project and oversaw the Ogoki and Long Lac diversions. During the war, he served as the Canadian representative on the public utilities commission set up by the Combined Production and Resources Board to survey the utility needs of the allied nations and to plan procurement of equipment for liberated countries. He also served as president of the Engineering Institute of Canada in 1940.[56] It would seem that Dr. Hogg's talents (his title is an honourary one) went beyond hydraulics into the field of politics, or at least diplomacy; perhaps that was why he was chosen as Gaby's successor.

The other engineer named in Harry's report, R.T. Jeffery, also had a certain talent for dealing with politicians and bureaucrats. According to Robert Bothwell, when the Commission was trying to solve its power surplus problems in the early 1930s, the government wanted to do so by cancelling the Quebec

contracts. Jeffery recommended to Arthur Roebuck, the hydro commissioner and minister responsible for the HEPCO, that they try to find a compromise. Roebuck apparently trampled on that idea and Jeffery from then on in gave Roebuck whatever information he requested and did not attempt to influence the Commissioner in what he proposed, "whether it was right or wrong."[57]

Hepburn also appointed a Royal Commission to investigate the possibilities of wrong-doing. Familiarly known as the Latchford/Smith Commission, it criticized the government's justification and rationale for financing the HEPCO take-over of the Power Service Corporation. Commissioner Latchford noted that the government claimed it had secured guarantees of a "satisfactory" load of 100,000 per horsepower for the benefit of northern power consumers at a "satisfactory" price. Yet as Latchford commented:

> The satisfactory load was fictitious as only a strained estimate of 55,000hp at the most, could be foreseen. The satisfactory price was also fictitious and was arrived at on the basis of a full load of 100,000hp for forty years when all knew that there was no load in prospect for more than 55,000hp all told.[58]

The Commissioners concluded their report by criticizing Premier Henry's involvement in the deal. They noted that the purchase of the Ontario Power Service bonds by the HEPCO had been negotiated by Henry himself even though he owned $25,000 worth of these bonds and the Wood Gundy Insurance Company of which he was a director held bonds worth $200,000. According to the

Commissioners, this conflict of interest should have precluded Henry's involvement in the negotiations. Henry responded that he had not informed his Cabinet of his interests "because he wished to leave his colleagues untrammelled in their judgment."[59] Despite the conclusions of the Commissioners, nothing was done to change the terms of the Abitibi Canyon deal; in the end, the Hepburn government must have agreed that it was a project worth funding after all.

Thus, the HEPCO's grand entrance, as choreographed by the provincial government, into northeastern Ontario was confirmed: it took over the construction of the Abitibi Canyon project and operated it and the other power developments in northeastern Ontario under its control as stipulated in the terms of the Northern Ontario Properties (NOP) trust agreement. Abitibi Canyon, a political project, became a political embarrassment to the conservative government and to the HEPCO. More importantly though, it also illustrated the profound effects of politics on hydro-electric development. Ferguson's desire to develop the northeast over-rode HEPCO plans in two ways. First it prevented the HEPCO from entering areas at points when a market became available and secondly, it ensured that the HEPCO power generated in the northeast would be used in the northeast, not the south thereby removing southern needs from the northern power equation. Consequently, the metropolitan system developers were not able to exploit the northern rivers for the benefit of southern power

consumers; they were however able to exploit the rivers to the detriment of some northern residents of long standing.

Apart from all the hubbub raised in the south over affairs in the north, the northern First Nations had their own concerns about hydro-electric development. Anishnabek and Cree concerns had nothing to do with the public/private debate, with political scandal, nor with the price and supply of power but rather with the effects of hydro-electric development on aboriginal lands. The Mattagami First Nation continued to press the federal government for a redress of their grievances. Inquiries from them in 1926 and 1929, concerning the matter of their compensation from the power company for timber damaged by the flooding, finally prompted the Department of Indian Affairs to instruct H. J. Bury, then Supervisor of Indian Timber Lands, to inspect Mattagami Indian Reserve #71, with specific reference to the area flooded by Northern Canada Power. In a memo to the Deputy Minister, dated June 20, 1930, Bury reported on his inspection:

> At the time of my previous visit, nine years ago [1921], the reserve had not been flooded, and it was therefore a difficult matter to decide just how and by what extent the raising of the water to the 1070 ft. level, would affect the reserve but ... a large area in the interior of the reserve has been flooded, notably on the eastern boundary and in the south west corner.... I compute the total flooded area as being 1340 acres.[60]

Bury's above noted estimate of 1,340 acres flooded was more than the original 1921 prediction of 1,089 acres indicated by C.V. Gallagher. Bury determined that the total compensation should be

$6,345.00: that included drowned timber at $5,675.00 and flooded land at $670.00, i.e. fifty cents per acre. Bury regarded the sum of $6,345.00 as "reasonable compensation."[61]

The Department of Indian Affairs submitted a claim for this amount on behalf of the Mattagami First Nation to Northern Ontario Power, a subsidiary of Nesbitt Thompson, that had acquired the assets of Northern Canada Power in 1926, including the dam at Kenogamissi Falls. The company replied that:

> When this Company took over the old Northern Canada Power Limited it, of course, was understood that there were no outstanding liabilities or claims, and having this in mind I am sure you will appreciate we were quite surprised to receive your claim. It will be very difficult to receive information with respect to this claim, however, I am endeavouring to get at the bottom of same and will write you fully very shortly.[62]

Shortly thereafter Northern Ontario Power offered $3,500.00 in settlement of the claim to Indian Affairs; it was accepted. H. J. Bury, in a memo dated March 9, 1931, wrote that:

> In view of the fact that a predecessor company actually flooded the reserve, who apparently believed all damage had been duly compensated for, and as the predecessor company have [sic] already paid $272.25 as compensation for flooding 1089 acres at the rate of 25 cents per ac. (10 years ago), I am inclined to the opinion, that the Department would be justified in accepting this offer in settlement of our claim.[63]

The Departmental Solicitor advised that the Crown had no legally enforceable claim against the Northern Ontario Power Company for damages and it was too late to sue the Northern Canada Power Company because of the Statute of Limitations.[64] Apparently, it was also inappropriate or too late to submit the claim to Nesbitt Thomson, the owner of both companies.

One half of the $3,500.00 compensation was distributed to the individual band members in May of 1931. The balance of the compensation was distributed to the Mattagami First Nation in September 1931, as per their request, for the purchase of winter supplies.[65] With that, Indian Affairs turned its attention to other matters.

When confronted with First Nations grievances, the system operators and those who supported them, such as government officials, responded by offering compensation as stipulated under Common Law and nothing more. In contrast, when confronted with mining grievances, the power companies responded creatively and developed a variety of responses in order to meet the requirements of secure power supply at lowest cost. Responding to mining companies concerns was in some ways easier than responding to those of First Nations because in the former situation, both parties supported the same goal-- to supply power at lowest possible cost. Interaction between power companies and First Nations revolved around the need to mitigate the effects of environmental degradation for Aboriginal People. Power companies gave compensation for lost land. They did not attempt to protect aboriginal fisheries or trap-lines during this time period nor did they consider stopping further development.

The political environment in which electrical systems developed was generally supportive but could on occasion effectively interfere in the plans for development. In the early 1930s, because of Ferguson's interest in northern development,

political factors played a greater role in the development of the hydro-electric system than technical or economic ones. Ferguson placed a great deal of importance in promoting northern development and used the HEPCO as one of the vehicles of promotion.

Ferguson's desire to assist northern development in general and the Abitibi Pulp and Power Co. specifically resulted in an alteration in the structure of the HEPCO system and of hydro-electric development in the north. Ferguson's successor, George Henry, when faced with the failure of the Abitibi Power and Paper Company, ensured the HEPCO's takeover of the Abitibi Canyon project. The ensuing controversy damaged the corporation, forcing the early retirement of its chief engineer. Without this extreme situation, the HEPCO would likely have headed north anyway, but followed its original plan of incremental expansion within an established market, while maintaining its municipal orientation.

Instead, through the take-over of the Abitibi Canyon development, the HEPCO, originally designed to service industries and municipalities, broadened its mandate from supplying power to industries towards developing the north country; despite the HEPCO engineers' desires to develop northern rivers for southern needs, the politicians over-rode technical and economic considerations in this stage of the system's development. In this interweaving of politics, nature, and engineering, we get a glimpse of the complexity of the metropolitan/hinterland

relationship. Technology linked the northern rivers with the southern power developers; it linked nature with the metropole. Yet because of the desire of the Premier to develop the north, the power derived from the rivers remained in the north. In this instance, the domination of the metropolitan systems builders over northern waterways was limited by political action. In this instance, the metropolitan/hinterland relationship was an interweaving of the interpretations of Careless, McCann and Cronon: nature interacted with technology, and metropolitan influences attempted domination and even exploitation but did not succeed.

A harsher portrayal of the metropolitan/hinterland relationship unfolds when First Nations concerns are added to the analysis. The interweaving of nature and the metropole through technology hinders the ability of the Cree and Anishnabek to maintain their aboriginal economy and the mitigating factor of compensation for lost land and timber is inconsequential. In this instance, the metropolitan system, designated by the provincial government to serve as the vehicle for northern development, was not subject to political limitations. In this instance, whether the power generated from the Mattagami and Abitibi rivers was used in the north or the south, the Cree and Anishnabek derived no benefit from the development of the system.

Northeastern Ontario was now occupied by two power systems, one operated by the HEPCO and the other by the Nesbitt Thomson interests. Neither development could be regarded as

technologically pre-determined, save for the growing inability of the small power companies to be economically viable. The HEPCO's arrival in the northeastern region, meant that the northeastern power system was increasingly brought into the orbit of southern Ontario, away from Montreal and Nesbitt Thomson. From the beginning, the HEPCO was interested in supplying northern power to southern industries. Yet the terms of the NOP trust seemed to block that option. Faced with a huge power surplus from Abitibi Canyon, direct competition with Nesbitt Thomson for northern customers was the HEPCO's only recourse of action as chapter four reveals.

NOTES

1. AO RG 3 Ferguson Papers Box 85 1926 File 03-06-0-1076, "Great Northern Power Company Ltd.," Letter, A.J. Nesbitt, President to Premier Ferguson, May 12, 1926.

2. AO RG 3 Ferguson Papers Box 85 1926 File 03-06-0-1076, Letter, A.J. Nesbitt, President to Premier Ferguson, June 25 1926.

3. AO RG 35 Series 2-22 Correspondence of the Honourable J.R. Cooke, 1923-29, File 23-1929, Letter, C.A. Magrath, HEPCO Chairman to the Hon. G.H. Ferguson, Premier of Ontario, August 29, 1928.

4. GSI OR 410.1 General Hydraulic Water Storage (Watershed) General March 1928- May 1945, Vol. 3, Memo, T.C. James, Asst Engineer to Chief Engineer "Water Powers and the Power Market, Northern Ontario," September 1, 1928.

5. Ibid., Letter, Premier Ferguson to C.A. Magrath, HEPCO Chairman, Oct 12, 1928.

6. Morrison, "Colonization," p.110.

7. GSI OR 104.11, The Latchford/Smith Royal Commission, (Ontario), Exhibit #70, "Memorandum re Electrical Service in Northern Ontario," March 22, 1933.

8. GSI OR 901.01 Archives Biographical Files, F.A. Gaby.

9. GSI OR 104.11, The Latchford/Smith Royal Commission, (Ontario), Attachment to letter, HEPCO Chairman C.A.Magrath to Premier G.H. Ferguson, November 10, 1928.

10. OA RG 35 Series 2 Box 21 General Correspondence of the Honourable J.R. Cooke, 1923-1929 File 1929-8, Letter, HEPCO Chairman to Premier G.H. Ferguson, February 20, 1929.

11. Ibid.

12. The Northern Miner, "Cheap Hydro-Electric Power Assisted Sudbury Development," September 11, 1930.

13. The Northern Miner, "Growing Use of Power Shows Greater Activity of Mines," January 29, 1931.

14. AO RG 3 Ferguson Papers Box 100 File 03-06-0-1399, 1928, "HEPC re Kirkland Lake Situation," Letter, A.J. Nesbitt, President, Canada Northern Power Corp. Ltd. to Premier G.H. Ferguson, January 17, 1929.

15. AO RG 3 Ferguson Papers Box 103, "HEPC re Kirkland Lake Power Company," 1929, Letter, J.B. Tyrrell, Managing Director, Kirkland Lake Gold Mining Co. Ltd. to Premier G.H. Ferguson, February 11, 1929.

16. See for example, "Power in the North," in The Northern Miner, December 12, 1925.

17. AO RG 35 Series 2 Box 22 General Correspondence of the Honourable J.R. Cooke 1923-29, File 23 1929, "Power for Northern Ontario," March, 1929.

18. AO RG 35 Series 2 Box 22 General Correspondence of the Hon. J.R. Cooke 1923-29, 1929 File 23, Attachment to memo from J.R. Cooke to Premier G.H. Ferguson, May 15, 1929, "Power Supply for a Metallurgical Industry at Sudbury, North Bay, Mattawa and Arnprior," March 25, 1929.

19. AO, Attachment to letter, Ferguson to C.A. Magrath, November 16, 1928.

20. Ibid.

21. GSI OR 104.11, The Latchford/Smith Royal Commission (Ontario), Exhibit #20, Ontario Power Service Corporation, "Memo re Abitibi Power and Paper Co. Ltd. and Abitibi Clarkson Gordon Report."

22. GSI OR 104.11, The Latchford/Smith Commission, File 31, Letter, Alexander Smith, President, Hudson's Bay Power Company to HEPCO Chairman C.A. Magrath, May 25, 1929.

23. GSI OR 104.11, File #31, The Latchford/Smith Commission, Memoranda to Commission, July 23, 1929.

24. GSI OR 104.11, The Latchford/Smith Commission, File 31, Letter, C.A. Magrath, HEPCO Chairman to Alexander Smith, President of the Hudson's Bay Power Co. Ltd., October 7, 1929.

25. AO RG 35 Series 2 Box 22 General Correspondence of the Hon. J.R. Cooke, 1923-1929, File 23, 1929, Untitled, undated document.

26. Edwin T. Layton, The Revolt of the Engineers: Social Responsibility and the American Engineering Profession, (Cleveland: Case Western Reserve University, 1971), p.1. For other insights into the relationship between engineers and business see David F. Noble, America by Design: Science, Technology and the Rise of Corporate Capitalism, (New York: Alfred A. Knopf: 1977) and J. Rodney Millard, The Master Spirit of the Age: Canadian engineers and the politics of professionalism, 1887-1922, (Toronto: University of Toronto Press, 1988).

27. AO RG 35 Series 2 Box 22 General Correspondence of the Hon. J.R. Cooke, 1923-1929, File 23, 1929, Untitled, undated document.

28. Ibid.

29. Ibid.

30. GSI OR 104.11 The Latchford/Smith Commission, File #31, Memo Charles McCrea, Minister of Mines to Robert Cook, HEPCO Commissioner, "Hydro Power in Sudbury Nickel District," December 18, 1929.

31. GSI OR 104.11, The Latchford/Smith Royal Commission (Ontario), File #8, Clarkson/Gordon Report, "Memorandum re Abitibi Pulp and Paper Company Ltd and Abitibi Canyon Development," July 18, 1934.

32. Ibid.

33. Ibid.

34. Ibid.

35. Ibid.

36. The Northern Miner, "Government may be Sole Supplier of Power in Mining Country," May 1, 1930.

37. The Northern Miner, "Sudbury Power Line to Run Direct," May 8, 1930.

38. GSI OR 505.3 Interconnections Hudson Bay's Power Company Ltd., 1930.

39. GSI OR 104.11, The Latchford/Smith Commission, Letter C.A. Magrath, HEPCO Chairman to Premier Ferguson, May 7, 1930.

40. GSI OR 104.11, The Latchford/Smith Commission, R.T.J. (Jeffery) Chief Municipal Engineer to Chief Engineer, "Purchase of Power from Hudson's Bay Power Co. Ltd., April 9, 1930.

41. GSI OR 633.01 Acquired Companies Canada Northern Power Corporation/Northern Ontario Power Company, "Notes for Brief Talk at Omega Gold Mines Ltd," signed C.J.V., May 25, 1944.

42. AO MU 1340 J.R. Cooke, HEPCO Chairman to Premier Ferguson, October 17, 1930.

43. GSI OR 104.11, File #27, The Latchford/Smith Commission, Minutes of a meeting between the HEPCO and the Hudson's Bay Power Co., April 11, 1930.

44. GSI OR 104.11, The Latchford/Smith Commission, Exhibit #37, "Government Considering Arranging of Equitable Terms, Henry Announces," The Mail and Empire, June 25, 1932.

45. AO George S. Henry Papers, MU 1348, June 15-30, 1932, Letter, General D.M. Hogarth, MPP to George S. Henry, June 23, 1932.

46. GSI, Orders-in-Council, January 1934-June 1934, Order-in-Council #0012/34.

47. GSI OR 633.01 Acquired Companies, Abitibi Power and Paper, Ontario Power Service Corporation, "Copy", c.1932.

48. The Northern Miner. "Two Markets are Suggested for Hydro Power in North," October 27, 1932.

49. The Northern Miner, "Hydro offers $30 on 500hp; Delivered at Kenty Door," August 3, 1933.

50. GSI OR 520 Retail Customers, Cochrane, "Memorandum re the Hydro-Electric Power Situation in the Districts of Temiskaming and Cochrane," J.A. McAndrews, October 19, 1933.

51. Ontario Hydro Corporate Archives, "Speeches," the Hon. J.R. Cooke, M.L.A. and HEPCO Chairman to the Summer Convention of the OMEA, June 23, 1933.

52. GSI OR 104.11, The Latchford/Smith Commission, Memo, unsigned, "Re the Acquirement of the Ontario Power Service Corporation's Properties at the Canyon on the Abitibi River," March 1, 1933.

53. Merrill Denison, The People's Power, (Toronto: McClelland and Stewart, 1960), p.197.

54. AO RG 3 Box 337, Hepburn Papers, HEPC General #2, General Correspondence Private 1936, Letter, HEPCO Chairman, T. Stewart Lyon to Mitchell Hepburn, December 17, 1936.

55. AO RG 3 Box 337, Hepburn Papers General Correspondence, Private 1936, HEPC General #3, Letter, H.H. Harry, Secretary of the Ontario Liberal Association to Premier Hepburn, October 1, 1936.

56. GSI OR 901.01 Archives, Biographical Files, T.H. Hogg.

57. John T. Saywell, "Just Call Me Mitch" The Life of Mitchell F. Hepburn, (Toronto: University of Toronto Press, 1991), p.199.

58. Ibid.

59. Ibid.

60. Ontario Native Affairs Secretariat, (ONAS) Mattagami Land Claim Files, Memorandum, H.J. Bury, Supervisor of Indian Timber Lands to D.C. Scott, Deputy Minister of Indian Affairs, June 20, 1930.

61. Ibid.

62. Ibid., Letter, B.V. Harrison, Vice President and General Manager of Northern Ontario Power to A.F. MacKenzie, July 26, 1930.

63. Ibid., H.J. Bury to Caldwell, March 9, 1931.

64. Ibid., A.S. Williams, Departmental Solicitor, Department of Indian Affairs to D.C. Scott, May 4, 1931.

65. Ibid., Chief James Naveau Sr. to T.J. Godfrey, September 19, 1931.

CHAPTER FOUR

After 1933, the HEPCO expanded into northeastern Ontario at the expense of Nesbitt Thomson and other power producers. The HEPCO's northern and southern systems remained separate but, as will be shown, amalgamation occurred after World War II as a result of power shortages in both the northeast and southern Ontario systems during the Second World War and the post war boom. During this time period, systems' characteristics, as defined by Thomas Hughes, began to dominate in many aspects of the northeast system's development. Centralization and consolidation of decision-making in Toronto and the amalgamation of the northeastern and southern Ontario systems were the two most obvious ways in which this dominance was manifest. The eventual takeover of the private system by the public and the system's interweaving with economic and environmental factors profoundly affected the northeastern system's development and added to the complexity of metropolitan/hinterland relations.

The momentum of hydro-electric development lay with the HEPCO following its entry into the northeast in 1933. It did after all have to find customers for over 100,000 horsepower after acquiring the Abitibi Canyon power site. While political controversy over the Abitibi Canyon deal raged in the south, the HEPCO set about building up its list of customers. Initially, the HEPCO encountered difficulties attracting buyers; for instance, it lost out to Canada Northern Power in its bid for two important mining contracts. As a result, the HEPCO appointed Ronald Starr to promote the HEPCO in the north and specifically

to sell Canyon power. One of the reasons for the HEPCO's failure with Ashley and Beattie had been the HEPCO's insistence that these companies build their own transmission line to the HEPCO network, whereas Canada Northern Power had agreed to build the same line at their expense.[1]

By April 1935, the HEPCO had managed to break into the market by negotiating a contract with the Treadwell Yukon Company Ltd to deliver power to its operations in the Sudbury district. This agreement stipulated that the HEPCO would "acquire, reconstruct, extend, hold, maintain and operate the electrical transmission line" of the company that "extend[ed] from the Commission's Coniston power house on the Wahnapitae River to the Transformer station on the mining property of the said Company in the Township of Creighton." The HEPCO was also authorized to "transmit, transform, make available for use, distribute, deliver and sell electrical power in the said Township of Creighton and other places in the District of Sudbury, and to interconnect with any other power works."[2]

The HEPCO also contracted with Falconbridge Nickel Mines Ltd "for supply to that Company of both twenty-five and sixty cycle power at that Company's mining properties" in the District of Sudbury. This contract was approved by Order in Council on August 21, 1935.[3] By 1937, the HEPCO had contracted with numerous other interests in the Sudbury district to supply power. They included Howey Gold Mines, Huronian Co., Hollinger Consolidated Gold Mines, Kirkland Gold Rand, Mcmillan Gold Mines,

Moneta Porcupine Mines, Omega Gold Mines, Pamour Porcupine Mines, Preston East Dome Mines, Abitibi Power and Paper Co., Bidgood Kirkland Gold Mines, and Canadian National Railways at Capreol.[4]

The first contract signed by the Commission for power supply to mines in the Porcupine district was with the Central Porcupine Mine. Power was first delivered to this company in April 1935, with an initial load of 263 horsepower. The first mining property supplied by the Commission in the Kirkland Lake district was the Bidgood Kirkland, power deliveries to this mine commencing in September 1934. The Matachewan Consolidated mine in the Matachewan area received HEPCO power in June 1934. The first mine served in the Larder Lake district was the Omega property in 1935, with an initial load of 216 horsepower. Therefore within two years, the HEPCO was supplying approximately 29,000 horsepower to these five districts.[5]

Meanwhile, Canada Northern was trying to hold its own in the northeastern Ontario power market. In 1933, it launched a series of advertisements reminding northeastern residents of its long and faithful service. It also defended its record of fair rates and reassured investors that the company was still interested in supplying its northern customers. As the company indicated in the first of its ads:

> In recent months power matters in Northern Ontario and Northwestern Quebec have been freely discussed by newspapers and individuals. Many incorrect statements have been made about the position and rates of Canada Northern Power Corporation and its associated companies. It is possible, therefore, despite the fact that current sales of power are the highest in history and future prospects are most promising, that a feeling of uncertainty has been engendered

> in the minds of some of our 3,000 shareholders in Northern Ontario and Quebec.[6]

In the next ad, Northern Canada Power described its massive network of interconnected transmission lines and generating stations, making the point that this huge investment was undertaken in an effort to provide the mines and homes with a secure source of supply free from shortages or outages due to accident, storms or fire. Northern Canada proved its point by example: "For instance, Kirkland Lake is assured of ample power through two transmission lines from the south, two from the east, one from the west. Porcupine is also equipped with five transmission lines." The company concluded by noting that:

> the weaving of a network of power protection has meant great labor and great financial expenditure, but the Corporation has satisfaction in knowing that customers will not suffer power shortage or interruption. Its officers take pride in the knowledge that up here in the North there have been established power facilities second to none in Canada on the score of efficiency and safety.[7]

Another advertisement explained the company's rate structure. It admitted that their $50.00 per horsepower rate had been controversial but countered that the $50.00 was the maximum amount anyone would have to pay for power and that in reality, the average charge amounted to much less, even as little as $28.75 per horsepower. It also noted that some of the money consumers were paying to the company came back to them in the form of company taxes amounting to $1,000/day in 1932. In conclusion, Nesbitt Thomson stated that:

> Power rates are funny things, because power is a service and a commodity, and many apparent contradictions

> creep in. Notwithstanding the statements of the inexpert, and those with axes of one sort or the other to grind, you can be proud of the fact that the rates of this Company which serves the North so well, and in which so many of you are interested, compare favourably with the rates of any other enterprise of its kind, either publicly or privately owned, anywhere.[8]

Significantly, in early 1933, Canada Northern Power, the HEPCO's biggest competitor, approached the HEPCO about the possibility of purchasing power from the Abitibi Canyon site. The Company was then providing Ontario industries with approximately 30,000 horsepower from its Quinze development in Quebec but it could not meet its contractual obligations in Ontario, unless it either constructed a new power line or purchased power from "some other source."[9] Northern Canada Power opted to purchase power from the HEPCO. The HEPCO gave as its reason for negotiating this contract that:

> ...entering into ... the agreement... enables the Company and the Commission to co-operate in the conservation and economical use of the developments available in Ontario at the Canyon site on the Abitibi River of the Ontario Power Service Corporation recently acquired by the Government, rather than proceed with the extension of its present power developments, or the construction of new developments. The Government from this development at the Canyon is now capable of supplying the requirements of the Northern mining district.[10]

The Company agreed to purchase from the Commission all of the additional power it required to meet its Ontario and Quebec customers' increased power needs. It also agreed to refrain from building any new generating plants or to extending its present operations. The agreement was contracted for ten years commencing from the first of January, 1934. The power would be

transferred from the Commission to the Company at Schumacher, at Kirkland Lake and at a third point on the interprovincial boundary between Ontario and Quebec. Towards that end, the Commission agreed to install the transformers necessary to parallel its supply with the company's system.[11] With this contract came the end of Nesbitt Thomson's plans of building an electrical empire in northeastern Ontario.

The HEPCO undertook a massive building program in order to meet the needs of its new customers. In April 1934, a thirty-eight mile, 132,000 volt single circuit wood-pole line between Kirkland Lake and Matachewan was placed in service to serve Matachewan customers.[12] In July, a twenty-one mile double-circuit steel tower line between Hunta and Smooth Rock Falls was built to deliver power to the Abitibi Power and Paper Mill at Smooth Rock Falls.[13]

Despite these activities, the HEPCO had the reputation of being overly cautious. The Northern Miner commented upon this in an editorial in 1936. It stated that the HEPCO should be more aggressive and enterprising in the north country:

> ...when they [the HEPCO] went into the mining field they took upon their shoulders a special obligation to assist mine-making. They could not go into the mining country and deal with it as they would the old, long established industrial areas of southern Ontario. They had to learn to take a few chances, learn to grow up with the mines, to prepare themselves for sudden increases in power demand as mines expanded overnight.
>
> It has been suggested by some that the Hydro is not mentally equipped to be a real northern pioneer, that it is strange, and shy and backward in the company of aggressive northerners all set to go places....
>
> To be a real partner to mining men Hydro of course has to go out and spend money that it cannot be always sure will

> be returned. It has to learn to accept a good average-- as the private power companies learned, to their great advantage. It must not wait until it gets a book filled with orders before it goes out and provides a new power development.[14]

The Northern Miner may have been correct given that the HEPCO was originally designed to service communities whose municipal status signified some permanence of settlement. By contrast, most mines were short term affairs with temporary camps for workers and support industries. Therefore to invest huge amounts of capital to support a risky and short term venture required considerable daring. For the HEPCO to adopt such bravado, an entire paradigm shift from "settled urban/industrial communities" to "transient" ones would have to take place. As it turned out, the HEPCO did not have to make the shift because in reality, many mining areas in northeastern Ontario showed unusual longevity.

Even so, the HEPCO found it a challenge to operate in the harsh northern environment. Perhaps this was the real reason for the HEPCO's plodding approach to expansion. Building and maintaining transmission lines proved a difficult task because transmission lines were subject to the vagaries of weather. In 1935, the winter was more severe than usual. On January 23 a "dead-ending device on one conductor of the 132,000 volt line at Iroquois Falls" failed "due to excessive strain during a cold spell."[15] Apparently the temperature had dropped to minus 72 degrees F. In the Fall, a severe wind and electrical storm toppled one steel tower on the Hunta-Smooth Rock Falls line. "During the spring break-up several steel towers on the Abitibi

Canyon to Hunta and Hunta to Copper Cliff lines were heaved by frost."[16] This was a common problem for towers resting on clay but there had been no effective remedy found. Overall, during the year there had been twelve interruptions of the 132,000 volt steel tower lines between Abitibi Canyon and Copper Cliff: ten due to lightning, one to fog and one to external causes.[17] The same conditions continued into 1936.[18]

Despite these difficulties, the HEPCO's sales efforts seemed to have paid off by 1937. The Northern Miner reported that the Abitibi Canyon generating station was operating at about seventy-five per cent capacity and it had customers in the Porcupine, Kirkland Lake and Sudbury districts. It was selling 30,000 horsepower to Canada Northern Power and had bought the Crystal Falls generating station from the Abitibi Pulp and Paper Company. The Abitibi Canyon despite the prophets of doom was now operating in the black.[19]

The HEPCO's northern expansion had gotten a boost when Thomas Hogg had become chairman of the Commission. (He also retained his post as Chief Engineer.) The Northern Miner commented that Hogg was well and favourably known to the mining community. Hogg's appointment was viewed favourably because he held "a sympathetic feeling towards the problems of the young mine endeavouring to establish itself."[20] Hogg did indeed prove himself a friend to the miners. In 1937, he proposed that the Ontario government assist the construction of transmission lines

in much the same way it was subsidizing rural transmission lines.[21]

The HEPCO got another boost in its expansion efforts from the courts in two key judgments. The first involved the La Roche mine. Briefly, this mine had entered into a contract for power from the company for the life of the mine but had then gone bankrupt. Then, Delnite Mines Ltd. took over the mine but refused to honour the power contract. Canada Northern Power argued that the power contract was still valid for the mine even if under new ownership. The Supreme Court agreed with that argument but reasoned that "life of the mine" really meant a period of ten years, given that the life of most mines did not exceed that time period.[22] In 1938, the Privy Council on appeal, overruled the Supreme Court on the ownership issue but confirmed the notion that the life of a mine was the equivalent of ten years.[23] This was a significant judgment because it meant that the mining companies could now transfer their business every ten years to another power company. This decision further weakened Nesbitt Thomson's position in northeastern Ontario: its monopoly over long-established customers was no longer legally enforceable.

Another court decision also worked to the disadvantage of Nesbitt Thomson. In 1938, the Hollinger company sued Northern Ontario Power Company Ltd (owned by Nesbitt Thomson) claiming that the rates it was being charged were not in keeping with the contract stipulations that it always receive the lowest rate

being charged comparable operations. The power company had lowered its rates from $50.00 per horsepower to $44.00 per horsepower with new customers or in new contracts over the preceding two years yet the Hollinger had not received notice of the reduction. The power company argued that Hollinger was excepted from the reduced rates in this instance because as a large company it had to pay for "special services" such as a reserve of 20,000 horsepower whether it was used or not. The courts rejected this argument and ruled in Hollinger's favour.[24]

This decision was damaging for the power company because it obliged them thereafter to offer all its customers reduced rates whenever it became possible, instead of waiting for contracts to end and offer lower rates during re-negotiation. The Northern Miner noted that the initial rate reductions had been made in response to competition from the HEPCO.[25] Obviously, the HEPCO was winning the competition for customers and received tremendous support from the courts. Even though it did not take part in the legal battles, the HEPCO benefitted from them as they provided an opening in the mining market for their product. Here judicial disputes connected with the cross-current of competition between Nesbitt Thomson and the HEPCO, giving the HEPCO another opening in the northeastern power market. Nesbitt Thomson would soon leave northeastern Ontario altogether.

The Second World War brought increased power demands and therefore a massive building program in many parts of Ontario, though not in the northeast. The HEPCO took its responsibilities

for the war effort seriously. In fact, it believed that hydro-electricity was "the driving force behind Ontario's war effort" and that the HEPCO was contributing to the allied victory. As Dr. Hogg explained:

> Night and day, without cessation, our speeding war industries are fashioning the instruments of victory that will go forward to the fighting men of the United Nations in all parts of the world. The importance of war production transcends all other 'home front' activities.[26]

In response to this need for power, the HEPCO spent over fifty million dollars on new construction in the first year of the war. Among the construction projects undertaken was the Ogoki river diversion in northwestern Ontario. That project, in conjunction with the Long Lac diversion, diverted water into the Great Lakes allowing an additional 360,000 horsepower to be developed at various sites between Lake Nipigon and the mouth of the St. Lawrence river. In 1943, the HEPCO completed a six million dollar power plant at DeCew Falls and provided power to the iron ore deposits at Steep Rock lake.[27]

The Commission also acted under the orders of the Dominion Power Controller to conserve energy by restricting its uses by non-essential industries and domestic consumers.[28] Conservation became a necessity when the increases in war loads and the unfavourable weather and water conditions forced the imposition of quotas in the Niagara district, resulting in the cutting of about 100,000 horsepower over a period of three hours on two days in September.[29]

Although the HEPCO system expanded in other parts of Ontario during World War II, northeastern Ontario's power output remained fairly stable. In some cases, there was even a decline in power demands. Canada Northern Power reported that its earnings were down in 1943 largely because gold production had declined due to shortages of labour.[30] Nevertheless, there was one important event in the history of the northeastern system during this time. In 1944-45, the HEPCO acquired the Ontario assets of Canada Northern Power for $12.5 million. This sale included eight power plants, the three on the Mattagami River and five on the Montreal River. It did not include the Quinze plant that operated in Quebec but supplied power to some of the mines in the Porcupine and Kirkland Lake districts.[31]

With this purchase, the HEPCO became the sole hydro-electric system operator in northeastern Ontario, although there were other companies operating individual power stations.[32] There were several reasons why Nesbitt Thomson would choose to sell its assets in Canada Northern Power to the HEPCO, some of which have already been alluded to, such as adverse court decisions and declining gold production. Perhaps the final blow to Northern Canada's ambitions came when the Hollinger, its biggest customer, announced that as of November 1st, 1944, it would switch to the HEPCO as its power supplier.[33]

It is uncertain whether Nesbitt Thomson approached the HEPCO about the sale or vice versa, but the Commission became interested in the idea when considering the inefficiencies of

having two hydro-electric systems operating in the same area. Dr Hogg in explaining the purchase to the Premier, George Drew argued that:

> The Company and the Commission now have considerable duplication of facilities, and if competition continued further duplication will be inevitable. This duplication of facilities is not desirable. Power can be distributed more efficiently, more reliably, and at lower cost by the amalgamation of the two existing systems into a single system. Amalgamation would bring about economies in operation and maintenance and an improvement of service, particularly to the Company's customers. It would also enable the Commission to extend its service to many rural customers in this district which, under existing conditions, cannot be economically served.[34]

Finally, the Commission was hopeful that it could reduce the price of power from its present $36.00 per horsepower to $27.50 per horsepower, thereby lowering the cost of hard-rock mining in northeastern Ontario.[35]

Nesbitt Thomson lost its northeastern Ontario market because of the interweaving of many factors: political goals of the Ontario government, adverse legal decisions, World War II. With its departure in 1944, the shape of the hydro-electric system was becoming more homogeneous to the extent that there was one system operator in the region instead of two, but it should be remembered that variety still persisted: individual operators, most notably pulp and power companies, continued to produce hydro-electricity. For example, by the end of the war, power plants on the Mattagami river included the HEPCO's Lower Sturgeon, Sandy Falls and Wawaitin developments with a total installation of 27,800 horsepower, the Smooth Rock Falls plant of

the Abitibi Pulp and Paper Company (9,350 horsepower) and the Smoky Falls development of the Spruce Falls Pulp and Paper Company (56,250 horsepower).[36] The HEPCO operations supplied both twenty-five cycle and sixty cycle operation to consumers in the Timmins-Cochrane area: twenty-five cycle coming from Abitibi Canyon and the Mattagami plants; sixty cycle coming from the five plants on the Montreal and Matabitchuan rivers. Also, transmission ties with the Sudbury and North Bay areas handled some power interchange as required between these operators.[37] Abitibi Pulp and Paper was supplying the town of Cochrane with twenty-five cycle power from its Twin Falls, Iroquois Falls and Island Falls plants on the Abitibi river and the Smooth Rock Falls generating station on the Mattagami river. The Spruce Falls Pulp and Paper Company operated two dams-- Smoky Falls and Kapuskasing. These generating stations operated in isolation until 1952 when a tie with the HEPCO network was placed in operation.[38]

The continued presence of these various operators also points to the persistence of other types of hydro-electric generation, despite the push for the one big system on the part of the HEPCO and Nesbitt Thomson. To think of hydro-electric generation in northeastern Ontario as one homogeneous monolith would be inaccurate. However, the post war period did mark a turning point in hydro-electric development as environmental and economic pressures forced the HEPCO engineers to pursue more vigorously their plans for consolidation and centralization.

Following the war, the HEPCO system encountered many difficulties that would influence the course of hydro-electric development in both the northeast and the south. Both systems experienced power shortages because of the interweaving of drought and the post-war economic boom. The Sudbury-Nipissing district faced a power shortage for three months in 1947[39] while at the same time, power demands in Southern Ontario had almost doubled since 1938 with approximately forty per cent of this increase occurring since the end of the war.[40] From 1948 to 1952, power demands in southern Ontario continued to increase an average of thirteen per cent yearly.[41]

In response to these environmental and economic conditions, the HEPCO devised numerous strategies for carrying out its mandate of supplying power to all the citizens of Ontario at lowest possible cost. The strategies, although they will be discussed here sequentially, were all adopted and carried out during the 1940s, 1950s and early 1960s so that many, if not all, overlapped. The first strategy was conservation: consumers were asked to voluntarily restrict their power consumption and then were forced to do so by the imposition of quotas.

The second strategy was to build more generating stations: hydro-electric ones at first and then by changing the emphasis of power supply sources, fossil fuel and then nuclear stations. This strategy meant that the place and the importance of water-power was downgraded to the extent that power from hydraulic sources, with the exception of Niagara, was to be used for

peaking purposes only, instead of base-load generation. The switch of water-power use from base-load to peaking-power was significant to northern power users as it meant they became reliant upon southern sources of power. Also, by differentiating between base-load and peak-load, the HEPCO engineers established a hierarchy of electric power sources. Water-power now was no longer as important to the provincial energy system because it was only used as a supplement to base-load generation provided by fossil fuel and later nuclear power.

The third strategy, which fits hand in glove with the second, was to consolidate generating sources and distribution under one system, effectively managed from Toronto. Consolidation occurred through amalgamation either technologically, administratively or both, between the power systems within the northeast and then of the northeast and south. Amalgamation meant that the HEPCO engineers were striving to centralize their operations. Both hierarchy and centralization are two characteristics of systems development identified by Hughes. When faced with crises of supply, the engineers responded in a variety of ways, but always in ways that fit the established parameters of systems' development: continued growth at lowest cost. Consequently, the solutions proposed to alleviating power shortages of the post-war period that seemed to have the greatest success, were ones that supported centralization and the hierarchical ordering of components within one system.

Unlike the droughts of earlier decades, the drought in northeastern Ontario during the late 1940s proved to be the bane of engineering planning. Otto Holden, Chief Hydraulic Engineer for the HEPCO during the war recognized this factor in an address to the Royal Canadian Institute. In his concluding statement, Holden recited the following poem:

> The raging torrent's rush is stilled,
> The mighty river works the will of man.
> O'er countless miles his web is flung
> From which is drawn the quickening force
> That drives our modern age.
> All this his mind and hand has wrought
> That he may lift to happier plane his daily round,
> But hand and mind and heart have toiled in vain,
> If God, sends not the rain.[42]

In 1948, rainfall on the Abitibi and Mattagami River watersheds was below normal and snowfall during the winter and spring amounted to only one half the normal amount. These two watersheds constituted about one half of the region's storage capacity and the Wahnapitae and Sturgeon River watersheds constituting about one third of the storage capacity also faced a one third to one half decrease in the amount of precipitation. As a result, the storage lakes in the northeastern region were "on the whole less than one half full which corresponds to less than three quarters of the water held in storage at this time in normal years."[43]

In response to this water shortage, the HEPCO recommended that all energy consumers reduce their loads. It outlined its plans in a memo dated January 21, 1948, written by Mr. Challies and forwarded by E.B. Easson, Acting Secretary of the HEPCO to

the Hon. D.R. Michener, the Provincial Secretary of Ontario. According to Challies, the natural river flows in the watersheds of northeastern Ontario were the lowest in ten years. He did not anticipate an improvement in the situation until the Spring breakup and therefore recommended that an immediate fifteen per cent reduction in kilowatt hour consumption be made to prevent even more stringent cuts as the winter advanced.[44]

This action was considered necessary because no other sources of power were readily available. Mr. Challies explained that the HEPCO could not hope to buy power from either Quebec Hydro or Northern Quebec Power Co. because each faced the same drought conditions. Other private companies in Northeastern Ontario were also short of water. Indeed, two small towns being supplied with power by the Proprietary Mines Ltd in the Larder Lake area were "threatened with drastic curtailment," and the small amount of power that the HEPCO received from the Abitibi Electrical Development Company (about 4,500 kilowatts) was to be curtailed in the Abitibi River if flow was further reduced.[45] Both industries and municipalities reduced their power consumption: industries by cutting back on their production and municipalities by cutting back on street lighting.[46]

In January 1948, HEPCO and North Bay Hydro representatives met with North Bay merchants to discuss the possibility of relaxing the conservation policy imposed by the Commission. They wanted to light their store windows and were willing to ensure that a comparable reduction in their use of power in the store

interior would take place in exchange. The Commission was unwilling to allow this exception because, as it informed the merchants: "further restrictions in the use of electricity must be considered... making impossible any relaxation of present restrictions... until water storages were adequately improved by spring thaws."[47]

As a follow-up to that meeting, over fifty-five representatives of the northeastern municipalities and mining companies met with HEPCO representatives on January 26, 1948 to discuss the need for further restrictions. According to the HEPCO minutes, all the representatives agreed that a reduction was necessary; however, they wished to control the implementation of the reductions instead of the HEPCO. The HEPCO was amenable to this. The municipal representatives also demanded from the Commission what steps it was taking to ensure that power shortages did not recur. Mr. Manby and Mr. Leeming replied that the immediate situation resulted "not from a shortage of generating capacity, but from a shortage of water drainage in the area, and it was not expected to recur in the succeeding years."[48] It would not be surprising if the northeast representatives met this statement with scepticism given that drought had been a recurring problem in the northeast since hydro-electric development had begun.

Shortly after this meeting, the HEPCO ordered power reductions as of January 28, 1948 to all power consumers in the territorial districts of Abitibi, Nipissing, Sudbury and

Timiskaming. These draconian conservation measures did little to improve the situation. A follow-up report on water storage levels in October of that year, indicated that there had been a further decline in the amount of water held in storage. In fact, water storages throughout northeastern Ontario were "now showing signs of serious depletion."[49] All the storage lakes in the area were affected including Abitibi, Frederickhouse and Watabeag Lakes on the Abitibi river and Mesomikenda, Minisinakwa, and Mattagami Lakes on the Mattagami river.[50] Furthermore, in an announcement to Northeastern power consumers, E.B. Easson declared that:

> rainfall has been entirely inadequate to replenish our storage reservoirs, with the result that the water now held in storage is only sufficient to support an average output from our generating Stations from now until the Spring break-up of approximately 143,000kws. As against this, we estimate average consumption in the same period, without conservation or allocation, could be 164,000kws, leaving a deficiency of 21,000kws average or roughly 13%.[51]

Conditions improved somewhat the following year but drought returned in January 1950 and the HEPCO once again imposed power quotas. In January, the total amount of water in storage was thirty-nine per cent of capacity compared to fifty-two per cent the previous year and because overall demand for energy had increased over 1949, even more stress was added to the system.[52]

These quotas were lifted in March 1950 with the arrival of spring break-up. By this time, the HEPCO engineers, no longer willing to believe that they could rely on sufficient rainfall, had commenced building several new hydro-electric generating stations on other rivers. Echoing an announcement made by the

HEPCO Chairman, Mr. Saunders, Mr. H.R. Graham, Manager of HEPCO's northeastern region attempted to reassure its customers that these new facilities would prevent the reoccurrence of power shortages. Graham announced to the northeastern power consumers that three new generating stations would be completed within the next two years: the tunnel development on the Mississagi River, and the Des Joachims and La Cave plants on the Ottawa River. Mr. Graham went on to say:

> It is our sincere hope that never again will there be a lack of electric power which might tend to retard development in this north country; but rather that a plentiful supply will be available for mining and manufacturing, for Cities, Towns and Hamlets, and for the development and improvement of rural areas and farms throughout Northern Ontario.[53]

Mr. Saunders's and Mr. Graham's hopes were not to be fulfilled, as some sceptics must have predicted. Insufficient precipitation continued to threaten power generation in the northeastern region throughout the 1950s and there was nothing the engineers could do to make it rain, even though they had tried.

In 1948, the HEPCO collaborated with the Abitibi Pulp and Paper Company in "Operation Snowflake". Researchers from the Abitibi Company and the National Research Council conducted a test flight over Kapuskasing during which ice crystals of frozen carbon dioxide were dropped in hopes that they would then form into clouds. The flights took place on November 10th and 14th. The results, as reported by D.W. Ambridge, President of the Abitibi Pulp and Paper Company, were "promising but inconclusive."[54]

During the 1950s, the Abitibi Company continued with its experiments. The company's activities were reported in the Toronto Daily Star:

> The Abitibi Power and Paper Co. Ltd. is "seeding" clouds to increase the rainfall over part of its Northern Ontario lands.... The system of putting silver iodide crystals into clouds in order to create rain is being used to increase the flow of water so that power supplies will continue to be adequate.... Abitibi has 25 rain-making "generators" in the watersheds of the Mattagami and Abitibi rivers in Northeastern Ontario.... The water level at present gives "no cause for alarm," Abitibi officials say, but last year's snowfall did not furnish the usual volume of water.[55]

These experiments were also inconclusive and did nothing to relieve immediate power shortages. The HEPCO engineers went back to studying more orthodox possibilities for relieving the power shortage. Once again, they investigated the possibilities of constructing new stations on undeveloped sites in northeastern Ontario. The usefulness of these stations was dependent on improvements to long distance transmission technology. The engineers reported that there were thirteen undeveloped hydro sites on the Abitibi, Mattagami and Missinaibi Rivers but that only two could be developed immediately: Red Rock and Otter Rapids. The other sites depended on the further improvements in the field of Extra High Voltage (EHV) transmission.

The technological difficulty posed by long distance transmission was the loss of power between points along the line. If too much power were lost, then construction and operating costs exceeded the amount of revenue received from the sale of power. Lines that could carry ever increasing amounts of voltages without losing inordinate power along the way were the

focus of engineering studies. The HEPCO knew it needed at least 460kv lines to bring power from the far northeast to the south; the present state of transmission technology meant that maximum transmission capacity was only 230kv.[56]

Technological improvements from the 1930s onward began to make EHV transmission attractive. One such innovation was the use of aluminum instead of copper in transmission towers and conductors. The Northern Miner reported on the advantages of this innovation:

> The "Aluminum Cable Steel Reinforced Conductor" had a weight of approximately seventy-one per cent of copper and an ultimate strength of 140 per cent of copper. It was this combination of low weight and high strength that made it possible to string ACSR conductors on longer spans without increasing the tower height, thereby effecting a saving in the number of towers, insulators and other fittings per mile of line. The saving in weight had the added advantage of lowering transportation charges, especially where material was transported by aeroplane.[57]

A second innovation occurred in transformer technology. Transformers converted high voltages to low voltages and vice versa. They were an important component of EHV transmission because generators, motors, heaters, light and domestic appliances were built to operate at low voltages and could not take large blocks of power over distances greater than two or three miles. Transformers would typically step down 110,000 volts from the transmission lines to 12,000 volts for the generators and motors of the customers.[58] It should be pointed out that the definition of "long distance" transmission is relative to the technological developments within any given time

period. When the HEPCO first built its transmission lines from Niagara to Toronto, this was considered a marvel in long distance transmission. Long distance projects in Ontario today are on the scale of transmitting power from northern Manitoba to Toronto.

Pursuant to these innovations, James Duncan, the Chairman of the HEPCO, directed the Commission to investigate the possibilities of long distance direct current transmission in order to get access to James Bay power sites along the Moose and Albany rivers or to the British Newfoundland Corporation's Hamilton River site in Labrador. The reason given for this investigation was the fact that the HEPCO was "facing the necessity of importing coal from the United States in ever increasing quantities" in order to meet the power demands of the Southern Ontario system.[59] Thus even though drought was causing power shortages in the northeast, the HEPCO's interest in EHV transmission was to facilitate the transfer of power from the northeastern rivers to southern consumers who were also suffering from power shortages. Some success with high voltage direct current (DC) transmission in places such as Sweden and the USSR warranted consideration of the idea. In general, DC transmission over long distances was found to be more economical and efficient than alternating current (AC) transmission but only if the distances involved exceeded 1000 miles.[60]

These investigations, when applied to the Ontario situation, indicated that long distance DC transmission from the rivers beyond the present power developments in northeastern Ontario

would be more costly to establish than AC transmission from undeveloped sites along the Mattagami. The Commission therefore announced in 1961 that it would begin:

> the construction of the first major 460kv trans line in North America. This line will operate at 230 kv until 1965, and thereafter will be operating at the full 460kv. It will bring power from the [Mattagami] to load centres in Southern Ontario, and if everything works out as satisfactorily as we expect, this high-voltage long-range transmission line will assist in bringing into economic production hydraulic sites which up to the present were considered to be too far removed from our densely populated areas.[61]

Power from these new sites were to be transmitted to Southern Ontario, a distance of more than 400 miles, by Extra High Voltage transmission lines. Because these sites were built with the specific purpose of supplying power to the south, it would seem the needs of the southern system took priority over the northeastern one, even though both systems were suffering from power shortages. Developing hydro sites in the northeast to supply the south signified a switch in the status of the northeastern system. No longer was northeastern power for northeastern users exclusively and secondly, no longer did it operate in isolation from the southern Ontario system. Now components of the northeast region instead of being used within the northeastern system were being incorporated into the southern Ontario system.

The fourth response developed by the engineers to the power shortages was a reconsideration of alternative fuels as sources of energy. With the power shortages in Southern Ontario during the booming post-war period, the HEPCO had had to build

"emergency" steam plants in 1949 in Toronto, Hamilton, Thorold and Chatham with a combined total capacity of 61,000kw.[62] At the time, the HEPCO considered these plants to be of secondary importance as a source of power and it was hoped that future installations would not be necessary.

Attitudes towards fossil fuel generation began to change significantly in the early 1950s. In the early years of hydro-electricity in Ontario, the power generated from hydro sources had been used for base-load generation, that is power was drawn off during the entire day. Fossil fuel was used only to make up any shortfall from the hydro-electric generators during times of the day when power demands peaked. By the late 1950s, with improvements to fossil fuel generation and with the advent of the possibility of nuclear power, the roles of the hydro-electric stations and fossil fuel stations reversed. It became increasingly appealing to system planners to relegate hydro-electric generation, with the exception of Niagara, to peaking purposes.

The attraction arose for many reasons, most of them technical. Hydraulic plants were quick starting; conventional turbines on automatic control could be started within two and one half minutes and they required little maintenance resulting in few forced shut downs of operations for repairs.[63] There were several reasons for this. The efficiency of steam-electric plants had been improving over the years: by 1953, one kilowatthour of electricity required on average only 1.10lbs of

coal. This meant that "each installed horsepower of water-power turbine capacity, if assumed to be in full operation throughout the year, which was never the case, would produce about 6,200 kilowatthours of electricity" which would be equivalent to about three and one half tons of coal.[64] Also, in the south, another reason for the change of heart was the simple recognition that further hydro-electric development was limited. H.H. Leeming, the Director of Engineering explained this in a memo to the staff of the Engineering Department in 1957:

> With the completion of the Niagara Developments on the Canadian side in 1958, and the St. Lawrence in 1958-1960, we will have harnessed the last major sources of hydraulic - electric power in Ontario therefore, major load growth beyond 1960 must be met by the erection of fossil-fired generating stations or from nuclear energy sources when such sources become economically competitive.[65]

Thus hydro-electric construction was nearing an end in southern Ontario.

Co-incident with this circumstance was the understanding that any future hydro stations would have to be in remote northern locations. The more remote the hydraulic stations, the more cost effective it became to develop them as peaking plants. When the planning engineers investigated the possibility of developing additional power on the Mattagami, they intended these plants to be used for peaking purposes only. Also, using water for peaking purposes conserved water in the northern storage lakes and lessened the risks from drought. Finally, the inability of the HEPCO engineers to control precipitation levels led them to seek alternative, more dependable sources of fuel.

Evidently, hydro power was no longer the best answer to industrial development.

Demoting water power to support status allowed the continued use of hydro-electric power, even if on a more limited scale, rather than its complete obsolescence. However, the impact of this change in orientation on the northeastern system was profound. The water wealth of northern Ontario became of less significance and northern Ontario ended up a tributary of the southern system, not the mainstream within the energy system of Ontario.[66] Also, fossil and nuclear generating stations were built exclusively in the south, further demoting the importance of the northeastern system by not promoting energy diversification there as well.

By 1963, the HEPCO had fully integrated the hydro-electric generating stations into its thermal generation program. In a submission to the Legislative Committee on Energy, the new HEPCO Chairman, Mr. Ross Strike, explained the value of having a power system that balanced the advantages of one energy source with the disadvantages of another. According to Mr. Strike, "the availability of thermal-electric reserves to some extent relieves the system from complete dependence on the fickleness of nature."[67] Strike went on to state that combining energy sources lowered overall costs as well:

> ...thermal plants provide both peak and energy reserves for a predominantly hydro-electric system at fairly low cost. Hydro-electric stations involve high capital costs but low operating costs; thermal plants on the other hand have relatively low capital costs, but involve higher operating costs. Developed together in some acceptable blend, hydro-

> electric and thermal-electric resources can result in a more favourable financial situation than is generally accepted.[68]

With the decline in opportunities for hydro-electric expansion, the HEPCO engineers also turned their attention to nuclear power even though they realized that it was as yet far from being economical. The HEPCO was attracted to the possibilities of nuclear power because nuclear power stations could be built anywhere in the province, including close to the market, thereby avoiding the problems posed by long-distance transmission. Moreover, the power source, uranium, was indigenous to Canada allowing the HEPCO to be independent of foreign sources of fuel.[69] But until nuclear generation became feasible, the HEPCO would continue to use and build up conventional sources. As M. Ward explained in a speech to the Sarnia Branch of the Engineering Institute of Canada: "Our plan is to develop the remaining economic hydraulic sites in conjunction with conventional steam plants until the development of nuclear power has proceeded to the point where it is demonstrated to be reliable and approaches competition with conventional plants."[70]

Hence, reacting to economic conditions that overwhelmed the hydro-electric resources of the province, the HEPCO engineers intermixed the northern hydraulic generating stations with southern fossil fuel generators. In other words, they backed away from dependence on unpredictable river systems and created a

unified system in hopes of providing the cheapest power for all of Ontario.

Complicating the power shortage problem was the incursion of gas companies into the southern power market, especially into domestic appliances. The HEPCO viewed this competition with concern because of the success gas companies had had in the United States and with the effects the competition had on their economies of scale. As James Blay, the HEPCO's Director of Information explained to a meeting of the OMEA in 1957:

> We are now entering an era where natural gas, as an alternative source of energy, will become increasingly available, and where its use will be vigorously promoted. Our basic responsibility to our customers is to provide an adequate and reliable supply of power at a minimum of cost. One essential requirement in providing this low-cost energy is to maintain or improve our present load factor. The loss of large revenue-producing appliances such as electric ranges and water heaters is bound to lower the utility's load factor and thus eventually could result in increased rates.[71]

The key to understanding the danger posed by competition with natural gas is the effect it was having on the HEPCO's load factor. Load is the amount of electricity consumed by customers and load factor is the percentage of the average amount of power consumed, for any given load, divided by the amount of peaking power consumed. The amount of actual consumption varies throughout the day and the year, with the most amount of power being used during working hours and during the winter. Power suppliers have to have the capacity to generate sufficient energy during those time periods. This means that during the off-peak periods, generators reduce their power output even though they

are capable of supplying more. This economic inefficiency is expensive to system operators who, after enormous capital investment can only "sell" a portion of their entire product. To offset this inefficiency, power suppliers created or encouraged off-peak use, primarily through the sale of domestic appliances. If promotion of off-peak use were successful, then the average power consumption would increase giving a more favourable load factor. Both electric and gas companies were subject to the whims of fluctuating power demands and both responded in similar fashion, intensifying competition.

I.K. Sitzer of the HEPCO noted in a speech to colleagues in the Niagara Region, that a large percentage of homes built in the late 1950s were using natural gas for heating and since heating was a seasonal load, the gas companies were making every effort to obtain off peak load in the summer months. They accomplished this by competing with the HEPCO in sales of water heaters and other appliances such as stoves. The HEPCO had conducted a study of the kilowatthour use by existing residential customers served by municipal utilities and found that, in the first five years of the 1950s, the average annual increase was approximately 301 kilowatthours per customer, while in the second five years, when natural gas started to become more generally available, this average annual increase dropped almost forty per cent to 182 kilowatthours per customer. This evidence illustrated the extent to which the HEPCO's load factor was threatened by the success of the gas companies. If the trend continued, then the HEPCO would

not be able to meet its increasing costs, except through increased rates.[72] This alternative was anathema to the HEPCO.

Having summarized the straightened circumstances in which the HEPCO found itself, Sitzer threw down the gauntlet and claimed that:

> the Commission has a responsibility to provide a supply of power to the people of Ontario at the lowest cost consistent with adequate service. We, therefore, cannot stand by and allow a competitor to take over those applications of electric energy which have contributed in a major way, over the last 50 years, to our favourable rate position in municipal utilities and rural operating areas.[73]

In short, Sitzer reaffirmed the HEPCO's commitment to the economies of scale approach to system building. It would continue to promote the use of electricity rather than conserve it and in so doing continue to support its large-scale plant and transmission system. If its load factor were threatened, then it would compete with the "intruders" in an effort to eliminate them.

Consequently, during a time of power shortages, the HEPCO was promoting electric use instead of conservation. Admittedly, the HEPCO was in a Catch-22 position. If it risked power shortages by promoting electric use, its load factor would increase and the price of power would decrease but it would incur the wrath of power consumers when their power supply became insecure. If it did not counter the effects of the gas companies, the HEPCO would then lose customers, decreasing its load factor and therefore increasing the cost of power, further weakening their ability to compete.

As it was, in the 1960s, rising costs were already a concern to the HEPCO. I.K. Sitzer outlined the difficulties posed to the system's operations. He noted that electric power systems cost a great deal of money and that interest and repayment of the cost were the major items in their annual cost of operation. The economic expansion in Ontario was expected to continue throughout the 1960s so that new high cost plants would have to be constructed to meet the corresponding increases in power demands.[74] Most of the new power would have to come from thermal and nuclear plants that had higher capital and production costs than the hydraulic sites built in the past. Along with increased construction costs were increases in labour costs and taxes. Sitzer noted that the Commission had faced a fivefold increase in the amount of taxes it had paid from 1951 to 1959.[75] In light of all these difficulties, the HEPCO considered the incursion of the gas companies into "their" home market a particular hardship.

The HEPCO engineers had one other response to the adverse environmental and economic conditions and that was to amalgamate the northeastern system with the southern Ontario one. Pressure to amalgamate these systems had begun during the war years as a conservation measure. Realizing that the men and materials were not available for the construction of new plants, the Commission opted instead to link up the various systems in the province in order to allow exchanges of power between them.[76]

The process of amalgamation continued after the war because of continuing power shortages in the Southern Ontario System, where the demands for materials and manpower for vital industrial expansion for war production had taken priority over the claims of utilities for the construction of new power plants. Following the war, the severe shortage of men and materials continued, thus delaying the development of power sites. As a result, substantial power interruptions, particularly in Toronto, occurred during peak periods from 16:00 to 19:00 and to a lesser extent throughout the whole working day from 8:00 to 20:00. The HEPCO announced that the power cuts during peak had been due to a lack of power supply within the system as a whole and that the reductions throughout the day were directly attributable to the inability of the hydraulic plants to produce their normal levels of power because of low stream flow and the depletion of storage.[77]

As in the northeast, the Commission responded to this crisis in the south's power supply by urging small customers such as domestic consumers to share the burden of conservation through voluntary restrictions-- it was reluctant to cut power from factories-- and if that did not work then through imposed quotas.[78] Voluntary restrictions were called for in early December, 1946. Two weeks later, Osborne Mitchell, the HEPCO secretary informed Roland Michener, the Provincial Secretary that voluntary conservation had been ineffective in bringing about power reductions. Industries were unable to get all the power

they needed and were complaining about the waste of power for "non-essential" uses such as street lighting and commercial signs. As a result, the Commission was seriously considering reimposing the controls on power usage in place during the Second World War under the authority of the *Power Control Act of 1939*.[79]

While power shortages were giving rise to complaints about the operations of the HEPCO, the government was finding fault with the Chairman of the Commission, Thomas Hogg. In September 1946, the HEPCO made arrangements to buy the Ottawa Light, Heat and Power Company. Premier Drew was angered that the HEPCO had not informed him or the Cabinet about these negotiations until after the offer to buy had been made, even though the provincial government would have had to pass legislation authorizing the deal and the $7 million purchase price.[80]

Secondly, Drew was upset with Hogg's handling of the power shortages in December. Again he was not informed that the HEPCO was considering imposing conservation quotas. Drew wrote to the Commission asking about the situation only to learn that Hogg had gone on a four week vacation. Prior to his departure, Hogg had asked the Niagara Hudson Power Company for 100,000 horsepower. It was up to the Commission to follow through with this enquiry. Hogg's departure for vacation at such a crucial time, in Drew's mind, was inexcusable. This coupled with Hogg's apparent neglect in keeping the government informed of HEPCO activities caused Drew to call for Hogg's resignation. According to Drew, "Dr.

Hogg had obviously got into the unfortunate habit of keeping important information entirely to himself."[81] Hogg tendered his resignation on January 28, 1947 but claimed ill-health as the reason for his early departure.[82] Despite Hogg's resignation, power shortages continued as did the HEPCO's attempts to find extra power by purchasing through other companies.

While system planners were responding to the power shortages in the south as a result of demand exceeding supply, they were also responding to the power shortages in the north due to drought. The HEPCO's response to the power shortage in both regions was amalgamation. To the Commission's engineers, ever guided by the "lowest cost" principle, amalgamation made sense both administratively and technologically.

Initially, the HEPCO was content to consolidate operations in three of the northern districts: Abitibi, Timiskaming and Sudbury. The amalgamation of these systems was only a technical one by way of a tie-line between them; the financial accounts of each system was still kept separate.[83] In 1949, the Little Current distributing station with connecting line from Inco's Lawson Quarry substation was placed in service. Thus the Manitoulin district became interconnected with the Sudbury district and therefore the Abitibi, Timiskaming and Nipissing districts. As it was explained in the annual report of 1949:

> This region was operating in close co-operation with the Abitibi Power and Paper Co. to make the most efficient use of the water.... During the period of high flow in the spring when not all of the water could be stored, surplus energy was supplied to the Abitibi Power and Paper Co. for the operation of electric boilers to the extent of some

78,000,000kwh. The Commission in turn received 24,000,000kwhs from Abitibi Power and Paper Co.[84]

The HEPCO then, in 1950, interconnected the Northeastern system with the Southern Ontario System. HEPCO adopted this solution rather than building new generating facilities within Northeastern Ontario because it believed that the capital expenditures involved for their construction would be more expensive than interconnection.

The HEPCO firmly believed that certain advantages would accrue to both the southern Ontario system and the northeastern one. Interconnections would allow the transfer of surplus energy either way during periods of power deficiencies. The total load of northeastern Ontario in 1948 was 208,000 kilowatts whereas in the southern system the total was over two million kilowatts therefore even if a deficiency existed in both systems, the SOS could help out the northeast without "materially increasing the deficiency in southern Ontario."[85] Also the SOS could supply the northeast with power on weekends thus conserving the water held in northeastern storage dams. As the HEPCO reported in April: "Later on, when all the new resources projected for southern Ontario are completed, there should be ample reserve capacity to transfer it to northern Ontario to take care of any condition such as was experienced last winter."[86] Interestingly, in 1952, the net result of power interchanges between the southern Ontario system and the northeastern one was the transfer of 105,799,500 kilowatthours to the southern Ontario

system.[87] By 1957, the net transfer was almost exclusively throughout the year favouring the north.[88] In this instance, the consolidation of two systems into one might have been of more or equal benefit to the northeast. The southern metropole, from a 1950s vantage point might not have been entirely exploitative of the northeast hinterland waters.

However, despite this seemingly rational approach to dealing with the northeastern power shortage, the technical amalgamation of the southern and northeastern system led to concerns on the part of northern power consumers that "their" power was being shipped south. In January 1950, the town of Timmins sent a copy of a council resolution to Premier Leslie Frost. It stated:

> Whereas it is not within the powers of a municipality to place restrictions on power consumers as requested in ultimatum issued to the Town of Timmins by R.H. Saunders and that such restrictive powers are solely within the Hydro Electric Power Commission of Ontario and
>
> Whereas power generated in North-Eastern Ontario is by-passing municipalities in North-Eastern Ontario
>
> Now be it resolved that the Province of Ontario be and is held liable and responsible for every work day lost by miners due to the fact that power generated in North-Eastern Ontario is being transmitted to Southern Points of Ontario and that it is felt that municipalities in North-Eastern Ontario have first claim on power generated here....[89]

Though criticism continued against amalgamation, the HEPCO continued to justify its decision. This amalgamation was a technical one only as Chairman Saunders explained in a radio broadcast, during which he asserted that the northern Ontario system had not "in any way, and in fact cannot by law, lose its identity by reason of this interchange of power."[90] Regardless

of Saunders' reassurances, the technical interchange did effectively mean a loss of "identity."

Simple technical amalgamation proved to be a short term solution. For one thing, the outbreak of the Korean war made power demands soar once again. Within a year of its commencement, power demands had increased by 373,800 kilowatts.[91] By 1961, HEPCO planners estimated that the northeastern division would "be importing 308,000kw from the Southern Ontario System." To meet this increased demand, the Southern Ontario System would have to rely more on thermal generation which was more expensive, in the long run, than hydraulic. Thus costs for power in the Southern system would be pushed upwards. This in turn would increase the costs of power in northeastern Ontario because with interconnection came a pooling of costs between the southern and northeastern systems. In order to ameliorate the cost increases, the HEPCO planners sought to increase hydro-electric generation in northeastern Ontario because this would have the double benefit of making the northeast self-sustaining and ease the South's need for thermal power.[92]

The HEPCO planners also amalgamated the two systems' finances into one. They believed this to be a necessary action because it was no longer possible to keep account of the cost of generation and distribution of power within each system. For example, the Otto Holden Plant was paid for by the Southern Ontario System even though it was located in the northeastern

region. This hydro-electric power once sent from the north to the south, could be sent back to the north when needed. How could the accountants divide the costs of maintenance and power distribution in this instance?[93]

Amalgamation of the systems took place for yet another reason. Since it was no longer possible to link a particular power supply with a particular customer, costs had to be pooled and rates charged based on a kilowatthour consumption regardless of the source of energy, whether nuclear, fossil or hydro-electric. As the HEPCO explained:

> At one time it was quite feasible to trace the direct supply of power to any customer and assess the cost of generation, transformation and transmission facilities to each load. Our customers of the SOS now receive power from a large system network, supplied by some 50 generating plants dispersed over a large area, connected by an extensive system of 230kv and 115kv lines and stations, and interconnected with other large utilities in Quebec and in the States of New York and Michigan.

Thus it was no longer possible to trace the flow of power from its source to individual customers. The structure of the system with its interconnecting grid meant that costs from bulk generation, transmission and transformation now had to be pooled and assessed on a per kilowatt basis to all consumers.[94]

It soon became evident to power consumers in northeastern Ontario that amalgamation involved more than exercises in accounting or technical hook-ups. Amalgamations signified a change in the HEPCO's thinking about power distribution. Instead of regionalizing the power grid into separate systems, the HEPCO was now thinking of power distribution for the province as a

whole, an attitude that symbolized the full flowering of the principle of the common good. Now power was being developed for the good of all the people of Ontario. As the HEPCO motto states: "The gifts of nature are for the people." This meant that not only was power distributed on a province-wide scale but so too were costs of construction of generating stations and transmission lines to the concern of northern mining companies who had hitherto been benefitting from a regional costing system.

The process of amalgamation illustrates very well Hughes' theory of systems development of which interconnected parts and centralization are key characteristics. Amalgamation promoted interconnections between the components of the northeastern and southern systems. This interconnection increased the ability of each component to affect the others. The process of interconnections created a spiralling effect in which changes to one part of the system led to changes in the others. Always though, because of the engineers' preference for centralized control, there was a linear progression towards consolidation within the southern Ontario system framework.[95]

The transformation of the northeastern hydro-electric system during the post war period also gives us some insight into the dynamics of metropolitan/hinterland relations. Power shortages within both regions led to a restructuring of both energy systems. Because of environmental characteristics and of engineering mentalité about economies of scale and such, the northeastern system lost its distinctive identity. Its identity

was not subsumed into the south simply as a result of predatory exploitation by metropolitan interests but rather because the demand for power in the north exceeded the supply of power available within the northeastern region. Even though the metropolitan system builders initially eyed northern power for southern industries, northern industries were soon the recipients of southern power. Of course, an alternative was to slow down development of the northeast, as the Anishnabek would have preferred or build fossil fuel generating stations in the north. Regardless of the reasoning and motivations of the HEPCO engineers, the cross-currents of economics and environmental factors precipitated actions by the HEPCO engineers-- in keeping with their preferences for centralization and consolidation-- that resulted in the reshaping of the northeastern system so that it was subsumed under the southern Ontario system. Only a remnant survived.

By 1944, the energy sources in northeastern Ontario had developed from a series of independent privately-owned power generating stations into a publicly-owned system. With drought in the northeast and overwhelming energy demands in the south during the post-war period, the system would evolve further into a mixed fuel energy system, centrally controlled from Toronto. Through this process, the northeast system would cease to exist independently from the rest of the province and its energy output would be subordinated to the energy generated by other fuels located in the south.

Not everyone was pleased with this turn of events. The people most dependent on northeastern hydro were the most vociferous in their complaints about the policies of centralization and consolidation. These people, the mine-operators of the gold and silver districts, will be the focus of the next chapter as will be the HEPCO's response to their criticism. Secondly, the northern First Nations faced further intrusion with the construction of three new generating stations on the Mattagami river. Their observations of the environmental degradation that occurred from the operations of the stations will be highlighted, as will the continuing failure of the HEPCO to adequately address their concerns.

NOTES

1. The Northern Miner, "Hydro Out after Mine Business," July 13, 1933.

2. GSI Orders-in-Council January 1935- December 1935, Order-in-Council, April 1935.

3. GSI Orders-in-Council, January 1935-December 1935 Order-in-Council 0062/35, August 21, 1935.

4. GSI OR 621 Contracts, Agreements and Rights Acquired, Excluding Power Contracts General to 1937, Attachment to Memo, Chief Municipal Engineer to A.T. Fairlie March 9, 1951.

5. GSI OR 102.101 Power Systems, Northern Ontario Properties, January 1936 to August 1958, Vol. 1, "Utilization of Hydro-Electric Power by the Mining Industry in Northern Ontario as Supplied by the Hydro-Electric Power Commission of Ontario," circa, May, 1942.

6. The Northern Miner, Northern Canada Power advertisement, March 9, 1933.

7. The Northern Miner, "Protecting the Mine and the Home too, Against Accident," Canada Northern Power advertisement, March 30, 1933.

8. The Northern Miner, "Canada Northern's Power is Cheap Power," Northern Canada advertisement, May 11, 1933.

9. GSI OR 541-91.029, Letter from Secretary, Chief Engineer's Office to the City Editor, the Evening Telegram, Toronto, November 1, 1933.

10. Ibid.

11. GSI OR 505.3, Interconnections, Canada Northern Power Corporation, 1933-1944, Indenture between the HEPCO and Canada Northern Power Corp. Ltd., November 7, 1933. See also GSI OR 104.11, File #13, The Latchford/Smith Royal Commission (Ontario), Memoranda to Commission "Northern Ontario Properties-- Power Supply to Canada Northern Power Corporation, Ltd.," October 24, 1933.

12. Ontario Hydro Twenty-seventh Annual Report, 1934.

13. Ibid.

14. The Northern Miner, "Hydro has got to Pioneer," May 28, 1936.

15. Twenty-eighth Annual Report of the HEPCO, 1935, No.26, pp.52-54.

16. Ibid.

17. Ibid.

18. Twenty-ninth Annual Report of the HEPCO, 1936, No.26, pp.56-70.

19. The Northern Miner, July 29, 1937.

20. The Northern Miner, November 4, 1937.

21. The Northern Miner, "More Liberal Mine Policy Foreshadowed for Hydro," December 9, 1937.

22. The Northern Miner, "Privy Council Favors Mine in Decision on Power Case," July 28, 1938.

23. Ibid.

24. The Northern Miner, "Hollinger Power Decision," October 26, 1939.

25. The Northern Miner, "More Cuts in Rate for Power?" February 15, 1940.

26. GSI OR 505.12 World War II Priorities and Controls (Includes Power Controller) General, Vol.2, February 1918- September 1940, "Hydro Fights for Victory on Many Production Fronts," Hydro News Bulletin by Thomas Hogg, Chairman and Chief Engineer HEPCO, circa, 1940.

27. OH Corporate Archives, Speeches, Address by the Hon. George H. Challies, March 1944.

28. Ibid.

29. Ontario Hydro (OH) Corporate Archives, Speeches, An Address by Dr. Thomas H. Hogg Chairman and Chief Engineer, HEPCO, before the Eastern Ontario Municipal Electric Association," September 16, 1942.

30. The Northern Miner, "Canada Northern Power Earnings Down," March 11, 1943.

31. The Northern Miner, "Ontario Buys out Private Power," December 1, 1944.

32. Ministry of Natural Resources (MNR) Land File #1160, "Water Power Development on the Montreal River", "Assignment of Licenses of Occupation," Northern Ontario Power to the Hydro-Electric Power Commission of Ontario, January 31, 1945.

33. The Northern Miner, "Power Rate Cut is Confirmed," August 3, 1944.

34. AO RG 3 Box 449 File 207-G, Drew Papers, Northern Ontario Power Company Ltd., Letter and attachments, Premier George Drew to Thomas Hogg, HEPCO Chairman, December 19, 1944.

35. Thirty-seventh Annual Report of the HEPCO, 1944, No.26, p.xvf.

36. GSI OR 410.1-193 Vol. 5, Water Storage Abitibi River, Memo, Dr. O. Holden, Asst General Manager of Engineering to Mr. R.H. Saunders, "Abitibi River Area-- Undeveloped Power Sites," May 4, 1951.

37. Ibid.

38. Ibid.

39. GSI OR 402 Bulk Electricity Systems, Northern Ontario Properties, August 1933- August 1973, Vol.8, Memo, A.M. Manby, Assistant General Manager-- Administration, HEPCO to R.L. Hearn, May 5, 1947.

40. GSI OR 123 Vol. 37, Professional Associations, Canadian Manufacturing Association 1923-1964, "Notes Re Power Situation in Ontario," September 25, 1947.

41. HEPCO Annual Reports, 1948 to 1952 inclusive.

42. OH Corporate Archives, Speeches, "Canada's Water Power: Its Development and Importance," Dr. Otto Holden, Presidential Address, Royal Canadian Institute, October 30, 1943.

43. GSI OR 402 Vol. 2, Bulk Electrical Systems, General, Report "Northeastern Region Rainfall 1947, 1948," Power Supervisor's Office, October 22, 1948.

44. GSI OR 402, Vol. 2, Bulk Electrical System General, (Northeastern Region) Memo "Energy Deficiency, North Eastern Ontario," Attachment to letter, E.B. Easson, Acting Secretary, HEPCO to Hon. D.R. Michener, Provincial Secretary, January 21, 1948.

45. Ibid.

46. Ibid.

47. GSI OR 510 Municipal Customers, North Bay, Memo to File, E.B. Easson, Acting Secretary, "North Bay," January 12, 1948.

48. GSI OR 505.121 Restrictions/Conservation World War II/ Post-War Power Shortage January 1948 to April 1948, "Report on Meeting with Municipalities and Mining Organizations, North Bay. Monday, January 26, 1948."

49. GSI OR 402 Vol. 2, Bulk Electricity Systems General, "The Power Situation in NE Region" October 18, 1948.

50. Ibid.

51. GSI OR 505.1 Vol. 2, Utilization of Energy Restrictions/ Conservation, August 1939 - December 1967, Announcement, E.B. Easson, Secretary, HEPCO, "Power Conservation: NE Region," October 26, 1948.

52. GSI OR 530 Direct Customers, The Huronian Co. Ltd., Letter to the Huronian Co. Ltd., Copper Cliff, January 6, 1950.

53. GSI OR 505.121 Vol. 9, Restrictions/ Conservation World War II/ Post-War Power Shortage, January 1950- September 1953, "Notice to all Consumers" from H.R. Graham, Manager, Northeastern Region, March 27, 1950.

54. Archives of Ontario, (AO), MU 8661, Hearn Papers, File: "Operation Snowflake."

55. GSI OR 530, Direct Customers, Abitibi Power and Paper Co., Toronto Daily Star, "Abitibi 'Seeding' Clouds for Rain," August 17, 1955.

56. GSI OR 202 Vol. 15, Bulk Electricity System, Northern Ontario Properties, Memo, M. Ward, Director of Planning to H.A. Smith, Asst General Manager-- Engineering, "Preliminary Funds for Research Engineering Design and Property Acquisition for Extra High Voltage Transmission Northeastern Division," June 6, 1958.

57. The Northern Miner, "Use of Aluminum Conductors in Power Transmission Grows," Annual Number, October 27, 1938.

58. The Northern Miner, "Electric Transformer Vital Link in Mine Power Supply," Annual Number, October 27, 1938.

59. GSI OR 240.3 Engineering Studies Bulk Transmission, Memo, James S. Duncan, Chair to A.W. Manby, Asst General Manager and Engineer, August 27, 1958.

60. GSI OR 813 Electrical Research: Generation, Transmission and Distribution, Memo, J.G. Cassan, Supervising Engineer, Transmission, Distribution and Utilization Section to G.D. Floyd,

Asst General Manager-- Engineering, "Preliminary Survey of Long Distance Transmission Methods-- Research Division Report No. 57-150" April 11, 1957.

61. GSI OR 104-12 Vol. 9, Investigating Committees: Committee on Energy, March 1961- March 1962, Report to the Legislative Committee on Energy, March 15, 1961, Appendix I, p.4.

62. GSI OR 130.01 Vol. 2, Progress and Activity Reports Construction Department, May 1938 to October 1952, "The HEPCO Construction Activities During the 1949 Calendar Year."

63. OH Corporate Archives, Speeches, "Economics of Hydro Peaking Units," H. Teekman, HEPCO System Planning Department, November 1960.

64. GSI OR 410, Operation and Maintenance-- General Hydraulic (Incl. Step-up transformation and high-voltage switching), November 1928 - January 1973, Federal Department of Resources and Development/ Engineering and Water Resources Branch/ Water Resources Division, "Water-Power Resources of Canada," March 15, 1953.

65. GSI OR 131 Vol. 30, Organization (OOOH) General Departmental Memo, H.H. Leeming, Director of Engineering to the Staff of the Engineering Division, "Re-Organization of Generation Departments, Engineering Division," December 2, 1957.

66. GSI OR 211.1, "A Report on the Development and Incorporation of the Remaining Undeveloped Hydraulic Sites in the Northeastern Division," No.427, Planning Division, The HEPCO, June 12, 1959.

67. GSI OR 104.12 Vol. 5, Investigating Committees Committee on Energy, January 1962- March 1963, "Report to the Legislative Committee on Energy," March 20, 1963, pp.4-6.

68. Ibid.

69. Robert Bothwell, Nucleus: The History of AECL, (Toronto: University of Toronto Press, 1988), p.279.

70. OH Corporate Archives, Speeches, "Power Requirements of Ontario Hydro and the Place of Nuclear Power in Ontario Hydro Planning," November 19, 1957.

71. OH Corporate Archives, Speeches, "Remarks by James A. Blay," Director of Information, OH, November 6, 1957.

72. OH Corporate Archives, Speeches, "Why the Commission is Involved in Sales Promotion," I.K. Sitzer, Supervisors' Conference, Niagara Region, September 30, 1960.

73. Ibid.

74. GSI OR 570.1 Marketing and Utilization Programs Load Building Program, Report, "Why Hydro is involved in Load Building," I.K. Sitzer, October 25, 1960.

75. Ibid.

76. Ibid.

77. AO RG 3 Box 440 File 137-G Drew Papers, H-EPC Power Shortages, Letter, T.H. Hogg, HEPCO Chairman to all Municipal Commissions, December 3, 1946.

78. Ibid.

79. AO RG 3 Box 440 File 137-G Drew Papers, H-EPC Power Shortages, Letter, Osborne Mitchell, Secretary to Hon. Roland Michener, Provincial Secretary, December 19, 1946.

80. The Toronto Star, "Drew Explains his Stand on Dr. Hogg and Hydro," January 28, 1947.

81. Ibid.

82. OA RG 3 Box 440 File 137-G Drew Papers HEPC, Resignation of Dr. T.H. Hogg. It seems the HEPCO's top job had a habit of ruining the health of its occupants. C.A. Magrath had commented earlier that when he had held the post, he had nearly suffered a collapse and surmised that Cooke's death in a car accident, shortly after leaving the chair, had been the result of frayed nerves. NAC MG 30 E82 Vol. 5, File 16, C.A. Magrath Papers, Letter, C.A. Magrath to J.R. Cooke, Chairman, August 19, 1933, Note in margin dated May 20, 1939.

83. GSI OR 126 Vol. 10, Conferences and Meetings Executive Meetings November 1946- November 1951, Minutes of Executive Meeting, March 1, 1948.

84. Forty-second Annual Report of the HEPCO, 1949, No. 26, p.30f.

85. AO RG 3 Box 440 Drew Papers, File 137-G H-EPC Power Supply, Report, "Power Supply-- Northeast Region," April 17, 1948.

86. Ibid.

87. Forty-fifth Annual Report of the HEPCO, 1952, p.11.

88. Fiftieth Annual Report of the HEPCO, 1957, p.14.

89. GSI OR 510 Municipal Customers Timmins, Letter, V. Salomaa, Municipal Clerk, Timmins to Premier Leslie Frost, January 5, 1950.

90. OH Corporate Archives, Speeches, "Radio Report from Blind River," by Robert Saunders, HEPCO Chairman, November 16, 1954.

91. OH Corporate Archives, Speeches, Address of Robert H. Saunders, HEPCO Chairman, to the Toronto Board of Trade Club, April 23, 1951.

92. GSI OR 210 Col 2, Generation Hydro-Electric Step Up Transformation and High Voltage Switching, Memo, M. Ward, Director of Planning to H.A. Smith, Asst General Manager--Engineering, "The Remaining Undeveloped Hydraulic Sites in Ontario," January 27, 1958.

93. GIS OR 101 Vol. 1, Administrative History of Ontario Hydro, October 1959- May 1981, "Amalgamation of Systems of Ontario Hydro."

94. Ibid.

95. In 1951, Clarkson and Gordon Co., the provincially appointed financial auditors of the HEPCO, submitted a proposal for the financial amalgamation of the Thunder Bay System with the Northern Ontario Properties. Their reasons for recommending this course of action stemmed from concerns raised by the smallness of the Thunder Bay operations: there was no broad municipal base, at least relative to Southern Ontario; there was less stability in charges and costs because the Thunder Bay System could not take advantage of the benefits offered through economies of scale and the sparse population in the Thunder Bay area made it unlikely that further hydro-electric development could take place in an economical way. A technical amalgamation was not possible at this time because there were no large industries between Thunder Bay and Sudbury or Toronto for that matter that would justify the expense of building connecting transmission lines. In 1952, the HEPCO accepted Clarkson Gordon's recommendations for financial amalgamation with the NOP and consequently the SOS thereby establishing a province wide energy system along financial lines. The Thunder Bay continued to be technically isolated from the rest of Ontario.

CHAPTER FIVE

As we have seen, the relationship between the mine owners of northeastern Ontario and the power companies seemed to be a troubled one. Of the three northeastern groups studied in this thesis, the mining companies were the most dependent on the power companies for their particular product. Although they did have their own sources of energy supply and generation, these supplies did not meet the bulk of their energy requirements. Furthermore, given the financial risks of most mining ventures, both in terms of initial capital investment and in fluctuating markets, mine owners were not interested in adding further to that risk by spending many thousands of dollars on a hydro-electric system.

When the power companies failed to supply the mines with adequate, dependable or inexpensive energy, mine owners quickly protested such failings. In the earlier years, the major criticisms against the power companies had been about security and adequacy of supply. After the Second World War, when the Bretton-Woods agreement froze prices on a wide variety of commodities, while labour and material costs increased, the mining companies of northeastern Ontario, especially the gold mines, found it increasingly difficult to continue operating. The federal government acknowledged this hardship by passing the *Emergency Gold Mining Assistance Act* in 1948. This act was designed to subsidize the cost of mining based on the price they received for their product as against the costs they incurred to secure it.[1] Still, some mining companies were forced out of business.

Those that were able to continue focused much of their survival strategies on cutting costs. The cost of energy was not a concern as long as it remained low; however, the HEPCO was subject to the same inflationary forces as were the mines. When it raised its rates during the 1950s, the mine owners protested, arguing that the raise would force their mines to shut down. They also seriously questioned the HEPCO's decisions with regard to the operations of the northeastern power system, in particular, the HEPCO's policies of amalgamation and of building new, and what they deemed to be unnecessary, generating facilities. The mine owners were not the only people critical of HEPCO policies. First Nations continued to voice their concerns about the degradation of their environment and loggers competed for control of the waterways. The loggers will be discussed in the next chapter, while mine owners and First Nations concerns will be discussed here.

In 1954, the Ontario Mining Association (OMA) took up the attack against amalgamation arguing that it was the reason for increased power rates in northeastern Ontario. In a submission to the Minister of Mines, the association, recalling the terms of the trust agreement between the Ontario government and the HEPCO over power facilities in northern Ontario, argued that the Northern Ontario Properties (NOP) was established originally as a separate system from the Southern Ontario System (SOS) and that the separateness should continue. This would allow cheaper rates to prevail in northern Ontario because the power consumers would

not have to pay the price of the system's expansion in the SOS. The OMA reminded the minister that the Ontario Government acquired the power developments of the Abitibi Canyon in 1930 and turned them over to the HEPCO to operate them in a manner that would provide cheap power to encourage the development of the mining industry and as a consequence, Northern Ontario.[2]

To a large extent, the government had achieved its purpose. However, according to the OMA there was still much to be done and it was of vital importance that the mining companies receive power at cost. As it was explained:

> The mining industry can still expand but a good part of it still operating is comprised of older mines which must take full advantage of mechanization and is faced with the necessity of treating lower grade ores and of mining these ores at greater depth. Without even cheaper power than has been available in the past, the continuation of that part of the industry will be curtailed.[3]

Consequently, the effect of the rate increases would be to accelerate the decline in the number of mines now active and bring the development of the north to a standstill.[4]

Secondly, the OMA then pointed out that in the 1920s when contracts between power companies and mines were negotiated, the rates set for the power supply were quite high because of the risk involved in serving new untried mines. To offset the risk of mines prematurely closing, capital costs of power companies were included in mining contracts with an amortization of ten or twelve years. After that time period, if the mines were still in operation, the mine owners were assured that power rates would be reduced. However, this had not been the case. According to the

mining association, only one new plant had been built or acquired for the Northern Ontario Properties over the previous fifteen or twenty years; yet the capital charges against the northeastern system had increased from "some $41 million at the end of 1944... to some $214 million at the end of 1953." As a result of these capital charges, the mines were hit with an increase in rates of "22 per cent on the first 5000 horsepower annual consumption, 41 per cent on the second 5000 horsepower annual consumption [and] 81 per cent on the balance of consumption each year...."[5]

Northern mining companies were angered not only by the increases but also by a change in Hydro policy to the effect that rates were to be in future set on a year by year basis only instead of for ten years or more thus depriving the mining companies of protection from inflation. The OMA preferred to believe that fixed annual rates were the result of the desire of Hydro to finance its province-wide construction programs with greater flexibility rather than a response to Korean War inflation. This was contrary to the original understanding between the mining companies of northeastern Ontario, the Ontario government and the HEPCO. The mining industry was to be provided with power at cost, that is generating cost and maintenance once the capital costs had been taken care of.[6]

The Ontario government received further correspondence from the OMA in 1954. N.R. Parkinson, the Executive Director of the OMA, stated in his letter to the Minister of Mines, the Hon. Philip Kelly, that the additional capital costs the HEPCO was

charging the northeastern system came about largely as the result of mergers and building of inter-communicating lines. He then pointed out that the HEPCO Chairman, Robert Saunders had taken great pains to assure the northeastern power consumers that the two accounts of the two systems were kept separate in order to avoid charges being applied to the north that should be applied to the south. Parkinson looked askance at Saunders' claims. He explained his scepticism in this manner:

> the policy of determining to what account capital charges properly belong, has apparently been left, of recent years, with the commission and that in any event policy with respect to the operation of these Northern Systems has changed such that today instead of a self contained System to provide power to mining and allied interests in the Northern areas, the NOP have become virtually an operating division of Hydro itself....[7]

Parkinson also took unction about statements made by Saunders in his report to the Legislative Committee in 1943. At that time, Saunders made it clear that the capital cost of these connection facilities was divided equally between the two systems. Parkinson stated that this division was unfair as the amount of power consumed in the south against that consumed in the north was six times greater.[8] While the HEPCO did admit that mining rates were high relative to the prevailing rates in Southern Ontario,[9] it did not alter its rate structure.

The Ontario Mining Association continued to press for relief from higher rates, always blaming amalgamation for the increase. It hired the accounting firm of Thorne, Mulholland, Howson and McPherson "to review for [it] the Hydro accounts and records with particular reference to details going to make up charges against

the Northern Ontario Properties." Hydro refused to open its books for such an examination. Nevertheless by consulting public documents, the accountants were able to determine that the HEPCO was supplying power to some customers below cost, in particular to rural users in northern Ontario and to pulp and paper producers in the Thunder Bay system, with the resulting deficit being charged to the mining companies in northeastern Ontario. The accountants recommended that: "if for any reason Government policy indicates the desirability of selling power to any group at lower than cost then in such case Government funds should be provided to meet the cost."[10]

In this instance, the mining companies were challenging the principle of cross-subsidization, one of the basic principles by which most utilities operated. Cross-subsidization meant the areas that could not be self-sustaining would have the cost of their electric generation subsidized by other areas that could operate at a profit. The HEPCO for its part had initiated a policy of cross-subsidization in southern Ontario several years before and so had little sympathy for the mine owners' point of view. The Hydro responded in turn noting that "it is not possible, in a power system that must expand to meet load growth, to maintain 1945 rates."[11]

Most of the protest over the increased mining rates came from the gold mines, in particular the Hollinger interests and they renewed their criticism in 1960, when the Commission raised its power rates by nine per cent in Northern Ontario. The HEPCO,

unmoved, pointed out that hydro costs represented but a small proportion of the mines' total production costs compared to labour and materials. The HEPCO also elaborated upon its reasons for adding capital charges to the rates of the northeastern mining companies by stating that requests had been made from time to time from groups elsewhere in Ontario for the distribution of large blocks of power to industries at reduced rates but these requests had been denied because it was a "fundamental concept of Ontario Hydro that the water power resources of the Province must be developed for the common benefit of all the power users of Ontario."[12]

"Common benefit" meant equal benefit; all citizens were to get equal benefits from hydro-electric development but it was the system designers who defined what the benefits were to be. Equalization of power rates is another example of how the equality principle and common good doctrine were used as a means of supporting hydro-electric development. Without shared costs, some regions, especially rural or areas with low population density would never have received hydro-electric power. The fact that the principle was adopted by the HEPCO illustrates that it was not only pervasive within the Common Law but within utilities' business practices too.

The commission's response showed that the NOP trust had been transformed from providing northern power to northern Ontario consumers to providing power for the common good of all the people of Ontario effectively ending its influence as a defender

of northeastern development. The HEPCO pointed out that in the past, some municipal electric utilities and industrial power users adjacent to large power developments, such as Niagara Falls, had received a lower rate for power purchased from the Commission than other utilities or industrial power users farther from sources of power. However, power loads had increased to such an extent that new plants had to be constructed in various locations throughout the province and were interconnected through transmission lines and switching stations. The complexity added to the system as a result of these interconnections made it necessary to replace the original system of costing with a system that distributed costs equally throughout the province. Therefore the costs assessed to municipalities and industrial customers near generating plants became the same to other customers in the Province.[13]

"In other words," as the HEPCO explained, "all customers enjoy equal rights, which is as it should be in a cooperative enterprise, and any attempt to give one group of customers preferential treatment would be most unfair to the other partners, and, therefore, could not be considered."[14] The HEPCO's equal rate structure meant that northeastern Ontario could not benefit from its cheap sources of power derived from the northern rivers.

The mining companies argued this point but failed to acknowledge that during times of power shortages, which became chronic in the 1960s, the more expensive power "imported" from

southern fossil fuel generators was subsidized by the province-wide system to the advantage of the northeastern system. Under these circumstances, it would seem the mining companies did receive benefits from interconnections with and new stations in the south. Thus, the mining companies were being hypocritical in their protests about rates.

Regardless of the principle of equal rates, which the HEPCO seemed to advocate so strenuously, it pointed out in a separate report to R.W. Macaulay, the Minister of Energy Resources, that it had been involved in a running battle with the gold mines for the past several years and that the Hollinger mine in particular had been granted concessions as a result of these battles. According to the HEPCO, in 1955, there were fifteen gold mines in northeastern Ontario that refused to pay the new standard mining rate after their old agreements had expired. The Hollinger mine had faced an increase in their rates from $23.46 to $42.50 per kilowatt when their contract expired in October, 1954. The latter rate had been the rate established for most mines in November, 1952. Refusing to pay for power at the new rates, the Company paid its monthly bills at the rate specified in the original agreement. At that time, the HEPCO had backed down and agreed to grant a special concession to gold mines, including the Hollinger mine. Hollinger's new contract stipulated that it would pay an average rate of $34.50 per kilowatt.[15]

The HEPCO went on to explain that during the past several years additional concessions had been granted to Hollinger. It

had been granted a reduction in the minimum power charge of fifty per cent instead of the usual rate of seventy-five per cent when its Timmins mine went on strike in 1951 and it had been granted billing adjustments for their two week annual vacation period between the years 1951 and 1959. This practice was discontinued in 1960 when other industries requested the same privilege and costs to the Commission began to overtake revenues.[16]

The gold mining interests held meetings with the Premier, with Hydro officials and with Robert Macaulay. These efforts accomplished very little according to the gold mining interests in a letter to Macaulay of November 19, 1960. Nevertheless they continued to press for reduced rates. This time, their tactic was to criticize the HEPCO's relationship to the provincial government. R.E. Findlay, of the Hollinger gold mines, led the attack by challenging the very notion of public enterprise as a service and by insisting that it operate like a private firm. In a letter to Macaulay, he stated:

> We appreciate the statements made by the Prime Minister, yourself and Hydro officials to the effect that costs must be met with income. In general we can agree with this thesis; however, if Hydro were governed by the economic criteria which govern any other kind of business, Hydro's management would be compelled to see that each cost increment was at least met with a corresponding increment of return. This means that the only justification for new plant is that the activity it creates will more than pay for its cost. The building of generating facilities excess to this is totally unwarranted.[17]

It appears that Findlay was familiar with the HEPCO's policy of forecasting load in anticipation of demand and that he did not endorse it.

The enormous expense of the St. Lawrence power project was highly publicized but usually in such a way that the benefits of this power were highlighted not the cost. Findlay, in his role as mining advocate, took the opposing slant. He argued against the government's attempts to develop the north by subsidizing northern development through the mining companies' rates. Furthermore, he stated that if the HEPCO was assisting the government in its efforts to build up the north country, then it should do so in such a manner so that the mining companies did not end up footing the bill. As Findlay argued:

> If, however, these new plants were built, not as a matter of Hydro policy, for which economic validity would be questionable, but as a matter of government policy, for which there could be ample justification as a method for developing the potential of the Province, then the costs of the uneconomic and excess facilities should logically be borne by the government.[18]

Findlay was careful not to trample on the idea of government support for economic development per se as many of the gold mining companies currently received financial support from the federal government under the *Emergency Gold Mining Assistance Act*. He acknowledged that this support was in fact the only way of keeping these mines going and pointed out that any increase in power rates would threaten the ability of these companies to continue. Already, the cumulative effect of the increases had "all but wiped out profit margins for the majority of gold mining operations" and that five mines in the Kirkland Lake/ Porcupine area had announced their imminent closure. Instead they attempted to get support from the province claiming poverty and

chided the province for neglecting the economy of northern Ontario despite the fact it was a more rightful concern for the province than the federal government. As a solution to the gold miners' problems, Findlay suggested that the provincial government offer support by subsidizing power rates in the north or getting the HEPCO to lower its rates charged to the companies.[19]

The gold miners may have targeted the HEPCC specifically for criticism out of frustration. They had learned that they could do little to affect the policy-making decision at the HEPCO, an organization often given a wide latitude by the province to make policy decisions that directly affected the gold mining industry. If the HEPCO were a private company then the gold miners could use business strategies, such as going to another supplier to combat unpopular policies or if it were more closely tied to the government, then political pressures could be brought to bear such as funding support or electoral support.

As a technocratic organization, the HEPCO was not always subject to political or economic pressures and had the added advantage of having the weight of "experts" on its side formulating supposedly sound rational scientific policies for the mutual benefit of all concerned. On previous occasions, public protest had been effective in changing the course of hydro policy but that had depended on the will of individual politicians or governments. In the late 1950s and early 1960s, the HEPCO was relatively free from political interference. This may be in part

due to the success of engineers in claiming the authoritative voice in matters of state organization. As J. Rodney Millard has argued, the engineers of early twentieth century Canada had managed to replace traditional authority such as the government and the church with their own authority based on scientific rationality.[20] This credence given to science and rationality was to remain unshaken until the 1960s.

Also, the government of Ontario had established a modus vivendi with the HEPCO during this time period. Stability in government from the long ruling Conservatives, economic prosperity, and extension of social services were all factors that mitigated against the occurrence of issues likely to stir up political controversy. It was during times of dissatisfaction with the government or a change in government that the HEPCO was most vulnerable to outside attack. In the near future, circumstances would arise that would make the HEPCO vulnerable once again but in the early 1960s, the HEPCO seemed a fortress. Consequently, the OMA's attack, even though it followed a time honoured approach to getting concessions from the HEPCO, was as it turned out, ill-timed.

By late 1960, some of the gold mines were prepared grudgingly to submit to the increased rates. Robert Stanley Jr., President of Wright-Hargreaves Mines Ltd. wrote to E.B. Easson, Secretary of the Commission, in December acknowledging his acceptance of the new rate but complained that he felt he had no choice and pointed out that "the gold-mining industry [was]

particularly squeezed ... and continues to be, between a price for its product fixed a generation ago [by the Bretton Woods agreement] and the unrelieved pressure of rising costs from labour, supplies and services...." While Stanley recognized that the HEPCO was subject to the same price increases, he specifically targeted its construction program; he did not see the necessity of expanding generating capacity. The HEPCO disagreed arguing that expansion had to occur and would occur in order to meet the increased demand.[21]

Stanley countered that the Commission's load forecasting for the years 1955-1957 had been overly optimistic (thereby indicating that the hydro "experts" could not intelligently manage the system) and that the expected growth in mines and pulp and paper industries had not materialized. Further, the forecasted increase in mining load had been expected to come from the newly developing uranium industries that never materialized. As Stanley explained:

> The major part of additional power contemplated for the mining industry in 1955 was for the uranium mines. These mines at that time had firm contracts for sale of their product until 1962, with options on further production after that date. However, informed opinion (certainly in 1956) was that by 1962 uranium production would be far in excess of world demand and a sharp cut-back was inevitable.... To meet this demand for production of uranium ore ... the Commission undertook to supply additional generating and transmission facilities which, presumably, are now part of surplus facilities, a portion of the cost of which must now be borne by the gold-mining industry.[22]

As a result of the failure of the mining and pulp and paper industries to grow as predicted, the Commission found itself with a temporary but, it hoped, abnormal reserve of power. Mr.

Stanley argued that "given this condition of abnormal surplus we find it difficult to understand why the Commission continues to press on with construction of new generating facilities-- for example, at Otter Rapids and in the Kapuskasing Area."[23]

The HEPCO responded. They admitted that their load forecasting had been inaccurate and that as a result, there was a surplus of power supply but only in the northwestern region. Power shortages continued to exist in the southern and northeastern regions and the construction of new plants in northeastern Ontario, such as the Otter Rapids plant, was still necessary to counter these deficits. Because the northwestern region was not connected to any other region by transmission lines, its surplus power was useless for reducing the power deficit that existed elsewhere. The HEPCO believed that interconnection between the northwestern and northeastern system was not economically possible at this time because the distance necessary to traverse with transmission lines was approximately 500 miles, with no expectation of business in the intervening bush.[24]

As far as the financial relationship between the northeastern and southern systems, the HEPCO pointed out that the generating capacity in the northeastern region had been less than power demands for many years and that it had to rely on southern power to make up the deficit. According to the HEPCO: "at the present time, approximately one-third of the Northeastern energy requirement is supplied by transfer from the much larger SOS, at

a rate equal to the average cost of generation in Southern Ontario, a figure which reflects the low costs associated with those plants built many years ago." When the uranium loads did not materialize, the shortfall in power came from the southern system not the northeastern one, thus the only charges laid against the northern Ontario properties were charges for the construction of new transmission and transformation facilities.[25]

The HEPCO again stressed the benefits that interconnection accrued to the northeastern region but in so doing pointed out the loss of a distinct identity for the northeastern region. As I.K. Sitzer explained:

> As regards power developments in the Northeastern Region, I might say that the Northeastern and Southern Ontario systems are considered as an integrated unit for the purposes of planning new generating facilities. The Red Rock plant on the Montreal river came into service a few weeks ago, while Otter Generating Station on the Abitibi is scheduled for service late in 1961. These new plants will reduce the amount of energy required from Southern Ontario, where new power requirements in the immediate future will, for the most part, be supplied by thermal generation.[26]

Sitzer also explained that the HEPCO was proceeding with the development of two Mattagami River sites. These sites would, in addition to further reducing the energy deficiency in northeastern Ontario, provide peaking power for the SOS. As a result, the Commission was able to "develop the hydraulic sites in Northeastern Ontario, so as to co-ordinate them with the requirements of the southern Ontario system, with resultant benefits to both parts of the province."[27]

In 1960, when the last stage of amalgamation occurred through the financial amalgamation of the Northern Ontario Properties with the Southern Ontario System, the HEPCO system builders had to justify their decision to the mining companies, the government and the public at large. The recalcitrant mining companies did not appreciate the HEPCO logic and continued their protest in 1961. It took the threat of cutting off the power supply from the HEPCO to get them to pay the new rate. In a letter from W.B. Dix, Vice-President and Treasurer of the McIntyre Porcupine Mines Ltd., Dix informed the Commission that he was forwarding the money owed the Commission according to the new rates but that since he intended to meet with the Premier in the future to protest the mining rate he stated: "We wish to make it clear, however, that the enclosed cheque is forwarded under strong protests and is not to be taken in any way as concurrence by this Company with the Commission's recently announced rate structure."[28] In September, 1961, the Northern Miner acknowledged the mine-owners' defeat: "the situation has apparently reached a dead end and to all intents and purposes, the increased rates are in effect and there is nothing the companies can do."[29]

The mining companies operating in northern Ontario were interested in low rates and adequate supply of power. The HEPCO shared these interests but designed their system within a province-wide context; its broader viewpoint worked to the disadvantage of northern Ontario, at least as far as the gold

mining companies were concerned and they were quick to point this out. However with the amalgamation of the northeastern system into the southern system, both technically and financially, there was little the mining companies could do to fight the rate increases. The logic of the system, with its centralizing and homogenizing features, would not consider the mines' needs separate or distinctive from the needs of the rest of the power consumers. The mining companies were absorbed into the southern power system just as were the northeastern hydro-electric generating stations.

If the mining companies found themselves newly disadvantaged by HEPCO policies, the situation for Aboriginal People was as it had always been. In saying this, a distinction must be made between the issue of aboriginal rights and the Aboriginal People themselves. The legislative framework put in place at the turn of the century negated or severely limited aboriginal rights thus providing a structure in which hydro-electric development could proceed with minimal interference from First Nations. Yet, aboriginal people continued to exist as Aboriginal People.

Consequently, as the HEPCO continued to operate in a manner that denied aboriginal rights, Aboriginal People continued to protest against the HEPCO's activities. For the most part, aboriginal protest was ineffectual during the time period studied. However, their exclusion from the system would haunt the HEPCO in 1990 when it launched its Demand/Supply Plan and

recommended building more generating stations on the Moose/Mattagami river system.

The building of power generating stations on the Mattagami river between 1911 and 1944 had profound environmental impacts on the ecosystem and interfered with the First Nations' fishing and trapping practices long after the purchasing power of the compensation given had been exhausted. Witness statements on the part of Cree and Anishnabe representatives living within the Moose River basin area confirmed that hydro-electric developments had changed the riverine environment and had made it difficult for them to make a living from the land.

Chief Ernest Beck of the Moose Factory First Nation stated that while growing up in a community located a couple of miles from the dam at Smoky Falls during the 1950s and 1960s, his father expressed his concerns about how the dams affected fish and fur bearing animals in the area. The flooding had covered low-lying areas once home to poplar trees, an important staple for beaver. Also places where the Anishnabek and Cree had once been able to travel by boat to fish and to hunt were now inaccessible because water levels had dropped and dead-heads (submerged stumps) abounded. His personal experiences with Ontario Hydro relate the loss of the family trapping area and of the family home. Beck recounts:

> ...my family was forced to abandon construction of a partially completed log building in the Smoky Falls area by representatives of the dam eager to get us off the land. It was almost like they wanted to completely erase any indication of our presence there. Shortly after our departure from the area in the late 1960s, they went out to

> our small community and bull-dozed the area, eliminating any remnant of our ever having existed there.
>
> I believe I have been personally stripped of my right to have worked that land as my father did, as my grandfather did and as my brother had a brief opportunity to do. That connection is still there and still very much a part of our lives to date despite the fact that we don't get the opportunity to spend as much time there.[30]

Jane Louttit of the Moose Factory First Nation, born in 1922, spent her childhood in the bush frequenting areas such as Kesagami River, Hannah Bay River and Kapuskasing. Her father's trapline was located as Wash-Ush-Gaw, (South Bluff Creek), twelve miles south of Moosonee. Jane recalls that after the dam at Smoky Falls was built her mother set a net upstream of the dam. The fish she caught was so "dirty" it was inedible; the meat was brown and smelled like mouldy or rotten earth. She also noticed that the fish were not as plentiful and that the bigger fish were "no longer around." During the 1930s, after the dam had been built at Otter Rapids, Jane noticed piles of dead sturgeon and pickerel.[31]

Bert Jeffries who was born in 1924 is a member of the Moose Factory First Nation. He remarks that:

> I notice that the fish are depleted.... I believe there is something in the water that is killing the fish. There are hardly any fish these days, around Moose Factory and up the Moose River for about 15 miles or so....
>
> Once the dams were built, the rivers dried up, so fish would die. We would also see suckers, which are bottom-feeding fish, who would be floating upside down on the Moose River.[32]

George Cheena, a member of the Moose Factory First Nation was born in 1928. He testified that he moved his traplines from the Moose River to Fraserdale because the dams lowered the waters

and the area became too dry. The changes in water levels also made travelling treacherous. The ice was only half as thick as it used to be and became unsafe to cross because "the water is going up and down and it makes a pothole or false ice. Also during the summer, the rivers became muddy. The silt build-up made navigation more difficult in places where they used to pole their way through. This silt build-up also affected the ducks and other feeders of the river bottoms.[33]

James Davey was born at Me-tito-Bostik (Grand Rapids) on the Mattagami River in 1922 and is a member of the Moose Band. He also records that after the dams were built, it was impossible to travel the river routes to his family's hunting grounds:

> In the winter, it would get slush. Because of the fluctuations caused by the dam operations, we had to cut a two to three mile path through the bush, whereas before we would take the river. In the summer, it was much drier than before, and we had to portage a lot more. This took a lot more time and was hard work.
>
> ...The fluctuations in the water level cannot be predicted. Sometimes, I found my beaver traps high up above the water level, or at other times, way below the water level. These fluctuations also had effects on the Moose River spawning areas.
>
> The fish had a kind of slime on them after the dam was built. They were thinner. One time I caught a sturgeon that looked like it had only a head. I caught that just below Moose River Crossing, at Cheepash River.
>
> The river banks started to erode a lot after the dams, especially in the spring. I noticed this north of the last dam on the Mattagami River, at China Clay Island.[34]

James Roderique born in 1924 in Hearst grew up in Mattice with his parents until 1943 when he went to live with his grandparents along the Smoky Line. The Smoky Line is what they used to call the railroad that ran from Kapuskasing to the Smoky Falls Dam. His accounts of the building of the Little Long dam

reveal great ecological change. He believes that the whole ecology of the fish and wildlife was affected. James remembers that the beaver he and his family trapped along the Mattagami river smelled so badly that they could not eat them and that their fur, along with the fur of other animals they trapped had become very greasy. This meant more work for them when preparing the furs for sale because they had to wash them very carefully before stretching them out. Secondly, James reports that the areas where they used to pick berries were all flooded out.[35]

The testimonies of these witnesses illustrate how profoundly the hydro-electric system affected their lives. Their trapping, fishing and hunting were interfered with because either the food they gathered was inedible or the habitats the animals depended on were destroyed.[36] Neither the HEPCO nor the other power companies compensated the Cree or the Anishnabek for the losses they sustained to their traditional livelihoods: because these losses occurred off reserve land, there was no legal obligation on the part of the power companies to do so. In the opinion of the provincial authorities, aboriginal rights did not extend off reserve, even though Aboriginal People spent much, if not all of their time away from reserves, harvesting food and furs in keeping with their traditions.[37]

One other effect of hydro-electric development on Aboriginal People has yet to be discussed. When the Northern Canada Power Company raised the water level in its Kenogamissi storage dam in 1923, part of Mattagami Indian Reserve #71 was flooded. Unlike

the environmental effects noted above, this flooding actually occurred on reserve land and therefore was subject to the rules of compensation. Not only was land flooded but so too were traplines, graves and the village where many of the reserve inhabitants lived. As we have seen, minimal compensation was given despite continued protest from the band. However, in 1951, the Department of Indian Affairs finally proposed the building of new homes for the Mattagami First Nation on Indian Reserve #71. J.M. Taylor, District Forester, Ontario Department of Lands and Forests, Gogama, wrote in a letter dated July 5, 1951, to W.D. Cram, Chief, Division of Land and Recreational Areas, Ontario Department of Lands and Forests:

> considerable difficulty has been encountered in the selection of a site suitable for basement construction and also for a water supply on the present reserve. For this reason, officers of the Department of Indian Affairs have enquired whether it would be possible to purchase additional land in the immediate vicinity of the present reserve which would provide suitable building sites.[38]

Taylor recommended that the application to purchase land south of the Mattagami Indian Reserve, on the same point where the new Indian cemetery was established in 1921-22, be considered favourably by the Ontario Government. He reasoned that having the new town site in this location, adjacent to the Ontario Department of Lands and Forests Ranger headquarters, (identified as "Location 23"), would "increase the value" of the Mattagami people for fire fighting purposes in the area. The land proposed for transfer was surveyed by A.B. McLennan, OLS. McLennan in conducting the survey was instructed to retain five acres for the

Ontario Department of Lands and Forests and a right-of-way to cover the existing access road and telephone line to the new village. McLennan was also to ensure that "the north boundary should not encroach within the area reserved to the Hydro-Electric Power Commission for flooding rights and which extends to elevation 1070."[39] McLennan completed his survey in 1952. The addition to the Mattagami Reserve was two hundred acres and was transferred from Ontario to Canada for $363.02 in September, 1952.[40]

In 1960, Mattagami Chief Walter Naveau resubmitted the Band's September 20, 1929, letter to the Chapleau Indian Agency Superintendent, C.R. Johnston, again questioning the amount of compensation granted the Band for flooding damage of Mattagami Indian Reserve #71. In a memo dated July 26, 1960, C.R. Johnston forwarded a copy of this letter to Fred Matters, the Regional Supervisor in North Bay for the Department of Indian Affairs, and explained that Chief Naveau wanted to know "what action was take[n] on the letter in question and how much money, if any, was paid to Mattagami Band Funds in remuneration for land flooded and resulting damage to timber."[41]

In his reply to C.R. Johnston, Matters included a memo showing compensation payments paid for flooding on the Mattagami Indian Reserve. Matters concluded:

> It would seem that a reasonable compensation was paid at the time of the flooding both to individual band members and to band funds. If flooding has occurred beyond the line established at that time, then a further claim might be in order.[42]

Despite the damage done to aboriginal subsistence activities, the HEPCO concluded that all compensation that was required of them under Canadian law had been paid. They could therefore proceed with further hydro-electric developments without having to negotiate any further compensation.

Construction of the Otter Rapids site on the Abitibi River began in 1958. It was located between the steep banks of the Abitibi River, ninety-three miles north of Cochrane and officially opened in 1963. The Otter Rapids site included a diversion of water from the Little Abitibi River down Newpost Creek into the Abitibi River upstream from Otter Rapids. It involved construction of nearly two miles of canals and a 450 foot timber crib dam flanked by earth dykes.[43]

In 1966, three new generating stations at the Little Long, Middle Long and Upper Long Rapids on the Mattagami River were officially opened. Little Long was the first of the three plants to be built on a fifteen mile stretch of the Mattagami. The project also included a diversion of Adam Creek. The Little Long plant included five miles of dams and dykes and the twenty-one mile long Adam Creek diversion served to channel flood waters past the Mattagami power sites. The second Mattagami dam, Harmon,[44] was thirteen miles downstream and the third, the Kipling site was a further three miles downstream. Power from these new stations was to be channelled through the Pinard Transformer station, twenty-seven miles southeast of Little Long. The line was built to carry power 230 miles south on the first

leg of the EHV line to the Sudbury area and then on to Toronto. This line was Canada's first 500,000 volt line.[45]

The transmission line was built specifically to feed power from these northern sites to load centres at Sudbury and then in southern Ontario. As the HEPCO explained:

> Power from the new Abitibi and Mattagami hydro-electric developments will be fed into Ontario Hydro's East System, a vast power grid serving more than 1,900,000 customers in an area of 155,000 square miles. It extends from Windsor to Ottawa and nearly as far as James Bay. The East System draws power from hydro-electric stations throughout the southern and northeastern sections of the province, including Niagara, Ottawa and St. Lawrence river plants, and from thermal-electric facilities. It is also interconnected with neighbouring utilities in Quebec and the United States.[46]

As the citation clearly illustrates, the hydro-electric sites on the Mattagami river were now incorporated into a vast energy system that connected waterpower with fossil fuel, the northeast with the south and the province with other political jurisdictions.[47] In the process, regional interests such as mining companies were also absorbed into the province-wide system.

The interests of the First Nations were neither absorbed nor recognized, even though hydro-electric development affected Aboriginal People profoundly. The Anishnabek and Cree were constrained in using the waterways to pursue their traditional life-styles because legislation at the time did not recognize aboriginal rights beyond those indicated in the Treaty or determined by the federal government. No compensation was given

to the Cree and Anishnabek for the loss of their traplines nor for the loss of their fishing and hunting economy.

Some individuals did receive compensation for their houses lost to flooding and the Mattagami First Nation as a group also received compensation for the loss of reserve land but the sums paid out reflected the limited value of their land for timber, rather than its full utility to them, and for a few thousand dollars, they were circumscribed in their efforts to pursue their traditional harvesting activities. Canadian law only recognized rights to compensation to those who lost chattels and "property". Loss of an aboriginal economic livelihood was not considered a legitimate claim for compensation.

As a result, the ability of the First Nations to affect the development of the hydro-electric system, during this time period, was negligible despite the existence of such principles as mutuality of rights, aboriginal rights and treaty rights. The issue of aboriginal rights however never totally disappeared; it was merely submerged temporarily by over-riding legislation and non-native preoccupations with development.

In conclusion, this chapter has discussed the responses of two groups of people to the HEPCO's approach to northeastern hydro-electric development. Neither group was effective in obtaining a redress of their grievances. The mining companies, campaigning for relief from rate increases, used various arguments of "unfairness" towards them. Many of the arguments were self-serving but still represented an understandable

reaction against the demotion of the northeastern system, through amalgamation and centralization, from an autonomous entity to a mere sub-system within the Southern Ontario System.

The First Nations had no specific grievances against amalgamation and centralization. Their complaints arose from the physical harm to their traditional lifeways and homes that followed hydro-electric development. No charges of hypocrisy could be levelled against them yet the HEPCO's response to the Mattagami Cree and Anishnabek was just as unsatisfying. The HEPCO limited its response to the legal requirements of compensating individuals and the community for lost property and chattels.

Examining the HEPCO system as we have done in this and the preceding chapters may lead to a conclusion that hydro-electric systems do indeed develop as Thomas Hughes has described them: growth leads to a centralized, hierarchical ordered system that manages to dominate and control its social and natural environment. However, the next chapter turns the focus away from the intra-relationship between the southern and northeastern system towards the study of the hydro-electric system interacting with other actors within the northeastern region, such as logging companies. Changing the focus of the study changes the dynamics of the system's development. The apparent ability of the system to dominate or destroy opposing interest groups and regions is considerably less when the opposing force is the river itself, or the other groups who have legal rights to its use, such as lumber

companies. This is made clear when the study once again turns to the issue of who controls the river, from which the system builders get their power.

NOTES

1. D.M. Le Bourdais, Metals and Men. The Story of Canadian Mining, (Toronto: McClelland and Stewart Ltd., 1957), p.171f.

2. GSI OR 530.01-1 Ontario Mining Association, Letter J. Beattie, President, Ontario Mining Association to Philip Kelly, Minister of Mines, Ontario, November 19, 1954.

3. Ibid.

4. Ibid.

5. Ibid.

6. GSI OR 530.01-1 Ontario Mining Association, Letter J. Beattie, President, Ontario Mining Association to Philip Kelly, Minister of Mines, Ontario, November 19, 1954.

7. GSI OR 530.01-1 Ontario Mining Association, Letter, N.F. Parkinson, Executive Director, Ontario Mining Association to Philip Kelly, Ontario Minister of Mines, December 1, 1954.

8. GSI OR 530.01-1 Ontario Mining Association, Letter, N.F. Parkinson, Executive Director, Ontario Mining Association to Philip Kelly, Ontario Minister of Mines, December 1, 1954.

9. GSI OR 500.1-15, "The HEPCO Trend in Cost of Power and Proposals for Increase in Wholesale Rates," Clarkson, Gordon and Co. Report, November, 1949.

10. GSI OR 530.01-1 Ontario Mining Association, Letter, J.C. Adamson, President, Ontario Mining Association to Premier Leslie Frost, October 17, 1955.

11. GIS OR 530.01-1 Ontario Mining Association, Memo, "Comments re letter of October 24, 1955 to the Honourable P.T. Kelly from the Ontario Mining Association," November 21, 1955.

12. GSI OR 503.1 Vol.5 Public Criticism and Participation, Questions in the Legislature, January 1961- April 1962, Memo, "Comments re Mr. Macaulay's Memorandum to Mr. Duncan, December 23, 1960," January 4, 1961.

13. Ibid.

14. Ibid.

15. GSI OR 530 Direct Customers, Hollinger Consolidated Gold Mines Ltd., "Draft Report to the Honourable R.W. Macaulay Concerning the Ontario Mining Association's Letter of October 6,

1960, about the Rates for Power supplied to Hollinger Consolidated Gold Mines Ltd.," October 14, 1960.

16. Ibid.

17. GSI OR 530 Direct Customers Hollinger Consolidated Gold Mines Ltd., Letter, R.E. Findlay et al to Robert W. Macaulay, Ontario Minister of Energy Resources, November 19, 1960.

18. Ibid.

19. Ibid.

20. J. Rodney Millard, The Master Spirit of the Age: Canadian engineers and the politics of professionalism, 1887-1922, (Toronto: University of Toronto Press, 1988), p.146.

21. GSI OR 530 Direct Customers, Wright-Hargreaves Mines Ltd., Letter, Robert C. Stanley Jr., President Wright-Hargreaves Mines Ltd. to E.B. Easson, Secretary, HEPCO, December 22, 1960.

22. Ibid.

23. Ibid.

24. GSI OR 530 Direct Customers, Wright-Hargreaves Mines Ltd., Letter, I.K. Sitzer, Assistant General Manager, Production and Sales, HEPCO to Robert C. Stanley Jr., President, Wright-Hargreaves Mines, Ltd., January 11, 1961.

25. Ibid.

26. Ibid.

27. Ibid.

28. GSI OR 530 Direct Customers, McIntyre Porcupine Mines Ltd., Letter, W.B. Dix, Vice-President and Treasurer, McIntyre Porcupine Mines, Ltd. to E.B. Easson, Secretary, HEPCO, May 2, 1961.

29. GSI OR 503.4 Vol.3, Public Criticism, Media, January 1961 to December 1961, Northern Miner article, "Ontario Hydro's Arbitrary Action Adds to Gold Miners' Woes," September 7, 1961.

30. Ontario Hydro Public Reference Centre, (OH/PRC), Ontario Hydro Demand Supply Plan, (OH/DSP), Exhibit #1064, Witness Statement of Chief Beck.

31. Ibid., Exhibit #880, Witness Statement of Jane Louttit.

32. Ibid., Exhibit #881, Witness Statement of Bert Jeffries.

33. Ibid., Exhibit #883, Witness Statement of George Cheena.

34. Ibid., Exhibit #872, Witness Statement of James Davey.

35. Ibid., Exhibit #875, Witness Statement of James Roderique.

36. Changes to the riverine environment have also been noted by academics. They agree that hydro-electric development has had drastic consequences for the First Nations who use the rivers as a source of country food. For example, James Waldram argues that there is a direct relation between hydro developments and dependency. Hydro destroys wildlife thereby making it increasingly difficult for Aboriginal People to harvest country food. As a result, they start to buy their food stuffs which are usually less nutritious than their country diet and more expensive.

Within Ontario, one important study has been conducted that details the negative impacts of the Ogoki diversion on the Anishnabek of Northwestern Ontario, in particular the Whitesand First Nation. Paul Driben, an anthropologist at Lakehead University, reported on the fears and concerns of the Whitesand Band concerning a proposal by Ontario Hydro to develop power on the little Jackfish River. The band, having endured the detrimental impacts of the Ogoki diversion, did not wish to have a bad situation made worse with more power developments. The point was also stressed that hunting, fishing, and trapping are not just economic pursuits that can be substituted with other employments but rather social, political and religious ones as well.

Also, with respect to other types of employments, Hydro companies have, within the past twenty years, promised to give Aboriginal People employment opportunities and the benefits of electricity in their own homes. These promises of benefits have not been realized. Native employment has consistently been short-term, despite the fact that their traditional livelihoods have been lost and the cost of electrifying remote northern communities has impoverished Aboriginal People who have to devote more of their subsistence income to paying for this "benefit."

37. Aboriginal people, in this instance, did not affect the development of the hydro-electric system during the years 1911-1966. But this was to change after passage of the *Constitution Act of 1982*, the Ontario Environmental Assessment Acts and the changes in interpretations of the law by the Supreme Court of Canada commencing with the Guerin judgement in 1984; the concept of aboriginal rights has been given added meaning. First Nations in northern Ontario have used these changes to great effect. In 1992, Ontario Hydro announced that its plans to develop additional sites on the Moose/Mattagami river system would be placed on hold until negotiations between it and the northern First Nations resolve outstanding grievances and concerns.

38. MNR Indian Land File #39414, J.M. Taylor to W.D. Cram, July 5, 1951.

39. Ibid., W.D. Cram to D.J. Allan, Superintendent, Reserves and Trusts, Indian Affairs, July 20, 1951; F.W. Beatty, Ontario Surveyor-General to B.W. Waugh, Surveyor-General, Canada, November 1, 1951; J.M. Taylor to Ontario Division of Surveys and Engineering, November 12, 1951.

40. Ontario Native Affairs Secretariat (ONAS) Files, Ontario Order in Council #2123/52, September 24, 1952; Canada Order in Council, P.C. #4389, October 30, 1952.

41. Ibid., F. Matters to C.R. Johnston, September 26, 1960.

42. Ibid., W. Gefrownes for W.C. Bethune to F. Matters, September 23, 1960.

43. The Fifty-fourth Annual Report of the HEPCO, 1961, p.75f.

44. See Appendix II for a photograph of the Harmon Generating Station.

45. The Fifty-fourth Annual Report of the HEPCO, 1961, pp.73-75.

46. OH Corporate Archives, Speeches, "Hydro Forces Roll Back New Frontier of Power," September, 1963.

47. See Appendix I, Map 3.

CHAPTER SIX

The HEPCO's regulation of the dams and water levels in northeastern Ontario was a source of concern and conflict between it and loggers. The HEPCO dealt with these concerns differently than the struggle over rates and aboriginal rights because of constraints on their control of the waterways that recognized the multi-use characteristic of rivers and lakes. This feature was recognized through legislation that protected the rights of specific groups to use the waterways according to their needs, that is, it recognized their mutual rights to access and use of navigable rivers and lakes. This fact was also recognized, after some quarrelling, by the various user groups resulting, eventually, in co-operation. Here the northern waters exercised control over the southern systems designers.

We shall see that this co-operation arose out of the principle of mutuality of rights and the practice of mutual accommodation. Co-operation that arose out of legal responsibilities often came grudgingly whereas co-operation that arose out of business or technical exigencies, such as cost or power shortages, was far more acceptable to the power companies and the other river users. Regardless of the motivations, co-operation was a key characteristic of hydro-electric development in northeastern Ontario.

The power dams on the Mattagami were a continuous source of worry to logging companies because these dams hindered the driving of their logs. They did not, however, go unarmed into their disputes with the power companies, for existing legislation

such as the *Rivers and Streams Improvement Act*, called for the free passage of logs and the building of sluices and so forth around dams to ensure that result. Yet because the legislation focused solely on dams it did not address all of the lumber companies concerns, for hydro-electric development did more than obstruct logs at power dams. It could also hinder the passage of logs in the downstream channels of dams because the water levels had been lowered. Conflicts therefore arose between the power and logging companies over whether or not power companies were limited to the responsibility for ensuring that logs could easily pass by the dams themselves or if the power companies' responsibilities also extended to the waters below the dams.

The provincial government was unsure of how to interpret its own legislation and gave conflicting advice, sometimes out of the mouth of a single individual. In November 1943, Mr. Fullerton, of the Department of Lands and Forests, advised the HEPCO that log slides around dams were the responsibility of the power companies, while improvements in the stream below the dams were the responsibility of the lumber companies. However, less than a year later, Fullerton reversed his earlier decision and ruled that the power company, in this case, Northern Ontario Power, was "responsible not only for improvements at the dams, but also for improvements in the channel of the river, particularly below the Wawaitin dam, on account of the diversion of water from it to the flume".[1]

The Department of Lands and Forests arranged a meeting that month between the logging companies and the Northern Ontario Power Company[2] to discuss log driving river improvements and the reallocation of timber areas along the Mattagami, Red Sucker and Grassy River watersheds. Those attending agreed that the Northern Ontario Power Company would investigate what improvements could be made at the Sandy Falls, Wawaitin and Kenogamissi dams for log driving. As a result of the investigation, Northern Ontario Power agreed to install an apron and log slide at the Kenogamissi dam and to clear the Wawaitin dam of rocks and side piers or, alternatively, to construct a log flume.[3]

Before these improvements could be made, ownership of the Wawaitin and Kenogamissi storage dams passed to the HEPCO. The lumber companies explained once again their need for log driving improvements and informed the HEPCO of Northern Ontario Power's commitment to improve the conditions around the two dams. Representatives of the Rudolph-McChesney Lumber Company explained that they passed "several million feet of White Pine log timber each year" through the Wawaitin and Kenogamissi dams and that each year, about ten per cent of their logs were damaged "due to fractures and dynamiting the logs in order to pass them through the above two dams".[4]

J.R. Montague of the hydraulic department was unwilling to commit the HEPCO to Northern Ontario Power's undertaking until he had more information. He wanted to know how broadly Mr.

Fullerton's ruling that the power companies were responsible for channel improvements below the dams was to be interpreted and asked for clarification on several issues from the legal department:

> We have the impression that the *Lakes and Rivers Improvement Act* gives the lumbermen the right to drive during spring, summer, and autumn freshets only. If they did so, would we be responsible for the shortcomings of the natural river channel between the dam and the power house location? Also, one of the lumber companies prefers to drive smaller batches at intervals throughout the summer. Are we obliged to provide water through the dam to accommodate this procedure? If we are deemed to be obliged to improve the river between the dam and the lower river by means of a log slide or other works, would we be responsible for the full cost of such a structure or could we expect the lumber companies to share in the expenditures?[5]

Cecil Carrick, counsel for the HEPCO, replied that the Commission was responsible for ensuring that its operations did not obstruct "the natural flow in the river channel at any place to such an extent that it interferes with, lessens, or restricts the right of timber owners or others to drive their logs or timber down the Mattagami River."[6] This responsibility arose from Subsection 1 of Section 24 of *The Lakes and Rivers Improvement Act*.[7] This right was reiterated in Water Power Lease No. 50 which governed the hydro-electric developments on the Mattagami River. The lease stipulated that "the lessee shall not destroy or obstruct the navigation of the Mattagami River." Mr. Carrick repeated that the Commission had responsibilities to improve logging operations over the dam but stated that the Commission should have nothing to do with the bed of the stream or improving it downriver of the dams except in that the

Commission should ensure that water levels were comparable to their natural state in the downstream channels during the spring, summer and autumn freshets. Mr. Carrick recommended that the Commission provide as much water as possible during the freshets, even if it meant a loss of power production, because it would save them from having to construct channel improvements.[8]

Following this advice, the HEPCO indicated its willingness to co-operate with the lumber company:

> We also note the comment on behalf of yourself and other timber operators, offering the fullest cooperation in the use of the rivers in which we are mutually interested, and can assure you that this Commission earnestly desires to work in close harmony with the lumbering and other interests whose activities make use of the streams on which our power plants are situated.[9]

Here the HEPCO, acknowledging the existence of other users on the waterways, recognized the need for co-operation.

Another lumber company interested in river improvements at Wawaitin was the Mountjoy Timber Company, a subsidiary of the Hollinger Consolidated Gold Mines, a major consumer of HEPCO power. Fred MacDonald of the timber company explained his interest in a letter of October 30, 1945: the company was presently storing its logs over the winter above the dam and then driving them over the dam all at one time, usually around the first week in June. Mountjoy considered this to be a risky operation having already faced near disaster in the spring of 1945 when flood conditions had forced the Northern Ontario Power Company to open its stop logs, thereby sending most of the stored logs over the dam and crashing into the timber company's booms at

their sawmill, breaking several and damaging some of the logs themselves.

MacDonald requested that the HEPCO consider allowing the timber company to sluice their logs once a month although he acknowledged that this would mean a considerable wastage of water. He suggested that a chute be built to restrict the amount of water passing uselessly over the dams. Mr. MacDonald noted that Northern Ontario Power had previously located a place for a chute.[10]

B.D. Poyser of the HEPCO suggested that improvements to the channel below the dam should be made with the HEPCO and the lumber companies sharing the cost of the improvements equitably. Mr. Poyser argued that since the HEPCO interrupted the normal amount of flow over the dam for most of the year, it should assist in the erection of a log chute between the lake and the river below the power house. Mr. Poyser recommended that costs for this chute should be shared between the HEPCO and the lumber companies. Constructing the chute would be of benefit to the HEPCO because the channel below the dam was "torturous" and "involve[d] a large release of water at the dam for the purpose of flushing the logs down to the river."[11]

The hydraulic department was reluctant to accept this recommendation because it would have meant considerable expense for the construction of a log slide over that length of river. The Hydraulic Department stated its case for a reconsideration in a memo to Mr. Carrick, on October 2, 1946.[12] Mr. Carrick

repeated his opinion that the HEPCO was responsible for providing log driving facilities at the dam site and to some extent along the natural river channel between the dam at Wawaitin and the flat water below the power house.[13]

In 1946, both the HEPCO and the Abitibi company considered options for the replacing of an old log sluice at Sandy Falls with Abitibi suggesting replacing the sluice with "a new V notch type of log slide." The construction would take place on HEPCO lands.[14] The HEPCO agreed to construct and maintain the concrete intake to the log slide at the dam while the Abitibi Power and Paper Company agreed to construct and maintain the log slide itself. The Commission agreed to contribute towards the cost of the log slide and to the costs of the alterations that had to be made to the lumber company's boom in the forebay area. In total, the Commission agreed to pay $7,500 of the $22,000 cost for the improvements.[15]

Despite the HEPCO's agreement to help with the Sandy Falls development, it remained reluctant to improve the facilities at Wawaitin and Kenogamissi. The Commission believed that much of the damage caused to the logs occurred in the channels below the dams and improving the channels was not their responsibility. In 1947, the HEPCO sent out E.A. Sudden to talk with the lumber company representatives and investigate the dams in question.

The Rudolph-McChesney firm which held cutting rights to eight townships and the Mattagami Indian Reserve, used the dams on the Mattagami the most. They informed Sudden that they had to

cut their logs an extra six inches longer in order to try to offset damage caused to their logs due to broomage and splitting as they hit the rocks going into the channel below the dam at Kenogamissi. Roy McChesney also related that there was often serious damage to the saws at the mill resulting from rocks that had become embedded in the split logs. Sudden also reported that similar damage probably occurred at the Wawaitin dam. He stated that: "The channel below the dam is quite rough and tortuous. Glance cribs had, at some time, been installed in places in an attempt to train the logs through tough portions of the channel."[16]

The Mountjoy Timber Company complained that wastage due to brooming and splitting ran "about 10 per cent on the average and from 15 to 20 per cent on large timbers" and that Mr. MacDonald, their manager, preferred that the Wawaitin channel be improved rather than installing a log slide, because the slide would be too slow for large drives." Mr. Sudden noted that the flooded lands at Wawaitin:

> ...had apparently never been cleared and the channel traversed during the towing of logs contained many dead heads which should be cleared out. The clearing of about one mile of slash along the west shore above Wawaitin would be a big improvement. Invariably one or two booms broke during each drive and the recovery of the loose timber was very difficult and wasted much time. Probably about 3,000 logs were lost last year at Caribou Creek area.[17]

Mr. MacDonald stated that it usually took about two days to sluice the logs through the dam and about a week to sweep the river.

Mr. Sudden's follow-up meeting with the Department of Lands and Forests was not quite as pleasant. Mr. F.W. Beatty, the Surveyor General accused the HEPCO of not doing anything further to improve the log-driving facilities at Wawaitin or Kenogamissi since the meeting of August, 1945. Beatty believed that improvements were the responsibility of the Commission and the lumber companies. As a result of his investigation, Sudden informed his superiors that: "All the limits held by these lumbermen apparently have sufficient future life (at least twenty to twenty-five years) to warrant making improvements at both Kenogamissi and Wawaitin dams."[18] The HEPCO took Sudden's recommendation under advisement.

Meanwhile, in a response from a direction from the Department of Lands and Forests, A.S. Bray, the District Forester at Cochrane investigated the dams at Kenogamissi and Wawaitin for possibilities of broomage (split ends). Mr. Bray concluded that damage did occur, sometimes extending from one to five feet from the bruised ends of the logs. He noted that it was difficult to ascertain any definite results because the water was "abnormally low" but believed that "there are only a few rocks which are causing damage and these could be removed by dynamiting or otherwise at fairly light expense."

Bray concluded by reminding his superiors that "the condition of these dams was brought to the attention of the Royal Commission on Forestry during the sittings at Cochrane and at that time it was pointed out that representations were made to

the HEPCO approximately one year ago but the matter was never further followed up."[19] The brief submitted by the Mountjoy Timber Company Ltd. to the Royal Commission noted that:

> considerable loss of timber is caused by the rapids in the Mattagami River below the dam at Wawaitin Falls through brooming of logs. When the dam was constructed, it was understood that a chute or flume would be provided for the transportation of logs. This has not been done and we submit that the Government should undertake to improve the rapids or make adequate provision for the passage of logs so that destruction to the logs will be minimized.[20]

In January 1947, representatives of the HEPCO and the lumber companies met with Mr. Beatty of the Department of Lands and Forests to discuss improvements to the Mattagami River. At this meeting, the parties agreed that the Commission would provide facilities necessary to convey logs past the dams, but that improvements to the river channels, downstream and clear of the dams, were not the Commission's responsibility and that log driving should be carried out only during periods of freshet.[21]

Consequent to this agreement, HEPCO representatives along with provincial and logging company representatives travelled to the Wawaitin dam to observe log driving conditions and the causes of any damage to the logs. Their inspection convinced the party that extending the apron and removing some of the rock near the point of discharge would permit the logs to pass safely through the dam. One member of the party, the Assistant District Forester at Timmins, Mr. Robinson opined that "improvements to the river bed between the dam and tail-water (other than those in the immediate vicinity of the dam) were entirely the concern of the lumber companies."[22] Robinson therefore suggested that the

HEPCO be magnanimous and share the costs of river improvements with the logging companies. For its part, the HEPCO agreed to extend the existing apron as recommended, to remove about 200 cubic yards of rock, and to do it as soon as possible.[23]

As a follow-up to the visit to the dam and to Mr. Robinson's report, F.W. Beatty asked for further co-operation from the HEPCO in making additional improvements to the dam:

> I would ask you to arrange... for the extension of the existing apron below the Wawaitin Dam for a distance of 60 feet and also to remove approximately 200 cubic yards of rock from the channel immediately below the Dam ...
>
> Mr. Robinson points out that if such a slide were built, it would save water, particularly if the drive were carried on during the summer months. This would also eliminate a considerable amount of the damage that is caused to the logs.
>
> Would your Commission be agreeable to bear part of the cost of the construction ... if the lumber companies interested were also willing to bear part of the cost...?[24]

The HEPCO built log slides at the Kenogamissi and Wawaitin dams but they did not bring an end to the complaints because their construction had created a new problem. In August 1949, the HEPCO received complaints from the Rudolph-McChesney Company that "the larger pine logs were sustaining excessive damage when passing through the log slides in the ...dams."[25]

Mr. Reeve of the lumber company elaborated on the technical difficulties. According to him, this new type of damage arose from the type of slide at both the Kenogamissi and Wawaitin dams. The problem was the angle at which the slides were built over the dams to the water below. The gradient was so steep that the logs would leave the end of the slide at a very high velocity and enter the water "in the manner of a spear." Smaller logs would

be immersed only up to two or three feet after plunging into the water and therefore were not usually harmed. On the other hand, larger logs, such as the white pine logs that frequently exceeded thirty-six inches in diameter and weighed up to two tons, would accelerate down the slide, reaching speeds of sixty miles an hour, and plunge their full length into the gorge thus hitting the rocky bottom of the river bed and splitting. As a result of this damage, Mr. Reeve requested that the log slide be extended into a "level flume with a slight curve at the open end." This alteration would reduce the speed of the logs coming down the chute and throw the log out so it landed parallel to the water instead of perpendicular to it.[26]

Mr. Jackson of the HEPCO investigated McChesney's complaints and appeared convinced that damage to the white pine logs was extensive; he noted that "McChesney claims that he is not making a profit on his operations, mainly because of this damage." Even so, Mr. Jackson did not recommend that the HEPCO do anything to ameliorate the situation until further discussions took place with other lumber operators in the area. He was not fully sympathetic to McChesney's complaints, commenting that: "In talking to Mr. McChesney, one gathers that he expects the Hydro, as a 'part of the government', to give him help, whether economically justifiable or not."[27]

The dispute over the log flumes continued into 1950. The HEPCO Chairman wrote to Mr. McChesney in May indicating a retrenchment on the part of the HEPCO with respect to their legal

responsibilities towards improving the river channels. The Chairman pointed out that the *Lakes and Rivers Improvement Act* stipulated only that "All persons shall have the right to and may, subject to the provisions of this Part, during the spring, summer and autumn freshets, float timber down all lakes and rivers." Thus the act called "for the floating of timber during the freshet periods, whereas the drives by your Company take place during the period of low flow, and the water wasted is water stored by this Commission for power purposes."[28]

McChesney continued to complain bitterly. In a letter to Frank Sharpe of the Department of Lands and Forests, McChesney pointed out that damage to logs passing through Wawaitin and Kenogamissi Dams from 1943 to 1949 was estimated at $45,561.90. McChesney then stated that: "we are of the opinion that if the [Commission] are responsible to provide safe passage for our logs through their dams, then it is they who are responsible to us for $45,561.90 damages." McChesney was therefore planning to sue the HEPCO for damages.[29]

McChesney was able to get some support from the Department of Lands and Forests where an internal memo argued that:

> The Region feels that, inasmuch as the log chute directs the logs against the point of rock that juts out from the opposite bank of the river, we should blast off this rock projection and thus remove the cause of Mr. McChesney's complaint.[30]

The cause of damage was important to both logging and power interests because the cause would determine which interest was legally responsible for improving log driving on the Mattagami

River. Beatty explained the concerns about legal responsibility to J.R. Montague in a letter dated October 15, 1952 that also pointed out the differing interpretations of the problem on the part of the Commission and the logging companies. According to the Commission, the damage done to the logs took place between and below the hydro dams. According to the lumber companies, the damage occurred as a result of the log slides at the dams.[31]

A memo written by E.T. Ireson confirmed the HEPCO's worries about legal responsibility. In it, Ireson expressed the opinion of many of his engineering colleagues who believed that removing the rocks in the channels would not reduce the damage caused to the logs during drives. He went on to state that: "It also may set a precedent for the lumbermen to claim we are responsible for improving the natural channels of these streams.[32]

McChesney continued to press for assistance from the Commission. He argued that improving the channels below the Kenogamissi and Wawaitin dams would be of benefit to the HEPCO because: "less water would be required for driving the logs and less labour would be required to take the log sweep from the rapids after the sluicing of the logs had been completed." Furthermore, doing the work at this time would be advantageous "with so many hard rock miners out of work it would be an excellent time to secure qualified rock drillers to do this work."[33]

In 1953, the Commission agreed to improve the log slide at Kenogamissi dam but not at Wawaitin dam, believing that to be

unnecessary. In justifying its decision to the Department of Lands and Forests, Mr. E.B. Easson noted that the Commission had spent $10,000 in 1947 to improve Wawaitin and $30,000 to improve Kenogamissi. "Observations made in collaboration with representatives of the Department of Lands and Forests and of the lumber company during actual driving and subsequent thereto, indicate that improvement may be obtained by the removal of a jagged rock projection at a cost of $5,000 or $6,000." Before the work was to be authorized though, the HEPCO insisted that the Department of Lands and Forests and the lumber companies agree that this would be the last improvement the HEPCO would have to make.[34]

Both the Mountjoy and Rudolph-McChesney Lumber Companies responded to the HEPCO offer by arguing that an expenditure of $10,000 was needed at the Wawaitin and Kenogamissi dams in order to fix the problem. They therefore offered to the HEPCO an alternative arrangement. They proposed that:

> ... the lumber companies in question are willing to execute a release regarding further improvements on the River if the Hydro Electric Power Commission will authorize the expenditure of $10,000.00 for improvements at both Wawaitin and Mattagami [Kenogamissi] Dams.
>
> ... the work be carried out by the two lumber companies, the Hydro Electric Power Commission providing the paymaster or clerk necessary to assure itself that no more than $10,000.00 is spent. This work would, of course have to be performed, under the supervision of the lumber companies, in the Fall of they [sic] year when the water is at its lowest level.[35]

The HEPCO accepted this offer.

Throughout the controversy over channel improvements, the HEPCO tried to deny as much responsibility as possible; yet the

logging companies were able to appeal to their legal rights and received some support in their efforts from the Department of Lands and Forests. As a result, the HEPCO was forced to co-operate with the logging companies in ensuring the safe passage of their logs through river channels that contained power dams. In this instance, co-operation arose out of government policies based on the Common Law principle of mutuality of rights.

Another issue of concern that gave rise to co-operation, eventually, between various interests operating in northeastern Ontario was the storage dams. However, unlike legislation governing power dams on rivers that were also used for log driving, there was none that specified the mutual responsibilities for storage dams. These were important to loggers and formed part of the hydro-electric system whereby natural lakes were set aside to act as reservoirs. Dams were constructed to regulate the drainage of these lakes so that their waters could be added to the rivers when they were needed for log drives or for power generation.

Where there were no legal obligations to each other, the various interest groups could ignore the needs of the others. This did happen on occasion, though the more likely occurrence was co-operation between the various interests. Because lakes were multi-use areas, the various interests who used them often found themselves in situations where co-operation was mutually beneficial. Under circumstances of "mutual accommodation", co-

operation was much more forthcoming than the legal obligations incurred as a result of mutuality of rights.

Storage dams were used essentially as a means of controlling water flow in order to reduce waste. The HEPCO and the lumber companies depended on storage dams to impound water so that it would be available throughout the year to be used either to generate power or to raise water levels to assist log driving. Also, municipalities depended on the dams to prevent floods during the spring and fall run-offs. For example, H.J. Muehleman, Operating Engineer for the HEPCO in a letter to Mr. Sanborn of the Abitibi Power and Paper Company illustrated the conflicting needs for stored water:

> ...I should like to assure you that the interests of your Company have been constantly borne in mind when planning the regulation of the river flow and the use of storage on the Mattagami River Watershed. There have, of course, been other interests to consider, such as log and pulp drives as well as our own requirements. In this connection, our own requirements have been given somewhat secondary consideration during the current year owing to our ability during this period to compensate for fluctuations in the supply from our Mattagami River plants by variations in production at Abitibi Canyon.[36]

One of the storage lakes which was the subject of much correspondence was the Peter Long Lake or Grassy Lake storage dam. This dam had been acquired by the HEPCO in 1944 as part of the assets of Northern Canada Power. Built in 1916 of rock-filled timber cribs, it serviced the flow at the Sandy Falls and Lower Sturgeon plants, the Smooth Rock Falls generating station of Abitibi Power and Paper and the Smoky Falls generating station of the Spruce Falls Power and Paper Company. The dam, in need of

extensive repair in 1944, was not being used by the Commission. After 1944, various interests wanted the Commission to rehabilitate the dam. They included officials and residents of the Timmins area, who hoped to avoid a recurrence of the springtime floods of 1947. J.R. Montague of the HEPCO commented that it was unlikely restoring the dam would greatly increase the security of the Timmins residents however, "the installation of this dam would have a very favourable influence on our public relations in that area."[37]

Logging and private power interests were also interested in rehabilitating the Peter Long Lake storage dam. H.L. Sanborn of the Abitibi Power and Paper Company requested the HEPCO to repair the dam. Sanborn noted that water levels in the lake had fallen to sixty-one per cent and that: "It has been stated that your own use for Grassy Lake [Peter Long Lake] is not so important as formerly, as you can avoid power shortages in the power balance with other Plants on your system."[38]

In January 1948, in a related matter, the HEPCO met with Mr. A.E. Wicks to discuss the inundation of the previous year of the Wick's sawmill in Timmins. Mr Wicks argued that:

> the Grassy River dam should be rebuilt as soon as possible as a means of controlling a substantial flow which now discharges from that watershed without restriction. [Also] a procedure should be followed whereby the storage dams at Wawaitin, Kenogamissi and Peter Long Lake should be drawn down to a minimum level, required for the operation of the generators, previous to the flood and be used to impound the freshet. He stated that such had been the practice in the past in conjunction with the Power Company, and believed that such action would generally minimize flooding in the future.[39]

Mr. Wicks further argued that: "Sandy Falls should be drawn down before an expected flood to the minimum required for the operation of the generators to provide a better get-away for the flood water past Timmins." Mr. Wicks's suggestion to draw down the waters of Peter Long Lake was ignored but he was informed at this meeting that the "rebuilding of the Grassy river dam and the provision of more complete discharge facilities at Sandy Falls dam would be undertaken by the Commission as soon as practicable."[40]

In March, 1948, J.R. Montague wrote to F.W. Beatty, the Surveyor General of Ontario inquiring if he knew if other power companies would be interested in sharing the costs of rehabilitating the Peter Long Lake dam and to investigate the difficulties involved in constructing the dam and providing enough water to meet the needs of both power companies and logging companies. Montague noted that the Grassy River contained several cascades and waterfalls between the dam and the Mattagami river that could create difficulties in driving logs. He then enquired to what extent the water stored in the reservoir would have to be released in order to allow the lumbermen to drive their logs over these cascades. Montague acknowledged that the lumbermen had the right to use this water for their drives during the spring, summer and fall freshets. However, if the lumbermen wanted water during other times of the year, the amount of water stored in the reservoir would be seriously depleted rendering the dam's reconstruction useless for hydro-electric

purposes. Montague therefore requested that "a statement of the Department's policy in the distribution of stored water be set forth for our guidance at this time."[41]

In July, 1948 the HEPCO met with Mr. Feldman of the Feldman Timber Company to discuss his needs and plans for the Peter Long Lake dam. The Company had obtained cutting rights in a large tract of land adjacent to Peter Long Lake and expected to operate in the area for the next twenty-five years. The company intended to bring out their logs via the Grassy river to the Mattagami and thence to Timmins where their mill was located. As the Grassy river extended some twenty miles between Peter Long Lake dam and the Mattagami river, "and since this reach of river contains a 120-foot cascade at one location and is comparatively tortuous throughout ten miles of its length,"[42] the lumber company agreed to determine the amount of water it needed for driving purposes before the dam was repaired. Feldman stated that his company would want to pass the logs through the dam and down the river to a storage area on the Mattagami in one complete operation in order to get as much of the freshet water as possible. This was reassuring to the HEPCO. He also agreed to undertake the necessary repairs or reconstruction of slides at the 120-foot cascade located some ten miles downstream from the dam site.[43]

By 1949, the Commission was willing to restore the Peter Long Lake dam. It reasoned that repairing the dam would enable the Commission in the future to avoid "the more expensive undertaking of modifications at Sandy Falls to improve discharge

conditions."[44] It also recognized the public relations advantage vis-à-vis the people of Timmins and Mountjoy. According to the HEPCO, "considerable faith is placed by the residents of this area in the influence of a dam at Peter Long Lake on flood conditions," a faith that was unfounded in the opinion of the HEPCO engineers.[45] The Commission agreed, once the dam had been rebuilt, to store spring freshet water one foot higher than the formerly accepted level and to make this extra water available for log-driving purposes during the driving season. The Department of Lands and Forests agreed to allow this increased flooding. Abitibi Power and Paper and Spruce Falls Power and Paper agreed to share in the capital, maintenance, and operating costs of the new dam, with the costs to be apportioned on the "basis of 40% by the Spruce Falls Company, 20% by the Abitibi Company and 40% by the Commission."[46] This allocation of costs was based directly on the power generation capabilities of the various plants, modified by a factor which took into consideration the relative distances of the plants from the storage dam.[47]

The HEPCO was amenable to the restoration of this dam not only for the above noted reasons but also because it anticipated a power shortage in the northeastern region during the upcoming winter months. The new storage dam would make available additional water for power generation, thus reducing the amount of expensive, steam-generated energy that would have to be supplied to the northeastern region from southern Ontario.[48]

Clearly, the HEPCO agreed to co-operate because it perceived advantages in doing so. Unlike the quarrels over river channel improvements, where it sought to evade legal responsibility, in this case, co-operation was perceived as beneficial and not harmful. Abitibi Power and Paper would need further convincing that co-operation with the Feldman company was a good idea, notwithstanding its participation in this agreement.

H.L. Sanborn wanted assurance that the use of Peter Long Lake for log-driving purposes would be strictly regulated. According to Sanborn:

> It appears this matter of the use of Water stored for Power development purposes on Peter Long Lake should be gone into thoroughly with the Department and an understanding arrived at as to the rights of Log Driving-- in and out of season-- over that of stored water for Power development purposes. These rights should be definitely defined for this particular application.[49]

Furthermore, Mr. Sanborn commented that: "It does not appear from the correspondence that Mr. Feldman's... conscience would bother him much if, in any year, he deemed it to his advantage to use active Kwh water from Peter Long Lake storage to deliver his logs to his Mill booms" even if at a later time it led to a decline in kilowatt capacity. Mr. Sanborn informed J.R. Montague of the HEPCO that all water "should be made dear for both interests: so that neither party shall be unduly penalized by the operations of the other. That is to say, when the water storage is at a certain level, then, it [is to be considered] Kwh storage-- not Log Driving Storage."[50]

Delays on the part of the HEPCO as a result of Sanborn's concerns led the Feldman Lumber Company to take matters into its own hands. In a letter to J.R. Montague, the company threatened that:

> we have reached the decision that unless the Hydro constructs the dam in question within the near future, we will seek permission from the proper authorities to construct the dam ourselves, as it seems incredible that our industry should be held up for want of a dam. Perhaps the Hydro Commission does not realize that we have approximately 150 families depending on us for a livelihood along with a considerable number of single persons...."[51]

Representatives of the Abitibi Power and Paper Company met with Mr. A.G. Ferguson, district representative for the HEPCO to discuss their concerns about the water levels in various storage reservoirs. Mr. Ferguson passed their concerns on to head office. The lumber company representatives claimed that they required a minimum continuous flow of 1500 cfs at Smooth Rock Falls to operate the mill. The company believed that without the use of the Peter Long Lake storage reservoir, this minimum requirement of flow would not be met over the winter months.[52]

The HEPCO looked into the water flow situation at Wawaitin and based on mean monthly water flows concluded that the present available storage was adequate to meet Abitibi's requirements of 1500 cfs flows through Smooth Rock Falls.[53] Hence, the HEPCO did proceed with the restoration of the dam.

Control of the waterways did not lie in the hands of one interest. Consequently, accommodations had to be worked out between the various users in order to ensure that each had the ability to carry out his or her work. Sometimes the

accommodations were imposed through government legislation that entrenched the mutuality of rights to the river. In the absence of legislation however, obstruction could occur but often the user groups continued to co-operate with each other, especially under circumstances in which mutual accommodation existed. The interweaving of loggers' and power companies' needs for storage dams, gave both groups an opportunity to co-operate in such a way as to bring mutual benefit to themselves and others as well. The negotiations giving rise to co-operation could involve many groups and become quite complicated; nevertheless, the HEPCO system builders did adopt co-operation as one of its strategies when dealing with other users of the rivers. This co-operation sustained the hydro-electric system's growth by allowing more power to be taken from the northeastern waters once agreement had been reached on storage. It also, through this process, brought more northeastern lakes into the system.

Co-operation also owed much to the nature of the northeastern rivers themselves. The Mattagami river basin was not noted for its excess storage capacity, especially during times of drought. Hence, the environment of northeastern Ontario encouraged co-operation in conserving water just as much as the recognition that rivers were multi-use areas.

Co-operation arose out of technical or business exigencies as well and was not limited to storage dams. For example, co-operation between the power companies in northeastern Ontario was common when it came to sharing power loads. Exchanges would be

contractually arranged with one power company agreeing to buy power from another in order to supply energy needs for its customers. This sharing of resources was not uncommon in other utility industries. Nelles and Armstrong have written that sharing telephone lines was a common practice in the west on the part of Bell telephone. Bell encouraged private company development in areas where it could not economically compete and thus benefitted from selling equipment and allowing exchanges to the private companies.[54] In northeastern Ontario, it was clear that the HEPCO felt that some developments would be more expensive to undertake than to contract from other companies for power; hence exchanges of power were arranged when it was mutually convenient.

In 1949, the minutes of a meeting between Abitibi Power and Paper Company and the HEPCO illustrated clearly the high degree of interconnection of power supplies between the two companies. In the minutes, Abitibi inquired as to the possibilities of receiving 8,000 to 10,000 kilowatts from the Commission's generating station at Iroquois Falls for four or five months. The Commission stated that it could supply the company with the power but only on a month-to-month basis. The Company also inquired when the Commission would be ready to take over the municipal load in Sturgeon Falls. The Commission said it would be ready to do so once their "Tunnel" [La Cave] development had been completed. That was to occur in the spring of 1950. The Company further asked if it could acquire 5,000 horsepower of

this power at Sturgeon Falls in order to expand its operations. Finally, Mr. Ambridge of the company suggested that it would be a good idea to investigate the possibilities of concentrating both companies' steam generation facilities at the Head-of-the-Lakes.[55]

Similarly, the town of Espanola, until 1959, was supplied with power by the Kalamazoo Vegetable Parchment (KVP) Company which operated generating facilities of approximately 15,000 kilowatts on the Spanish River. The Company bought from the HEPCO an average yearly load of 6,000 to 7,000 kilowatts and its power needs were increasing. Meanwhile, the HEPCO was taking power from the KVP Company because it lacked 115kv transformation facilities at Espanola to transmit power to the adjoining rural area and municipalities of Massey and Webbwood. The HEPCO only received 1,000 kilowatts from the Company for this purpose and now required 1500 kilowatts.[56]

The KVP Company was itself concerned that its own power needs were in danger, in the event of a shortage of water or other trouble at its generating plant and had informed the town of Espanola that it no longer wished to be its supplier. KVP therefore asked the HEPCO to take over the responsibility of supplying the town. The HEPCO agreed to do so and installed a permanent transformer station in 1960, thereby relieving the KVP of its responsibilities.[57] Thus technical and business concerns resulted in exchanges of power and transfers of customer loads. The HEPCO and private companies co-operated along these lines

because it saved them the expense of building new generating stations and transmission lines or duplicating existing ones.

In conclusion, mutual rights and mutual accommodation governed the relationship between the HEPCO and the logging companies. While there was disagreement over how to interpret each user's rights, the ultimate result was co-operation in improving the river channels for log driving in a way that would allow the most power to be taken from the dams and the most logs to go through the channels. Mutual accommodation was a much preferred working relationship. It arose out of environmental and technical exigencies and resulted in mutual benefits to the participants. The HEPCO's relationship with the logging companies was one in which the logging companies interacted with the system, through the co-operative currents of mutuality of rights and mutual accommodation. Co-operation arose because the logging companies could impose constraints upon HEPCO activities and deny it absolute control of its primary power source, the river.

The province's waterways were multi-use resources and the HEPCO was constrained in power generation on the rivers because it had to ensure that adequate water levels were maintained for the driving of logs over the power dams and through the river channels. Co-operation also occurred when mutual benefits were possible. This co-operative element was missing in the HEPCO's dealings with mining companies and First Nations. In those instances there was no supportive legislation defending the

rights of miners and First Nations (although in the case of the latter, there could have been, had treaty and aboriginal rights not been interpreted in such a limited fashion). Nor was there an opportunity for mutual benefit. During the 1940s and 1950s, the miners, Cree and Anishnabek did not have anything to offer the HEPCO that would be of benefit, not even favourable public opinion or political sympathy. Thus the mining companies arguments for better rates and the First Nations complaints about environmental degradation fell on deaf ears during these years.

Nevertheless, co-operation did exist in this hinterland system. Yet it is a concept that is missing or undervalued in explanations of systems that depend on military or Darwinian metaphors. Because co-operation arises partly out of environmental conditions, it demonstrates that there is a distinctive quality to hinterland hydro-electric development. It also raises the question, given that everything exists in an environment, of how important it is in shaping urban/industrial systems. Niagara helped to create a public ownership movement in southern Ontario as explained by Armstrong and Nelles; in northeastern Ontario, the rivers helped create a system in which co-operation was an important characteristic.

This idea of co-operation needs further explanation. It has more relevance for systems builders today, given the increased environmental constraints and shortages, than does the Niagara system based as it is on a world where waterfalls of Niagara's power still lie undeveloped a few miles away from major

population centres. Also, despite the fact that power companies and logging companies recognized each others mutual rights to the river, the same courtesy did not extend to First Nations. Here a fundamental hypocrisy lay between "blind" justice and the law. The only reason that co-operation with First Nations did not occur was due to the Weltanschauung of the system builders and their supporters. It would not allow a subsistence activity to interfere with other activities that were considered "progressive". The former activity had to be swept away or submerged by the latter. Submerged it certainly was, but only temporarily. Co-operation between First Nations and Ontario Hydro, after fifty years of neglect is now an established requisite for further hydro-electric development in northeastern Ontario.

NOTES

1. GSI OR 192-3-17 Wawaitin Development, Memo, J.R. Montague Hydraulic Engineer to C.C. Carrick, Counsel "Wawaitin Development, Log-Driving Facilities", October 2, 1946.

2. A subsidiary of Nesbitt Thomson which took over control of the Mattagami dams from Northern Canada Power.

3. GSI OR 192-3-17 Wawaitin Development, Letter, Rudolph-McChesney Lumber Company Ltd to Dr. O. Holden, HEPCO, August 14, 1945.

4. Ibid.

5. GSI OR 192-3-17 Wawaitin Development, Memo, J.R. Montague Hydraulic Engineer to C.C. Carrick, Counsel "Wawaitin Development, Log-Driving Facilities", October 2, 1946.

6. Ibid.

7. The Act stipulated that "All persons shall have the right to and may, subject to the provisions of this part, during the spring, summer and autumn freshets, float timber down all lakes and rivers."

8. GSI OR 192-3-17 Wawaitin Development, Memo, C.C. Carrick, Counsel to Dr. O. Holden, "Wawaitin Development, Log driving facilities", October 5, 1946.

9. GSI OR 192-3-17 Wawaitin Development, Letter, Dr. O. Holden, Hydraulic Engineer to the Rudolph-McChesney Lumber Company Ltd., August 23, 1945.

10. GSI OR 192-3-17, Wawaitin Development, Letter, Fred R. MacDonald, Manager, Mountjoy Timber Company Ltd. to Dr. O. Holden, HEPCO, October 30, 1945.

11. Ontario Hydro Corporate Records Archives, Engineering and Construction Records, (Encon) 192-3-1 Sandy Falls, Memo, B.D. Poyser to Dr. O. Holden "Mattagami River, Log-Driving Facilities," November 12, 1945.

12. GSI OR 192-3-17 Wawaitin Development, Memo, J.R. Montague, Hydraulic Engineer to C.C. Carrick, Counsel "Wawaitin Development, Log-Driving Facilities," October 2, 1946.

13. GSI OR 192-3-17 Wawaitin Development, Memo, C.C. Carrick, Counsel to Dr. O.Holden "Wawaitin Development, Log driving facilities", October 5, 1946.

14. Encon 192-3-1 Sandy Falls, Memo, E.A. Sudden to Dr. O Holden, "Sandy Falls Development, Log Driving Facilities" November 14, 1946.

15. Encon 192-4-1 Sandy Falls General Correspondence, Letter, O. Mitchell, HEPCO Secretary to J. Hundevad, Abitibi Power and Paper Company Ltd., November 18, 1946.

16. Encon 192-3-1 Sandy Falls, Memo, E.A. Sudden to O. Holden, "Log-driving facilities at Wawaitin and Kenogamissi dams," January 8, 1947.

17. Ibid.

18. Ibid.

19. Encon 010 Wawaitin, Attachments to letter, R.K. McChesney to E.A. Sudden, the HEPCO, January 15, 1947.

20. Ibid.

21. GSI OR 410.1-1192, Water Storage (Watershed) Mattagami River, Lakes Dams Diversions, August 1946- February 1966, Letter, O. Holden, Hydraulic Engineer to F.W. Beatty, Surveyor General, Department of Lands and Forests, January 22, 1947.

22. Encon 010 Wawaitin, Letter, O. Holden, Hydraulic Engineer to F.W. Beatty, Surveyor General, Ontario, March 5, 1947.

23. Ibid.

24. Encon 010 Wawaitin, Letter, F.W. Beatty, Surveyor General Ontario to O. Holden, Hydraulic Engineer, March 22, 1947.

25. Encon 010 Wawaitin Operating Engineer files, Memo, R. O. Standing, Mechanical Maintenance Engineer, Rudolph-McChesney Lumber Company to Mr. E.T. Ireson "Log Slides, Wawaitin G.S. and Mattagami Lake Dams, Northeastern Region," August 11, 1949.

26. Encon 192-4-2 Ontario Government, Mattagami River, Letter, E.H. Reeve, Rudolph-McChesney Lumber Co. Ltd to The HEPC of Ontario, Timmins Branch, July 29, 1949.

27. Encon 192-4-2, Ontario Government, Mattagami River, Memo, A.H. Jackman to E.T. Ireson, "Mattagami River, Log Driving," August 30, 1949.

28. Encon 192-4-1 General Correspondence, Mattagami River, Letter, Chairman to M.E. McChesney, Treasurer, Rudolph-McChesney Lumber Company Ltd., May 26, 1950.

29. GSI OR 410.1-192 Water Storage (Watershed) Mattagami River, Lakes, Dams, Diversions, August 1946- February 1966, Letter, M. McChesney, Rudolph-McChesney Lumber Company Ltd to Frank Sharpe, Department of Lands and Forests, September 16, 1949.

30. GSI OR 410.1-192 Vol.4, Water Storage (Watershed) Mattagami River General January 1948- December 1952, Memo, "W.E.R." for Mechanical Maintenance Engineer, Northeastern Region to E.T. Ireson, "Mattagami Dam Log Chute, Mattagami River Storage System-- Northeastern Region," August 15, 1952.

31. Encon 192-4-2 Ontario Government Mattagami River, Letter, F.W. Beatty, Surveyor General to J.R. Montague, October 15, 1952.

32. GSI OR 410.1-192 Water Storage (Watershed) Mattagami River, Minisinakwa Lake Dam, February 1946- July 1953, Memo, E.T. Ireson, Generation Engineer to J.R. Montague, "Mattagami Lake Dam Log Driving," October 30, 1952.

33. GSI OR 410.1-192 Water Storage (Watershed) Mattagami River, Lakes, Dams, Diversions, August 1946- February 1966, Letter, M.E. McChesney, General Manager, Rudolph- McChesney Lumber Company Ltd. to F.W. Beatty, Surveyor General, Department of Lands and Forests, September 21, 1953.

34. GSI OR 410.1-192 Box 97, Water Storage (Watershed) Mattagami River, Lakes, Dams, Diversions, August 1946- February 1966, Letter, E.B. Easson, HEPCO Secretary to Frank MacDougall, Deputy Minister, Department of Lands and Forests, November 16, 1953.

35. Encon 192-4-2, Lumber Companies, Letter, M. Hankinson, Manager, Mountjoy Timber Company Ltd to the HEPCO, December 9, 1953.

36. GSI OR 410.1-192 Vol.3, Water Storage (Watershed) Mattagami River, General, May 1945- December 1947, Letter, H.J. Muehleman, Operating Engineer to Mr. H.L. Sanborn, Abitibi Power and Paper Company Ltd., October 20, 1947.

37. GSI OR 410.1-192 Vol.1 Box 99, Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1945- December 1950, Memo, J.R. Montague to Dr. O. Holden, "Grassy River-- Peter Long Lake Storage Dam," November 21, 1949.

38. GSI OR 410.1-192 Vol.1, Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1945- December 1950, Letter, H.L Sanborn, Abitibi Power and Paper Company Ltd. to Otto Holden, November 1, 1947.

39. Encon 192-1 Mattagami River, Memo, "Mattagami River Water Levels," January 27, 1948.

40. Ibid.

41. GSI OR 410.1-192 Vol.1, Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1945- December 1950, Letter, J.R. Montague, Hydraulic Engineer to F.W. Beatty, Surveyor General, March 25, 1948.

42. Encon, File 192-3-1 Records of the Mattagami River, General Memos File 533, Memo, "Notes of a Meeting with Mr. Feldman (Feldman Timber Company), representatives of the Department of Lands and Forests and Commission officers for the purpose of discussing matters relative to the use of water from the proposed Peter Long Lake Dam," July 8, 1948.

43. Ibid.

44. Encon, 192-3-1 Records of the Mattagami River, General Memos, File 533, Memo to Dr. O. Holden, "Peter Long Lake Storage," August 22, 1949.

45. Ibid.

46. GSI OR 410.1-192 Vol.1 Box 99, Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1, 1945- December 1950, Memo, J.R. Montague to Dr. O Holden, "Grassy River-- Peter Long Lake Storage Dam," November 21, 1949.

47. Ibid.

48. Ibid.

49. GSI OR 410.1-192 Vol.1 Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1945- December 1950, Letter, H.L. Sanborn, Abitibi Power and Paper Company Ltd. to J.R. Montague, Director of Engineering, December 12, 1949.

50. Ibid.

51. GSI OR 410.1-192 Vol.1 Water Storage (Watershed) Mattagami River, Peter Long Lake, September 1945- December 1950, Letter, W.H. Phillips, Feldman Timber Company Ltd., Schumacher, to J.R. Montague, Director of Engineering, March 8, 1950.

52. Encon 192-3-1, Memo, A.G.Ferguson, District Superintendent to Dr. Holden, "Mattagami River Storage as it affects Smooth Rock Falls-- Timiskaming District," October 12, 1945.

53. Encon 192-1, Memo, M.C. Hendry [?] to Dr. O. Holden, "Mattagami Storage," October 31, 1945.

54. See H.V. Nelles and Christopher Armstrong, Monopoly's Moment.

55. GSI OR 192-1 Mattagami River, Minutes of a Meeting with Abitibi Power and Paper Company Ltd., August 23, 1949.

56. GSI OR 510 Municipal Customers-- Espanola, "Draft Reply to the Hon R.W. Macaulay's Inquiry of January 19, 1959 Concerning the News Clipping from Sudbury Daily Star of January 13, 1959, re Espanola," D.J. Gordon, January 22, 1959.

57. Ibid.

CONCLUSION

Hydro-electric development commenced on the Mattagami River in 1911. Both the Hollinger company and E.A. Wallberg, an independent entrepreneur, started building generating stations on the river; Wallberg's work was completed by the Northern Canada Power Company the following year. Increasing demands for power from the mining companies, coupled with drought in the 1920s, encouraged Northern Canada Power and other companies to build more stations on the Mattagami River. This construction altered the riverine environment and intruded upon the lifeways and lands of the northern First Nations.

When the Nesbitt Thomson Corporation purchased the assets of Northern Canada Power, including the Mattagami river sites in 1924, this marked a change in the practice of hydro-electric generation. No longer were the Mattagami river stations isolated from other hydro-electric developments. Now, they were part of an interprovincial system that included power sources on other rivers in northern Ontario and Quebec and that obtained direction and financing from Montreal.

In the early 1930s, the HEPCO, largely as a result of political manoeuvring, entered northeastern Ontario by taking over the development of the Abitibi Canyon power source from the Abitibi Pulp and Paper Company. For the next two decades, both Nesbitt Thomson and the HEPCO operated in northeastern Ontario, alternatively competing aggressively against each other for customers and co-operating on the sharing or exchanging of power loads as a result of environmental or business exigencies. These

two organizations also co-operated with other interests using the rivers, especially the lumber companies, who had a legally protected access to the waterways. The 1930s and 1940s signified a difficult time for Nesbitt Thomson as it lost court battles over rate structures and contracts and faced a decrease in the demand for power from its principal customers in the gold mining industries. Consequently, Nesbitt Thomson sold its Ontario power generating stations, including those on the Mattagami river, to the HEPCO in 1944. The HEPCO was now the sole system operator in northeastern Ontario.

The post-war boom in southern Ontario and the post-war drought in northeastern Ontario wrought significant change in the northeastern power system. These two factors forced the HEPCO engineers to find other ways of increasing generating capacity. They attempted numerous methods but invariably the solutions most favoured resulted in increased concentration of power generation and administrative control in Toronto.

In 1966, the Kipling generating station became the last station to be built on the Mattagami river. Ontario Hydro had indicated its intentions to build more stations on the river in its 1989 Demand/Supply Plan but these plans were placed on hold as a result of protests by the northern Cree and Anishnabek.

Thus, hydro-electricity as a power source in northeastern Ontario developed first as a series of private independent local waterpower generators servicing mines and pulp and paper industries. Through numerous interactions of technology,

politics, economics, interest groups, legal decisions and the natural environment, the northeast system, by 1966, had been transformed into part of a public, province-wide, centralized mixed-fuel technological system. The approach taken to studying this process of development and the conclusions drawn as a result, supports some of the arguments presented in other studies of hydro-electricity but differs substantially with others.

To date, the bulk of the historiography on hydro-electricity in Canada has taken a political economy approach focusing on interest groups and economic factors that gave rise to the various hydro-electric systems in the provinces. These works either discuss the politicians and businessmen who promoted the system or they discuss the negative impacts hydro-electricity has had on the northern First Nations and the northern environment. H.V. Nelles's Politics of Development and James Waldram's As Long as the Rivers Run respectively are good examples of these approaches. All of these works pay little attention to the importance of the engineers and technology in shaping hydro-electric development. Those studies that have highlighted the importance of technology have focused on urban/industrial conditions; and the built environment, not the natural one, has provided the focal point for study. The works of Thomas Hughes particularly and Nelles and Armstrong's Monopoly's Moment exemplify this approach. These studies slight the environment and ignore the First Nations.

Although hydro-electric development is important to the study of metropolitan/hinterland relations, those historians who have examined the relationship have said very little about technology. While J.M.S. Careless recognizes its importance as one of the many means of establishing communication between the metropole and the hinterland, he has very little to say about technology beyond that. Also, his thesis posits the idea that the metropole, through its communications with the hinterland, ends up dominating it. This domination in Careless's view is not exploitative but rather mutually beneficial. However, characterizing the metropolitan/hinterland relationship in this way creates an impression that the hinterland is nothing but a backdrop to metropolitan activities. Therefore, it has no or little influence over the metropole. L.D. McCann, and to an even greater extent, William Cronon give the natural environment its proper due but still, the relationship between the environment and technological systems needs to be more fully explored.

The last point to note about current historiography is that those studies that speak of technological development employ metaphors that connote images of conquest and control. Thomas Hughes, John Law and J.M.S. Careless are the most representative of this conceptualization of development. William Cronon in his Nature's Metropolis has a less conflictual model of development, but even he hints at or flirts with the idea of conquest because he emphasizes succession and displacement. Examining hydro-electric development in northeastern Ontario, where environmental

constraints and co-operation are principal characteristics of the system, illustrates the limitations of these metaphors. It also illustrates the limitations of the methodological approaches, especially when used in isolation from each other.

By interweaving the methodologies of systems analysis and actor-networks, metropolitan/hinterland relations and environmental history, we gain an understanding of how technology interacts with the political, economic, and social currents of society. It is fundamentally important that technology be the focus of any historical study of development because technology is the link between society and nature, native and non-native peoples, and between the metropole and the hinterland. This is made especially clear when the study of electricity is moved from an urban/industrial setting to a northern location.

The history of the northeastern hydro-electric system contrasts in many ways with the history of hydro-electricity in Canada as it has been written. By including the sources of power, that is the rivers themselves in the study, we gain an understanding of how important nature is as a factor in influencing the shape of technological development. There are other conclusions to be drawn from this particular study and they relate to the importance of co-operation to the process of development and the short-comings of the systems designers' mentalité in building a system that ultimately fell vulnerable to natural constraints and economic conditions, and that denigrated the value of alternative economies.

Studying the influence of rivers on the development of technical systems proves that nature does indeed affect technological systems. In the example provided by this dissertation, the river influences the shape of the hydro-electric system significantly. Before hydro-electric development could take place, environmental conditions had to match the technical capabilities of the system builders. Afterwards, once hydro-electric generating stations had been established, the systems builders had to contend with recurring droughts, in the 1920s and 1950s especially. In the first instance, the system builders were able to respond to this environmental constraint by building more stations or increasing the output of stations already in place. By the 1960s, there were no more large-scale generating stations to be built within southern Ontario and those remaining in northern Ontario were considered out of "economic transmission distance." The system builders recognized that the natural limits of hydro-electric power had been reached and thus opted to emphasize other fuel sources and consolidate the various resources into one centralized system.

Their responses had significance to the northern residents. On the one hand, building more generating stations and larger ones meant increased environmental degradation and increased harm to First Nations. On the other hand, it assisted the industrial development of the northeastern region as more and more mines could now have access to relatively cheap power. In the 1950s, the northeast hydro-electric infrastructure was amalgamated with

the southern Ontario system. Accompanying this amalgamation was the subordination of hydro power to coal and nuclear power by relegating the northeastern rivers to peaking power stations and the subordination of the northeastern system into a province-wide system.

From a systems point of view, these decisions made perfect sense however hindsight illustrates the negative ramifications these decisions had on the lifeways of the Cree and Anishnabek and on the northeastern system. Increased hydro-electric generation increased the disruption to First Nations' traplines, fisheries and even to reserve land and communities. Secondly, by expanding the hydro-electric system, power became available to service more and more mines. When drought hit the region in the 1950s, the large number of mines overwhelmed the system's power capacity and revealed the dangers of pursuing unsustainable economies. The amalgamation of the 1950s also had some adverse effects because co-incident with it came the concentration of power generation in southern Ontario. Instead of building fossil fuel generating stations in the northeast, the region became dependent on the south to meet its energy needs.

In summary, the environment does indeed exert a great deal of influence over the hinterland system and the metropolitan system builders. The irony is that this influence led to or at least assisted the centralization of the system in Toronto and the absorption of it into a province-wide grid. If this centralizing quality is to be characterized as domination or

exploitation of the hinterland, it must be understood that it arose out of the interweaving of the hinterland environment with the ideology of the systems builders: it arose out of the reactions of the systems builders to the constraints imposed upon the system's growth by the natural environment.

The environment affected hydro-electric development in one other significant way: it fostered, if not forced, co-operation among the various users of the rivers. Rivers were (and are) multi-use resources. They were used not only for hydro-electric generation but for transportation too. Because of this, the rivers could not be so transformed as to make the passage of logs impossible. The rights of loggers had to be respected. This meant sharing the river by systems builders with loggers and co-operating with them on maintaining water levels necessary to both users' needs. Sometimes this "co-operation" was imposed. The state recognized and enforced the mutuality of rights doctrine. Other times co-operation arose out of mutual accommodation. It was in the best interests of both hydro and logging companies to maintain dams for storage lakes in northeastern Ontario, especially given the shortage of storage lakes in the area. This co-operative feature of the system denotes one area in which the metropole was unable to obtain a dominant or exploitative position.

Notably, this co-operation, legislated or not, did not extend to First Nations. The legal machinery that could have included First Nations was available but the cultural ideology

was not. This point illustrates the importance of the fact that technology is a cultural artifact. Hydro-electric development under the "progressive" ideology of the early twentieth century could not have occurred unless the "sustainable" ideology of the First Nations was swept aside. The system builders were supported in their developments by legislation, court cases, politicians and businessmen. Without this support, hydro-electric development would not have taken the shape it did. Without this support, perhaps mutuality of rights, if not aboriginal and treaty rights, would have been recognized as the appropriate means of dealing with First Nations' needs and concerns. Certainly, that approach to relations with the First Nations is now being recognized increasingly by many politicians and Ontario Hydro personnel.

Despite the existence of co-operation in the process of system's development, it must be recognized that co-operation was not necessarily the preferred route for systems builders to take in resolving certain systems' problems. Co-operation represented areas in the operations of the system in which they did not have full control. Consequently, conflict among interest groups was the more likely relationship. Conflict could give rise to co-operation, often state-imposed, but usually control and domination was the result. Conflict between the HEPCO and northern miners left HEPCO's ability to set rates and manage the system intact. Conversely conflict between mining companies and Nesbitt Thomson, led to court decisions that adversely affected

its ability to manage its own system and to compete with the HEPCO. In these instances, "conquest" was the result of these conflicts. The mining companies paid the new rates and Nesbitt Thomson sold its assets in northeastern Ontario. In both instances, the HEPCO benefitted the most. This outcome was in no way predetermined but simply arose as a result of the interweaving of the cross-currents of economic demands, legal decisions and some political intervention on the part of Premiers Ferguson and Henry.

Notwithstanding the above, the history of the northeastern system still offers some interesting insights into the process of development. Unlike its Manitoba and Quebec neighbours, the northeastern Ontario system did not develop as a post 1960 megaproject or even as a post 1906 megaproject like Niagara. The natural limitations of the northeast and the activities of others in the region imposed constraints on the systems builders' abilities to control the river itself and the others who used it.

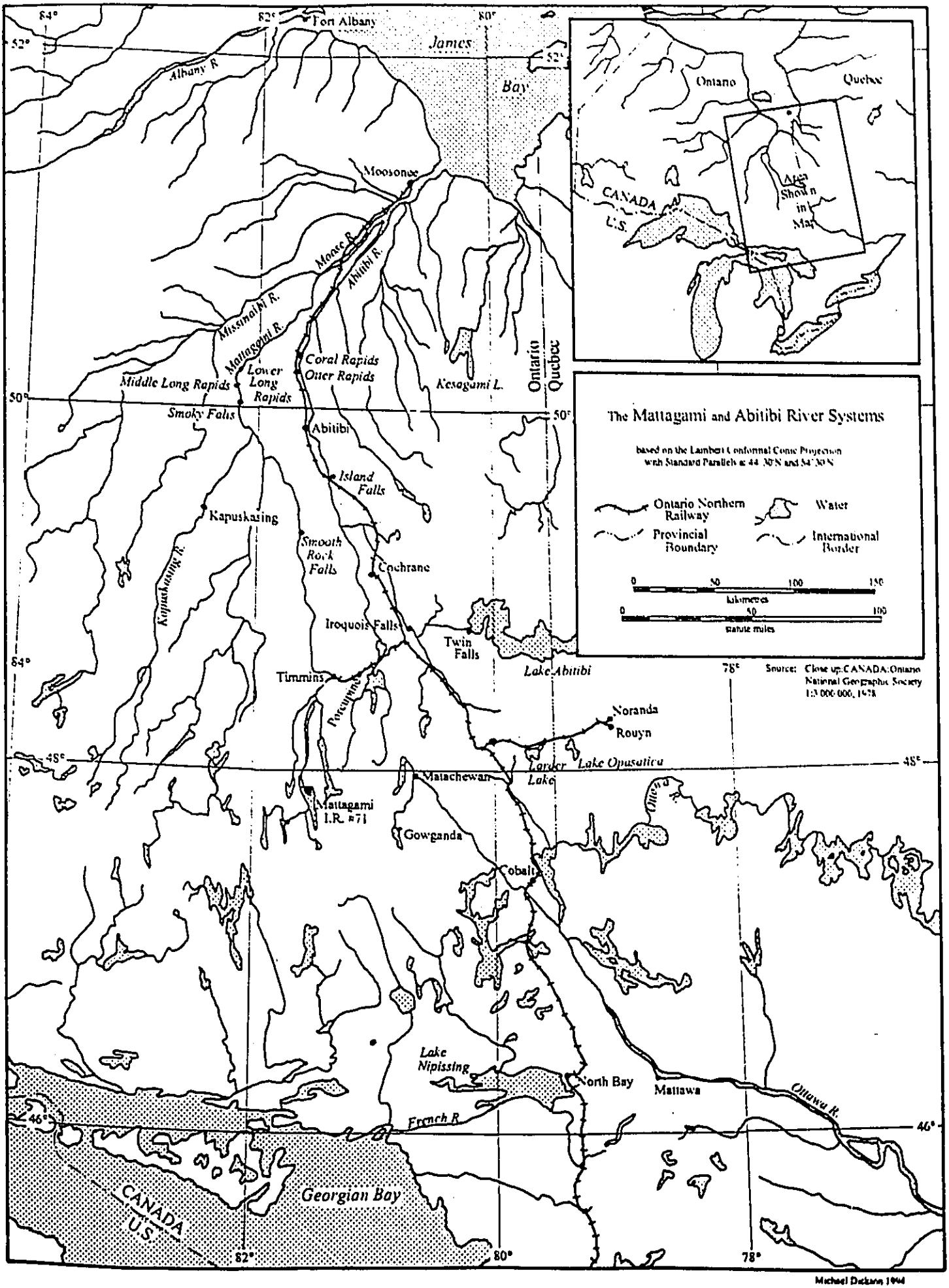
Even though the First Nations were unable to affect the shape of the system during the time period covered by this dissertation, they did bring an effective halt to further development in 1990. Their continued existence and perseverance illustrates yet another short-coming in the systems' builders conceptualization of systems development. Some cross-currents may appear to have been washed away but in reality were merely submerged in the river's depths, waiting to resurface at a later date. Thus, there is yet one more cross-current to acknowledge

when discussing technology and its link to native/non-native relations and that is the cross-current of time. The interweaving of the past and the present shapes the process of development. Aboriginal peoples understand this very well, systems' builders and their supporters need to too.

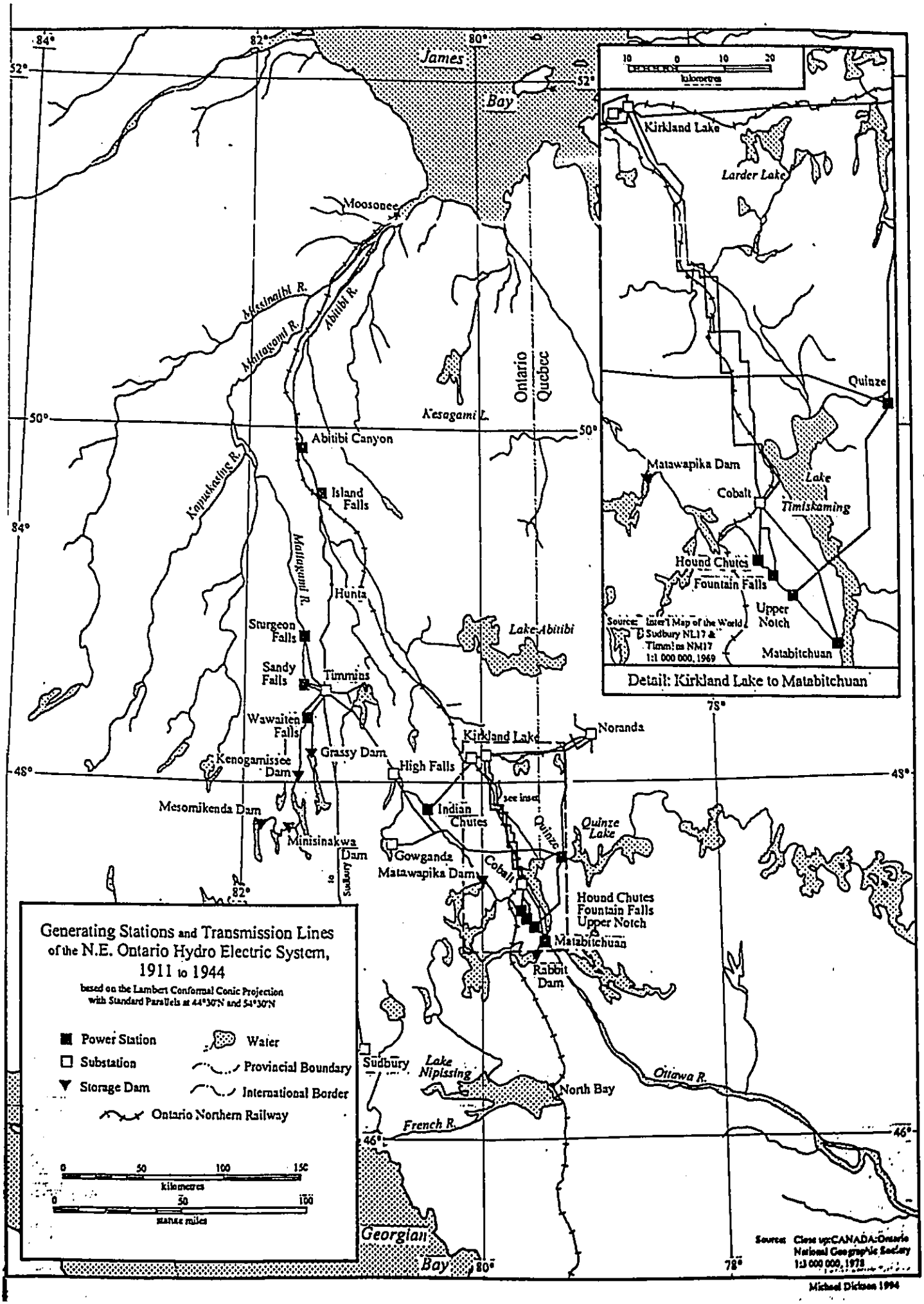
Finally, because the northeastern system developed within a set of various constraints, both past and present, its history offers an alternative understanding of development. The history of the northeastern hydro-electric system reveals, first, the power of the environment to affect the shape of development rather than the ability of technology to conquer nature; second, the perseverance of northern First Nations in the face of technological change rather than their victimization by it; third, the co-operation among river users and power operators that existed in addition to the competition among them; and fourth, the importance of technology and of the ideology of the systems builders in shaping the complex and changeable relationship between metropole and hinterland. For these reasons, the northeastern system offers an approach to development that is perhaps more in tune with to-day's conditions of limited fuel resources, disillusionment with Progress and greater respect for First Nations' rights and traditional ways.

APPENDIX I
Maps

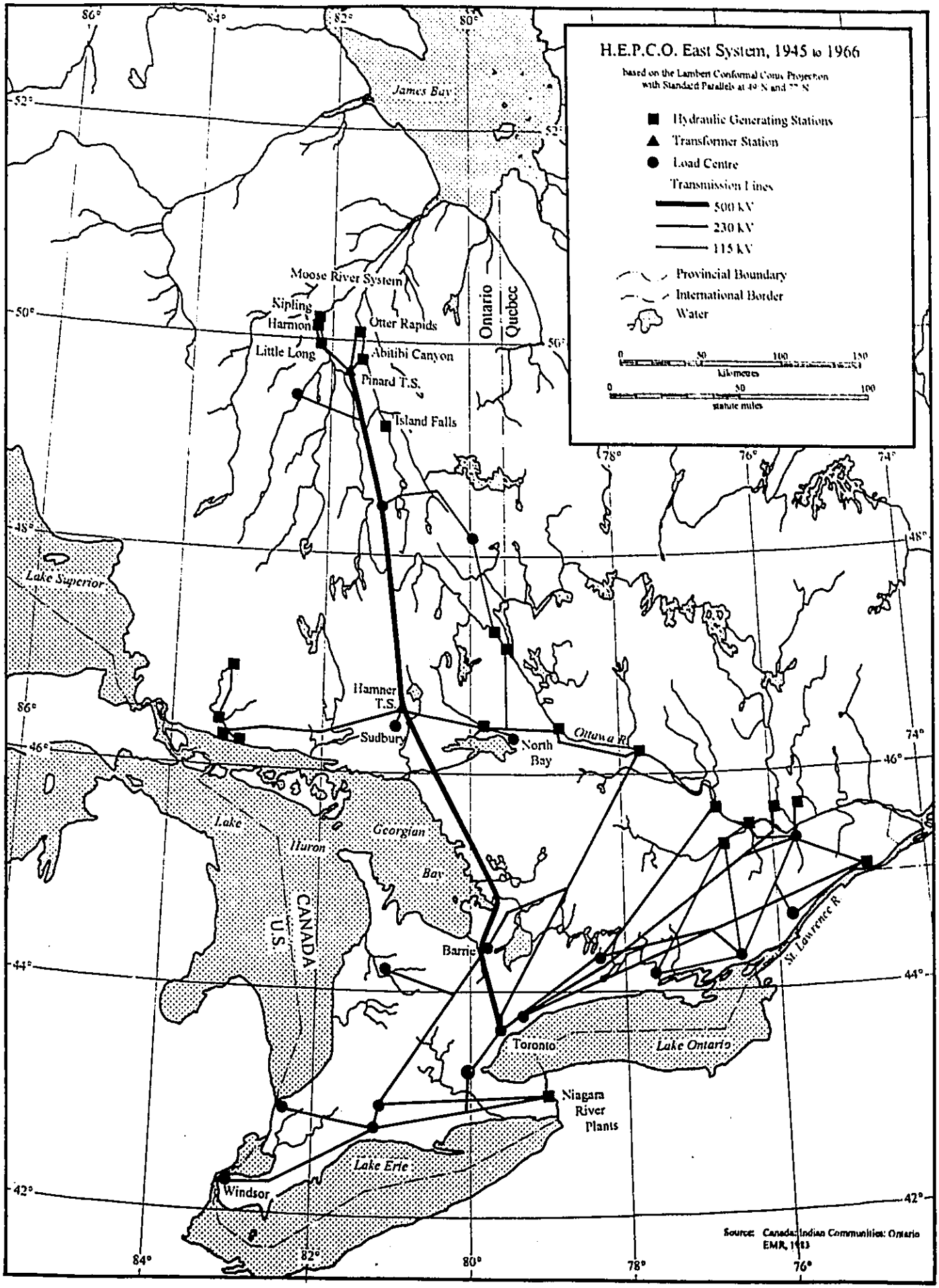
Map I
The Mattagami and Abitibi River Systems


Fort Albany
James Bay
Albany R.
Moosonee
Moose R.
Abitibi R.
Missinaibi R.
Mattagami R.
Lower Long Rapids
Middle Long Rapids
Coral Rapids
Otter Rapids
Kesagami L.
Ontario
Quebec
Smoky Falls
Abitibi
Island Falls
Kapuskasing
Kapuskasing R.
Smooth Rock Falls
Cochrane
Iroquois Falls
Twin Falls
Lake Abitibi
Timmins
Porcupine
Noranda
Rouyn
Matachewan
Larder Lake
Lake Opasatica
Mattagami I.R. #71
Gowganda
Cobalt
Ottawa R.
Lake Nipissing
North Bay
Mattawa
French R.
Georgian Bay
CANADA
U.S.
Ontario
Quebec
Area Shown in Map
The Mattagami and Abitibi River Systems
based on the Lambert Conformal Conic Projection with Standard Parallels at 44° 30'N and 54° 30'N
Ontario Northern Railway
Water
Provincial Boundary
International Border
0 50 100 150
kilometres
0 50 100
statute miles
Source: Close up:CANADA:Ontario National Geographic Society 1:3 000 000, 1978
Michael Dickens 1994

Map II
Generating Stations and Transmission Lines of the N.E. Ontario Hydro Electric System, 1911 to 1944

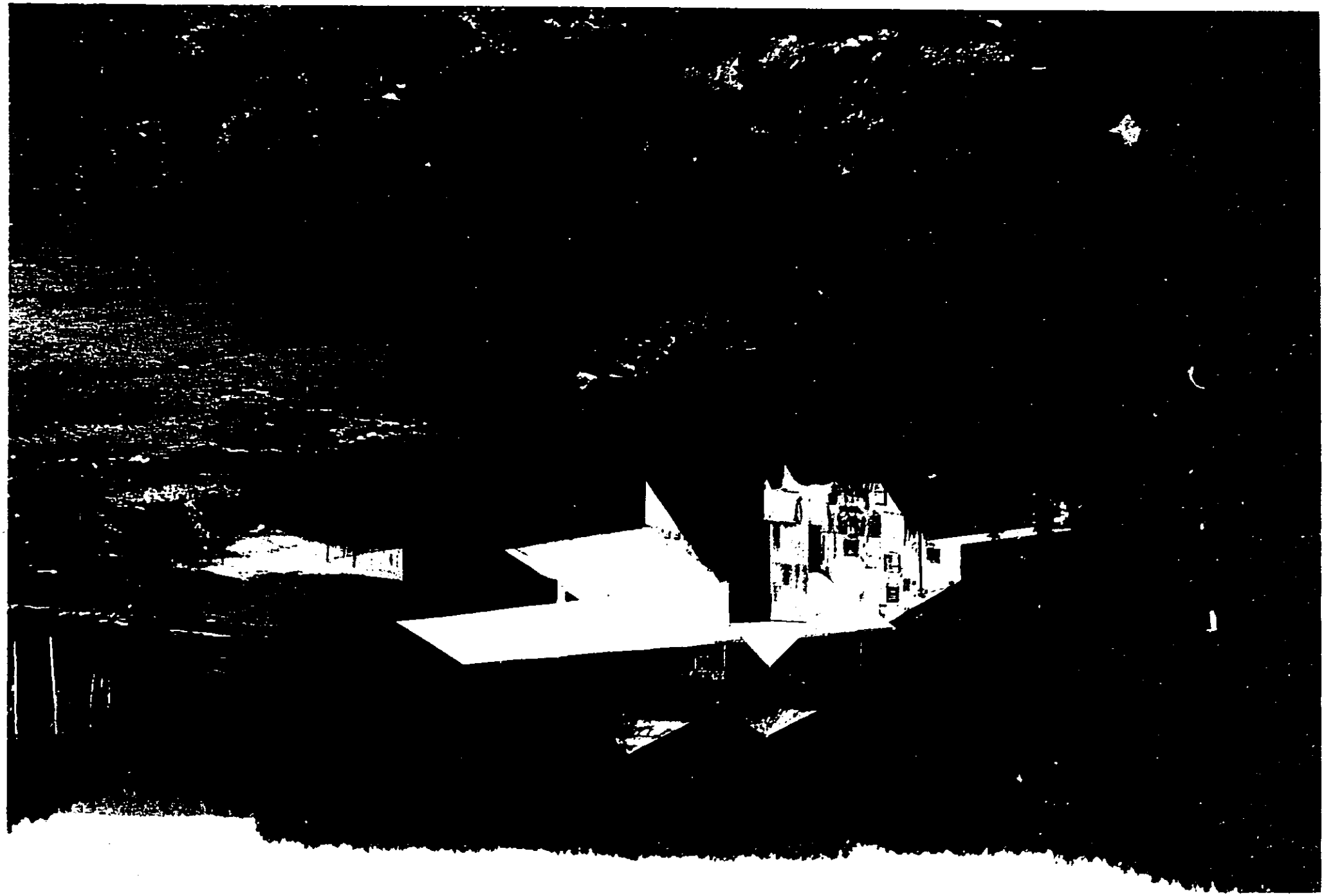

James Bay
Moosonee
Abitibi R.
Mattagami R.
Ontario
Quebec
Kesagami L.
Abitibi Canyon
Island Falls
Kapuskasing R.
Sturgeon Falls
Hunta
Lake Abitibi
Sandy Falls
Timmins
Wawaitin Falls
Grassy Dam
Kenogamissee Dam
Mesomikenda Dam
Minisinakwa Dam
to Sudbury
High Falls
Kirkland Lake
Noranda
see inset
Indian Chutes
Gowganda
Matawapika Dam
Cobalt
Quinze
Quinze Lake
Hound Chutes
Fountain Falls
Upper Notch
Matabitchuan
Rabbit Dam
Sudbury
Lake Nipissing
North Bay
Ottawa R.
French R.
Georgian Bay
Kirkland Lake
Larder Lake
Quinze
Matawapika Dam
Lake Timiskaming
Cobalt
Hound Chutes
Fountain Falls
Upper Notch
Matabitchuan
Source: Inset Map of the World 1:1 000 000, 1969
Detail: Kirkland Lake to Matabitchuan
Generating Stations and Transmission Lines of the N.E. Ontario Hydro Electric System, 1911 to 1944
based on the Lambert Conformal Conic Projection with Standard Parallels at 44°30'N and 54°30'N
Power Station
Substation
Storage Dam
Water
Provincial Boundary
International Border
Ontario Northern Railway
kilometres
statute miles
Source: Close up:CANADA:Ontario National Geographic Society 1:3 000 000, 1978
Michael Dickson 1994

Map III
HEPCO East System, 1945 to 1966


H.E.P.C.O. East System, 1945 to 1966
based on the Lambert Conformal Conic Projection
with Standard Parallels at 49° N and 77° N
Hydraulic Generating Stations
Transformer Station
Load Centre
Transmission Lines
500 kV
230 kV
115 kV
Provincial Boundary
International Border
Water
0 50 100 150
Kilometres
0 50 100
statute miles
James Bay
Moose River System
Kipling
Harmon
Little Long
Otter Rapids
Abitibi Canyon
Pinard T.S.
Island Falls
Ontario
Quebec
Lake Superior
Hamner T.S.
Sudbury
North Bay
Ottawa R.
Lake Huron
Georgian Bay
CANADA
U.S.
Barrie
St. Lawrence R.
Toronto
Lake Ontario
Niagara River Plants
Lake Erie
Windsor
Source: Canada: Indian Communities: Ontario EMR, 1983
Michael Dickson 1994

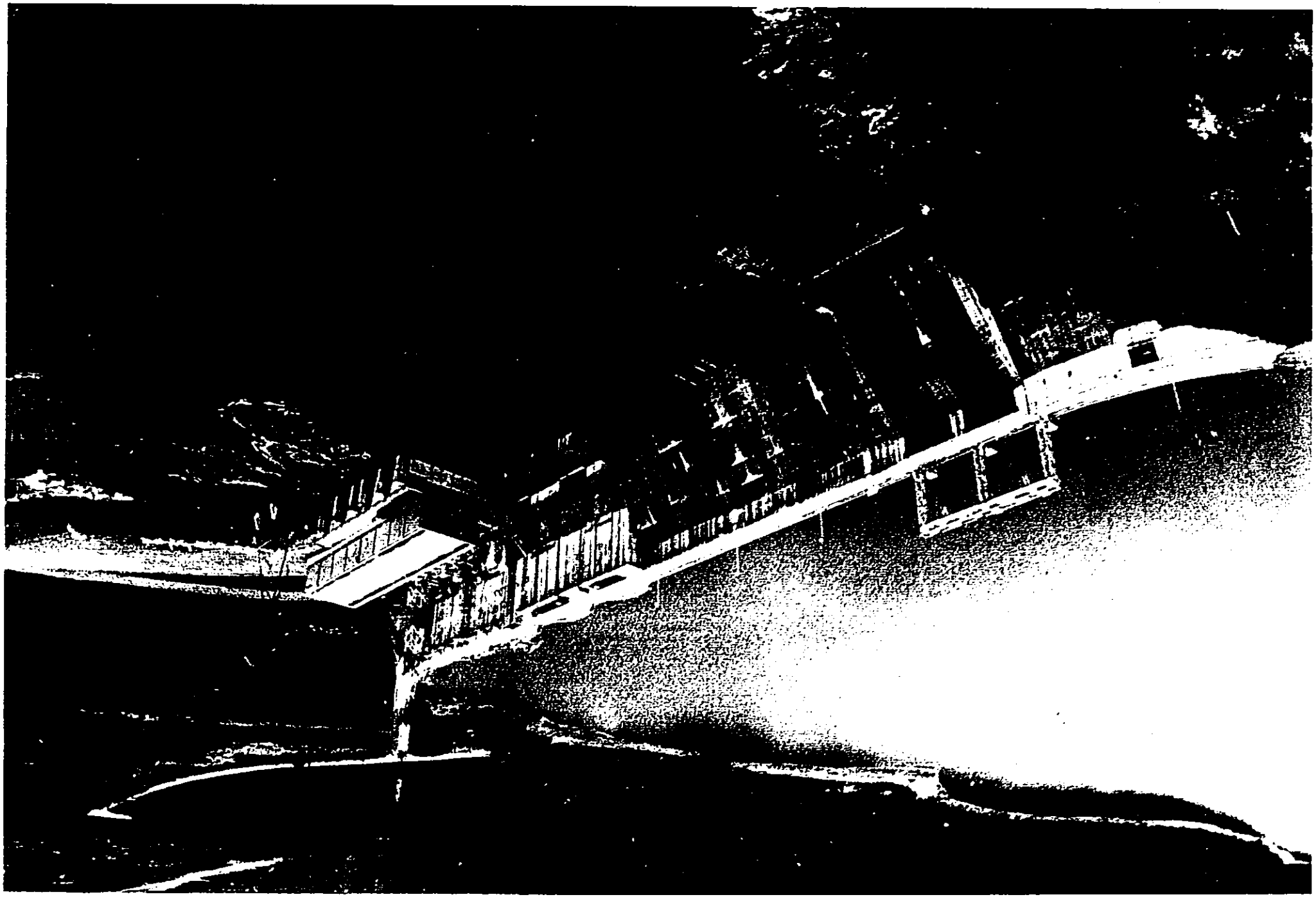
APPENDIX II
Photographs

Photograph 1
Sandy Falls Generating Station



Photograph II
Wawaitin Falls Generating Station

Photograph III
Harmon Generating Station



GLOSSARY

ampere	a measurement of current flows
cycle	the number of times per second alternating current completely reverses the direction of its flow
forebay	reservoir from which water is taken through penstocks to the hydraulic turbines
generator	a machine that converts mechanical power into electrical power
horsepower	the rate of doing work
hydraulic turbine	enclosed rotary prime mover that produces mechanical power from energy given up by water flowing down
kilowatthour (kwh)	unit of electric energy equivalent to one hour's use of 1,000 watts
load factor	the ratio of average output to maximum output
penstock	a pipe for delivering water to a hydraulic turbine
spillway	area set aside for excess water
surge tank	a chamber designed to neutralize sudden changes of pressure in a flow of liquid
thermoclines	sub-surface layers created in waterways because of differences in temperatures
transformer	a machine that increases or decreases alternating current voltages
volt	a unit of electrical pressure which makes a current flow
watt	electrical unit of power or rate of doing work

BIBLIOGRAPHY

A. Primary Sources

Ontario Hydro Corporate Archives.

The bulk of the records available for examination are listed in the GSI Index. The following is a list of record groupings that were the most useful for this dissertation.

History of Ontario Hydro, Power Systems (Hydraulic), Northern Ontario Properties, Post-War Development, Investigating Commissions, Memos to Board of Directors, Advice of Decision of Board of Directors, Policy Directives, Ontario Hydro Committees, Progress and Activity Reports, Organization and Operations of Ontario Hydro, Engineering, Bulk Electricity Systems (Northern Ontario Properties), Bulk Transmission, Generation, Hydro Electric (general), Construction, Integrated Operation, Generation (Hydraulic), Water Storage (Watershed), System Disturbances, Effect of Weather and Climate on Generation, Alphalist of Rivers, Questions in the Legislature, Utilization of Energy, Restrictions/Conservation, Relations with Power Suppliers, News Releases and Bulletins, Marketing and Utilization (Electricity), Wartime Relations, World War I Priorities and Control, World War I Post War Power Shortage, World War II Priorities and Controls, Post-War Power Shortage, Interconnections, Direct Customers alphalist, Electricity vs. Gas, Legislation, Water Leases and Licenses of Occupation, Waterways, Acquired Companies (alphalist), Archives Biographical Files (alphalist, general).

Records not listed under the GSI:

Orders-in-Council, Speeches, Engineering and Construction (ENCON)

Ontario Hydro Public Reference Centre

"Mattagami River Preliminary Environmental Appraisal of Hydroelectric Development Potential Between Yellow Falls and Grand Rapids," Report No.82071, Design and Development Division-- Generation, June, 1982.

"Abitibi River Preliminary Environmental Appraisal of Hydraulic Development Potential Between Abitibi Canyon and Blacksmith Rapids," Report No.81029, Design and Development Division-- Generation, October, 1981.

Ontario Hydro Demand/Supply Plan Environmental Assessment Hearing Documents.

Ontario Hydro Photographic Archives

Generating Stations: Wawaitin, Smooth Rock Falls, Sandy Falls, Abitibi Canyon, Otter Rapids, Little Long, Upper Long Rapids.

Archives of Ontario

RG 35 Hydro Commissioner's Office 1920-1929
RG 3 Office of the Premier and Cabinet

Personal Papers of Frank E. Davison, George Gathercole, HEPC Scrapbooks, Peter Heenan, R.L. Hearn, Sir Aemilius Irving, Frank A. Macdougall, J.L Morris, A.E. Wicks Ltd., E.E. Johnson.

Ontario Native Affairs Secretariat

Ministry of Natural Resources Indian Land Files
Map Collection

Ministry of Natural Resources

Surveys and Mapping
MNR Land Management Branch Land Files and Crown Leases

National Archives of Canada and the National Library

RG 45 Records of the Geological Survey of Canada
RG 10 Records of Indian Affairs and Northern Development

MG 30 C.A. Magrath Papers

Department of the Naval Service Sessional Paper 39a. "A Report on the Fish and Fisheries of the Western Coast of James Bay," by A.R.M. Lower. Canada: 1915.

The Northern Miner, 1920-1949.
The Canadian Engineer, 1911-1939.

B. Secondary Sources

Abel, Kerry and Friesen, Jean. eds. Aboriginal Resource Use in Canada: Historical and Legal Aspects. Winnipeg: University of Manitoba Press, 1991.

Armstrong, Christopher. The Politics of Federalism: Ontario's Relations with the Federal Government, 1867-1942. Toronto: University of Toronto Press, 1981.

_____ and Nelles, H.V. Monopoly's Moment.

Asch, Michael. Home and Native Land: Aboriginal Rights and the Canadian Constitution. Toronto: Methuen, 1984.

Bartlett, Richard H. Aboriginal Water Rights in Canada: A study of Aboriginal title to water and Indian water rights. Calgary: Canadian Institute of Resources Law, 1988.

Basalla, George. The Evolution of Technology. Cambridge: Cambridge University Press, 1988.

Biggar, E.B. Hydro-Electric Development in Ontario. Toronto: The Ryerson Press, 1920.

Biggar, Glenys. Ontario Hydro's History and Description of Hydro-Electric Generating Stations. Toronto: Ontario Hydro, 1991.

Bijker, Wiebe, Hughes, Thomas P. and Pinch, Trevor. eds. The Social Construction of Technology: New Directions in the Sociology and History of Technology. Cambridge: MIT Press, 1987.

Boldt, Menno. Surviving as Indians: The Challenge of Self-Government. Toronto: University of Toronto Press, 1993.

Bothwell, Robert. Nucleus. Toronto: University of Toronto Press, 1988.

Bourassa, Robert. Power from the North. Scarborough: Prentice-Hall Canada Inc., 1985.

Careless, J.M.S. Careless at Work. Toronto: Dundurn Press, 1990.

_____. Frontier and Metropolis: Regions, Cities and Identities in Canada before 1914. Toronto: University of Toronto Press, 1989.

_____. Toronto to 1918: An Illustrated History. Toronto: 1984.

Cockcroft, James D., Frank, Andre Gunder, et al. Dependence and Underdevelopment: Latin America's Political Economy. Garden City, New York: Anchor Books, 1972.

Cook, Ramsey. The Maple Leaf Forever: Essays on Nationalism and Politics in Canada. Toronto: Macmillan of Canada, 1971.

Cronon, William. Nature's Metropolis: Chicago and the Great West. New York: W.W. Norton and Co. Inc., 1991.

Dales, John H. Hydroelectricity and Industrial Development: Quebec, 1898-1940. Cambridge: Harvard University Press, 1957.

Denison, Merrill. The People's Power. Toronto: McClelland and Steward Ltd., 1960.

Dickason, Olive. Canada's First Nations: A History of Founding Peoples from Earliest Times. Toronto: McClelland and Stewart Inc., 1992.

Dubinsky, Karen. Improper Advances: Rape and Heterosexual Conflict in Ontario, 1880-1929. Chicago: University of Chicago Press, 1993.

Fleming, Keith. Power at Cost. Montreal: McGill Queen's University Press, 1992.

Frost, Robert L. Alternating Currents: Nationalized Power in France, 1946-1970. Ithaca: Cornell University Press, 1991.

Gleick, James. Chaos: Making a New Science. London: Penguin Books, 1988.

Graham, Roger. Old Man Ontario: Leslie M. Frost. Toronto: University of Toronto Press, 1990.

Green, L.C. and Dickason, Olive. The Law of Nations and the New World. Edmonton: University of Alberta Press, 1989.

Grey Owl. Pilgrims of the Wild. London: Lovat Dickson and Thompson Ltd., 1935.

Harring, Sidney L. Crow Dog's Case: American Indian Sovereignty, Tribal Law, and United States Law in the Nineteenth Century. Cambridge: Cambridge University Press, 1994.

Hawkins, W.E. Electrifying Calgary: A Century of Public and Private Power. Calgary: University of Calgary Press, 1987.

Hirsh, Richard F. Technology and Transfer in the American Electric Utility Industry. Cambridge: Cambridge University Press, 1989.

Hodgins, Bruce, et al. eds. Co-existence? Studies in Ontario--First Nations Relations. Peterborough: Trent University, 1992.

_____, and Benidickson, Jamie. The Temagami Experience: Recreation, Resources and Aboriginal Rights. Toronto: University of Toronto Press, 1989.

_____, and Hobbs, Margaret. eds. Nastawgan: The Canadian North by Canoe and Snowshoe. Toronto: Betelgeuse Books, 1985.

Hughes, Thomas P. Networks of Power: Electrification in Western Society, 1880-1930. Baltimore: Johns Hopkins University Press, 1983.

Humphries, Charles W. 'Honest Enough to be Bold': The Life and Times of Sir James Pliny Whitney. Toronto: University of Toronto Press, 1985.

Jarrell, R.A. and Ball, N.R., eds. Science, Technology and Canadian History. Waterloo: Wilfrid Laurier University Press, 1978.

Johnston, Charles M. E.C. Drury: Agrarian Idealist. Toronto: University of Toronto Press, 1986.

Keane, David and Read, Colin. Old Ontario: Essays in Honour of J.M.S. Careless. Toronto: Dundurn Press Ltd., 1990.

Latour, Bruno. Science in Action: How to follow Scientists and Engineers through Society. Cambridge: Harvard University Press, 1987.

Law, John. ed. Power, Action and Belief: A New Sociology of Knowledge? London: Routledge and Kegan Paul, 1986.

Layton, Edwin T. The Revolt of the Engineers: Social Responsibility and the American Engineering Profession. Cleveland: Case Western Reserve University Press, 1971.

LeBourdais, D.M. Metals and Men: The Story of Canadian Mining. Toronto: McClelland and Stewart Ltd., 1957.

Lower, A.R.M. My First Seventy-Five Years. Toronto: Macmillan of Canada, 1967.

Marcus, Alan I. and Segal, Howard P. Technology in America. Orlando: Harcourt Brace Jovanovich Inc., 1989.

Mavor, James. Niagara in Politics. New York: E.P Dutton and Co., 1925.

McCann, L.D. Heartland and Hinterland: A Geography of Canada. Scarborough: Prentice-Hall Canada Inc., 1987.

McCutcheon, Sean. Electric Rivers: The Story of the James Bay Project. Montreal: Black Rose Books, 1991.

McKay, Paul. Electric Empire: The Inside Story of Ontario Hydro. Toronto: Between the Lines, 1983.

Millard, J. Rodney. The Master Spirit of the Age: Canadian engineers and the politics of professionalism, 1887-1922. Toronto: University of Toronto Press, 1988.

Mooney Melvin, Patricia. The Organic City: Urban Definition and Community Organization, 1880-1920. Lexington: The University Press of Kentucky, 1987.

Morgan, Gareth. Images of Organization. Newbury Park, California: Sage Publications, 1986.

Nash, Roderick. Wilderness and the American Mind. New Haven: Yale University Press, 1967.

Nelles, H.V. The Politics of Development: Forests, Mines and Hydro-Electric Power in Ontario, 1849-1941. Toronto: Macmillan of Canada, 1974.

Nesbitt, A.R.D. Dry Goods and Pickles: The Story of Nesbitt Thomson. Toronto: self-published, 1989.

Noble, David F. America By Design: Science, Technology and the Rise of Corporate Capitalism, New York: Alfred A. Knopf: 1977.

Nye, David E. Electrifying America: Social Meanings of a New Technology, 1880-1940. Cambridge: MIT Press, 1990.

Oliver, Peter. G. Howard Ferguson: Ontario Tory. Toronto: University of Toronto Press, 1977.

Pain, S.A. The Way North: Men, Mines and Minerals. Toronto: The Ryerson Press, 1964.

Platt, Harold L. The Electric City: Energy and the Growth of the Chicago Area, 1880-1930. Chicago: University of Chicago Press, 1991.

Plewman, W.R. Adam Beck and the Ontario Hydro. Toronto: The Ryerson Press, 1947.

Posluns, Michael. Voices from the Odeyak. Toronto: NC Press Ltd., 1993.

Roberts, Marc J. and Bluhm, Jeremy S. The Choices of Power: Utilities Face the Environmental Challenge. Cambridge: Harvard University Press, 1981.

Rogers, Edward S. and Smith, Donald, eds. Aboriginal Ontario: Historical Perspectives on the First Nations. Toronto: Dundurn Press, 1994.

Saywell, John T. "'Just Call Me Mitch' The Life of Mitchell F. Hepburn. Toronto: University of Toronto Press, 1991.

Smith, Philip. Harvest from the Rock: A History of Mining in Ontario. Toronto: Macmillan of Canada, 1986.

Swainson, Neil A. Conflict Over the Columbia: The Canadian Background to an Historic Treaty. Montreal: McGill Queen's University Press, 1979.

Talbot, Alan R. Power Along the Hudson: The Storm King Case and the Birth of Environmentalism. New York: E.P Dutton and Co. Inc., 1972.

United Nations, World Commission on Environment and Development. Our Common Future. Oxford: Oxford University Press, 1987.

Waldram, James B. As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada. Winnipeg: University of Manitoba Press, 1988.

Weber, Max. The City. New York: The Free Press, 1958.

White, Clinton O. Power for a Province: A History of Saskatchewan Power. Regina: University of Regina, 1976.

Winner, Langdon. The Whale and the Reactor: A Search for Limits in an Age of High Technology. Chicago: University of Chicago Press, 1986.

Worster, Donald. Rivers of Empire: Water, Aridity and the Growth of the American West. New York: Pantheon Books, 1985.

Young, Scott and Young, Astrid. Silent Frank Cochrane. Toronto: Macmillan of Canada Ltd., 1973.

Zaslow, Morris. The Opening of the Canadian North, 1870-1914. Toronto: McClelland and Stewart Ltd., 1971.

Articles

Bartlett, Richard H. "Hydroelectric Power and Indian Water Rights on the Prairies," in Prairie Forum. Vol. XIV : No.2, (Fall, 1989), pp.177-193.

Benidickson, Jamie. "Private Rights and Public Purposes in the Lakes, Rivers and Streams of Ontario, 1870-1930," in Essays in The History of Canadian Law, Vol.2, Toronto: The Osgoode Society, 1983.

Callon, Michel and Law, John. "On Interests and their Transformation: Enrolment and Counter-Enrolment," in Social Studies of Science. Vol.12: No.4, (November, 1982), pp.615-625.

Careless, J.M.S. "Frontierism, Metropolitanism and Canadian History," in Approaches to Canadian History. Toronto: University of Toronto Press, 1967, pp.63-83.

_____. "Metropolis and Region: The Interplay between City and Region in Canadian History before 1914," in Urban History Review. Vol. : No.3, (1978), pp.99-118.

_____. "Metropolitanism and Nationalism," in P. Russell, ed. Nationalism in Canada. Toronto: 1966, pp.271-83.

Davis, Donald F. "The 'Metropolitan Thesis' and the Writing of Canadian Urban History," Urban Historical Review. Vol. XIV: No.2, (October, 1985), pp.95-113.

Emond, D.P. "Environmental Law and Policy: A Retrospective Examination of the Canadian Experience," in Consumer Protection, Environmental Law and Corporate Power. Ivan Bernier and Andre Lajoie. Toronto: University of Toronto Press, 1985.

Gillis, R. Peter. "Rivers of Sawdust: The Battle over Industrial Pollution in Canada, 1865-1903," in Journal of Canadian Studies, Vol.21: No.1, (Spring, 1986), pp.84-103.

_____. "Early Federal Regulatory Records as Potential Sources for the History of Science and Technology in Canada: The Case of the Sawdust Pollution Files, 1866-1902," in Science, Technology and Canadian History. Richard A. Jarrell and Norman R. Ball, eds. Waterloo: Wilfrid Laurier Press, 1978. pp.60-70.

Hansen, Lise C. "Treaty Fishing Rights and the Development of Fisheries Legislation in Ontario: A Primer," in Native Studies Review. Vol. VII: No.1, (1991), pp.1-22.

Hard, Mikael. "Technology as Practice: Local and Global Closure Processes in Diesel-Engine Design," in Social Studies of Science. Vol.24: No.3, (August, 1994), pp.549-585.

Loney, Martin. "The Construction of Dependency: The Case of the Grand Rapids Hydro Project," in The Canadian Journal of Native Studies. Vol. VII: No.1, (1987), pp.57-78.

Marchuk, M. Patricia. "What Happens When Common Property Becomes Uncommon?" in BC Studies, No. 80, (Winter, 1988-89), pp. 3-23.

Nelles, H.V. "Public Ownership of Electrical Utilities in Manitoba and Ontario, 1906-30," in Canadian Historical Review. Vol. XLII: No.4, (1976), pp.461-484.

Waldram, James. "Hydroelectric Development and Dietary Delocalization in Northern Manitoba, Canada," Human Organization, Vol. XLIV: No.1, (Spring, 1985), pp.41-49.

_____. "Native Employment and Hydro-electric Development in Northern Manitoba," Journal of Canadian Studies, Vol. XXII: No.3, (Autumn, 1987).

Theses and Papers

Dewar, Kenneth. State Ownership in Canada: the Origins of Ontario Hydro. PhD: University of Toronto, 1975.

Manore, Jean. "Mattagami Indian Reserve #71 and Hydro-Electric Development: A Case Study of Government Policy with respect to Resource Administration and Native People." Victoria: Canadian Historical Association Annual Meeting, 1990.

_____. "Power and Performance. The Indian Agent and the Agency, 1877-1897: two Western case studies," M.A.: University of Ottawa, 1986.

McCallum, John. Agriculture and Economic Development in Quebec and Ontario to 1870. PhD: McGill University, 1977.

Slattery, Brian. "Understanding Aboriginal Rights." Unpublished paper: December, 1986.

Van West, John J. "Ojibway Fisheries, Commercial Fisheries Development and Fisheries Administration, 1873-1915: An Examination of Conflicting Interests and the Collapse of the Sturgeon Fisheries of the Lake of the Woods." Victoria: Canadian Historical Association Annual Meeting, 1990.

Wuerscher, Rose Boyko. "Title to the Water Bed: The Legal History of the ad Medium Filum Aquae Rule." Department of Indian Affairs and Northern Development, 1982.

Wylie, Peter James. "Electrification and Technical Adaptation in Canadian Manufacturing, 1900-1929." PhD: Queen's University, 1986.