

**Expert Systems for Environmental Self Assessment: A Case Study
of Manitoba Hydro Sub-Transmission Lines (66kV) in the
Rural Municipality of Whitemouth.**

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**EXPERT SYSTEMS FOR ENVIRONMENTAL SELF ASSESSMENT:
A CASE STUDY OF MANITOBA HDYRO SUB-TRANSMISSION LINES (66kV) IN THE
RURAL MUNICIPALITY OF WHITEMOUTH**

BY

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**A Thesis/Practicum submitted to the Faculty of Graduate Studies of the University of Manitoba
in partial fulfillment of the requirements for the degree of**

MASTER OF NATURAL RESOURCES MANAGEMENT

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Abstract

According to the Manitoba Environment Act, Classes of Development Regulation 164/88, the construction of transmission lines of less than 115 kV capacity does not require a formal environmental assessment. However, Manitoba Hydro voluntarily assesses the biophysical and socio-economic impacts of sub-transmission line (66 kV) development in a process referred to as environmental self assessment. As many assessments must be performed by Hydro on many low voltage projects, the self assessment procedure must be consistent, efficient, and economical.

An expert system is a computer program that can be programmed with expert knowledge and be used as a decision support tool. Expert systems give non-experts access to an expert's knowledge, and give experts a source of supplementary information. The use of expert systems technology should be well suited to making assessments consistent, efficient, and economical.

This study addressed the feasibility of using expert system technologies to assist in the environmental self assessment process for sub-transmission lines (66 kV) in the Rural Municipality of Whitemouth. Information was collected through a series of interviews and programmed into a prototype expert system using the expert system shell VP Expert. The prototype system, PREASES, contains: contact information for the various agencies; agency concerns; and the information required to obtain the regulatory approvals for a sub-transmission line.

The study concluded that expert systems can be used to improve the environmental self assessment process. PREASES predicted the approvals that would be required and made recommendations as to how to obtain those approvals.

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Chapter One-Introduction

1.1 General Background

Manitoba Hydro is the principal producer and distributor of electricity in Manitoba. Most of the electricity is produced by hydroelectric generating facilities located in the northern part of the province. However, most of the demand is located in the South of the province.

To connect producer to consumer, Manitoba Hydro has constructed a network of electricity transmission lines to link the generators in the North to the electricity consumers in the South. High voltage electrical transmission lines of 115 to 500 kV transmit electricity from the generation stations to the transformer stations, or between transformer stations. These high voltage lines are termed transmission lines. Lower voltage lines, operating at 66kV, and known as sub-transmission lines, transfer power from transformer stations to sub-stations or between sub-stations. Finally, distribution lines, operating at 33, 25, or 12 kV, supply electricity to the consumer.

1.2 Concepts

The following section defines four concepts as they are used in this document.

Approval: This term is used throughout the document to refer to permitting, and concurrence procedures required by various government agencies. It is not designed to refer to a formal approval through a licencing procedure.

Environmental Assessment: Environmental assessment (EA) has been described as "... a vehicle for incorporating environmental considerations, along with conventional technical, financial, and political considerations, in decision making (Gibson, 1993). A complete environmental assessment process may include up to eight stages. The process may begin with a pre-project land use development plan produced by the community. The project will then be screened. The screening process will identify projects that require formal environmental assessment as well as identifying any low impact projects that may proceed without further pre-development assessment. If further assessment is necessary, well focused guidelines will be written or scoped for the Environmental Impact Study (EIS). A baseline study will be conducted to determine pre-project conditions. The EIS will be conducted according to the guidelines. A decision will then be made to determine whether the project should proceed. Finally, the project must be monitored and its effects audited.

Formal Environmental Assessment: Formal environmental assessment is defined as following the

assessment process as detailed under the Manitoba Environment Act (1987) and the Canadian Environmental Assessment Act (CEAA) (1995). Formal environmental assessments are generally carried out on large scale or contentious projects with known or suspected environmental effects. Certain projects, defined in the Acts and their regulations, do not require formal environmental assessment.

Environmental Self Assessment: Environmental self assessment is a voluntary investigation of the biophysical and socio-economic consequences of development. These assessments are carried out by the project proponent. Self assessments are conducted to: i) ensure that the predicted consequences of the development are within acceptable limits; ii) identify mitigation methods that will reduce any impacts to acceptable limits; iii) and to identify when formal environmental assessments are necessary. In this case, self assessments are performed on projects that do not require formal environmental assessment.

1.3 Legislative Background

The development of electrical transmission lines are subject to government approval to reduce any possible adverse environmental effects. The specific approvals process for transmission, sub-transmission, and distribution lines vary according to the type of line and the environmental sensitivity of the land over which the line is to cross.

1.3.1 Provincial Requirements

According to the Manitoba Environment Act (MEA) (1987) and the accompanying Regulation 164/88 (1988), the construction of an electricity transmission line of greater than 115 kV requires an environmental licence. The MEA does not mention electricity transmission lines of less than 115 kV. As a result, the construction of these lines does not require any formal environmental assessment under the Act (Pannell, B. Environmental lawyer, Personal Communication, 1994). However, at the discretion of the Minister of Environment, a sub-transmission or distribution line may require an environmental licence. Assessments are most likely when unacceptable levels of adverse environmental impact are anticipated.

1.3.2 Federal Assessment Requirements

The requirements of the Canadian Environmental Assessment Act (CEAA) for low voltage electrical power lines are well defined by CEAA and its regulations. According to the CEAA, a low voltage line does not require an assessment unless the line is not excluded and it triggers the Act.

All non-international power lines of less than 130 kV are excluded from the Act unless: i) the line is constructed on a new Right of Way (ROW); ii) the poles are placed below the high water line of a waterbody; or iii) a polluting substance might be released into a wetland that is covered by water for three consecutive months of the year (Part 3, Section 21, Exclusion list, Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). If one or more of these conditions are true, then the line will be subject to assessment, if a trigger exists.

Under CEAA, four triggers, or conditions that start the Act, exist. The most likely trigger in the case of low voltage sub-transmission or distribution lines is a government decision on the Law List. The Law List of CEAA details the legal decisions and approvals that may trigger the Act. The most likely cases are: i) a leave under the Railway Act; ii) an approval under the Navigable Waters Protection Act; or iii) an authorisation to harmfully alter, disrupt, or destroy fish habitat under the Fisheries Act (Annotated Law List, Policy and Regulatory Affairs, Canadian Environment Assessment Agency, 1995). If one or more of the above triggers exists on a line that is not excluded, then a federal environmental assessment known as a screening will be required.

It is important to remember with all of these assessment processes, that should the provincial or federal environment minister deem it necessary, then assessment will be required. Ministerial discretion is an element of all of these assessment acts.

1.4 Environmental Self Assessment

Manitoba Hydro voluntarily investigates the biophysical and socio-economic consequences of sub-transmission or distribution line development. Sub-transmission lines typically do not require formal environmental assessment. These environmental self assessments are conducted to ensure that the predicted consequences of the development are within acceptable limits, or can be mitigated to within acceptable limits, and to identify when formal environmental assessments are necessary.

Manitoba Hydro conducts many environmental self assessments of this sort. The self assessment process, although subject to ongoing refinement, is designed to identify areas that would

be adversely affected by sub-transmission line development. These assessments are generally performed by professional staff with significant knowledge and experience concerning environmental assessment. However, by using expert system computer technologies, it may be possible for experienced technical support staff to conduct environmental self assessments for sub-transmission lines.

1.5 Expert Systems

When faced with a potential environmental effect, a person with in-depth knowledge and experience, or an expert, will be able to determine the best procedures to minimize negative biophysical and socio-economic impacts (Tursman and Cork, 1992). Unfortunately, human experts are not always available where they may be needed. An expert system is a computer program designed to model the problem-solving ability of a human expert (Durkin, 1994). The expert system does not replace the human expert, rather, it would provide the human expert with supplementary information and give non-experts access to much of the expert's knowledge. The expert system could also be used as a decision support tool.

1.5.1 Environmental Assessment Expert Systems

Expert systems have been applied to the field of environmental assessment. Geraghty (1993) has identified four environmental assessment expert systems. These systems are under development in several countries, including Canada, Japan, Portugal, and the United States. The Canadian system is called SCREENER and was developed by Environmental and Social Systems Analysts Ltd. in Vancouver to assist in the EARP (Environmental Assessment and Review Process) screening process. At least three other environmental assessment expert systems have been developed. Expert systems have also been used in other environmental applications, including monitoring and control of lakes (Warwick, Mumford and Norton, 1993). Although it appears that expert system technology has not been applied to the environmental self assessment of sub-transmission lines, the technology has been used in the environmental assessment and environmental management fields.

1.6 Issue Statement

An environmental self assessment expert system that incorporates the knowledge and experience of experts will assist experienced technical staff in conducting part of the environmental self assessment process for sub-transmission line (66 kV), once a preferred route has been established.

1.7 Objectives

The purpose of this research is to investigate the feasibility of developing an expert system to assist in the environmental self assessment of electrical sub-transmission lines (66 kV capacity). Specific objectives include:

- To determine the factors that are significant in the self assessment of sub-transmission lines within the study area.
- To investigate various expert system shells to determine their potential for use in an environmental self assessment expert system prototype.
- To develop an environmental self assessment expert system prototype.
- To test the prototype on a fictional case on the Rural Municipality of Whitemouth to assess its comprehensiveness.
- To recommend whether expert systems are feasible to assist with environmental assessment.

1.8 Scope and Limitations

The research was conducted according to the following limitations.

- The prototype was developed to identify the approvals and endorsements that should be obtained prior to sub transmission line development. The system is not designed to be used as a route selection tool. However, in its application, the system may identify problems which are best addressed through route modifications.
- The prototype was not designed to assist the user through the entire environmental self assessment process. The prototype concentrates on the agency concerns and the agency contact phases of the assessment.
- The prototype was developed for the conditions that exist in the Rural Municipality of Whitemouth. The study area does contain many characteristic features found throughout Southern Manitoba including, areas of agricultural land, forested land, wetlands, streams and

rivers, railways, highways, towns, and roads. However, the system was not designed to operate over all of Southern Manitoba. Not all of the features that characterize Southern Manitoba exist in the study area, and as such are not included in the system.

- The expert system prototype was based on the existing Manitoba Hydro process. A new self assessment process was not developed.
- Not all of the expert system shells evaluated were examined directly. Determinations of suitability were made from summary information about the shells. This summary information was available from the literature and over the Internet.
- Manitoba Hydro general environmental protection measures for Transmission Line Construction were assumed to be relevant for sub transmission line construction.
- Manitoba Hydro general environmental protection measures for Transmission Line Construction were also assumed to continue to be considered as acceptable guidelines by both Federal and Provincial authorities.
- The various external agencies contacted in the preparation of this report have devised various recommendations for minimizing and mitigating the potential effects of sub-transmission line development. Although attempts were made to accommodate the recommendations of all agencies, in some cases, it may not be possible to find a balance that satisfies all parties.

1.9 Methods

1.9.1 Determination of Factors Significant to Self Assessment

To identify the factors that are significant to environmental self assessment, a literature review and a series of interviews were conducted. Environmental assessment process documents, Manitoba Hydro reports, and government publications dealing with transmission line development provided a current understanding of the environmental self assessment process. Interviews were conducted to obtain additional information, especially when information concerning specific procedures was required.

A literature search assisted in determining an acceptable environmental self-assessment process design. Manitoba Hydro environmental assessment and environmental self assessment documents, and related government publications provided an understanding of typical environmental

self assessment process. Staff from the Manitoba Hydro Licensing & Environmental Assessment, Design Division T&D outlined many of the requirements of the self assessment process (Rawluk, R. and Munro, W., Licensing & Environmental Assessment, Design Division T&D, Manitoba Hydro, Personal Communication, 1995). Supplemental information was obtained from class lectures and interviews with environmental assessment specialists at the University of Manitoba (Punter, D., Environmental Assessment Specialist and Botany Professor, University of Manitoba, Personal Communication, 1995 and Sinclair, A.J., Environmental Assessment Specialist and Natural Resources Management Professor, University of Manitoba, Personal Communication, 1995).

Detailed information on the specific modules of the environmental self assessment process was obtained principally from interviews. Interviews were conducted with the government agencies identified in Chapter Four. Initial interviews were conducted by telephone. In several cases, in-person interviews were conducted. Those interviewed were informed of the objectives of the research and, when appropriate, were asked the following standard questions.

1. Will any form of formal approval be required from the department, or organization, that you represent, for the proposed project to be constructed?
2. What steps must be followed in order for the approval to be granted?
3. Will any information need to be supplied before the approval can be granted?
4. Are there any other issues of concern to the department, or organization, that you represent?
5. How might these issues best be addressed? Does some form of mitigation exist that would reduce the effect of the proposed project?

Although answers were obtained for all of the relevant questions, attempts were made to keep the interview unstructured. Once the essential information had been obtained, the interviewee was encouraged to discuss potential concerns and identify other individuals who might provide additional information.

1.9.2 Expert System Shell Selection

Expert system shells were evaluated according to the following criteria: availability of support, and cost. Shells obtained from computer software stores and through the University were analysed directly. Textual information about other shells was obtained from the Internet. However, the support available for the shareware shells found on the Internet was insufficient to warrant the

downloading of those shells. A detailed analysis was only performed on shells actually used.

The expert system shells were first subjected to a screening that determined whether the shell could be suitable for this project. If detailed programming support was available and the cost was under \$150, the shell passed the initial screening.

The shells that passed screening were then subjected to detailed investigation. Attempts were made to code the prototype with each of the shells investigated in detail. The shell that allowed the most efficient expert system programming was then selected.

1.9.3 Programming

The third objective was to program a prototype environmental self assessment expert system, using the most acceptable shell. VP Expert was the shell used to program the system. Manuals, tutorials, and knowledgeable individuals were consulted to assist in this process. A prototype was then developed.

1.9.4 Test Case

The expert system prototype was tested on a hypothetical sub-transmission line in the Whitemouth Municipality. The criteria used to evaluate its success were:

1. The prototype's ability to determine the approvals and endorsements required to develop a sub-transmission line in the case study area.
2. The prototype's ability to provide general information, agency concerns, and recommended construction practices for a sub-transmission line in the case study area.

A prototype capable of meeting these criteria would be considered successful. The system was run and its output recorded on hard copy.

Chapter Two-Environmental Assessment

2.1 What is Environmental Assessment?

Environmental assessment (EA) has been described as “... a vehicle for incorporating environmental considerations, along with conventional technical, financial, and political considerations, in decision making (Gibson, 1993).” Environmental assessment is a process for identifying the likely consequences for the biogeophysical environment and for man’s health and welfare of implementing particular activities and for conveying this information, at a stage when it can materially affect their decision, to those responsible for sanctioning the proposals (Munn, 1979). This definition was completed by Davies & Muller (1983) by extending this definition to cover socio-economic effects. Other authorities call environmental assessment a planning and decision making tool used to achieve the overall goal of sustainable development, or development that meets the needs of present generations without compromising the needs of future generations (Canadian Environmental Assessment Agency, Banff Environmental Assessment Office, 1996). In short, EA is a way of making decision-makers aware of the biophysical and socio-economic impacts of their decisions.

2.2 Why Environmental Assessment?

The publication of Rachel Carson’s *Silent Spring* in 1962, and its focus on the man’s destruction of the environment marked the beginning of the era of concern for the environment. Both air and water pollution had become issues of serious concern. Photochemical smog and other forms of air pollution were beginning to damage crops and affect human health in the Los Angeles area. Oil spills off both coasts of the United States fouled beaches, killed wildlife, and ruined people’s vacations. And oil was not the only thing fouling the waters. The dumping of untreated human waste into lakes, rivers, and oceans triggered massive algal blooms and huge fish kills. Phosphorus laden detergents exacerbated these algal blooms and contributed to the “death” of lakes such as Lake Erie. Overseas, the famed German forests were beginning to die, victims of the *Waldsterben* (forest death). People across the developed world were beginning to demand that these environmental problems be cleaned up and steps be taken to prevent such occurrences.

By the late 1960’s the environmental consequences of this type of development on the

biophysical environment had become apparent at a time when society's environmental consciousness was rising. People began searching for methods of preventing environmental catastrophes. Environmental assessment offered a way of preventing future problems by predicting potential environmental impacts in the planning stages of development before irrevocable decisions were made. Environmental assessment also provided a means of outlining recommended mitigation opportunities for minimizing adverse impacts. By identifying concerns, suggesting alternatives, and taking advantage of opportunities for mitigation, environmental assessment can protect the biophysical environment, while allowing appropriate development to continue.

However, it soon became apparent that more than the biophysical environment was affected by development. The socio-economic environment, or the people in the area, were also often affected by developments. For example, the Mackenzie Valley Pipeline Inquiry found that the construction would affect both the biophysical environment, and the socio-economic environment, or "the life," of the First Nations people of the area (Gamble, 1978). Socio-economic assessments are performed to inform decision makers of the socio-economic consequences of their decisions, any possible mitigative measures, and alternatives to those decisions.

A final purpose of environmental assessment is to provide the public with an opportunity to provide input into the assessment process. The public often has important information and insight into the effects of a development that is of value in the planning stages of a project. The public consultation process also offers the project proponent an opportunity to inform the public of the proposed project. The whole assessment process may be less controversial and the eventual decision better received, when the public is informed of the project and given an opportunity to become involved.

2.3 Environmental Self Assessment

Environmental self assessment is a voluntary process in which the proponent of a project undertakes a study designed to identify and mitigate any potential negative environmental consequences of that project. Self assessment determines whether a formal environmental assessment is warranted or required. It can be considered to be a small scale environmental assessment designed to address environmental concerns for projects that do not meet the initial requirements for conducting a formal environmental assessment.

Both environmental self assessment and formal environmental assessment are performed for the same reasons. Environmental assessment and environmental self assessment give decision makers the tools they require to identify negative environmental consequences. Environmental self assessments also improve the proponent's overall planning process by identifying issues in the consultation phase that the proponent might not have been aware of. By incorporating these issues into the project at an early stage, the proponent will benefit by having a better planned project that will be less likely to be derailed by unforeseen issues.

2.3.1 Under what conditions are environmental self assessments performed?

Environmental self assessments are performed when formal environmental assessments are not required by government. Since this practicum is concerned with sub-transmission lines, this next section will focus on the circumstances that determine whether formal environmental assessments are required, and when environmental self assessment is an option.

2.3.1.1 Provincial Assessment Requirements

The Manitoba Environment Act requires that major projects, including many electrical transmission lines, undergo an environmental assessment before they can be licensed for development. Regulation 164/88 (Classes of Development) of the Environment Act outlines the types of projects that require assessment and licencing while Regulation 163/88 (Licencing Procedures) outlines the environmental assessment procedures required for licencing. According to the Act and regulations, developments fall into three classes. In increasing order of potential environmental effect, they are, classes 1, 2, and 3. For example, under these regulations, power transmission lines of 115 kV and over but not exceeding 230 kV are considered to be Class 2 developments. Transmission lines of greater than 230 kV are considered Class 3 developments. Projects not defined in these regulations only require assessment if significant environmental impacts are expected or if assessment is demanded by the public. In most of these cases, the assessment of developments not mentioned in the act or in the regulations is left to the proponent's discretion. As transmission lines of less than 115 kV capacity are not mentioned in the Classes of Development regulations, such developments usually do not require any formal environmental assessment under the act. As a result, sub-transmission lines are candidates for environmental self assessment.

2.3.1.2 Federal Assessment Requirements

Under CEAA, the following four conditions must be true if a development is to require

assessment.

1. The project must either be a physical work or be on the Inclusion List. The Inclusion List is a list prescribing physical activities and classes of physical activities not relating to physical works that may require an environmental assessment.
2. The development must not appear on the Exclusion List.
3. A Federal Authority must be present.
4. A trigger under Section 5 of the Act must be present.

Under certain circumstances, all of these conditions will be true and sub-transmission lines will require assessment.

Since a low voltage power transmission line falls under the definition of a project, i.e. "...any proposed construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work..." (Definitions, Canadian Environmental Assessment Act), the first of the four conditions is always met for low voltage power line development.

Some low voltage lines are excluded. All non-international electricity transmission lines of less than 130 kV are automatically excluded from the Act unless: i) the line is constructed on a new Right of Way (ROW); ii) the poles are placed below the high water line of a waterbody; or iii) a polluting substance might be released into a wetland that is covered by water for three consecutive months of the year (Exclusion list, Canadian Environmental Assessment Act). The whole line does not need to be on a new ROW, etc. for the line to not be on the Exclusion List. For example, if a line, or part of the line, is constructed on a new ROW, the line may be subject to screening.

The federal authority condition exists in all cases when the final condition, the Law List condition, exists. When a decision must be made under the Law List, a federal authority under the definitions in the Act (Definitions, Canadian Environmental Assessment Act), must exist to make that decision.

The final condition is a trigger under Section 5 of the Act (Section 5(1) (a-d), Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). Under CEAA, four triggers exist. The Act is triggered when: i) the Federal government is the proponent of the project; ii) the Federal government makes payments toward the project; iii) the project is constructed on Federal land; or iv) the government must grant some form of approval on the Law List (Section 5(1) (a-d), Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). Each of

these triggers will now be discussed in the context of sub-transmission lines in the study area.

The federal government is unlikely to be the proponent for the construction of sub-transmission lines. In the study area chosen, Manitoba Hydro is usually the proponent of the project. Thus the first trigger is unlikely to apply. The second trigger, financial contributions, is unlikely to apply in this case. Since only direct transfers of money, not including tax incentives, trigger the Act, the financial contribution trigger is unlikely. Manitoba Hydro generally constructs sub-transmission lines without financial assistance from the federal government. The third trigger, federal lands, is a likely trigger in many cases. However, in the study area chosen, there are no federal lands to which the Act refers.

The most likely trigger in the case of sub-transmission lines is that of a government decision on the Law List. Although the Law List contains many theoretical cases in which the Act might apply, there are three principal cases under which a line might be assessed. If an electrical transmission line crosses a railway, then a leave, or approval, under the Railway Act may be required. Leaves are not required in all cases. If a leave is required, then CEAA will apply. Should a line be constructed on, over, under, through, or across a navigable waterway, an approval must be secured under the Navigable Waters Protection Act. Finally if fish habitat will be harmfully altered, disrupted, or destroyed in the course of a work an authorization under the Fisheries Act must be granted (Annotated Law List, Policy and Regulatory Affairs, Canadian Environment Assessment Agency, 1995). The issuance of any one of the above approvals means that as a department of the federal government must issue an approval on the Law List before the construction can take place.

If an assessment is required, then the project must undergo screening. Although other types of assessments are possible under the Act, screening is the most likely form of assessment. If the sub-transmission line does not require a formal environmental screening, then the project may be a candidate for environmental self assessment.

2.3.2 Environmental Self Assessment Process Considerations

It is not an easy task to define an ideal environmental assessment process that is both cost effective and efficient, as well as complete and inclusive. Complete and inclusive assessments of complex projects may require months to years to complete. Less complex projects may not require the same degree of assessment. The process must be appropriate to the project: comprehensive enough that all of the necessary components of the environment are evaluated, while being both cost and time effective.

Before a sub-transmission line is constructed, a route selection and environmental self assessment process must be undertaken. The steps in this process include: i) an acknowledgement of the need for the project; ii) an examination of the environmental, socio-economic, and technical factors in the project area; iii) the planning of the route; iv) an acknowledgement of the concerns of the agencies; v) the contacting of the relevant agencies; vi) the collection of the information required to make decisions; vii) the evaluation of the concerns and information and the drafting of construction guidelines and recommendations, and; viii) the granting of the necessary approvals and suggested endorsements. Although all of these issues are generally addressed, they need not be covered in exactly this order. However, for the purpose of this study, the preceding order will be used.

Step 1

Firstly, a need for the new sub-transmission line must be demonstrated. A new line may be required to enhance system reliability, or to supply additional electrical power to satisfy an increased demand.

Step 2

Two, the general area over which the line will pass must be established. Within this area, environmental, socio-economic, and technical factors that may constrain or optimize sub-transmission line development must be identified. Additionally, should development opportunities exist, they should also be identified. In many cases, input should be sought from government and non-governmental organizations to aid in determining these parameters.

Step 3

Three, the exact route of the sub-transmission line must be identified. Where possible, constraints should be avoided and opportunities should be used.

Step 4

Four, the concerns of the various agencies whose jurisdictions may be affected by the sub-transmission line development should be acknowledged. The concerns of both governmental and non-governmental organizations should be considered whenever possible.

Step 5

Five, the development of a sub-transmission line may affect existing factors in the biophysical and socio-economic environment. Agencies responsible for these factors may have certain concerns about the development. Agencies, both governmental and non-governmental, whose jurisdictions will be impacted are contacted. For example, if wildlife may be affected by the line, then the Wildlife Branch may have concerns regarding the construction of the line, and must be contacted. Government department representatives in each department contacted should be asked whether the proposed project complies with the legislation that empowers that particular department. If the proposed development does not meet with the legislation, then the department should be asked how the proposed project could be brought into compliance. Government departments should also be asked how the proposed project could be designed with consideration for the environment. Non-governmental organizations should also be asked whether the proposed project will negatively affect their operations, and if so, how the proposed project could be designed to minimize these deleterious effects. Non-governmental organizations concerned with the environment will also be concerned with the proposed project's potential effects on the environment. It is important that individual landowners, whose property could be crossed or impacted by the proposed line be contacted.

Step 6

Six, information must be collected from the agencies contacted. The proponent generally provides the agencies with contact information and is prepared to receive the information.

Step 7

Seven, the information collected must be analyzed and used to develop construction plans and practises for the development. Ongoing consultation with the respective agencies will assist the proponent in developing plans that will fulfill the requirements of both the agency and the proponent. For example, if contact with the agencies responsible for fisheries (in Manitoba, the Federal Department of Fisheries and Oceans, and the Provincial Fisheries Branch of the Department of Natural Resources) determines that a certain stream to be crossed by the line contains fish habitat,

then a construction plan should be drawn up that will reduce or prevent possible damage. Such a plan could restrict vehicle traffic in the stream bed and suggest that the construction be timed to avoid certain critical periods when the fish are especially vulnerable.

Step 8

Finally, all necessary government approvals and suggested government and non-government endorsements are requested. With early notification and ongoing consultation, potential concerns should be successfully resolved. Approvals should then be issued without problems. Notification and consultation will also assist in obtaining the endorsement of other agencies that may not have direct permitting authority but should still be contacted.

This particular study has concentrated on steps four and five of the process. The agencies' concerns are usually with the potential effects of the development and will generally assist the proponent in reducing any possible negative effects. The specific concerns of each agency contacted will be explored in greater detail in Chapter Four of this report.

In the Manitoba jurisdiction, at minimum, the following government departments and organizations should be consulted: the Environment Department, the Historic Resources Branch, and the Policy Co-ordination Branch of the Department of Natural Resources. In some cases, other departments will be involved, including: the Department of Energy and Mines, Department of Highways, Rural Development, and other branches of the Department of Natural Resources including, Fisheries, Forestry, Lands, Parks, Water Resources, and Wildlife branches. Regional branches of the above departments may also be involved in some cases. Depending on the location of the proposed project, one or more of the following federal government departments should be contacted: the Canadian Environmental Assessment Agency (CEAA) of Environment Canada, the Department of Fisheries and Oceans (DFO), Indian and Northern Affairs Canada (INAC), the Canadian Parks Service, and Transport Canada.

In Ontario, most electricity transmission lines of less than 115 kV require no formal environmental assessment (Class Environmental Assessment for Transmission Facilities (Preliminary), Environmental Services and Approvals, Ontario Hydro, 1996). However, as in Manitoba, a self assessment process is conducted (Bradley, B., Ontario Hydro Transmission Projects Division, Personal Communication, 1996.) The same federal, municipal, and First Nations departments and organizations are generally contacted as were contacted in Manitoba. The following

provincial departments are consulted in all cases: Citizenship, Culture and Recreation, Economic Development, Trade and Tourism, Environment and Energy, Municipal Affairs and Housing, Natural Resources, Northern Development and Mines, and Transportation (Class Environmental Assessment for Transmission Facilities (Preliminary), Environmental Services and Approvals, Ontario Hydro, 1996). In certain cases, other departments may be contacted. These include: Agriculture, Food and Rural Affairs, the Niagara Escarpment Commission, and the Ontario Native Affairs Secretariat (Class Environmental Assessment for Transmission Facilities (Preliminary), Environmental Services and Approvals, Ontario Hydro, 1996).

In Saskatchewan, according to S. Saylor (Supervisor, Environmental Studies, SaskPower, Personal Communication, 1996) electricity transmission lines of 72 kV or less, referred to as distribution lines, do not usually require formal assessment. In most cases, that do not involve crossing sensitive or valued terrain, an internal SaskPower screening that ensures legislative compliance and environmental consideration will suffice. This screening, similar to a self assessment process involves contacting the same federal, municipal departments as in Manitoba and Ontario. Appropriate non-governmental organizations are contacted. A number of provincial government departments are also contacted. These include: Community Planning and Development Services, in Southern Saskatchewan, or Northern Development Services, in Northern Saskatchewan; Environment and Resource Management, Assessment, Fisheries, Forestry, and Wildlife Branches; Heritage Branch - Archeological Resource Management; Indian and Metis Affairs Secretariat; Lands and Regulatory Management Branch - Saskatchewan Agriculture and Food; Regional Public Health Officers - Saskatchewan Health; and Saskatchewan Highways and Transport (Saylor, S., Supervisor, Environmental Studies, SaskPower, Personal Communication, 1996). Consultation with these departments should help to ensure a smoother approvals process.

Chapter Three - Expert Systems

3.1 What are Expert Systems?

Durkin (1994) defines an expert system as “a computer program designed to model the problem-solving ability of a human expert. An alternative definition describes expert systems as “...interactive computer programs incorporating judgement, experience, rules of thumb, intuition, and other expertise to provide knowledgeable advice about a variety of tasks” (Simonovic and Barlishen, 1987). Expert systems attempt to model an expert’s knowledge and reasoning on the subject in question.

3.2 What can Expert Systems do?

As functional expert systems simulate the problem solving ability of an expert, the expert system makes much of the expert's knowledge portable. The system could be used to supplement an expert, and to act as an assistant. This is the most commonly used application of expert systems (Durkin, 1994). Many of these types of systems are designed to assist an expert in performing a routine function and to enhance the expert’s productivity. Some expert systems have been designed to replace an expert (Durkin, 1994). Although these types of system exist, most expert systems assist the professional rather than replacing them.

Expert systems do not work with all types of problems. They are most useful when applied to well defined problems with available solutions (Bramer, 1992). When the problem is poorly defined or novel, the expert system approach will not work. Expert systems work especially well with procedural and heuristic knowledge. Rules and procedures are examples of how procedural knowledge can be incorporated into an expert system. Heuristics are rules-of-thumb that are usually derived from experience, and they can be incorporated into an expert system.

3.3 How do Expert Systems work?

This section is designed to give the reader a brief introduction to the components of an expert system and how expert systems process information. The section will not delve into the subject in detail, but will provide a general overview of the components and functioning of expert

systems.

3.3.1 The Knowledge Base

The expert system must model the expert's knowledge of the subject. The expert's understanding of a well focused subject area is termed domain knowledge (Durkin, 1994). The domain knowledge is contained in a part of the expert system known as the knowledge base. To encapsulate the information in the knowledge base, the information must be phrased in a format that the computer will be able to process. This process, known as knowledge representation, has also been defined as the method used to encode knowledge in an expert system's knowledge base (Durkin, 1994). The person responsible for representing this knowledge and developing much of the system is termed the knowledge engineer.

However, before knowledge representation may begin, the knowledge engineer must consider the type of information that is to be processed. Different types of knowledge may require different methods of knowledge representation. Durkin (1994) discusses five main types of knowledge: procedural, declarative, meta-knowledge, heuristic, and structural. Procedural knowledge is knowledge about how something is done. Declarative knowledge describes what is known about the subject and can be expressed in simple true-false statements or in a list of statements about the subject. Meta-knowledge is knowledge about knowledge. It is often used to find the best way to solve or simplify the problem. Heuristic knowledge is the term given to the knowledge derived from experience with the subject. It is often a collection of rules-of-thumb that will yield a quick and workable solution most of the time. Finally, structural knowledge describes the expert's mental structure of the problem. It is often composed of rule sets, and concept to object relationships.

One common method of representing knowledge is by using rules. Such a system is called a rule-based expert system. Rule-based systems are well suited to dealing with procedural knowledge and with the rules-of-thumb of heuristic knowledge (Durkin, 1994). A rule is defined as a knowledge structure that relates some known information to other information that can be concluded or inferred to be known (Durkin, 1994). Rules are generally phrased in IF-THEN statements. IF one statement, the premise, is true, THEN the other, the conclusion, will also be true (Kandal, 1992). Boolean operators such as AND, OR and NOT can also be used to better express knowledge. An example of the use of the Boolean operator AND is a situation where both 'condition X' AND 'condition Y'

must be true before the 'conclusion Z' is true. An example of a rule that uses these operators and that determines whether one is late for work is as follows:

IF	The time is after 9 AM.
AND	Today is a weekday.
AND	I am at home.
OR	My boss called and said that I am late for work.
THEN	I am late for work.

In this simple example, the expert's knowledge about being late for work is captured in four premises. If the individual is at home, on a weekday, after 9 AM then the person is late for work. Alternatively, if the person's boss calls and that says the individual is late, then he or she is late for work. Rule-based systems are a simple yet effective method of representing knowledge in a knowledge base.

Rule-based systems are not the only method by which knowledge can be stored in a knowledge base. Other methods include object-attribute-value triplets, semantic networks, and frames (Durkin, 1994). Although each have their advantages, a rule-based system will be used in this project because such a system is well suited to dealing with procedural or "how-to-do-it" knowledge of this project.

3.3.2 The Inference Engine

A second important component of an expert system is the inference engine. Inference is the process used in an expert system of deriving new information from known information (Durkin, 1994). The inference engine is the processor in an expert system that matches the facts contained in the working memory with the domain knowledge contained in the knowledge base, to draw conclusions about the problem.

There are two basic types of inference engines, forward chaining and backward chaining. Forward chaining inference engines use an inference strategy that begins with a set of known facts, derives new facts using rules whose premises watch the known facts, and continues this process until a goal state is reached or until no further rules have premises that match the known or derived facts (Durkin, 1994). Forward chaining systems begin with data and apply the knowledge base to the data in support of conclusions (Kandal, 1992). Backward chaining engines begin with conclusions and apply the knowledge to the conclusions to discover whether the conclusions fit the data. If the first conclusion is incorrect, other conclusions will be examined until one is found that fits the data

(Bramer, 1984).

3.3.3 The Working Memory

The third part of a basic expert system is the working memory. It is the part of the system that contains the problem facts that are discovered during the session (Durkin, 1994). During the consultation with the expert system, the user will supply the system with information about the problem. This information will be stored in the working memory. As the session proceeds, intermediate and then final conclusions will also be stored in the working memory.

3.3.4 How the Information is Processed

Briefly speaking, an expert system works by comparing the facts in the working memory, usually supplied by the system user, with the knowledge contained in the knowledge base. This process is controlled by the inference engine. The inference searches the rules in the knowledge base (assuming a rule-based system) for a match between the rule premises and the information in working memory. When a match is found, the inference engine adds the conclusion to the facts in working memory. In this way, conclusions are drawn based on the user's input and the information supplied by the expert in the knowledge base.

3.4 Expert System Shells

Expert system shells are expert systems without any knowledge in them. They contain inference engines, working memory, and an empty knowledge base (Keen and Williams, 1984). Shells have been designed to aid in the programming of expert systems. Instead of designing an entire system, using a shell, the programmer need only fill the knowledge base. This greatly speeds the process. Different shells represent knowledge differently: for example, some shells work with rules, others with frames, and some can work with two or more methods of representing knowledge. Inference engines can also vary, for example, some are forward chaining, others are backward chaining. Prices and other shell features also vary. With the variety of shells available, most system development projects can be hastened with the use of expert system shells.

3.5 Where are Expert Systems Used?

Expert systems are used in a wide variety of applications. In 1986, the majority of expert

system applications were in the field of medicine. By 1992, sixty percent of the applications were in business and industrial fields (Durkin, 1994). According to Durkin (1994), expert systems are now used in agricultural, business, computer, electronics, engineering, environmental, manufacturing, medical, military, power systems, space technology, and transportation applications. Warwick, Mumford and Norton (1993) have examined the use of expert systems in environmental applications. They have found seven basic categories of tasks that expert systems have been used to perform. Ten expert systems have been identified that can be used to assist in environmental applications. Geraghty (1993) concentrated specifically on environmental assessment expert systems. The author found four such systems. One of the systems was developed in Canada to assist to performing EARP screenings. Three other environmental assessment expert systems were also identified.

3.5.1 Types of Expert Systems for different Environmental Applications

As stated above, expert systems have been developed to work with different types of problems. Warwick *et al.* (1993) have identified seven problem types for which environmental management expert systems have been developed. Warwick *et al.* (1993) state that different environmental problem types require different solutions. They divide problems into seven broad categories: interpretation; prescription, diagnosis, and repair; prediction; design and configuration; planning; monitoring and control; and instruction.

Warwick's *et al.* (1993) first category is interpretation expert systems. These systems infer the current state or condition of the area in question. Identification is one common type of interpretation system. Warwick *et al.* (1993) have identified five examples of interpretation systems. These are: Pest identification in lucerne (Bishop, 1989), Weed seedling identification (Ballegaard and Haas, 1990), Compatible seed transfer locations (Monserud, 1990), River state based on water quality measures (Wishart *et al.* 1990), and Alfalfa cultivar selection (Bolte *et al.* 1991).

The second category identified by Warwick *et al.* (1993) are prescription, diagnosis, and repair expert systems. This type of program identifies a flaw or missing element in a system and provides information on how to rectify the situation and return or maintain the system in the desired state. Numerous examples of diagnosis type systems have been developed including the following four systems identified by Warwick *et al.* (1993): Speciality crop management (Durkin *et al.*, 1990), Tropical grain-store pest control (Compton *et al.* 1992), Various forest expert systems including whole industry or species management (Rauscher *et al.* 1990), and Silviculture prescription base on

forest stand characteristics (Buech *et al.* 1990).

Prediction is a third type of system identified by Warwick *et al.* (1993). Prediction type systems infer the consequences of certain situations or scenarios. Examples of this type of system include the testing of alternative scenarios, or the forecasting of the consequences of decisions. Specific examples of prediction expert systems with environmental applications include: Brown planthopper control (Holt *et al.* 1990), Mountain pine beetle expert system (Downing and Bartos, 1991), and Simulation of soil hydrologic process (Whittaker *et al.* 1991).

The fourth type of system Warwick *et al.* (1993) identified are design and configuration expert systems. Design type systems must select a suitable group of combinations from a given set of alternatives to achieve a desired goal. Because of design tends to be an unstructured task with few fixed rules, design type system tend to constructed for small defined problem types (Warwick *et al.* 1993). Examples of this type of system include: Herbicide selection for weed control in sugar beet. (Edwards-Jones *et al.* 1992) and the Design of crop management plans (Rellier and Chedru, 1992).

The fifth category identified by Warwick *et al.* (1993) are planning systems. These systems plan an entire course of action, a course of action based on the knowledge base and the user's criteria before beginning. Sample planning systems include: Planning and design of agroforestry systems (Warkentin *et al.* 1990), Resource systems planning for grazing (Stuth *et al.* 1990), Strategic planning in farming (Schmidt-Paulsen, 1990), and Wheat crop management planning (Rellier and Chedru, 1992).

Monitoring and control type expert systems have also been devised in the environmental management field (Warwick *et al.* 1993). These systems interpret incoming information and recommend or take appropriate action, often in real-time. Although this is a popular field for industrial expert systems, it has not been as well developed for environmental applications. Two examples of this type of system include: Flood-water control in Florida (Goforth, 1987), and an Integrated irrigation system (Heinemann *et al.* 1989).

The final type of environmental expert system identified by Warwick *et al.* (1993) is the instruction type expert system. Since expert systems deal with knowledge it is reasonable to expect that they may be useful for teaching and communicating that knowledge. Two examples of teaching expert systems for environmental applications are: Training for speciality-crop growing, (Durkin *et al.* 1990) and Training in forest-fire loss prevention (Schmoldt and Bradshaw, 1991).

3.5.2 General Environmental Expert System Applications

Other systems have been identified in the literature that use expert system techniques to assist in dealing with environmental concerns. Some of these tools do not fit neatly into one of the above categories, but rather perform two or more functions. Nevertheless the above categories are of value in classifying these systems.

3.5.2.1 Interpretation Environmental Expert Systems

Kartikeyan *et al.* (1995) have developed an interpretation type expert system for remote sensing image analysis for land cover classification. This system incorporates a model for spectral knowledge representation and a method for knowledge representation. The authors claim that the system avoids commission errors and has an accuracy with spectral knowledge alone that is comparable to standard digital methods.

Lein (1993) developed an interpretation expert system to determine carrying capacity for humans in eastern Kenya. The system acknowledges the role of uncertainty and inexactness in population and in resources limitation information. The system uses a large number of variables in the determination of limits including: degree of soil erosion, the degree of use of marginal land, the amount of landlessness, and the amount of migration. The system is a rule-based one and is written in Turbo Pascal.

Crowe and Mutch (1990) have developed an interpretation system to assess the potential for pesticides to contaminate groundwater. This system, known as EXPRES (EXpert system for Pesticide Regulatory Evaluation Simulations), combines a simulation system with a knowledge based system that aids the user in supplying the system with information. This system was also developed at the National Water Research Institute in Burlington, Ontario.

Rao and Raj (1990) developed an interpretation system that can identify the chemical or class of chemical discharged in a hazardous material release with limited information. It contains information on the physical and chemical characteristics of various chemicals and scenarios based on different levels of release and different environmental conditions. The system will then run hazard prediction models and estimate the level of risk. The system was developed at the Technological Management Systems Inc. in Burlington, MA.

Reinhardt *et al.* (1989) developed an expert system to assist in the design of prescribed or controlled fires in forest ecosystems. Prescribed fires are used to fulfill certain forest management

objectives. This rule and frame based system incorporates technical and heuristic information, and interprets the information to assist in its application. The system was developed at the Intermountain Research Station, U.S. Forest Service, Missoula, Montana.

An interpretation expert system was developed by the National Water Research Institute in Burlington, Ontario to assist with acid rain analysis (Fraser *et al.* 1987). The system examines a variety of databases for information on: watershed aquatic chemistry, lakes sensitivity to acidity, the volume of water discharge from subregions, and acid deposition. The system assesses the current state of a watershed with respect to acid rain sensitivity.

3.5.2.2 Other Environmental Expert Systems

Orhun and Demirors (1991) developed an interpretation and diagnosis/repair type system to assist in determining the best response to marine oil spills. Since oil spills are both damaging to the environment and expensive to clean-up and remediate, an appropriate response is important to minimize both damage and cost. The system was written with the shell PC-PLUS at Ege University, Izmir, Turkey.

DELAQUA, Deep Expert system Lake QUALity, is an interpretation, prescription, prediction, and control type system. This system, developed by Recknagel *et al.* (1991), was developed as a decision support tool for controlling water quality in lakes and reservoirs. The system classifies water samples according to legal standards, gives recommendations concerning algal bloom and pathogen control, and predicts water quality under changing control strategies. The system was designed for use on an IBM-PC, and contains a knowledge base written in PROLOG 2, the database written in dBASE III+, and a simulation program written in FORTRAN 77.

Stewart (1991) developed a monitoring and control type environmental expert system. The system was designed to control the environment in a biosphere. The system monitored the control of the temperature, humidity, and air velocity in a closed system ecology where water, air, and food are recycled. The system was developed using G2.

Kourtz (1989) developed a planning and monitoring/control type system to assist in the dispatching of resources to control forest fires. This expert system evaluates the conditions and recommends the desired water bomber force as well as the number of crews needed to fight the fire. Different water bomber characteristics and locations are used by the system to determine the best response. The system also dispatches a helicopter force sufficient to carry the crews. The system

was developed at the Petawawa National Forestry Institute of the Canadian Forestry Service.

3.5.3 Environmental Assessment Expert Systems

Geraghty (1993) found four environmental assessment expert systems, at least two of which are in active use. Three other systems were also found that use expert system technologies to assist in performing environmental assessments. All of these programs could be considered to be interpretation, prediction, and prescription type systems.

SCREENER was developed by the company Environmental and Social Systems Analysts Ltd., in Vancouver B.C. (Geraghty, 1993). The program screens potential projects based on the Canadian federal Environmental Assessment and Review Process (EARP) and determines what actions, if any, will be required under EARP. The system determines whether the project will require an EARP screening, and then based on input from the user, identifies any adverse effects that the project may have. SCREENER is also able to assess the possibility of mitigating these negative effects. Based on the project's predicted effects, certain mitigation procedures will be suggested. The program has been designed to be user friendly, especially for those users who do not have computer experience. SCREENER has been used by Environment Canada, Parks Canada, Transport Canada, the Great Lakes Fishery Commission, and the U.S. Environmental Protection Agency. The program is one of the few environmental assessment expert systems in general use.

ASSESSMAN was developed by the Japanese Environmental Assessment Centre, in Nagoya, Japan (Geraghty, 1993). It was developed using the expert system shell ADMAKER. The system is based on the Japanese prefectural government environmental assessment procedures. The program is composed of modules, each module dealing with a different environmental factor. For example, the module *kiken* deals with air pollution problems, the module *suiken* supplies information about water quality problems, while *seibutu* is concerned with flora and fauna. The program and these modules can be used in two ways. ASSESSMAN can be used in "project mode" and "environment mode". In project mode, the system will prompt the user for information about the project, determine which components of the environment could be affected, and then consult the specific modules that may be relevant. In environmental mode, the user determines which modules should be consulted. ASSESSMAN has been used by several Japanese regional governmental and by at least forty private companies. It is, like SCREENER, an environmental assessment expert system in general use.

IMPACT was developed by the U.S. Department of Energy (Geraghty, 1993). It was written in Turbo Pascal based on a "simplified geographical information system approach" (Geraghty, 1993). The program was designed to screen projects and ensure compliance with the U.S. National Environmental Policy Act. IMPACT represents areas of concern, such as archeological sites, wetlands, and waste disposal sites, as circles on a map. Any activities occurring in these circles or zones of influence will cause the system to issue a warning. The warning will contain information specific to the activity/area of concern interaction. The system has been used in field tests and was found to be effective.

ORBI was developed by the *Universidade Nove de Lisboa* for the Portuguese Department of the Environment. It was written in Prolog. ORBI assesses the suitability of a particular region for industrial, agricultural, or recreational use based on the geology, hydrology, biological resources, and microclimates. Based on the region's environmental attributes and the system's inferencing rules, the desirability of the particular development can be assessed.

A prediction and planning expert system for environmental assessment was developed by Mercer (1995). This program is a general purpose prototype tool for performing environmental impact assessments at an early stage. Environmentally damaging options can be weeded out early as negative impacts can be identified before work is started or irrevocable decisions are made. The program uses a set of rule bases each specializing in a specific field and then weighted according to importance. The system was developed with the assistance of the expert system shell SYNAPSE.

Autunes and Camara (1992) have developed a general purpose integrated method for performing environmental assessments. In this program, known as HyperAIA, effects are quantified and the significance of the effects considered in the weighting of the effects. Different effects are then combined and a total aggregate value derived for each development alternative. The program was written for the Apple Macintosh using Hypercard. The system was successfully tested during the environmental impact assessment of the Alqueva Dam on the Guadiana River in Southern Portugal.

Fedra *et al.* (1991) developed MEXSES, a prediction and planning tool to assist in the environmental screening of water resources development projects in the lower Mekong river basin in South-East Asia. Environmental checklists and Geographic Information Systems (GIS) are used to identify concerns, alternatives, and opportunities for mitigation. It provides a framework and tool for

the compilation and organization of environmental data. MEXSES allows easy access to environmental considerations in the early stages of planning. In this manner, environmental concerns are considered at the same time as are technical and economic considerations.

3.6 Environmental self assessment expert systems

In many cases, formal assessment is not required for the construction of sub-transmission (66 kV) lines. However, Manitoba Hydro practice has been to integrate biophysical and socio-economic considerations in the planning process in order to determine whether a formal environmental assessment is required and to provide opportunities to minimize or mitigate negative environmental effects. As a result, Manitoba Hydro has conducted environmental self assessments of low voltage developments in an internal review process. The environmental self assessment concept, especially in the form of an expert system, may also be an appropriate method of assessing and dealing with the impacts of comparatively small scale projects with predictable impacts. Currently self assessments are performed by Licensing & Environmental Assessment, Design Division, T&D staff and staff from the appropriate regions. An expert system approach would provide a more standardized self assessment procedure, an approach that would be consistent throughout Manitoba Hydro. Although high impact or contentious projects would still require the attention of experts, the expert system would identify projects with low impacts and would assist non-experts in performing these assessments. The environmental assessment expert system would assist non-experts in assessing small projects, while allowing the experts to concentrate on larger projects where the environmental effects are less well understood and where the expert's attention would be better directed.

3.7 Section Conclusion

It appears from the literature that expert systems are a viable method of handling information and a useful decision making tool. Evidence exists in the literature suggesting that environmental assessment and expert systems are compatible. It also appears that expert systems are compatible with the environmental self assessments process. The project proposes to fill a gap in the literature by integrating expert systems with phases of the environmental self assessment process for sub-transmission lines (66kV).

Chapter Four-Information Collected for the Prototype System

4.1 Prototype Scope

The prototype was designed to assist a user in performing steps four and five of the environmental self assessment process in described in section 2.3.2. Steps four and five are the acknowledgment of the concerns of external agencies and the contacting of these agencies. The prototype will provide information to the user that will be of assistance while conducting these parts of an environmental self assessment. Although the prototype will provide overview construction practices information, it will not interpret site specific information, and it will not develop specific environmental practices plans.

The prototype was named PREASES version 1.0. PREASES is short for PRototype Environmental self ASsessment Expert System.

PREASES was designed to be used in the Rural Municipality of Whitemouth. As a result, the system only covers information relevant in the Municipality. For example, since natural gas pipelines and cable television systems are not present in the Municipality, they are not covered by the system. However, with minor modifications, PREASES could be used in other areas.

The remainder of this chapter contains the information required to perform the above tasks. Section 4.2 displays the questions that the user may be asked. Based on the user's responses, the rules in section 4.3 direct the system to display the required information. This information is presented in section 4.4 in a modular format. The prototype only shows the information modules that the user has requested, however, in this report, all of the information is presented.

4.2 Questions

Those conducting the planning process for a sub-transmission line generally solicit input from Federal, Provincial, and Municipal authorities, as well as other interest groups or individuals who may have a specific interest in the project. In some cases, government endorsements, permits, or approvals may be required. Based on the responses from public and private representatives, the system will identify the approvals that will be required, and then lead the user through each approval or endorsement process. The system will provide contact information and will identify issues that concern the external agency in question.

PREASES will prompt the user for responses to a series of the following questions. Each

question will be answered Yes or No, and the answer will be stored under the variable name that follows the question. For example, the Yes or No answer to the first question, will any forested Crown land, merchantable or non-merchantable, need to be cleared, will be stored under the variable name, Clear Forest. Although all of the questions may be asked, in many cases, not all of the questions will be necessary, and consequently will not be asked. For example, if the user answers "No" to the question that asks whether forested Crown land will be cleared, the system will not ask any further questions regarding forestry. The questions are as follows:

1. Will any forested Crown land, merchantable or non-merchantable, be cleared?: Clear Forest
2. Will any merchantable timber on Crown land be cleared?: Merchantable
3. Will any streams be crossed?: Stream Crossing
4. Will any navigable waters be crossed?: Navigable Water
5. Will fish habitat be destroyed?: Destroy Fish
6. Will any provincial parks be crossed?: Parks
7. Will any Crown lands administered by the provincial Lands branch be crossed?: Lands
8. Will drainage ditches administered by Water Resources be affected?: Water Res
9. Will any areas that are significant to wildlife, flora or fauna, be crossed or otherwise affected?: Wild
10. Will a Historic Resources Assessment be required?: Historic
11. Will any Indian reservations be crossed?: Indian
12. Will MTS facilities be affected by the sub-transmission or distribution line?: MTS
13. Will current or potential highway's road allowances be affected by the line?: Highways
14. Will the line cross agricultural land at a point other than on a road allowance or on a quarter section line?: Rural Dev
15. Will a developed or high capability undeveloped gravel lease be crossed by the line?: Mines
16. Will the line be constructed along any developed or undeveloped road allowances?: Municipal
17. Will the line be constructed along a 66 foot (20.1 metre) developed or undeveloped road allowance?: 66 ROW
18. Will a new ROW be needed?: New ROW
19. Will pentachlorophenol treated poles be placed in a wetland?: Penta
20. Will poles be placed below the high water line of any watercourse?: High Water
21. Will a leave be required to approach a railway?: Railway

4.3 Rules

Using the answers to the questions above and based the following rules, PREASES will inform the user of the approvals and endorsements that may be required. The system will also display information that will assist the user in obtaining the approvals and endorsements. The rules displayed below are based on the actual rules in the knowledge base formatted for VP Expert. Each rule consists of a title, a premise, and a conclusion. The title can be any short series of characters.

but in the following rules it is generally a description of the rule's function. The premise or IF clause states the conditions that must be true for the rule to be true. The premise can be a single clause premise, like the premise in the first rule, No Clearing, where only one condition is examined. The premise could also be a multiple premise, like rule three, Merchantable, where two, and in some cases, more conditions are examined. In these cases the conditions or clause are linked by the logical operators, AND and OR. If the clauses are linked by an AND operator, then both clauses must be true in order for the rule to fire. If the clauses are linked by an OR operator then only one of the clauses must be true in order for the rule to fire. The conclusion is composed of similar clauses. If the rule fires, that is, the conditions in the premise are true, the clause or clauses in the conclusion will also fire.

System Rules

1. Rule No Clearing
IF Clear Forest = No
THEN Procedures = Forest 1
2. Rule Yes Clearing
IF Clear Forest = Yes
THEN New ROW = Yes
Procedures = Forest 2
3. Rule Merchantable
IF Clear Forest = Yes AND
Merchantable = Yes
THEN New ROW = Yes
Procedures = Forest 3
4. Rule Fish
IF Stream Crossing = Yes
THEN Procedures = Fisheries 2
ELSE Procedures = Fisheries 1
5. Rule Navigable
IF Navigable Water = Yes
THEN Procedures = Navigable 2
ELSE Procedures = Navigable 1
6. Rule Parks
IF Parks = Yes
THEN Procedures = Parks 2
ELSE Procedures = Parks 1
7. Rule Lands
IF Lands = Yes
THEN Procedures = Lands 2
ELSE Procedures = Lands 1
8. Rule Water Res
IF Water Res = Yes
THEN Procedures = Water Res 2
ELSE Procedures = Water Res 1
9. Rule Wildlife
IF Wild = Yes
THEN Procedures = Wild 2
- ELSE Procedures = Wild 1
10. Rule Historic Resources
IF Historic = Yes
THEN Procedures = Historic 2
ELSE Procedures = Historic 1
11. Rule Municipal Road Allowances No
IF Municipal = No
THEN Procedures = Municipal 1
12. Rule Municipal Road Allowances
Yes, 66 No
IF Municipal = Yes AND
66 ROW = No
THEN Procedures = Municipal 2
13. Rule Municipal Road Allowances
Yes, 66 Yes
IF Municipal = Yes AND
66 ROW = Yes
THEN Procedures = Municipal 3
14. Rule Prov Environment
IF New ROW = Yes AND
Stream Crossing = Yes OR
Wild = Yes
THEN Procedures = Prov Env 2
15. Rule Prov Environ Extra
IF Parks = Yes
THEN Procedures = Prov Env 2
16. Rule Inelegant
IF Procedures = Prov Env 2
THEN Procedures = Nothing
ELSE Procedures = Prov Env 1
17. Rule Federal
IF New ROW = Yes OR
Penta = Yes OR
High Water = Yes AND
Railway = Yes OR

- | | | | |
|-----|--|-----|--|
| | Navigable Water = Yes OR
Destroy Fish = Yes
THEN Procedures = Federal 2
ELSE Procedures = Federal 1 | 20. | Rule Highways
IF Highways = Yes
THEN Procedures = Highways 2
ELSE Procedures = Highways 1 |
| 18. | Rule Indian Affairs
IF Indian = Yes
THEN Procedures = Indian 2
ELSE Procedures = Indian 1 | 21. | Rule Rural Development
IF Rural Dev = Yes
THEN Procedures = Rural Dev 2
ELSE Procedures = Rural Dev 1 |
| 19. | Rule MTS
IF MTS = Yes
THEN Procedures = MTS 2
ELSE Procedures = MTS 1 | 22. | Rule Mines
IF Mines = Yes
THEN Procedures = Mines 2
ELSE Procedures = Mines 1 |

4.4 System Information

This section contains the information modules that will assist the user with the agency contact and agency concerns phases of the environmental self assessment. The user's responses and the preceding rules are used to determine which of the following sections will be displayed for each specific case.

The following sub-sections outline this information. Each agency is listed separately, and sub-sections provide: contact information; agency approval or endorsement procedures; the information that the agency will require; common concerns that the agency may have; suggestions by which these concerns may be addressed; and in some cases, Manitoba Hydro or Department of Fisheries and Oceans (DFO) recommended construction practices. The user will also be supplied with some general information about the importance of these issues.

4.4.1 Policy Coordination Branch Module

4.4.1.1 General Description

The Policy Coordination Branch of the Department of Natural Resources is responsible for distributing proposed project information from the proponent to the various branches of the Department. The Policy Coordination Branch also may provide the proponent with a consolidated departmental response.

4.4.1.2 Endorsement Procedure

Contact the Policy Coordination Branch of the Department of Natural Resources¹ and supply them with ten (10) copies of a project description (Baker, G., Director, Policy Coordination Branch, Personal Communication, 1995). This description should include:

- The proposed location of the line.
- A brief description of the need for the new line.
- A brief description of the type of line, e.g. single pole with a cross arm to support insulators and conductors.
- A description of the study area, complete with maps.
- If any of the line is to be constructed within road allowances, this fact should be noted.
- A brief description of how Manitoba Hydro plans to acquire the right to develop Crown Land, e.g. by easement, Crown Land reservation, etc.
- A brief description of how Manitoba Hydro plans to acquire the right to develop private land, e.g. by easement, etc.
- The name and contact information of the Manitoba Hydro contact person.

This project description will then be circulated to each branch of the Department as well as to the regional offices for review and comment. A consolidated response from the Department will then be forwarded to the Manitoba Hydro contact person by the Policy Coordination Branch.

4.4.1.3 Agency Concerns

A number of concerns may be raised by the Department of Natural Resources including fisheries, forestry, wildlife issues. The Policy Co-ordination Branch may provide the proponent with a list of concerns and individuals to consult with to address these concerns. Common concerns from each branch will be dealt with under the specific section dealing with that branch.

4.4.2 Fisheries Module

4.4.2.1 General Description

The Fisheries Branch of the Department of Natural Resources and the federal Department of Fisheries and Oceans are interested in maintaining the health of fish and of aquatic ecosystems. Sub-

¹ Address: PO Box 38, 200 Saulteaux, Winnipeg, MB, R3J 3V3. Phone (204) 945-6658. Contact Person: Director, Policy Coordination Branch.

transmission line construction and operation may be of some concern to those charged with their protection. Although proper construction practices should prevent damage, construction could disturb the shoreline and lead to erosion without such practices (Berger, 1995). This erosion could increase the amount of sediment in the water which could damage larval fish populations, and ultimately reduce the stocks of certain types of fish.

4.4.2.2 Endorsement Procedures

4.4.2.2a Endorsement Procedures - No Endorsement

With no stream crossings, fisheries are not of concern, and no endorsement is necessary.

4.4.2.2b Endorsement Procedures - Endorsement Required

If a stream crossing is necessary, fish habitat may be affected. If concerns are raised, the Policy Coordination Branch should supply Manitoba Hydro with the pertinent information. General information can be obtained through the Manitoba Department of Natural Resources, Fisheries Branch². Fisheries Branch may request that certain mitigative steps be taken. Manitoba Hydro construction practices should suffice. Inquire as to the presence and types of fish present in the watercourse. This information will be required to obtain input from DFO. If fish are present, determine whether any critical habitat or critical seasons, including spawning habitat of these fish, will be affected.

Information regarding species, habitat, and critical season information should be passed on to DFO³. DFO is concerned with the preservation of fish habitat. They will then determine whether an authorization will be required to alter fish habitat. To prevent having to obtain a licence to alter fish habitat (and to prevent altering or destroying habitat), construction practices that do not affect habitat should be followed. Manitoba Hydro's construction codes are designed to meet these standards. DFO has also issued non-binding guidelines that should be followed whenever possible.

² Fisheries Branch 200 Saulteaux Cr., Winnipeg, R3J 3W3, Phone (204) 945-8105.

³ Address: Fisheries and Habitat Management, Freshwater Institute, 501 University Crescent, Winnipeg, MB, R3T 2N6. Contact Person: Fish Habitat Management Co-ordinator, Phone (204) 983-5220, Fax: (204) 984-2402.

4.4.2.3 Agency Concerns

Unless proper construction practices are followed, the construction and operation of sub-transmission lines can have negative effects on aquatic habitat and fish. Shoreline erosion which may be caused by improper drainage, direct disruption of the banks, or vehicle traffic in the streambed can lead to an increased amount of sediment in the watercourse. Sediment in the water can coat fish eggs and restrict the flow of oxygen to the eggs. This can reduce spawning success and fish numbers. The sediment laden water can also affect adult fish. Fish that hunt by sight, such as trout, cannot hunt as well in murky water, and may suffer losses as a result. Proper construction practices that protect the shoreline and streambed from disruption, and control runoff into the watercourse, should prevent most of these negative effects.

Chemical contamination of the watercourses is another potential concern. Petroleum products and other chemical compounds can kill fish and other aquatic organisms. As a result, potentially damaging chemicals should be kept out of the watercourse. By keeping petroleum product storage containers away from the watercourse, and restricting the fueling of construction equipment near the stream, many of these problems can be avoided. DFO has also expressed concern about placing pentachlorophenol (penta) treated wooden poles below the high water line of the watercourse. Manitoba Hydro's practice is to use chromated copper arsenate (CCA) treated poles in and immediately adjacent to wetland and waterbody crossings.

4.4.2.4 Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning fisheries. These guidelines include recommendations concerning: borrow pits, access roads, marshaling yards, erosion and sedimentation control, drainage protection, wetlands management, and timber clearing adjacent to watercourses. DFO has published additional guidelines, reproduced in Appendix B. These address: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, and general transmission line construction guidelines.

4.4.3 Forestry Module

4.4.3.1 General Description

The Forestry Branch oversees the use of forested Crown land in the Province of Manitoba.

The Forestry Branch will receive a copy of the proposed project description from the Policy Coordination Branch. If the planned route will require the harvesting of timber, the Forestry Branch will require that permits be obtained. These permits will specify the ROW clearing and line construction practices that should be undertaken. When planning the line, input should be sought from the Branch. The Branch would generally prefer that high quality timber stands or high capability areas, especially merchantable ones, be avoided whenever possible.

4.4.3.2 Permitting Procedures

4.4.3.2a No Permit Required

As no forested Crown land will be cleared, Forestry Branch should have no concerns with the line and no permits should be required.

4.4.3.2b Permits Required for Non-merchantable Timber

Initial contact information for the Regional Forestry Manager, and/or the local Natural Resources Officers will be provided by the Policy Coordination Branch. Input from the local Natural Resources should be solicited in the route planning process. Forest inventory maps can also be useful in this process. They may be obtained from the Forest Inventory Branch of the Department of Natural Resources⁴. These maps provide information about each forest stand. As non-merchantable forested Crown land will be cleared, Forestry Branch will require that permits be obtained before clearing may take place. These permits are generally provided by local Natural Resources Officers or the Regional Forestry Manager⁵. To obtain these permits, inform the Forestry Branch of the stands to be cut. If the Branch does not consider the stands to be valuable, they will be principally concerned with disposing of the wood. If the Branch considers the stands to be of value they may require fees to be paid under the Forest Damage Appraisal and Valuation System (1995). Calculating the Forest Damage Appraisal fees should be done in consultation with Forestry Branch

⁴ Forest Inventory Branch, Address: 200 Saulteaux Cr. Winnipeg, MB, R3J 3W3, Phone: (204) 945-7957.

⁵Address: Regional Forestry Manager, Eastern Regional Office, 20 First St. S. Beausejour, MB, R0E 0C0. Phone: (204) 268-6052.

officials. They may require the following information to calculate these fees:

- Photos, Inventory maps
- Forest inventory area reports, Forest inventory S.S.V.T. Gross Merchantable Timber volume by sub-type by F.M.U.
- Nursery stock cost, site preparation cost, planting cost, silviculture survey cost, and tending cost
- Forest protection cost
- Mean annual increment by working group and site class, age distribution by Forest Section and species. (If applicable)

Disposal methods are generally outlined in the ROW clearing permits. Chipping, piling, and piling and burning, are the usual procedures.

1. Chipping is most likely with small amounts of timber.
2. Piling may be used to create habitat.
3. Piling and burning are likely when large amounts of timber must be disposed of. The burns must be conducted in a manner that minimizes the risk of uncontrolled blazes. Burning should only be conducted in winter and should not be conducted over peat bogs, to reduce the chance of peat fires. Following burning, the site is usually inspected by representatives of both Manitoba Hydro and the Department of Natural Resources staff to ensure that the ROW is in acceptable condition.

4.4.3.2c Permits Required for Merchantable Timber

The Regional Forestry Manager, and the local Natural Resources Officers should be contacted by Manitoba Hydro staff in the route planning process. Forest inventory maps will also be useful in this process. These maps may be obtained from the Forest Inventory Branch of the Department of Natural Resources⁶, and provide information about each forest stand. When possible contact the branch at least six months before construction is to begin to discuss permit requirements and concerns. The Branch would prefer that the merchantable timber be used. Contact the Branch to determine whether it is feasible that the timber be salvaged. If the timber can be salvaged, two scenarios are likely.

⁶ Forest Inventory Branch, Address: 200 Saulteaux Cr. Winnipeg, MB, R3J 3W3. Phone: (204) 945-7957.

- If the merchantable stands are included in a timber operator's FML area, then the particular timber operator should be given the option to clear the timber.
- If the merchantable stands are not included in a FML area, then the wood should be made available to interested local residents.

If the timber cannot be salvaged, a fee may be assessed under the Forest Damage Appraisal and Valuation System (1995). Calculating the Forest Damage Appraisal fees should be done in consultation with Forestry Branch officials.

The wood should then be disposed of in a manner acceptable to local Natural Resources Officers and Manitoba Hydro. Acceptable methods include piling and burning, and chipping. Methods and details should be arranged with local Natural Resources Officers. However, wood cut along an existing ROW in a developed area will probably be used by local residents.

4.4.3.3. Agency Concerns

Forestry Branch officials prefer that merchantable timber be used, where feasible. If the timber cannot be used then it should be properly disposed of. The permitting procedure addresses these considerations. Forestry managers may also be concerned with the cumulative loss of forested lands. No legislative requirement exists that would require a consideration of the cumulative loss of forested lands. However, it appears that forestry managers may see the permanent removal of forested lands, especially land that might support merchantable stands, as an important consideration. Forestry managers suspect that cumulative reduction of forested lands from all sources, e.g. agriculture, ROW for highways, telephone lines, and electricity transmission lines, will reduce annual allowable cuts (in the areas where merchantable timber can be grown) and could reduce the sustainability of forest ecosystems (Atkinson, J., and S. Kaczanowski, Regional Forester and Regional Forestry Manager, Personal Communication, 1995). Although the Department of Natural Resources would prefer that a no net loss policy be observed, no policy has been established.

No Net Loss Policy

A No Net Loss policy is one that requires any loss to be balanced by a gain in another area. The forested land may be replanted, or contributions may be made to groups that sponsor replanting efforts. The difficulty with a No Net Loss policy is that efforts to increase the amount of forested

land would necessitate the reduction of some other land cover type. If a No Net Loss policy is to be effective there must be an area of non-forested land that can be replanted without raising concerns about the loss of that non-forested land. Forestry Branch officials or local Natural Resources Officers should be contacted for further information if these concerns are raised.

4.4.3.4 Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning forestry and clearing practices. These include: timber removal permits, clearing methods, buffer zones, danger tree considerations, and vegetation management. The federal Department of Fisheries and Oceans has also published recommendations that may be of concern in Right-of-Way clearing. These guidelines are printed in Appendix B. They include: reservations, or buffer zones; clearing in reservations; use of herbicides; and maintenance of Rights-of-Way.

4.4.4 Lands Branch Module

4.4.4.1 General Description

During initial route assessment, the Lands Branch⁷ will have been provided with a copy of the proposed project description by the Policy Coordination Branch. The Lands Branch oversees the use of non-forested Crown land in the Province of Manitoba. For example, leaves, or buffer zones, must be left around airstrips, and the Lands Branch is responsible for this. Depending on the route to be traversed, the Lands Branch may have comments.

4.4.4.2 Clearance Procedures

4.4.4.2a No Clearance Required

As no Crown lands with existing encumbrances, or barriers or holds to development will be crossed by the new sub-transmission line, the Lands Branch of Department of Natural Resources should not have any concerns related to the transmission line. If concerns do arise, deal directly with the Lands Branch to resolve the concerns.

⁷ Address: Lands Branch, 1007 Century Ave. Winnipeg, MB, R3H 0W4. Phone: (204) 945-6616 or 123 Main St. Neepawa, MB. Phone: (204) 476-3441.

4.4.4.2b Clearance Required

The Lands Branch is responsible for administering non-forested Crown lands. Certain areas of Crown land, e.g. leaves around airports, have certain restrictions placed on development. As the sub-transmission line in question has been identified as crossing areas with existing encumbrances, these restrictions, or encumbrances, will have to be addressed prior to the construction of the line. Lands Branch will inform Manitoba Hydro staff of the encumbrances and assist in contacting the land holder or land holders in question (Lancaster, G., Senior Winnipeg Manager, Lands Branch, Personal Communication, 1995).

4.4.4.3 Agency Concerns

Lands Branch may be concerned with addressing any existing encumbrances that may exist on the Crown lands that are to be crossed.

4.4.5 Parks Module

4.4.5.1 General Description

The Parks Branch^s of the Department of Natural Resources is responsible for the administration of provincial parks in the province. During initial route assessment, the Parks Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. If the proposed sub-transmission line is to cross a Provincial park, the Parks Branch is likely to request input into the routing and construction process. Manitoba Hydro has the legal authority to construct sub-transmission lines, as well as other types of electricity transmission lines, in many provincial parks. Depending on the nature, designation, and location of the park, the Parks Branch may have various concerns, including the aesthetic effects of sub-transmission line development. Efforts should be made to incorporate these concerns into the development of the sub-transmission line project.

^s Address: Parks Branch, 200 Saulteaux Cr., Winnipeg, MB. R3J 3W3. Phone: (204) 945-6808.

4.4.5.2 Endorsement Procedures

4.4.5.2a No Endorsement Required

As the sub-transmission or distribution line does not pass through any Provincial parks, the Parks Branch should not have any concerns regarding the line.

4.4.5.2b Endorsement Procedures

If the sub-transmission or distribution line will cross a Provincial park, and the Parks Branch has concerns, then the Policy Coordination Branch will supply contact information for Parks staff. Obtain the input of Parks Branch staff and attempt to incorporate their concerns into route planning. Although Manitoba Hydro has the legal authority to develop sub-transmission lines within parks, attempt to incorporate Parks concerns in the route. A common concern of Parks staff is the aesthetic impacts of transmission line development (Hood, E., Park Superintendent, Retired Communication, 1995). They would prefer that the lines be "invisible." The discreet placement of poles and the proper attention to the direction of approach of the lines will reduce this potential negative aesthetic effect.

4.4.6 Water Resources Module

4.4.6.1 General Information

The Water Resources Branch⁹ of the Department of Natural Resources manages the use, development, and protection of the province's surface and groundwater resources. During initial route selection and planning, the Water Resource Branch will have been provided with a copy of the proposed project description by the Policy Coordination Branch. The Water Resources Branch rarely has concerns with sub-transmission line development. However, the Branch would prefer that poles not be located where they might interfere with the maintenance or future expansion of drainage ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). Efforts should be made to incorporate these concerns into sub-transmission line development.

⁹Address: Water Resources Branch, 1577 Dublin Ave., Winnipeg, MB, R3E 3J5, Phone: (204) 945-6497.

4.4.6.2 Endorsement Procedures

4.4.6.2a No Endorsement Required

As the line will not interfere with the maintenance or planned future expansion of any drainage systems, the Water Resources Branch should not have any concerns with the line.

4.4.6.2b Input Recommended

As the planned route for the sub-transmission line will interfere with the maintenance or planned expansion of the drainage system, input should be sought from the Water Resources Branch. The Branch may request a minor route modification. Ongoing contact with the Branch should assist in resolving any possible concerns.

4.4.6.3 Agency Concerns

The Water Resources Branch is concerned when sub-transmission line poles are placed in or near drainage ditches. Apparently, the poles can interfere with the drainage and the cutting of hay along the ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). The Branch would also prefer that the siting of the poles not interfere with planned or foreseen drainage ditch expansions.

4.4.7 Wildlife Module

4.4.7.1 General Information

The Wildlife Branch¹⁰ of the Department of Natural Resources is responsible for the administration of game and non-game species of wildlife in the province. During initial route planning, the Wildlife Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. The development of a sub-transmission line may have impacts on wildlife. Line construction and operation will turn the existing habitat from the original habitat to a (usually) shrub and grass habitat. The exact effects, both positive and negative, will vary according to the habitats involved. If the proposed sub-transmission line is to cross an area of sensitive wildlife

¹⁰Address: Wildlife Branch, 200 Saulteaux Cr., Winnipeg, MB, R3J 3W3, Phone: (204) 945-7775.

habitat, the Wildlife Branch is likely to request input into the routing and construction process. The Branch may request time of year restrictions and other forms of mitigation to reduce any negative impacts on wildlife. Attempt to incorporate these concerns into sub-transmission line development.

4.4.7.2 Endorsement Procedures

4.4.7.2a No Endorsement Needed

Since no areas that have been identified as sensitive wildlife habitat will be affected by the new line, departmental concerns should be minimal. If non-governmental organizations have expressed interest then the opinions of these groups should be considered in this phase. Manitoba Hydro general environmental protection measures should be followed to reduce any negative effects of development.

4.4.7.2b Endorsement Procedures

Since areas of significant wildlife habitat will be traversed or affected by the sub-transmission or distribution line, the Wildlife Branch may have concerns or may suggest certain construction practices to reduce the impact of the line. The Policy Coordination Branch will supply Manitoba Hydro with the contact people to consult with to resolve these problems.

4.4.7.2c DU Endorsement

Although Ducks Unlimited (DU) is not a agency of the Province, DU often has important information concerning the effect of developments on wildlife. Contact DU¹¹. Ask DU officials whether DU will have any concerns with the proposed sub-transmission line. They are concerned with the bird strikes and the possible effects of sub-transmission development on wetlands quality (Sexton, D., Personal Communication, 1995). They would prefer that sub-transmission lines, and other electricity transmission lines, not be constructed adjacent to high quality wetlands. They would also prefer that pentachlorophenol treated poles not be used in wet areas. Seek the input of DU officials if the line must pass close to wetlands. If DU has been involved in the site selection process, and their concerns have been addressed, then it is more likely that they will support the route even if

¹¹Contact: Ducks Unlimited, P.O. Box 1160, Stonewall, MB, R0C 2Z0, Phone: (204) 467-3000

some good waterfowl habitat must be crossed.

If other organizations have expressed interest or concerns over the new sub-transmission line attempt to address their concerns by mitigation or minor route adjustments.

4.4.7.3 Agency Concerns

The Wildlife Branch is concerned with the maintenance of wildlife and wildlife habitat. They would prefer that certain habitats and features not be disturbed. To prevent disturbance, some habitat need only be avoided at certain times of the year. Others must be avoided completely. Mitigation may be possible in some cases. Ongoing dialogue with and input the local Natural Resources Officer is an important method of determining the wildlife features that may be of concern in the local area. Some of these features may include:

- Breeding and calving grounds. These areas are significant because disruptions in or near the areas could reduce the animal's chance of successfully breeding or bearing young. Such a disruption could reduce the numbers of young, and in time, reduce the overall population size. However, if construction is restricted in the critical months or weeks, the area may be crossed without causing problems.
- Habitats for economically significant species, species that are hunted, trapped, or otherwise contribute to the local economy. Any significant reduction in the numbers of these species could also have a negative effect on the people who depend on them.
- Habitats for rare and uncommon species. If a species is common in the local area, then, in most cases, the small habitat altered by sub-transmission line development should have little effect. However, if the species is rare, then even a small loss of significant habitat could reduce the numbers of an already small population. If the loss is serious, then the species could be eliminated from the local area. This loss could be significant. The eliminated species could have been important in the local area, and its loss could trigger other losses. Some would also see a species' extirpation as an aesthetic loss or the loss of a potential future resource. Avoid these areas or reduce the impact of crossing whenever possible.
- Large contiguous blocks of habitat, especially if that habitat is comparatively rare in the region. Large blocks of habitat, not broken up by other habitat types are used by species intolerant of habitat edges. Some songbirds, for example, prefer contiguous habitats.

Although some species prefer edges and may be positively affected by sub-transmission line development, others are negatively affected by such development.

- **Wetlands.** Wetlands are important habitats for maintaining many species including many game species of waterfowl. Sub-transmission lines should not be located directly adjacent to wetlands to reduce the risk of birds striking the poles and conductors. Poles in wet areas should not be treated with pentachlorophenol (penta) to reduce the risk of these chemicals leaching out of the wood and damaging the local area.
- **Heron rookeries.** Herons nest in trees in colonial structures known as rookeries. The presence or absence of these rookeries is an important factor determining the number of herons in a local area. The accidental destruction or disturbance of a rookery will have a serious impact on the heron population. Avoid these areas, especially when they are in use. Winter construction may reduce the impact of sub-transmission line construction.
- **Raptor nests (birds-of-prey, eg. eagles, ospreys).** These birds tend to return to the same nest year after year, often building large distinctive nests. To avoid disrupting the birds and their young, avoid these areas when the nests are in use. Winter construction may reduce the impact of sub-transmission line construction.
- **Salt licks.** Salt licks are specific sites where certain species go to obtain minerals needed in their diets. Avoid these sites so that the animals will be able to use the salt lick without being disturbed. Whenever possible, construction should only be carried out when the salt licks are not in use.
- **Specific sites of rare and uncommon species (eg. rare plants).** Occasionally, rare species, often plants, will exist in a certain area. To avoid damaging these sites which could reduce or remove significant numbers of these species, route around these areas.
- **Other habitat types that may be important in the local area.** Not all significant wildlife habitats have been covered here, and other important ones may exist in the local area. Contact the local Natural Resources office.
- **Other local features may be of importance.** Consult with local Natural Resources Officers to determine whether this is the case in the local area.

4.4.7.4 Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning wildlife. These include: waste management and garbage control, wildlife treatment, important wildlife features, wetlands considerations, and vegetation management.

4.4.8 Energy and Mines Module

4.4.8.1 General Information

During the route selection and assessment phase, Manitoba Hydro typically contacts the Mines Branch¹² of the Department of Energy and Mines and supplies them with a copy of the project description for review and comment. If the Branch has concerns, then consult Branch officials to resolve the issues.

4.4.8.2 Endorsement Procedures

4.4.8.2a Minimal Concerns

Since no mining operations will be affected by the sub-transmission line, Mines Branch should have no objections.

4.4.8.2b Possible Concerns

If the planned sub-transmission line crosses an active or undeveloped gravel lease, contact the lease holder. This information should be available from Mines Branch. Negotiate with the lease holder and consider routing the line around the active pits and undeveloped areas with high potential for gravel quarrying.

4.4.8.3 Agency Concerns

The Mines Branch is concerned when sub-transmission lines cross active or high quality gravel lease areas. However, if the line is routed around the area to be quarried or mined, then the

¹²Address: Mines Branch, Department of Energy and Mines, 1385 Ellice Ave, Winnipeg MB, Phone: (204) 945-6546. Contact Person: Aggregate Geologist.

Branch should not raise objections.

4.4.9 Provincial Environment Module

4.4.9.1 General Information

The Manitoba Department of Environment is responsible for environmental protection in the province. Power lines of less than 115 kV, including sub-transmission lines, do not generally require formal assessment.

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. As the development of a sub-transmission line may have impacts on the environment, the Department will informally review the proposed project. If environmental concerns are raised, then the Department will contact Manitoba Hydro with its concerns. According to the Department, concerns may be raised if the proposed line is to cross streams, significant wildlife habitats, or Provincial parks. In these cases, it is possible that the Department may request formal assessment (Blunt, B., Manitoba Environment Department, Personal Communication, 1995). The Environment Department should be appraised of any significant impacts and issues. They may request time of year restrictions and other forms of mitigation to reduce any negative impacts on the environment. Efforts should be made to incorporate these concerns into sub-transmission line development.

4.4.9.2 Endorsement Procedures

4.4.9.2a Minimal Environmental Effects

In this case, since the sub-transmission or distribution line does not affect a Provincial park, any streams, or any areas of significant to wildlife, formal assessment is very unlikely. However the Department should be contacted and their comments solicited.

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. This information should then be sent to the Land Use Approvals section of the Environment Department¹³. The project will then be subject to an informal review by

¹³ Address: Environmental Approvals, Building Two, Fort Osborne Complex, 139 Tuxedo Avenue, Winnipeg, R3N 0H6.

interested government departments. Should a formal provincial assessment be requested by the Environment Department, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D¹⁴. However, a formal assessment is unlikely in this case. The Department is likely to suggest that standard environmental codes of practice be followed.

4.4.9.2b Possible Formal Assessment

Although power lines of less than 115 kV or less require no formal approval, the department may request an assessment, in certain cases. In this case, since the sub-transmission or distribution line crosses streams, areas of significant to wildlife, or Provincial parks, formal assessment is possible. However, early consultation and informal endorsement from the Department should reduce the need for formal assessment.

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. This information should then be sent to the Land Use Approvals section of the Environment Department. The project will then be subject to an informal review by interested government departments. Should a formal provincial assessment be requested by the Environment Department, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D.¹⁵ Formal assessments are more likely when streams are crossed, significant wildlife habitat is affected, or parks are crossed. A formal assessment is possible in this case. To reduce the need for formal assessment, cooperate with all departmental requests and attempt to obtain an informal endorsement of the preferred route. The endorsement is likely to include conditions, such as adherence to standard environmental codes of practice, *Recommended Fish Protection Procedures for Stream Crossing in Manitoba*, and *Timber Harvesting Practices for Forestry Operations in Manitoba* (1994).

¹⁴Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone (204) 474-3119.

¹⁵Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone (204) 474-3119.

4.4.9.3 Agency Concerns

The Environment Department will be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff will also be of concern to environment officials. Environment officials may also be concerned with socio-economic impact of the proposed projects.

4.4.9.4 Construction Practices

Manitoba Hydro has published a list of general environmental protection measures (Appendix A). These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety. The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines, guidelines for the planning and site selection and the construction and operation of borrow pits, and sand and gravel washing guidelines. Some or all of these guidelines may be recommended by the Department.

4.4.10 Department of Highways and Transportation Module

4.4.10.1 General Information

During the initial selection and assessment phase, Manitoba Hydro will provide the Department of Highways and Transportation¹⁶ with a copy of the project description. The Department may provide comments and input, and may request additional information. Standard Manitoba Hydro practices should address most Department concerns. Attempt to route sub-transmission lines where they will not interfere with present and future roadways. If concerns do

¹⁶Address: Department of Highways and Transportation, 215 Garry St. Winnipeg, MB.

arise, discuss these concerns with Departmental officials. It should be noted that not all roadways are administered by the Department of Highways. The respective municipalities should be contacted to discuss concerns relating to municipal roads. These concerns will be addressed in the municipal concerns module.

4.4.10.2 Endorsement Procedures

4.4.10.2a Minimal Concerns

Since no present or planned future highways road allowances are involved, the Department of Highways and Transport should not have any concerns with the sub-transmission line. Request a letter from Highways stating that the line is not being constructed in any existing or planned highways road allowance.

4.4.10.2b Possible Concerns

As the sub-transmission or distribution line will be constructed within or adjacent to an existing or future road allowance administered by the Department of Highways and Transportation, the Department may have concerns and should be consulted before construction takes place.

Highways may be concerned with safety and future highway expansion issues. For safety reasons, the poles must be set back a distance at least equal to their height in case of pole collapse. The poles should also be set back far enough that out of control vehicles are unlikely to strike them (Chadha, A., Department of Highways and Transportation, Personal Communication, 1995). The Department would prefer that the line be located a minimum of 10 metres from the edge of the shoulder (Kopansky, K., Manitoba Highways Department, Personal Communication, 1995). Contact the regional Highways office¹⁷ and ask the technical services engineer how far the sub-transmission line must be set back. Certain highways, especially Provincial Trunk Highways, may be expanded in the future to accommodate future traffic flows. As a result, sub-transmission lines should be set back far enough to accommodate planned highway improvements. The Department would prefer that the line be located at the edge of the road allowance. Manitoba Hydro practice is to construct on the two

¹⁷In the case of the Whitemouth Municipality: Highways and Transportation, 316-323 Main St., Steinbach, MB, R0A 2A0, Phone: (204) 326-4434.

foot line of the road allowance. Road allowance widths vary: four lane highways may have 600 foot road allowances; provincial trunk highways road allowances are up to 200 feet; new or reconstructed provincial roads have 150 foot road allowances; while older provincial roads have 99 foot road allowances. If no improvements are planned, then Manitoba Hydro should obtain written confirmation from the Department stating that the no highway expansions are planned that would interfere with the sub-transmission or distribution line.

4.4.11 Historic Resources Module

4.4.11.1 General Information

During the route planning and assessment process of sub-transmission lines, it is Manitoba Hydro's practice to provide the Historic Resources Branch of the Department of Culture, Heritage, and Citizenship with a description of the project to review. Historic Resources will then assess the likelihood of encountering an area of historic significance during project construction and operation. If such areas are known or suspected, then the Branch will notify Manitoba Hydro and advise that the areas be avoided or mitigation measures be applied.

4.4.11.2 Endorsement Procedures

4.4.11.2a No Endorsement Required

Since no areas of historic significance have been identified by the Historic Resources Branch as potentially affected by the proposed sub-transmission line, no further Historic Resources analysis will be required at this time. Historic Resources will generally provide a written confirmation that no historic sites will be affected by the development. However, if obvious unexpected historic sites are found in during sub-transmission line construction or operation, halt all operations in the area and contact the Historic Resources Branch immediately.

4.4.11.2b Endorsement Required

As the sub-transmission line may affect a historic site, a Historic Resources Assessment may

be required. Contact the Historic Resources Branch¹⁸. The Branch will issue guidelines and assist Manitoba Hydro staff in arranging the necessary studies (Manitoba Historic Resources Branch, 1995). Mitigation may be required to reduce or eliminate the impact of the sub-transmission line. Ongoing consultation with Historic Resources will be necessary in this case. In some cases, the route may need to be altered. Seek input from the Branch to determine whether route re-alignment will be necessary.

4.3.10.3 Agency Concerns

The Historic Resources Branch is concerned with the preservation of "...works of nature or human endeavor that have prehistoric, historic, cultural, natural, scientific, or aesthetic value." (Manitoba Historic Resources Branch, 1995) Arrowheads, fossils, and old buildings are examples of the tangible history that the Branch wishes to preserve. Historic sites are most likely to be located on areas of high ground, and along watercourses, especially at rapids and stream confluences. Development at or near these areas may concern the Branch as construction activities could damage these resources. Unless historic sites are noted and proper mitigation applied, sub-transmission line development could threaten these sites. However, the use of Manitoba Hydro general environmental protection measures should assist in preventing damage to historic sites.

4.4.11.3 Construction Practices

Standard Manitoba Hydro construction practices, reproduced in Appendix A, should reduce the impact of sub-transmission line construction on historic resources. These practices regulate access road construction to reduce the risk of damaging historic sites.

4.4.12 Rural Development Module

4.4.12.1 General Information

During the route planning and assessment of sub-transmission line development, contact the

¹⁸ Address: Historic Resources Branch, Manitoba Culture, Heritage, and Citizenship, Main Floor, 213 Notre Dame Ave., Winnipeg, MB, R3B 1N3. Contact Person: Impact Assessment Officer, Phone: 945-1830.

Department of Rural Development¹⁹. Provide the Department with a copy of the project description for review and comment. If concerns are raised, consult with the Department.

4.4.12.2 Endorsement Procedures

4.4.12.2a Minimal Concerns

As the sub-transmission or distribution line does not cross agricultural land, Rural Development should not have any concerns with the line. Consult with the Department if other concerns are raised.

4.4.12.2b Possible Concerns

As the sub-transmission or distribution line crosses agricultural land in a place other than a quarter section line, Rural Development may have concerns. Rural Development may be concerned when agricultural land is bisected, especially when small tracts of land are created which are then difficult to work with large farm machinery (Jackson, R., Rural Development Community Planner, Personal Communication, 1995).

4.4.13 Federal Environment Module

4.4.13.1 General Information

The Canadian Environmental Assessment Agency (CEAA)²⁰ is responsible for administering the Canadian Environmental Assessment Act (CEAA). This Act and the accompanying regulations stipulate when assessments under CEAA are required and what type of assessments are required. According to the Act, a 66 kV sub transmission line will not require an assessment unless two conditions are met. If the line is to require assessment, it must not be excluded from assessment, and it must trigger the Act.

All non-international electricity transmission lines of less than 130 kV are automatically excluded from the Act unless: i) the line is constructed on a new Right of way (ROW); ii) the poles

¹⁹Address: Community Economic Development Branch, 20 First St. S., P.O. Box 50, Beausejour, MB, R0E 0C0, Phone: (204) 268-6058.

²⁰Address: CEAA, Federal Building, 500-269 Main St., Winnipeg, MB, R3C 1B2, Phone: 984-2457

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are placed below the high water line of a waterbody, or iii) a polluting substance might be released into a wetland that is covered by water for three consecutive months of the year (Part 3, Section 21, Exclusion list, Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). If one or more of these conditions are true, then the line may be subject to assessment.

Under CEAA, the most likely trigger, in the case of sub-transmission lines, is a government decision on the Law List. The most likely cases are: i) a leave under the Railway Act; ii) an approval under the Navigable Waters Protection Act; or iii) an authorisation to harmfully alter, disrupt, or destroy fish habitat under the Fisheries Act (Annotated Law List, Policy and Regulatory Affairs, Canadian Environment Assessment Agency, 1995). The issuance of any one of these approvals qualifies as a department of the federal government issuing some form of approval before the construction can take place. If this occurs on a non-excluded line, then a federal environmental assessment known as a screening will be required.

4.4.13.2 Approval Procedures

4.4.13.2a No Approval Required

As the above conditions for a federal environmental assessment screening are not met, no screening will be required.

4.4.13.2b Approval Required

As the above conditions for screening are met, a federal environmental assessment screening report will be required. The screening report must consider (Section 16(1), Canadian Environmental Assessment Act, 1992).

- a. The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- b. The significance of the effects referred to in paragraph (a);
- c. Comments from the public that are received in accordance with this Act and the regulations: [S.C. 1993, c. 34, ss. 22(1) (French)]
- d. Measures that are technically and economically feasible and that would mitigate any

significant adverse environmental effects of the project; and

- e. Any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the responsible authority may require to be considered. [S.C. 1993, c. 34, ss. 22(2) (French)] (Parts a-e, Section 16(1), Canadian Environmental Assessment Act, 1992).

Should a screening be required, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D²¹.

4.4.13.3 Agency Concerns

CEAA, as will the Manitoba Environment Department, may be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff may also be of concern to environment officials. Environment officials may also be concerned with socio-economic impacts of proposed projects.

4.4.13.4 Construction Practices

Should CEAA suggest recommended construction practices they are likely to be similar to ones contained in Manitoba Hydro and Department of Fisheries and Oceans guidelines. Manitoba Hydro has published general environmental protection measures for Environmental Protection (Appendix A). These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety. The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines,

²¹ Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone: (204) 474-3119.

guidelines for the planning and site selection and construction and operation of borrow pits, and sand and gravel washing guidelines.

4.4.14 Indian and Northern Affairs Canada Module

4.4.14.1 General Information

If the sub-transmission line could affect Indian reservations, contact Indian and Northern Affairs Canada. Obtain the Department's input in routing the line and addressing any issues and concerns that may arise.

4.4.14.2 Issues and Concerns

4.4.14.2a Minimal Concerns

As the sub-transmission line does not cross any Indian reservations, Indian and Northern Affairs Canada should not have any concerns with the line.

4.4.14.2b Possible Concerns

As the sub-transmission line will cross Indian reservation lands, Indian and Northern Affairs Canada may have concerns with the line. Contact Indian and Northern Affairs Canada for more information²². A federal environmental assessment screening may also be required. Contact Licensing & Environmental Assessment, Design Division T&D²³.

4.4.15 Transport Canada Module

4.4.15.1 General Information

If any waterways will be crossed, contact the Coast Guard in Selkirk, Manitoba²⁴, during the route planning and assessment phase. If waterways will be crossed, the Coast Guard will request

²² Address: 1100-275 Portage Ave., Winnipeg, MB. Phone (204) 983-4689.

²³Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone: (204) 474-3119.

²⁴Address: PO Box 216, Selkirk, MB, R1A 2B2, Phone (204) 785-6030.

information concerning the exact nature of the crossing. Send them a copy of the screening report, the exact locations of the proposed crossings, the type of crossings, whether the crossing will be overhead, trenched, or tunneled, and the technical drawings of the crossings. They will require that CSA (Canadian Standards Association) electrical conductor clearance standards be met (Settee, R. Coast Guard, Personal Communication, 1995). Ask whether the Navigable Waters Protection Act will apply to the watercourse or watercourses in question. If the Act applies, a permit will be required.

Definition: According to the Transport Canada, a permit is required for any structure crossing a navigable waterway. Although the term “navigable waterway” has no legal definition, the department considers a waterway to be navigable if it will float a vessel of any size, including canoes, in its natural state (Settee, R. Coast Guard, Personal Communication, 1995). Natural state refers to the summer low water level, in the absence of beaver dams or other water-level raising structures. Since many waterbodies might fit this definition, the safest course of action is to request a ruling on the applicability of all waterbodies.

4.4.15.2 Approval Information

4.4.15.2a No approval Required

As no navigable waters are crossed by the line, no permit under the Navigable Waters Protection Act will be required.

4.4.15.2b Approval Required

If the Department has decided that the waterway to be crossed is navigable, then a permit will be required. The Coast Guard will require that CSA standards be met. Contact Coast Guard officials directly if more information is required.

Note: If a permit is required, and a new ROW will be needed, then a federal environmental assessment known as a screening will also be required.

4.4.15.3 Agency Concerns

The Coast Guard may be concerned that clearances be maintained on the waterways to permit the passage of vessels. To ensure this, they will require that CSA standards be met and that

permits be obtained. The projects's design specifications should meet these requirements.

4.4.16 Local Municipal Concerns Module

4.4.16.1 General Information

Sub-transmission lines are often constructed along the two foot line (0.62 m) of a municipal road allowance. According to Section 23(1) of the Manitoba Hydro Act, Manitoba Hydro has the right to place poles within the road allowance. However, the municipality should be contacted in the route selection and assessment phase of the project, and their input solicited. If concerns are raised by the municipality, discuss the issues with the reeve and councillors.

4.4.16.2 Endorsement Issues

4.4.16.2a Minimal Municipal Concerns

As the sub-transmission or distribution line will not be constructed in municipal road allowances, the municipality should not have any concerns. If outstanding issues are raised, contact the municipal reeve and councilors.

4.4.16.2b Minor Municipal Concerns

As the sub-transmission or distribution line will be located in a municipal road allowance, though not in 66 foot (20.1 metre) allowances, the municipality may have concerns. If outstanding issues are raised, contact the municipal reeve and councilors.

4.4.16.2c Possible Municipal Concerns

As the sub-transmission line will be located in a 66 foot (20.1 metre) road allowance, the municipality may express concerns. Construction of a sub-transmission line on the two foot line (0.62 metre) of a 66 foot road allowance may cause ditch maintenance problems for the municipality. According to the municipality, if the sub-transmission line is located so close to the ditch, it can be difficult to avoid damaging the line during routine maintenance. As a result, it has been suggested that, when a pole is damaged, the municipality not pay the full replacement cost but a depreciated cost based on the age of the pole structure (Steiner, D., Reeve of Whitemouth Municipality, Personal

Communication, 1995). Manitoba Hydro staff should be prepared to respond to this argument should it be raised. Further dialogue with the municipality may be required if these concerns are raised.

4.3.15.3 Agency Concerns

The municipality's concern is that the presence of the sub-transmission line may interfere with municipal operations, specifically with ditch maintenance. Construction of a line along a 66 foot (20.1 m) road allowance, apparently means that the ditch and sub-transmission line are located close together. Because the ditch and line are so close together, poles are occasionally damaged as the ditches are being cleared. As a result, the municipality may request that lines be constructed along 99 foot (30.2m) road allowances or that the municipality not pay the full replacement fee for damaged poles. Dialogue with the municipality should be pursued.

4.4.17 MTS Module

4.4.17.1 General Information

During the route selection and assessment phase of sub-transmission line development, Manitoba Hydro practice is to supply the Manitoba Telephone System (MTS) with a description of the proposed project for review and comment. If the proposed line could interfere with telephone line operations, then MTS will seek input into the development process and suggest mitigation to control and negative effects.

4.4.17.2 Endorsement Procedures

4.4.17.2a No Concerns

Since the sub-transmission line will not affect any MTS facilities, MTS should not have any concerns with the line. MTS generally provides written correspondence which indicates whether MTS facilities will be affected by the transmission line.

4.4.17.2b Possible Concerns

Since the sub-transmission line may have effects on MTS facilities, MTS may have concerns

with the line. MTS is concerned with the noise induction interference caused by electricity transmission lines on telephone lines (Zelig, D. Network Services. Manitoba Telephone System. Personal Communication, 1995). Noise induction is affected by the amount of separation between the lines and the length of parallel. If the sub-transmission line will cause interference, then Manitoba Hydro practice is to mitigate these effects through the installation of line noise controlling equipment. Contact MTS directly to determine whether noise mitigation is required, and if so, how the costs of the mitigation should be shared. Initial contact should be made with the regional MTS office, but MTS Headquarters Network Services staff may become involved.

4.4.17.3 Agency Concerns

MTS will be concerned that the sub-transmission line not interfere with the operation of the telephone system.

4.4.18 Railways Module

4.4.18.1 General Information

During the route planning and planning process, contact the owners of any railways that will be crossed or approached. The railways, CN and CP, will be concerned that the sub-transmission line construction and operation not affect the railway operation. If special studies or requirements are requested by the railway company, the company in question will contact Manitoba Hydro to resolve these concerns.

4.4.18.2 Approval Procedures

4.4.18.2a No Approval Required

Since no railways will be crossed or paralleled, no further action in this regard is needed.

4.4.18.2b Obtain Approval

Contact the railway and request permission to cross or approach the railway. Refer to the CN or CP sections as required.

Canadian National

Contact Engineering and Environmental Services²⁵. Request permission to cross or approach the railway. According to CN, require detailed engineering drawings with the following information will be required:

- a. "Profile of Crossing" detail (vertical elevation)
- b. "Plan View" detail (showing CNR property line and adjacent lot numbers):
- c. "Crossing Structure" pole framing detail:
- d. "Scale" for each of the above and dimensions ("not to scale" unacceptable):
- e. When power line parallels railway Signal and Communication lines, separate drawing must be submitted together with Signals and Communication Inductive Coordination Form;
- f. Revised drawings must be marked as revised and reason for revision stated;
- g. When joint use facilities are used, drawing must show information pertaining to both users and approval of other user denoted on drawing; and
- h. Drawing must have caption:
- i. "Construction, maintenance and operation of the line shall be in accordance with Transport Canada General Orders Number E-11 and E12 and Canadian Standards Association Standards CAN/CSA-C22.3 No. 1-M87 and CAN3-C22.3 no.7-M86 as applicable."
- j. Drawing referred to must contain the seal and signature of the professional engineer responsible for the work.

The drawing must also have the following technical information:

- a. Poles and adjacent structures or towers: height; class; set; material; pole number; owner.
- b. Anchor(s) and anchor rods: type; size; setting depth; owner; anchor rod size.
- c. Guy(s): lead and height; material; minimum breaking strength; grade; size; point of attachment; owner.
- d. Crossarm(s): size, material.
- e. Insulator(s): type; flashover rating.
- f. Power conductors and communication wires: size; material; type; minimum breaking strength; maximum tension; maximum sag; present number; ultimate number.
- g. Power Circuit Voltage: volts phase-to-phase; phase to effectively grounded neutral.
- h. Minimum clearances under maximum sag: above rails; above Signals and Communication plant.
- i. Separation between wires and cables: horizontal and vertical.
- j. Distances: crossing pole to crossing pole; crossing pole to adjacent pole; crossing pole to gauge of rail(s); crossing pole to Signals and Communication plant.
- k. Power and communication cables: number of conductors; type; diameter; weight; method of installation; number of cables.
- l. Messenger(s): diameter; type; grade; minimum breaking strength; maximum tension.

²⁵Address: 1004-104 Avenue, Edmonton, Alberta, T5K 0K2, Phone: (403) 421-6688, Fax (403) 421-6689.

- m. Angle of crossing: angle of line to Signals and Communications line: angle of change of direction at crossing and/or adjacent pole(s) (Signals and Communications, CN North America, 1993).

This information should be sufficient to obtain an endorsement for crossings. If the sub-transmission line is to be routed in parallel to the railway, additional studies may be required. CN should be informed of the location of the line relative to CN facilities, and they will contact Manitoba Hydro if more information is required.

Canadian Pacific

Contact Land Support Services²⁶. Request permission to cross or approach the railway. According to CP, CP will require the following information (CPRS, Land Management, Information Package for Utility Crossing Applications, 1994):

1. Title Block stating:
 - a) Company Name,
 - b) Title - Proposed Wire Crossing at Mile ___, ___ Subdivision.
 - c) Date.
 - d) Drawing Number.
2. Plan View Showing :
 - a) Poles, guys, wires, tracks, property lines, street name if any, dimensions from the crossing to a permanent reference ie: Street, property line, dimension from the poles to the centre of the track, dimensions from CP property line to the centre of the track, north arrow, any existing facilities, and the angle of the crossing in relation to the track.
3. Profile showing:
 - a) Cross level of the existing grade at the crossing, CP property lines, elevation of the top of rail at the crossing, poles, wires, guys, dimension from the wire to the top of rail, dimension from the wire to the top telegraph wires if any, dimension from the top of rail to the ground elevation at the pole locations and dimensions from the centre line of the track to the poles and guys.
4. Wire Information:
 - a) Number of wires
 - b) Specification of conductors
 - c) Messenger material, size and strength (if any)
 - d) Voltage
 - e) Type of voltage (AC/DC)
5. Pole Information:
 - a) Number of poles on the property

²⁶Address: CP Rail System, 800-200 Granville St., Vancouver, B.C. V6C 2R3, Phone: (604) 643-3295, Fax (604) 643 3274)

- b) Class of pole
- c) Length of pole
- d) Depth of bury
- 6. Guy Information:
 - a) Ultimate Strength
 - b) Diameter of anchor rod
- 7. Note Stating:
 - a) "To be constructed and maintained in accordance with the National Transportation Agencies General Order E-11." (if the poles are shared by two or more utilities, add "and E-12" to the note.

If more information is required, Manitoba Hydro will be informed by the railway.

4.4.18.3 Agency Concerns

Both railways will be concerned with the possibility of interference with railway operations. The railways may also be concerned with parallelisms, where the sub-transmission line and the railway line parallel each other. Special mitigation may be required in these cases. Contact the railway if these situations occur.

Chapter Five - Expert System Shell Selection -

The second objective, to assess the nature of knowledge engineering in expert system shells, was designed to determine the best shell to use in the development of this particular environmental self assessment expert system. Two factors, availability of support, and cost were used to determine the best shell to use. A number of expert shells were screened and two were examined in greater detail.

5.1 Selection Criteria

The important factors in the selection of the most acceptable shell, for this project, were availability of support and cost. Other potential factors, such as compatibility, flexibility, simplicity, and utility, were not important or were subsumed by the availability of support factor.

Availability of support became the most important factor. Since the researcher was not familiar with expert system shell programming in the beginning, support was required to use any of the shells. Support took a number of forms. Written manuals proved to be useful, as were on line tutorials and examples. Manuals and tutorials proved useful in providing examples and dealing with specific problems. However, the most useful form of support was the assistance of people familiar with the expert system shell. As detailed support was required, many shells that would be acceptable to the experienced programmer could not be used in this particular project. The potential factors, simplicity and utility, were subsumed by the availability of support. With sufficient support, most shells would be programmable. Similarly, with support, most shells would be usable.

The second factor was cost. Expert system shells that were priced ranged from freeware shells to shells costing \$1000. As the project expenses budget was \$500, cost was a significant factor. Programs that cost over \$150 were considered to be too expensive, and were screened out.

The factors of compatibility and flexibility were not significant in the selection of the appropriate shell. Incompatibility between the shell and the knowledge was not found to be a problem and so was not a factor. Similarly, all shells investigated appeared to be sufficiently flexible to deal with the knowledge.

5.2 Screening of Expert System Shells

Information about fourteen shells was obtained in written form from computer software stores, over the Internet, or from consultation with expert system designers. All shells were subjected to an initial screening to determine whether they should be investigated in greater detail. The screening was based on the availability of support and the cost of the shell, including all necessary support.

Table 5.1 summarizes the screening results. The table lists the name of the shell and the source of the information about the shell. The apparent availability of support was then assessed. If sufficient support appeared to be available then a Yes appears in the table in the Support Available column. Cost was then assessed. If the shell were priced at over \$150, a No appears in the table in the Cost Acceptable column. Finally the overall suitability of the shell was assessed on a Yes or No basis. A shell was only considered to be acceptable if both support and cost criteria were met. All other shells received a no rating and were screened out of consideration.

All shells located using the Internet lacked sufficient support to be used in this particular project. Although the Internet may be a valuable resource for experienced expert system programmers, it was not useful in this case.

It must be noted that many of the shells that were screened out may be well suited to many expert system development applications. It is only for this one project that they were found to be lacking. To a sufficiently experienced programmer, these shells may be excellent tools.

5.3 Detailed Investigation

Two shells were examined in detail, CLIPS version 5.0 and VP Expert version 3.0. As initial screening revealed that both shells appeared to be acceptable, attempts were made to program with both. Although programming was successful with VP Expert, programming with CLIPS was not successful. Because of the researcher's limited initial skill with expert system programming, extensive support was necessary. Although both were supplied with manuals and tutorials, the VP Expert material proved easier to understand than the CLIPS material. However, the principal advantage of VP Expert was the availability of on site support staff. People proved more useful than manuals in structuring and debugging the program. Primarily because human support was available, VP Expert rates higher than CLIPS in terms of availability of support.

Access to CLIPS was slightly less expensive than was access to VP Expert. CLIPS 3.0 was available for \$80. Educational access to VP Expert cost \$100, including support. It may cost up to \$350 to obtain the program. Therefore, in terms of cost alone, CLIPS would be the better option.

However, the superior support available for VP Expert, made programming with VP Expert much easier than CLIPS. As a result, VP Expert was used as the shell for the environmental self assessment expert system prototype.

Table 5.1

Shell Name	Source	Support Available	Cost Acceptable	Overall Feasibility
Babylon 2.3	Internet	No	Yes	No
Clips 3.0	Literature	Yes	Yes	Yes
Clips 5.1&6.0	Internet	No	Yes	No
ES 1.0	Internet	No	Yes	No
Esie 1.1	Internet	No	Yes	No
Expert 1.0	Internet	No	Yes	No
Frulekit	Internet	No	Yes	No
Hugin	Internet	No	Yes	No
Les 2.03&2.50	Internet	No	Yes	No
Level 5 Object	System Designer	Yes	No	No
Mike	Internet	No	Yes	No
OPS5	Internet	No	Yes	No
Salvini	Internet	No	Yes	No
VP Expert 3.0	System Designer	Yes	Yes	Yes

Chapter Six - Test Case

6.1 Explanation of Test Case

To test the PREASES 1.0, and demonstrate that the environmental self assessment expert concept is feasible, a case study was conducted. A brief summary of the decisions and input provided to the system follows. The actual output produced by the system is reproduced in Appendix C.

A hypothetical sub-transmission line, originating at an existing sub-station located in Section 33, Township 10, Range 12, just north of Elma, Manitoba, was deemed to be required to provide electrical supply to a hypothetical station located in SE Section 8, Township 12, Range 12. Map 6.1, illustrates the proposed location of the sub-transmission line. Map 6.2 provides land ownership information in the vicinity of the proposed route.

The expert system was designed to identify agency concerns, supply contact information, and identify the procedures that will be required to obtain the approvals and endorsements construct a sub-transmission line on a selected route. The user was then asked a series of questions. The answers to these questions determined the recommendations that the system would make. The questions and the answers entered were as follows:

1. Will any forested Crown land, merchantable or non-merchantable, need to be cleared? YES
2. Will any merchantable timber on Crown land need to be cleared? YES
3. Will any streams need to be crossed? NO
4. Will a railway be approached or crossed? YES
5. Will any provincial parks be crossed? NO
6. Will any Crown lands administered by the provincial Lands branch be crossed? YES
7. Will drainage ditches administered by Water Resources be affected? NO
8. Will any areas that are significant to wildlife, flora or fauna, be crossed or otherwise affected?
YES
9. Will a Historic Resources Assessment be required? NO
10. Will the line be constructed along any developed or undeveloped road allowances? YES
11. Will the line be constructed along a 66 foot (20.1 metre) developed or undeveloped road allowance? YES
12. Will a new ROW be needed? YES
13. Will pentachlorophenol treated poles be placed in a wetland? NO
14. Will poles be placed below the high water line of any watercourse? NO
15. Will a leave be required to cross or approach a railway? NO
16. Will any navigable waters need to be crossed? NO
17. Will any fish habitat need to be destroyed? NO
18. Will any Indian reservations be crossed? NO
19. Will MTS facilities be affected by the sub-transmission or distribution line? YES
20. Will current or potential highway's road allowances be affected by the line? YES

21. Will the line cross agricultural land at a point other than on a road allowance or on a quarter section line? NO
22. Will a developed or high capability undeveloped gravel lease be crossed by the line? NO

Based on this information, the prototype generated a series of recommendations designed to facilitate the approval and endorsement process for the line. The system asks whether the user wishes to view general information about each agency, the agency's concerns, and recommendations that the agency is likely to make. For this test case, the user decided to view all of the general information, agency concerns, and agency recommendations.

PREASES begins with the Policy Co-ordination Branch of the Department of Natural Resources. The user is prompted whether the general information should be displayed. Information that may assist in obtaining approvals and endorsements from Policy Co-ordination is then presented. The user is then asked whether the agency concerns should be displayed. In this case, the user requested that the information be shown.

The Fisheries Branch general information is then displayed. The user is prompted to choose whether the approval or endorsement information is desired. In this case, the information is displayed. However, in this particular case, no approval from Fisheries will be required. Agency concerns and recommendations are then printed and then the system moves to the next section.

The prototype then displays the Forestry module. After viewing the general information, the user is informed that based on user input, merchantable timber will be cleared. Information concerning the clearing of merchantable timber is then displayed. Forestry Branch general concerns and recommendations are then displayed.

The next section details Lands Branch issues. After viewing the general information, the user is informed that the Lands Branch will be involved in the approval process. After reviewing the information provided, Lands Branch concerns and recommendations will be displayed.

The next section is the Parks section. After viewing the general information, the user is informed that based on user input, Parks branch should have minimal concerns.

The next module is the Water Resources module. After viewing the general information, the user is informed that based on user input, Water Resources should have minimal concerns.

The system then continues with the general information for the Wildlife Branch of the Department of Natural Resources. Based on the user's previous input, the system displays the

information for the Wildlife Branch. The system then displays the agency concerns and suggested construction practices.

The next module focuses on the concerns of the Mines Branch. The system displays general information about the Branch. Since this particular route will not involve crossing existing or high capability gravel leases, the Branch should not have concerns about the line. The system then displays general Mines Branch concerns regarding sub-transmission line development.

The general information concerning the Manitoba Environment Department is then displayed. The user is informed that the Department may have concerns. Department concerns are then outlined. The system then prints general agency concerns and recommended practices.

The next section is the section dealing with the Department of Highways and Transportation concerns. After viewing the general information, the user is informed that based on previous input, the Department may have concerns in this case.

The system then continues with the Historic Resources Branch of the Department of Culture, Heritage and Citizenship. The general information is displayed. Based on the user's previous input, the user is informed that a Historic Resources Assessment will not be required. Agency concerns and recommended practices are then displayed.

The user is then asked whether the general information concerning the Manitoba Rural Development Department should be displayed. The user is informed that, in this case, the Department should not have significant concerns.

The next section is the section dealing with Federal environment concerns. After viewing the general information, the user is informed that based on previous input, a Federal review will not be required. Federal environmental concerns and recommended practices are then displayed.

The next section focuses on the concerns of Indian and Northern Affairs Canada. The system displays general information about the Department. Since this particular route will not involve crossing Indian reserve land, the Department should not have concerns about the line.

Information is then displayed concerning Transport Canada concerns. The user is then informed that the department will not have concerns regarding the test case line. Information is then displayed on Transport Canada concerns.

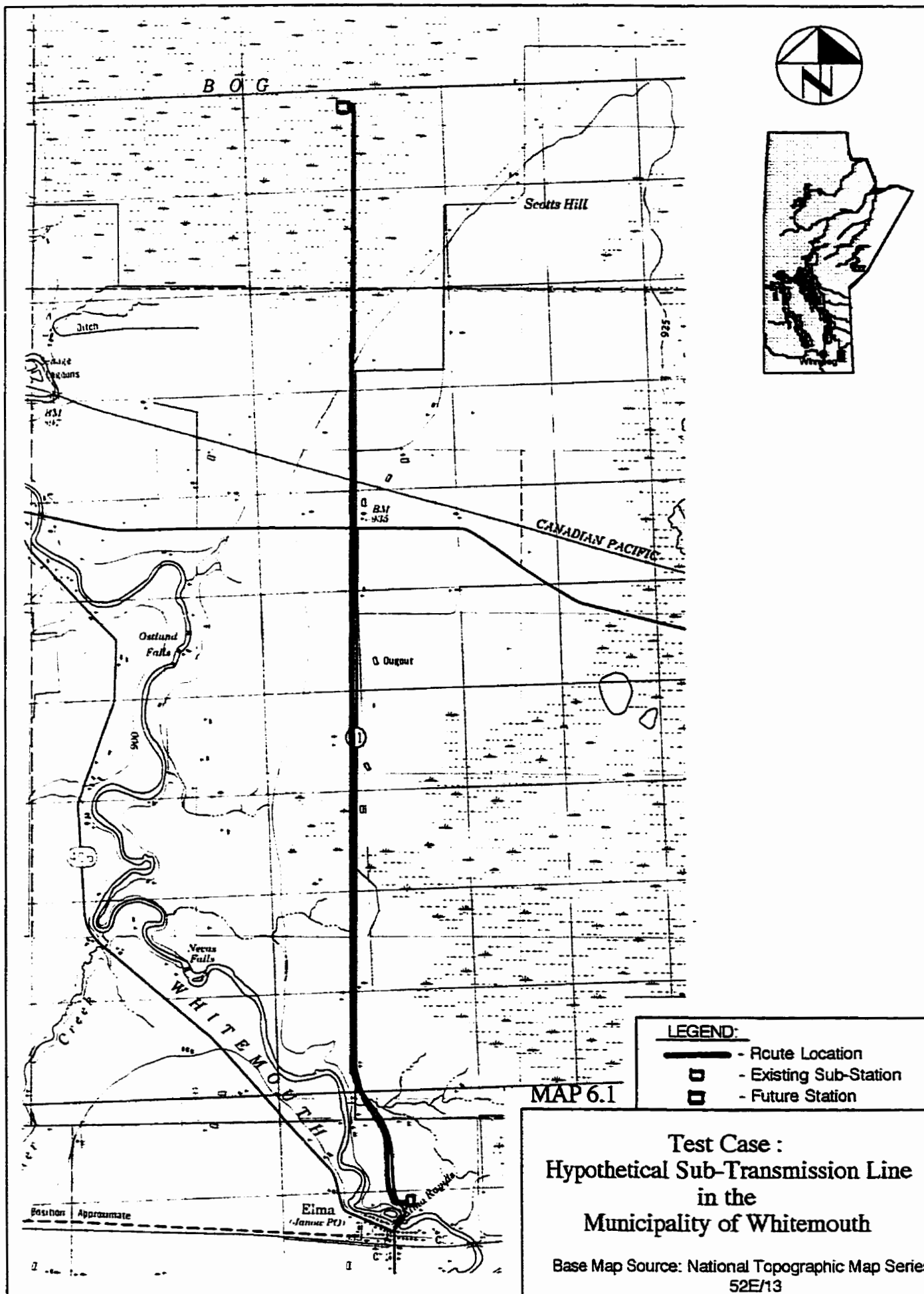
General information dealing with Municipal concerns is then displayed. Then the user is informed that, in this case, although no formal approval will be required, the municipality may have concerns. The system then displays the agency concerns.

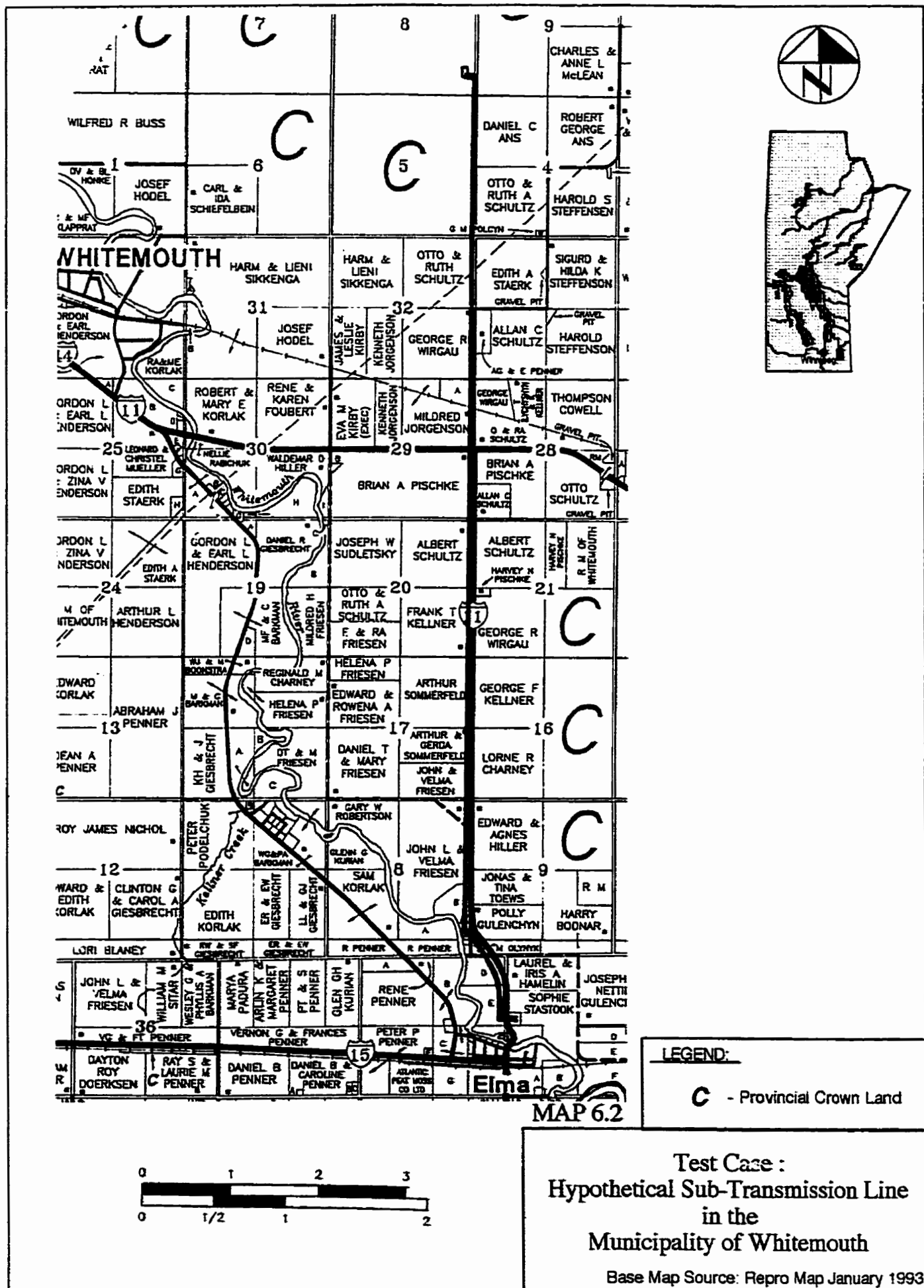
The general information concerning the Manitoba Telephone System (MTS) is then displayed. The user is informed that MTS may have concerns. Information is then supplied to assist in satisfying these concerns and mitigating the effects. General agency concerns are then printed and the system then moves to the final section.

The final section focuses on the concerns of the railway companies. The system displays general information about the railways. Since this particular route will involve crossing a railway line, information is provided concerning railway approvals. After viewing this information, general railway concerns regarding sub-transmission line development will be provided.

6.2 Test Case Summary

As stated in section 1.9.4, the prototype would be considered to be useful if it: i) determined the approvals and endorsements required for the construction of a hypothetical sub-transmission line, and; ii) provided background information about the relevant agencies, their concerns, and various construction practices that they may recommend. As demonstrated by the case study output and the explanation displayed above, the prototype system, once supplied with the necessary information, is capable of predicting these approvals and endorsements. The system also displays general information about the approval and endorsement granting agencies, their concerns, and various construction practices. Thus, the system meets the two criteria for a successful system. This system should be of assistance to those conducting these phases of an environmental self assessment of sub-transmission lines.





Chapter Seven-Conclusions and Recommendations

7.1 Conclusions

A case study, detailed in chapter 6, was used to test the feasibility of the prototype expert system. It demonstrated that an expert system can be used to provide the information necessary to conduct phases four and five of an environmental self assessment, namely, identifying the agency concerns and the agency approvals or endorsements phases. PREASES prompted the user for specific information about the preferred route, and based on the user's answers, the system responded with the agency concerns and a series of recommendations that will facilitate the approval and endorsement process for the line.

The prototype expert system presented here suggests that the expert system approach to the environmental self assessment of sub-transmission lines is feasible. However, the system will require refinement before it can be used. With expansion and refinement, the system will be suitable for assisting in performing environmental self assessments. The approach may also prove useful in developing environmental self-assessment process designs for other linear developments, eg. natural gas pipelines.

7.2 Recommendations

The expert system approach appears to be suited to performing the above-mentioned phases of environmental self assessment. However, the system should be refined to enhance its usefulness. The following recommendations will improve the prototype.

- I. Expand the system to include the planning phase of the environmental self assessment process.

The current prototype is capable of assisting the user with anticipating agency concerns and obtaining any necessary or desirable approvals or endorsements. Future expert system development should be focused on the other phases of environmental self assessment. A route planning tool that would assist with the second and third phases of the environmental self assessment would be the next step. Such a system would include the use of Geographic Information Systems (GIS) that would

assist the user in planning the route (phase 3) and examining the environmental, socio-economic, and technical factors in the potential development area (phase 2). Based on the land cover and land use areas the new line would cross, the system would identify the environmental, socio-economic, and technical factors that would need to be addressed. The system would identify issues and concerns for the user in the very earliest stages of planning.

2. Include the information evaluation phases of the environmental self assessment process in an expert system.

A further expansion of the system would concentrate assisting the user with the phases of the environmental self-assessment after the route planning and agency contact phases. Such a system would focus on phases six (the collection of the information required to make decisions) and seven (the evaluation of the concerns and information and the drafting of construction guidelines and recommendations). Such a system would have access to databases that contain site specific information about areas that could be traversed by development. Based on the information in these databases, some of which exist at the present time, site specific information could be obtained about the areas the development would affect. Based on this information, standard construction guidelines and recommendation would be outlined. For example, if the user indicated that the sub-transmission line would cross or pass within a certain preset distance of a stream, the system would obtain information about that particular stream crossing or approach from the databases to which it had access. Based on the rules in its knowledge base, the expert system would then generate construction guidelines and recommendations. An specific example would be: if the development were to cross a stream that was known to contain a fish species with a critical breeding or spawning season, the system would recommend that construction be restricted during this critical period. Although complex or unique situations would require the detailed attention of experts, the system could assist the user with many standard situations.

3. Develop a working environmental self assessment expert system for sub-transmission line development the agricultural regions of Manitoba.

The system developed in this feasibility study should be used as a starting point for an enhanced system that is not restricted to any one specific region of the province. Such a system would include modules concerned with natural gas pipelines, cable television systems, and other

wildlife considerations. Expanding and refining the prototype should yield a workable system for performing environmental self assessments on sub-transmission lines in all of agricultural Manitoba.

4. Develop an environmental self assessment expert system for sub-transmission line development in Northern Manitoba.

Adapting the system for application in northern Manitoba would require additional knowledge collection. More information on northern issues like trapping and remote lodges would be required. However, the existing prototype would serve as a useful starting point for such a project.

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Appendix A

This appendix is based on Manitoba Hydro's Transmission Line Construction Practices - General Environmental Protection Measures as referenced above.

General Management

1. Project specifications, guidelines, licences, and permits must be obtained prior to commencement of construction. All project participants are to be familiar with these documents.

Clearing

2. Timber removal on Crown Lands will be conducted in accordance with Department of Natural Resources "Forest Damage Appraisal and Valuation" Policy. Special clearing and timber disposal conditions may be issued for a specific project. On private land clearing conditions will be negotiated with the landowner.
3. Vegetation will be removed by mechanical means except where hand clearing is stipulated. Chemical vegetation control will not be carried out during construction clearing.
4. Machine clearing shall remove trees and bush with minimal disturbance to existing organic cover using "V" blades, "K-G" blades and other acceptable means.
5. Buffer zones shall be maintained between construction areas and natural waterbodies. Any modification to recommended buffer zones will only be made with the consent of the Natural Resources Officer (NRO) i.e.:
 - Skidders or clearing equipment are not allowed within a minimum of 15 metres of the high water mark except to allow temporary access across a stream or other waterbody.
 - Trees are not to be felled into streams.
 - Trees on the immediate bank, except those overhanging the stream, are not to be cut.
 - Slash is not to be left in buffer zone within 15 metres of the high water mark.
 - All slash landing in stream is to be removed by hand.
6. If any artifact or material is found which has heritage value, work activities shall be halted and the Senior Field Authority advised.
7. ROW clearing should be limited to areas required for the safe and reliable conditions required for construction, operation, and maintenance of the line.

8. Areas requiring hand clearing i.e. buffer zones, sensitive areas - shall be marked during the centreline survey.
9. Timber from the ROW on Crown Land should be made available to local residents prior to construction.
10. Slash is to be cut, piled and burned, or disposed of as specified in work permits.
11. Danger trees outside of the ROW are to be identified by the Senior Field Authority and appropriate action taken.

Borrow Pits

12. Borrow pits shall be located as close to existing facilities as possible. A buffer of natural vegetation will be left between access roads and borrow pits.
13. Borrow pits shall not be located within 100 metres of stream bands or steep slopes unless a specific exemption is provided by the local Natural Resources Officer.
14. During development, borrow pits shall be monitored for the presence of historic or heritage material. If found, the Senior Field Authority shall be contacted immediately.
15. Worked out pits shall be let with maximum 4:1 (horizontal-vertical) wall slopes. Slash and soil cover are to be replaced on pit slopes and bottoms after borrow material has been removed to encourage re-vegetation.
16. Access permission will be procured from the landowner or administrative authority prior to the commencement of construction.
17. Where possible, vehicle and machinery traffic is to be limited to the Right-of-Way.
18. Existing all weather roads/trails are to be utilized whenever possible.
19. If new access roads are developed outside the ROW, care shall be taken to avoid locally sensitive/significant features. Prior approval of the NRO is required.
20. In areas of steep slopes, susceptible to erosion, special consideration shall be given to directing run-off away from disturbed areas. Some vegetation, slash or snow covering should be maintained to protect the soil and overburden.
21. Access road grades should not exceed 12%. Grades near waterbodies should not exceed 5%. This gradient may be achieved through the use of snow/log ramps.
22. Ice and snow bridges developed for stream crossings are to be removed prior to spring break-up.

Marshaling Yards

Temporary marshaling yards are used mainly for the storage of materials. However, they are also used for packaging and repackaging materials for delivery to work sites; equipment assembly; storage and servicing of transport and work machinery and for miscellaneous work operations such as carpentry and welding.

Remote temporary storage sites away from main marshaling yards and camps will require similar types of environmental protection measures and should be located to minimize potential environmental impacts:

23. The site shall be located at least 30 metres from any watercourse unless otherwise authorized by Manitoba Hydro.
24. The site should be of low value with respect to its potential for other uses when compared to other lands in the area.
25. Minimizing the area cleared for storage will reduce costs, minimize wildlife habitat loss and decrease the potential for erosion, especially in slopes and stream approaches. The best location for storage sites are natural openings that will not require additional clearing. Minimize surface disruption and where possible low shrub and ground vegetation should be kept intact. Salvage timber should be limbed, bucked and stacked near the site.
26. Topsoil and organic materials should be removed during site preparation and stockpiled to be respread over the disturbed area following its use for storage of poles.
27. During the summer construction periods, storage areas should be located on soil types resistant to severe compaction, where possible. In the northern part of the province, permafrost soils are of the greatest concern. On the other hand, low permeability soils are preferred as storage sites to minimize chemical migration into the water table.

Poles should be stored in an elevated pile (on cross beams or pole ramps) to avoid direct contact with the ground, thereby minimizing the area of treated materials in direct contact with the soil.

28. Revegetation may be required in disturbed areas to:
 - a) stabilize erodible soils
 - b) create or wildlife habitat
 - c) prevent or delay the invasion of unwanted plant species; or
 - d) to enhance or restore the aesthetic appeal of an area.

These sites will be specifically identified as requiring special treatment.

otherwise natural revegetation will be allowed to occur.

29. Marshaling yards and temporary storage sites are to be identified to local Natural Resources officials prior to use. Site preparation, operating and remediation procedures as well as emergency action plans are to be provided. Regular visual inspections by the Environmental Protection Officer should be conducted during the construction (storage) period. A final inspection should be conducted with the appropriate regulatory authority or private landowner and at the appropriate time of year to ensure reclamation methods have been successful.

Material Handling and Storage

Site specific clean-up requirements often cannot be identified in advance of construction.

The extent of clean-up activity required will be decided by the environmental inspector in accordance with applicable permits, regulations and internal standards.

30. Fuel, lubricants and other potentially hazardous materials shall be stored and handled within dedicated areas at work camps and marshaling yards in full compliance with regulatory requirements.
31. Dedicated areas shall provide natural containment and facilitate clean up through measures such as:
 - maximum separation from sensitive features;
 - clear identification of the materials present;
 - access restricted to authorized vehicles only;
 - bermed storage areas;
 - double walled tanks; and
 - dedicated spill response equipment.
32. Products transferred from storage areas to specific work sites shall not exceed the daily requirement, 100 gallon fuel tanks mounted in truck boxes are exempted.
33. All containers are to be inspected daily. Product inventory is to be taken daily and retained for inspection upon request, 100 gallon fuel tanks mounted in truck boxes included.
34. The senior field authority or his designate is to be assigned responsibility of Emergency Response Coordinator in event of a spill.
35. Materials required for spill containment and clean up shall be on-site.
36. In the event of a spill:

The on-site Emergency Response Coordinator shall be notified immediately and action taken to contain the spill.

if the spill exceed 10 litres, or if stipulated quantities of other controlled substances are spilled the local Natural Resources Officer and the Manitoba Hydro Safety and Occupational Health Division are to be notified.

Manitoba Environment (945-4888) and Environment Canada (981-7111 or (403) 468-8020 after working hours) are to be notified if more than 68 litres of hydro carbon product is spilled.

37. A permit is required from Manitoba Environment for handling and storage of fuel products. 100 gallon fuel tanks mounted in truck boxes are exempted.
38. All contractors must be aware of Manitoba Hydro's spill response procedure and adherence thereto must be a condition of their contracts.
39. Site clean-up and disposal of contaminated material shall be as directed by the Emergency Response Coordinator.
40. General clean up in storage areas and sites where incidental spillage occurs will be in accordance with regulatory standards. All soil is to be remediated or disposed in a manner approved by regulatory authorities and Manitoba Hydro.

Waste Management

41. The work site is to be kept tidy at all times with construction and personal waste collected for proper disposal. Garbage is to be cleaned up so that wildlife is not attracted to work sites.
42. Indiscriminate burning, dumping, littering or abandonment is not to take place.
43. Before commencement of the work, protocols for containment, transport and disposal of wastes are to be developed and approved by local and provincial authorities including Manitoba Environment, Manitoba Department of Natural Resources and the local LGD or Municipality.
44. Manitoba Hydro's system for recycling waste oils and other materials shall be accessible to contractors.
45. Waste materials shall not be used as starter fuel for burning slash.
46. Opportunities for waste reduction, material reuse or recycling should be identified and a program developed for same if economically possible.

Wildlife

- 47. Stream crossings will be constructed and removed in accordance with "Recommended Fish Protection for Stream Crossings in Manitoba" and "Recommended Buffer Zones for Protecting Fish Resources in Lakes and Streams in Forest Cutting Areas". The publication "Stream Analysis and Fish Habitat Design" by Newbury and Gaboury is recommended as a technical reference. Also recommended is "Southern Region Operations Forest Management Good Housekeeping Manual" prepared by the Department of Natural Resources.
- 48. Wildlife and domestic livestock are not to be fed or harassed.
- 49. Nuisance wildlife are to be referred to the Natural Resources Officer.
- 50. Trees containing large nests of sticks and active dens or burrows are to be identified. Mitigation may be required to preserve important species of birds and animals and the ROW may have to be adjusted.

Safety

- 51. Public and employee safety is of paramount importance at all times. Employees and contractors employed by Manitoba Hydro must adhere to Corporate Safety Procedures at all times.

Regulatory Requirements

- 52. Manitoba Hydro demands that staff and contractors comply with all regulatory requirements relating to the construction and operation of its projects and facilities. General regulatory information is contained in the document "A Guide to Federal and Provincial Environmental Legislation Relating to Manitoba Hydro's Projects" available from the Environmental Planning Division and by other applicable Guidelines, Standards and Codes of Practice referenced in this Env.PP. Specific regulatory requirements for this project will be contained in the Natural Resources Work Permit(s) issued for the project.

Environmental Protection Measures for Construction in Urban Environments

Construction in an urban area has potential for disturbance to private property and public activities. Project scheduling and logistics planning can minimize the effects of construction.

- U1. Municipal and local protocols and bylaws will be observed. Appropriate methods will be applied to comply with regulatory standards during construction and operation of facilities.
- U2. In built-up areas and other areas where noise and vibration may create undue stress, work will be limited to daylight hours in accordance with local noise by-laws.
- U3. Mud and dust will be managed in a manner which will ensure safe, continuous public activities near construction sites.

- U4. Construction methods and timing will be designed to minimize traffic disruption. Equipment and materials will be operated and stored in secure designated areas at job sites to ensure public safety.
- U5. Every effort will be made to ensure that construction activities and equipment do not impact upon neighbouring properties, structures and operation. Appearance and general aesthetics of construction areas will be considered during the construction planning process. In the short term, hoarding may be required at specific sites for public safety reasons and to mask the appearance of specific construction activities.
- U6. Linear access and site lines will be avoided where reasonable when crossing public roads/traffic lanes.
- U7. Vegetation screens and buffers using natural or planted vegetation will be incorporated into the designs for facilities. Topsoil will be added to access roads and construction pads upon abandonment of the sites.
- U8. Disturbance to heritage resource sites and green spaces will be avoided. When facilities are located adjacent to such sites, measures will be designed to make facilities less obtrusive.

Environmental Protection Measures for Agricultural Lands

Agricultural practices have altered the natural characteristics of the landscape and have become the prevalent environmental feature in Southern Manitoba. The construction, operation and decommissioning of Manitoba Hydro facilities should be carried out in a manner which will minimize disruption to agricultural practices. Particular care should be taken to avoid further perturbation to identified isolated natural ecosites and patches of connecting habitats created by the construction of rights-of-way.

Above all, agreements with landowners on private lands and Provincial Crown Lands is essential to determine their preferences for site selection and construction access.

The following general guidelines for agricultural lands are consistent with current land use policies set out by regulatory agencies and Manitoba Hydro Transmission Line Construction Practices.

Access Roads

1. Routes will be developed to minimize disruption to:
 - stream crossing
 - drainage ditches
 - soils with low bearing capacity

- sensitive biological areas
 - cultural and historic resources
 - farming practices and crops
2. Route design will be sanctioned by the landowner.
 3. Existing access on and off the Right-of-Way will be utilized where possible. Access routes will be mapped on a Right-of-Way development plan. Vehicles will be restricted to those routes.
 4. Roads constructed across all cultivated agricultural land will be temporary as negotiated in advance between the property owner and Manitoba Hydro. Site traffic will be minimized. Access roads will be located along existing traffic routes where possible. Construction equipment with soft tracks and low ground bearing capacity will be used where and when appropriate.
 5. Where possible, construction access should be completed along sections of a Right-of-Way during frozen or dry conditions. The construction of rock or gravel access roads will be avoided. Snow should be plowed or compacted to drive the frost into the ground.
 6. Construction activities may be scheduled to recognize in order of priority:
 - areas designated for winter construction only
 - seasonal agricultural practice
 - areas susceptible to rutting
 - steep slopes (>10%)
 - all other areas including wet woodlots and wetlands

Appropriate measures will be taken to minimize negative impacts to agricultural lands during frost free and wet periods.

Access agreements and releases upon completion of the project require the landowner's signature.

Stream Crossings

In Addition to the guidelines provided by provincial regulatory authorities in "Recommended Fish Protection Procedures for Stream Crossings in Manitoba" the following measures will be implemented. The Senior Field Authority will be familiar with the specific legislation regarding natural and man-made waterways and their management in agro Manitoba.

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7. Access routes to construction sites will avoid stream crossings where possible.
8. Where crossing is necessary the crossing type and design will be specified in the Right-of-Way Development Plan. Consultation with the local Natural Resource Officer should ensue and appropriate approvals regarding crossing sensitive streams obtained. The type of stream crossing design will be determined by site inspection.
9. Necessary crossings of streams will be designed to protect the stream bed and banks, to minimize clearing of riparian vegetation, to prevent disruption to normal drainage patterns and to minimize interference to fish passage.
10. Cover crops will be established (seeded/planted and then monitored to ensure success) on disturbed areas as soon as possible after a permanent stream crossing is installed.

Wetlands

Wetland habitat conservation in agricultural areas throughout Canada is of increasing importance. All wetlands are critical to ensuring the long term well being of waterfowl populations. Five major classes of wetlands in natural basins are recognized on the basis of ecological differentiation according to Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. The classes are designated as follows:

- Class I Ephemeral Ponds
- Class II Temporary Ponds
- Class III Seasonal Ponds and Lakes
- Class IV Semipermanent Ponds and Lakes
- Class V Permanent Ponds and Lakes

11. Where possible tower construction in wetlands should be avoided.
12. Tower placement, conductor sag and line marking will be considered a means by which to minimize bird strikes on conductors particularly in areas that experience unusual or prolonged inclement weather conditions.
13. Construction and access through wetlands should be planned for periods when critical life functions of waterfowl are not affected; i.e. late fall and winter.
14. Equalizing culverts, approved by water resource managers, will be provided on a temporary/permanent basis where natural and man-made drainage is disrupted.
15. Where a tower must be placed in a wetland only approved non-polluting materials will be used.

Erosion and Sedimentation Control

Several other sections of these construction practices make reference to erosion and sedimentation control specific to construction activities. In addition to these sections the following practices will be adhered to:

16. All dewatering of excavations and depression will be directed away from watercourses.
17. Contaminated dewatered materials will be filtered through rock containment or silt fences; or removed in a dewatering truck. The Environmental Protection & Codes Department of Manitoba Hydro should be contacted for instruction as to site specific actions. Bentonite and any other filtered materials will be removed to an approved disposal site.
18. Where topsoil is stripped from a worksite, it will be stockpiled in a location where natural drainage will not be impeded. If appropriate to the particular facility design it will be replaced upon completion of construction activities. When its not appropriate to replace topsoil disposal, arrangements will be made with the landowner as a first option.
19. Top-soil and sub-soil will be segregated for re-use in construction site reclamation. Fertilizers may be added to the soil to replace lost fertility.
20. Where construction sites are located in floodplains, near wetlands or adjacent to streams, excess excavated soils will be removed to high ground on the Right-of-Way. The disposal area will be graded and seeded. If a suitable location cannot be located or if the spoil is contaminated it will be removed to an approved disposal site.
21. Water used to clean concrete trucks, chutes and mixers will not be allowed to enter any surface waters directly. Such wash waters should be percolated through the soil after hardened concrete has been removed to reduce lime concentrations.

Where there is potential for heavy run-off, berm construction and diversion channels may be necessary to retain such waters to allow time for percolation.

22. Where tower sites are located on slopes and/or in proximity to water courses some method of sedimentation control will be provided. Included in the options are:
 - straw mulching and seeding
 - erosion control blanket and seeding
 - straw bale containment dam
 - silt fence

23. Where such measures are employed, sites should be monitored and the effectiveness of the measures documented.

Definition: A windbreak is a linear grouping of natural or planted trees which reduces the effects of excessive wind speed; i.e. curbs soil erosion.

Where an existing windbreak is cleared entirely or a gap is created in a windbreak it will be re-established in a location compatible with local farming practices. Selection of species will be made in cooperation with the landowner. PFRA provides guidelines for shelterbelt design and species.

Drainage Protection

24. Drainage ditch and tile locations will be plotted on Right-of-Way Development Plans. Crossing locations will be reviewed in the field and verified with the property owner or in the case of Crown Lands with the appropriate regulatory authority.
25. Drainage ditches, field tiles and other in-ground water control structures will be avoided or protected. Protection options include the following:
- crossing under frozen conditions only
 - construction of access roads
 - ramping drains with filter fabric and granular material
 - timber mats, corduroy or steel plates over the structure of concern.
26. If damaged, drainage structures will be repaired immediately or well in advance of spring run-off in the case of winter construction schedules.
- Where drainage damage is indicated (i.e. water ponding, rutting) damage locations will be documented. Temporary restoration if possible; will be undertaken during construction. Otherwise final repair will be scheduled following completion of construction.
27. The Senior Field Authority will modify site construction work:
- when ground conditions are such that no effective construction practice will prevent irreparable damage caused by severe rutting resulting in:
 - increase in erosion and sedimentation potential.
 - destroying soil structure and channeling runoff.
 - soil mixing resulting in reduced fertility.
 - when a property owner has expressed concern about construction practices during wet conditions.

Vegetation Management

28. All vegetation removal, planting and maintenance will be carried out with the approval of the landowner. In most instances, vegetation management will be undertaken by the landowner under agreement with Manitoba Hydro. Manitoba Hydro may provide relevant information and technical advice when requested.

Security and Safety

29. Landowners will be advised (in advance of construction entry) of the timing, duration and nature of activities to be conducted on their property.
30. At all times during construction and maintenance of transmission lines, care will be taken to ensure the safety of livestock and rural residents. Excavation, material stockpiles and equipment will be clearly marked, maintained and isolated to avoid injury to livestock or interference with normal farming activities. Pasture gates will be closed and fences maintained.
31. Fences will be grounded in accordance with Manitoba Hydro Standards as described on Manitoba Hydro Drawing 1-34000-DC56800-001.

Electric and Magnetic Effects

In the last 10 to 15 years many studies on electric and magnetic fields have been completed worldwide. Some studies have shown certain biological responses. Some have indicated a possible association between electric and magnetic fields and human health effects while others have not.

The general consensus of the worldwide scientific community is that a public health risk from exposure to these fields has not been established.

Thus, while Manitoba Hydro is sensitive to public concerns regarding possible health effects from electric and magnetic fields, there is at present no scientific evidence to justify modification of existing practices or facilities for the generation, transmission and distribution of electricity. Federal and provincial health officials hold the same view.

Manitoba Hydro has undertaken the following actions to develop and maintain a reliable technical information data base upon which decisions can be made to ensure the safety of the public and employees:

- a. respond to enquiries and concerns from the public and employees;
- b. monitor worldwide research programs on electric and magnetic fields;
- c. participate in and support on-going health and safety research on local, national and international levels; and

- d. maintain active communications and make technical information available to interested parties, including the public and agencies responsible for public health and the environment.

Vegetation Management

Vegetation Management and Weed Control: Combinations of physical, chemical and biological control techniques for vegetation management will be developed and monitored.

Alternative techniques include the following:

- Hand Cutting utilizes chainsaws, brushsaws, axes, or brushhooks. Where local conditions and factors permit, all hand-cut deciduous trees should be stump-treated with an approved herbicide to prevent re-growth. Hand-cut areas that do not receive stump treatment will require a future action plan to address the re-growth.
- Mechanical Cutting is used when dense tree growth occurs on the Right-of-Way and tree growth has exceeded 2.5 m in height. The technique requires follow up within two years to manage the profuse suckering that occurs from most deciduous species.
- Winter Shearing is used in the winter on frozen ground. A tracked vehicle equipped with a "V" or "K-G" blade is used to remove dense tree growth exceeding 2.5 m in height. The method shears the off tree growth just above the ground surface in order to minimize environmental damage and disturbance to the important organic layer of surface soil usually present.
- Herbicide Treatment is used to control and reduce tree problems on a long term basis and as a follow-up action to previous tree removal work. All herbicide applications will be completed and supervised by licenced applicators and in accordance with a Pesticide Use Permit. Herbicide rates will be established by Manitoba Hydro's Chief Forester, Regional Services. Only herbicides which have been identified in the Pesticide Use Permit will be used.

Several methods of herbicide applications have been approved. Broadcast stem/foliar application equipment, used for tree heights of 2.5 m or less, includes droplet applicators (such as Radiarc and Vecta-Spray sprayers) and hose and handguns. Selective stem/foliar applications are made with hose and handgun sprayers and are the preferred method (for environmental, aesthetic and cost reasons) for tree heights of 2.5 metres or less. Basal treatment applications are made with hand-held equipment to direct a low pressure spray to the lower 45 cm of tree stem to root collar. This can be done at any time of

year and on trees over 2.5 m in height (subject to aesthetic considerations) and is used to maximize selectivity of treatment for environmental or aesthetic reasons. Stump treatment is used following hand-cutting whenever practical - to provide selective control of suckering for deciduous tree species and to minimize effects on desirable vegetation. Tree injection techniques (Hypohatchet, Ezject, and hack and squirt) may be used on trees over 2.5 m in height, subject to aesthetic impact considerations.

- Biological Control practices include the encouragement of competing plant species, enhancement and maintenance of desirable plant species, planting of desirable species, encouraging wildlife use and encouraging secondary use of rights-of-way.

Weed control on the Right-of-Way will be required for regulatory (e.g., Manitoba Noxious Weeds Act), operations and safety reasons. In agricultural areas continued cultivation of the Right-of-Way will reduce the need for weed control. Alternative techniques for the uncultivated portions of the Right-of-Way will include:

- Mowing is effective when conducted two or three times per growing season (prior to seed set to prevent spreading). This technique encourages grass growth and can, after several years, eliminate weed sources.
- Herbicide Spraying is the most effective way to control weed growth on rights-of-way. Equipment includes backpack sprayers, hand spreaders, truck-mounted power sprayers equipped with a broadcast applicator system, and hose and handgun, estate sprayers and ATC (all-terrain cycle) mounted power sprayers.
- Biological Control through the use of insects can be used to control certain weed species in specific Right-of-Way locations.

Weed control in cultivated and uncultivated areas of the Right-of-Way involve activity both by land owners and by Manitoba Hydro. Prior to any vegetation management work on private land, permission will be obtained from the appropriate landowner or authority. On Crown Lands, a work permit issued under the Manitoba Forest Act is required, and adjacent landowners are notified in advance. Manitoba Hydro's Regional Services Department will coordinate necessary approvals and is responsible for obtaining necessary Pesticide Use Permits and submitting Post Seasonal Control Reports as per Manitoba Regulation 94-88R under the Noxious Weeds Act. Any complaints respecting vegetation management are subject to a corporate procedure directive: copies of complaints must be attached to Post Seasonal Control Reports.

Appendix B

This guidelines have been adapted from Department of Fisheries and Oceans Guidelines: Fish Habitat Protection Guidelines - Overhead Powerlines, and Fish Habitat Protection Guidelines - Sand and Gravel Pits.

1. Borrow Pits

1.1 Planning and Site Selection

1.1.1 Groundwater Management

- Pits must be situated such that they do not draw down adjacent wetlands and watercourses. Hydrologists and hydraulic engineers should be consulted.
- If dewatering is required the settling pond should be larger enough to hold water from the operation and from precipitation and runoff. Sediments must be given time to settle out before water can be discharged into the surrounding waters.

1.1.2 Erosion Control

- Removal of rocks, gravel, or sand below the high water line of watercourses that can support fish or are connected to watercourses that can support fish is prohibited.
- A 90 metre buffer should be left between the pit and adjacent watercourses. Vegetation in this buffer should not be disturbed unless required for stream crossings or water intakes.
- Access road placement in hilly areas must not lead to erosion and runoff.

1.1.3 Pit Restoration

- In the planning stage, consider the post project restoration possibilities. Restoration information is available in *Rehabilitation of Pits and Quarries for fish and Wildlife* (Michalski et al., 1987) and *Aquaculture in Saskatchewan: Dugouts and Ponds* (Saskatchewan Parks and Renewable Resources, 1988).

1.2 Construction and Operation

1.2.1 Groundwater Flow Management

- Excavations should occur 1 metre above the maximum level of the water table.
- Water from dewatering should be directed into settling pond, and only released when clear. For water with suspended sediment loads of less than 100 mg/L, suspended sediment load of discharged water must not be more than 10 mg/L greater than background level. For water

with background values over 100 mg/L, discharged water loads must not exceed background by more than 10 %.

- Settling ponds should not be in contact with the groundwater.

1.2.2 Erosion Control

- Removal of vegetation and exposure of ground should be minimised. The boundaries of the work area should be staked and flagged to prevent unnecessary clearing.
- When erosion is likely, overburden should only be removed from the area that is to be excavated that year.
 - Topsoil, subsoil, and overburden should be handled separately.
 - Topsoil should be selectively removed and stored for use in rehabilitation.
- Stockpiles should be situated where they will not interfere with drainage or erode into waterbodies. Erosion of temporary stockpiles may be controlled by covering piles with polyethylene sheets or tarps or by placing silt piles at the base of the stockpiles.
 - Piles may also be seeded to reduce erosion, maintain soil health, and control weeds.
- Slash must neither obstruct drainage nor enter watercourses. Slash may windrowed, burned, buried, crushed, or shredded and stockpiled with the topsoil, or distributed over pit slopes in rehabilitation.
- Should flooding occur, pumped or drained water should not be released at the tops of slopes, or into watercourses. Water should be directed into settling ponds. Should runoff occur down a slope, silt fences, straw bales, or earth berms may be used to control erosion.

1.3 Decommissioning

- Pit slopes should be graded to provide slope stability. A 4:1 slope (4 horizontal: 1 vertical) is recommended. The contours should blend into the landscape. Pit slopes draining toward watercourses should be as flat as possible. Slopes should be revegetated as soon as possible. Decommissioning should be complete within three years of the end of excavation.
- Sand and 90 metre buffer should be left between watercourses and sand and gravel washing operations.
- Water removals from the watercourse must not reduce flow to levels that may degrade fish habitat. Consult with provincial Fisheries Biologist for ruling. Alternate water sources may be required.

1.4 Gravel Washing

1.4.1 Planning and Site Selection

- Sediment laden water must not be discharged into watercourses. Settling pond should be used. Clarified water from settling ponds should be reused to reduce the quantity of water that must be removed from the watercourse. Released water must meet provincial water quality standards.

1.4.2 Operation and Maintenance

- Water intakes and screens should not be placed in areas of good fish habitat. Screens should be located as deep as possible to minimize exposure to small fish. However screens must be situated 30 cm above the watercourse bed to prevent the entrapment of fish eggs and larvae.
- For water with suspended sediment loads of less than 100 mg/L, suspended sediment load of discharged water must not be more than 10 mg/L greater than background level. For water with background values over 100 mg/L, discharged water loads must not exceed background by more than 10 %.

2. Construction Waste Considerations

- Project sites should be inspected daily and lubricants, fuels and wastes should be disposed of properly. Spill containment codes of practice should be followed.
- Fuel caches, fuelling, and lubricating should be conducted outside of the buffer zones.
- Care must be taken to prevent construction materials, and other toxins from flowing into the watercourse.
- Equipment must not be washed where runoff will flow into the watercourse. If necessary, settling ponds should be employed. For water with suspended sediment loads of less than 100 mg/L, suspended sediment load of discharged water must not be more than 10 mg/L greater than background level. For water with background values over 100 mg/L, discharged water loads must not exceed background by more than 10 %.

3. DFO Clearing Recommendations

3.1 General Clearing Guidelines

5. Conduct clearing in winter whenever possible.
6. Reservations, or buffers, of undisturbed vegetation are required between the ROW and the

waterbodies to protect aquatic life. The following minimum buffers should be observed except when crossing.

- 90 metres for watercourses capable of supporting permanent fish populations.
- 30 metres for watercourses capable of supporting seasonal fish populations.
- 15 metres for watercourses not capable of supporting fish populations.

1. Clear buffers by hand clearing or with feller bunchers.
2. Avoid side-hill cuts and slope clearing that might cause slope failure and create erosion.
3. Fell danger trees away from the watercourse.
4. Winch any trees that do fall into the watercourse out the watercourse and remove all slash immediately.
5. Retain all stream bed vegetation that does not interfere with transmission line operations.
6. If the cleared material is chipped, place the chips where they will not be washed into the watercourse.
7. Cleared areas should be revegetated with shrubs and grasses as soon as possible.

3.2 Buffers

- Maintain the required buffer zones between ROW and watercourse except when crossing.
 - Vegetation in the buffer zone should not be disturbed. If safety concerns dictate that trees must be removed then:
 - 1) Conduct clearing in winter whenever possible.
 - 2) Retain all stream bed vegetation that does not interfere with transmission line operations.
 - 3) Avoid side-hill cuts and slope clearing that might cause slope failure and create erosion.
 - 4) Clear buffers by hand clearing or with feller bunchers.
 - 5) Fell danger trees away from the watercourse.
 - 6) Winch any trees that do fall into the watercourse out the watercourse and remove all slash immediately.
 - 7) If the cleared material is chipped, place the chips where they will not be washed into the watercourse.
 - 8) Cleared areas should be revegetated with shrubs and grasses as soon as possible.
- (Saskatchewan Environment and Resource Management and Federal Department of Fisheries and Oceans, 1995).

4. DFO Transmission Line Construction Guidelines

- Winter construction is preferable.
- Construction equipment should use existing stream crossings.
- Structures should not be placed below the high water line of the watercourse.
- In wet areas, wood poles may be set in augured holes and supported by cross pieces at ground level.. Timber mats, timber cribs, and stone filled galvanised containers may also be used.
- Poles placed in wet or flood prone areas should not be treated with creosote or PCP (Pentachlorophenol). CCA, ACA, ACC treated or untreated poles are acceptable.
- Installation equipment working in wet areas should use a working pad of clean gravel.
(Saskatchewan Environment and Resource Management and Federal Department of Fisheries and Oceans, 1995)

Appendix C

In order to test PREASES 1.0, a case study of a hypothetical sub-transmission line was performed. The actual output produced by the prototype is reproduced in full as it was generated by the system. Information about the case study is available in Chapter Six of the preceding report.

PREASES Ver 1.0

The approvals component will advise you on what type of approvals are necessary to construct this particular sub-transmission line.

Press any key to begin

The following procedures are recommended

Navig 1 CNF 100

Mines 1 CNF 100

Rural Dev 1 CNF 100

Highways 2 CNF 100

MTS 2 CNF 100

Indian 1 CNF 100

Federal 1 CNF 100

Nothing CNF 100

Prov Env2 CNF 100

Municipal 3 CNF 100

Historic 1 CNF 100

Wild 2 CNF 100

Lands 2 CNF 100

Parks 1 CNF 100

Rail 2 CNF 100

Water Res 1 CNF 100

Fisheries 1 CNF 100

Forest 3 CNF 100.

Press any key to display recommendations.

System Information

This section contains the information modules that will assist the user with the agency contact and agency concerns phases of the environmental self assessment. The user's responses and the preceding rules are used to determine which of the following sections will be displayed for each specific case.

Press any Key to Continue

The following sub-sections outline this information. Each agency is listed separately, and sub-sections provide: contact information; agency approval or endorsement procedures; the information that the agency will require; common concerns that the agency may have; suggestions by which these concerns may be addressed; and in some cases, Manitoba Hydro or Department of Fisheries and Oceans (DFO) recommended construction practices. The user will also be supplied with some general information about the importance of these issues.

Press any Key to Continue

General Description

The Policy Coordination Branch of the Department of Natural Resources is responsible for distributing proposed project information from the proponent to the various branches of the Department. The Policy Coordination Branch also will provide the proponent with a consolidated departmental response.

Press any Key to Continue

Endorsement Procedure

Contact the Policy Coordination Branch of the Department of Natural Resources (Address: PO Box 38, 200 Saulteax, Winnipeg, MB, R3J 3V3. Phone (204) 945-6658. Contact Person:

Director, Policy Coordination Branch) and supply them with ten (10) copies of a screening report (Baker, G., Director, Policy Coordination Branch, Personal Communication, 1995). This report should include:

The proposed location of the line.

A brief description of the need for the new line.

Press any Key to Continue

A brief description of the type of line. e.g. single pole with a cross arm to support insulators and conductors.

A description of the study area, complete with maps.

If any of the line is to be constructed within road allowances, this fact should be noted.

A brief description of how Manitoba Hydro plans to acquire the right to develop Crown Land, e.g. by easement, Crown Land reservation, etc.

A brief description of how Manitoba Hydro plans to acquire the right to develop private land, e.g. by easement, etc.

The name and contact information of the Manitoba Hydro contact person.

Press any Key to Continue

This screening report will then be circulated to each branch of the Department as well as to the regional offices for review and comment. A consolidated response from the Department will then be forwarded to the Manitoba Hydro contact person by the Policy Coordination Branch.

Press any Key to Continue

Agency Concerns

A number of concerns may be raised by the Department of Natural Resources including fisheries, forestry, wildlife issues. The Policy Co-ordination Branch may provide the proponent with a list of concerns and individuals to consult with to address these concerns. Common concerns from each branch will be dealt with under the specific section dealing with that branch.

Press any Key to Continue

General Description

The Fisheries Branch of the Department of Natural Resources and the federal Department of Fisheries and Oceans are interested in maintaining the health of fish and of aquatic ecosystems. Sub-transmission line construction and operation may be of some concern to those charged with their protection. Although proper construction practices should prevent damage, construction could disturb the shoreline and lead to erosion without such practices (Berger, 1995). This erosion could increase the amount of sediment in the water which could damage larval fish populations, and ultimately reduce the stocks of certain types of fish.

Press any Key to Continue

Endorsement Procedures - No Endorsement

With no stream crossings, fisheries are not of concern, and no endorsement is necessary.

Press any Key to Continue

Agency Concerns

Unless proper construction practices are followed, the construction and operation of sub-transmission lines can have negative effects on aquatic habitat and fish. Shoreline erosion which may be caused by improper drainage, direct disruption of the banks, or vehicle traffic in the streambed can lead to an increased amount of sediment in the watercourse. Sediment in the water can coat fish eggs and restrict the flow of oxygen to the eggs. This can reduce spawning success and fish numbers. The sediment laden water can also affect adult fish. Fish that hunt by sight, such as trout, cannot hunt as well in murky water, and may suffer losses as a result.

Press any Key to Continue

Proper construction practices that protect the shoreline and streambed from disruption, and control runoff into the watercourse, should prevent most of these negative effects.

Press any Key to Continue

Chemical contamination of the watercourses is another potential concern. Petroleum products and other chemical compounds can kill fish and other aquatic organisms. As a result, potentially damaging chemicals should be kept out of the watercourse. By keeping petroleum product storage containers away from the watercourse, and restricting the fueling of construction equipment near the stream, many of these problems can be avoided. DFO has also expressed concern about placing pentachlorophenol (penta) treated wooden poles below the high water line of the watercourse. Manitoba Hydro's practice is to use chromated copper arsenate (CCA) treated poles in and immediately adjacent to wetland and waterbody crossings.

Press any Key to Continue

Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning fisheries. These guidelines include recommendations concerning: borrow pits, access roads, marshaling yards, erosion and sedimentation control, drainage protection, wetlands management, and timber clearing adjacent to watercourses. DFO has published additional guidelines, reproduced in Appendix B. These address: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, and general transmission line construction guidelines.

Press any Key to Continue

General Description

The Forestry Branch oversees the use of forested Crown land in the Province of Manitoba. The Forestry Branch will receive a copy of the proposed project description from the Policy Coordination Branch. If the planned route will require the harvesting of timber, the Forestry Branch will require that permits be obtained. These permits will specify the ROW clearing and line construction practices that should be undertaken. When planning the line, input should be sought from the Branch. The Branch would generally prefer that high quality timber stands or high capability areas,

especially merchantable ones, be avoided whenever possible.

Press any Key to Continue

Permits Required for Merchantable Timber

The Regional Forestry Manager, and the local Natural Resources Officers should be contacted by Manitoba Hydro staff in the route planning process. Forest inventory maps will also be useful in this process. These maps may be obtained from the Forest Inventory Branch of the Department of Natural Resources (Forest Inventory Branch, Address: 200 Saulteax Cr. Winnipeg, MB, R3J 3W3, Phone: (204) 945-7957), and provide information about each forest stand. When possible contact the branch at least six months before construction is to begin to discuss permit requirements and concerns. The Branch would prefer that the merchantable timber be used. Contact the Branch to determine whether it is feasible that the timber be salvaged. If the timber can be salvaged, two scenarios are likely.

Press any Key to Continue

If the merchantable stands are included in a timber operator's FML area, then the particular timber operator should be given the option to clear the timber.

If the merchantable stands are not included in a FML area, then the wood should be made available to interested local residents.

If the timber cannot be salvaged, a fee will be assessed under the Forest Damage Appraisal and Valuation System (1995). Calculating the Forest Damage Appraisal fees should be done in consultation with Forestry Branch officials.

Press any Key to Continue

The wood should then be disposed of in a manner acceptable to local Natural Resources Officers and Manitoba Hydro. Acceptable methods include piling and burning, and chipping. Methods and details should be arranged with local Natural Resources Officers. However, wood cut along an existing ROW in a developed area will probably be used by local residents.

Press any Key to Continue

Agency Concerns

Forestry Branch officials prefer that merchantable timber be used, where feasible. If the timber cannot be used then it should be properly disposed of. The permitting procedure addresses these considerations. Forestry managers may also be concerned with the cumulative loss of forested lands. No legislative requirement exists that would require a consideration of the cumulative loss of forested lands. However, it appears that forestry managers may see the permanent removal of forested lands, especially land that might support merchantable stands, as an important consideration.

Press any Key to Continue

Forestry managers suspect that cumulative reduction of forested lands from all sources, e.g. agriculture, ROW for highways, telephone lines, and electricity transmission lines, will reduce annual allowable cuts (in the areas where merchantable timber can be grown) and could reduce the sustainability of forest ecosystems (Atkinson, J., and S. Kaczanowski, Regional Forester and Regional Forestry Manager, Personal Communication, 1995).

Although the Department of Natural Resources would prefer that a no net loss policy be observed, no policy has been established.

Press any Key to Continue
No Net Loss Policy

A No Net Loss policy is one that requires any loss to be balanced by a gain in another area. The forested land may be replanted, or contributions may be made to groups that sponsor replanting efforts. The difficulty with a No Net Loss policy is that efforts to increase the amount of forested land would necessitate the reduction of some other land cover type. If a No Net Loss policy is to be effective there must be an area of non-forested land that can be replanted without raising concerns about the loss of that non-forested land. Forestry Branch officials or local Natural Resources Officers should be contacted for further information if these concerns are raised.

Press any Key to Continue

Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning forestry and clearing practices. These include: timber removal permits, clearing methods, buffer zones, danger tree considerations, and vegetation management. The federal Department of Fisheries and Oceans has also published recommendations that may be of concern in Right-of-Way clearing. These guidelines are printed in Appendix B. They include: reservations, or buffer zones; clearing in reservations; use of herbicides; and maintenance of Rights-of-Way.

Press any Key to Continue

General Description

During initial route assessment, the Lands Branch (Address: Lands Branch, 1007 Century Ave. Winnipeg, MB, R3H 0W4. Phone: (204) 945-6616 or 123 Main St. Neepawa, MB. Phone: (204) 476-3441) will have been provided with a copy of the proposed project description by the Policy Coordination Branch. The Lands Branch oversees the use of non-forested Crown land in the Province of Manitoba. For example, leaves, or buffer zones, must be left around airstrips, and the Lands Branch is responsible for this. Depending on the route to be traversed, the Lands Branch may have comments.

Press any Key to Continue

Clearance Required

The Lands Branch is responsible for administering non-forested Crown lands. Certain areas of Crown land, e.g. leaves around airports, have certain restrictions placed on development. As the sub-transmission line in question has been identified as crossing areas with existing encumbrances, these restrictions, or encumbrances, will have to be addressed prior to the construction of the line. Lands Branch will inform Manitoba Hydro staff of the encumbrances and assist in contacting the land holder or land holders in question (Lancaster, G., Senior Winnipeg Manager, Lands Branch, Personal Communication, 1995).

Press any Key to Continue

Agency Concerns

Lands Branch may be concerned with addressing any existing encumbrances that may exist on the Crown lands that are to be crossed.

Press any Key to Continue

General Description

The Parks Branch Address: (Parks Branch, 200 Saulteax Cr., Winnipeg, MB, R3J 3W3. Phone: (204) 945-6808) of the Department of Natural Resources is responsible for the administration of provincial parks in the province. During initial route assessment, the Parks Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. If the proposed sub-transmission line is to cross a Provincial park, the Parks Branch is likely to request input into the routing and construction process.

Press any Key to Continue

Manitoba Hydro has the legal authority to construct sub-transmission lines, as well as other types of electricity transmission lines, in provincial parks. Depending on the nature, designation, and location of the park, the Parks Branch may have various concerns, including the aesthetic effects of sub-transmission line development. Efforts should be made to incorporate these concerns into the development of the sub-transmission line project.

Press any Key to Continue

No Endorsement Required

As the sub-transmission or distribution line does not pass through any Provincial parks, the Parks Branch should not have any concerns regarding the line.

Press any Key to Continue

General Information

The Water Resources Branch (Address: Water Resources Branch, 1577 Dublin Ave., Winnipeg, MB, R3E 3J5, Phone: (204) 945-6497) of the Department of Natural Resources manages the use, development, and protection of the province's surface and groundwater resources. During initial route selection and planning, the Water Resource Branch will have been provided with a copy of the proposed project description by the Policy Coordination Branch. The Water Resources Branch rarely has concerns with sub-transmission line development.

Press any Key to Continue

However, the Branch would prefer that poles not be located where they might interfere with the maintenance or future expansion of drainage ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). Efforts should be made to incorporate these concerns into sub-transmission line development.

Press any Key to Continue

No Endorsement Required

As the line will not interfere with the maintenance or

planned future expansion of any drainage systems, the Water Resources Branch should not have any concerns with the line.

Press any Key to Continue

Agency Concerns

The Water Resources Branch is concerned when sub-transmission line poles are placed in or near drainage ditches. Apparently, the poles can interfere with the drainage and the cutting of hay along the ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). The Branch would also prefer that the siting of the poles not interfere with planned or foreseen drainage ditch expansions.

Press any Key to Continue

General Information

The Wildlife Branch (Address: Wildlife Branch, 200 Saulteax Cr., Winnipeg, MB, R3J 3W3, Phone: (204) 945-7775) of the Department of Natural Resources is responsible for the administration of game and non-game species of wildlife in the province. During initial route planning, the Wildlife Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. The development of a sub-transmission line may have impacts on wildlife. Line construction and operation will turn the existing habitat from the original habitat to a (usually) shrub and grass habitat.

Press any Key to Continue

The exact effects, both positive and negative, will vary according to the habitats involved. If the proposed sub-transmission line is to cross an area of sensitive wildlife habitat, the Wildlife Branch is likely to request input into the routing and construction process. The Branch may request time of year restrictions and other forms of mitigation to reduce any negative impacts on wildlife. Attempt to incorporate these concerns into sub-transmission line development.

Press any Key to Continue

Endorsement Procedures

Since areas of significant wildlife habitat will be traversed or affected by the sub-transmission or distribution line, the Wildlife Branch may have concerns or may suggest certain construction practices to reduce the impact of the line. The Policy Coordination Branch will supply Manitoba Hydro with the contact people to consult with to resolve these problems.

Press any Key to Continue

DU Endorsement

Although Ducks Unlimited (DU) is not a agency of the Province, DU often has important information concerning the effect of developments on wildlife. Contact DU (Contact: Ducks Unlimited, P.O. Box 1160, Stonewall, MB, R0C 2Z0, Phone: (204) 467-3000) Ask DU officials whether DU will have any concerns with the proposed sub-transmission line. They are concerned with the bird strikes and the possible effects of sub-transmission development on wetlands quality (Sexton, D., Personal Communication, 1995). They would prefer that sub-transmission lines, and other electricity transmission lines, not be constructed adjacent to high quality wetlands.

Press any Key to Continue

They would also prefer that pentachlorophenol treated poles not be used in wet areas. Seek the input of DU officials if the line must pass close to wetlands. If DU has been involved in the site selection process, and their concerns have been addressed, then it is more likely that they will support the route even if some good waterfowl habitat must be crossed.

If other organizations have expressed interest or concerns over the new sub-transmission line attempt to address their concerns by mitigation or minor route adjustments.

Press any Key to Continue

Agency Concerns

The Wildlife Branch is concerned with the maintenance of wildlife and wildlife habitat. They would prefer that certain habitats and features not be disturbed. To prevent disturbance, some habitat need only be avoided at certain times of the year. Others must be avoided completely. Mitigation may be possible in some cases. Ongoing dialogue with and input the local Natural Resources Officer is an important method of determining the wildlife features that may be of concern in the local area. Some of these features may include:

Press any Key to Continue

Breeding and calving grounds. These areas are significant because disruptions in or near the areas could reduce the animal's chance of successfully breeding or bearing young. Such a disruption could reduce the numbers of young, and in time, reduce the overall population size. However, if construction is restricted in the critical months or weeks, the area may be crossed without causing problems.

Habitats for economically significant species, species that are hunted, trapped, or otherwise contribute to the local economy. Any significant reduction in the numbers of these species could also have a negative effect on the people who depend on them.

Press any Key to Continue

Habitats for rare and uncommon species. If a species is common in the local area, then, in most cases, the small habitat altered by sub-transmission line development should have little effect. However, if the species is rare, then even a small loss of significant habitat could reduce the numbers of an already small population. If the loss is serious, then the species could be eliminated from the local area. This loss could be significant. The eliminated species could have been important in the local area, and its loss could trigger other losses. Some would also see a species' extirpation as an aesthetic loss or the loss of a potential future resource. Avoid these areas or reduce the impact of crossing whenever possible.

Press any Key to Continue

Large contiguous blocks of habitat, especially if that habitat is comparatively rare in the region. Large blocks of habitat, not broken up by other habitat types are used by species intolerant of habitat edges. Some songbirds, for example, prefer contiguous habitats. Although some species prefer edges and may be positively affected by sub-transmission line development, others are negatively affected by such development.

Wetlands. Wetlands are important habitats for maintaining many species including many game species of waterfowl. Sub-transmission lines should not be located directly adjacent to wetlands to reduce the risk of birds striking the poles and conductors. Poles in wet areas should not be treated with pentachlorophenol (penta) to reduce the risk of these chemicals leaching out of the wood and damaging the local area.

Press any Key to Continue

Heron rookeries. Herons nest in trees in colonial structures known as rookeries. The presence or absence of these rookeries is an important factor determining the number of herons in a local area. The accidental destruction or disturbance of a rookery will have a serious impact on the heron population. Avoid these areas, especially when they are in use. Winter construction may reduce the impact of sub-transmission line construction.

Raptor nests (birds-of-prey, eg, eagles, ospreys). These birds tend to return to the same nest year after year, often building large distinctive nests. To avoid disrupting the birds and their young, avoid these areas when the nests are in use. Winter construction may reduce the impact of sub-transmission line construction.

Press any Key to Continue

Salt licks. Salt licks are specific sites where certain species go to obtain minerals needed in their diets. Avoid these sites so that the animals will be able to use the salt lick without being disturbed. Whenever possible, construction should only be carried out when the salt licks are not in use.

Specific sites of rare and uncommon species (eg. rare plants). Occasionally, rare species, often plants, will exist in a certain area. To avoid damaging these sites which could reduce or remove significant numbers of these species, route around these areas.

Press any Key to Continue

Other habitat types that may be important in the local area. Not all significant wildlife habitats have been covered here, and other important ones may exist in the local area. Contact the local Natural Resources office.

Other local features may be of importance. Consult with local Natural Resources Officers to determine whether this is the case in the local area.

Press any Key to Continue

Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning wildlife. These include: waste management and garbage control, wildlife treatment, important wildlife features, wetlands considerations, and vegetation management.

Press any Key to Continue

General Information

During the route selection and assessment phase, Manitoba

Hydro typically contacts the Mines Branch Address: Mines Branch, Department of Energy and Mines, 1385 Ellice Ave, Winnipeg MB, Phone: (204) 945-6546. Contact Person: Aggregate Geologist. of the Department of Energy and Mines and supplies them with a copy of the project description for review and comment. If the Branch has concerns, then consult Branch officials to resolve the issues.

Press any Key to Continue

Minimal Concerns

Since no mining operations will be affected by the sub-transmission line, Mines Branch should have no objections.

Press any Key to Continue

Agency Concerns

The Mines Branch is concerned when sub-transmission lines cross active or high quality gravel lease areas. However, if the line is routed around the area to be quarried or mined, then the Branch should not raise objections.

Press any Key to Continue

General Information

The Manitoba Department of Environment is responsible for environmental protection in the province. Power lines of less than 115 kV, including sub-transmission lines, do not generally require formal assessment.

Press any Key to Continue

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. As the development of a sub-transmission line may have impacts on the environment, the Department will informally review the proposed project. If environmental concerns are raised, then the Department will contact Manitoba Hydro with its concerns. According to the Department, concerns may be raised if the proposed line is to cross streams, significant wildlife habitats, or Provincial parks. In these cases, it is possible that the Department may request formal assessment (Blunt, B., Manitoba Environment Department, Personal Communication, 1995).

Press any Key to Continue

The Environment Department should be appraised of any significant impacts and issues. They may request time of year restrictions and other forms of mitigation to reduce any negative impacts on the environment. Efforts should be made to incorporate these concerns into sub-transmission line development.

Press any Key to Continue

Possible Formal Assessment

Although power lines of less than 115 kV or less require no formal approval, the department may request an assessment, in certain cases. In this case, since the sub-transmission or distribution line crosses streams, areas of significant to wildlife, or Provincial parks, formal assessment is possible. However, early consultation and informal endorsement from the Department should reduce the need for formal assessment.

Press any Key to Continue

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. This information should then be sent to the Land Use Approvals section of the Environment Department. The project will then be subject to an informal review by interested government departments. Should a formal provincial assessment be requested by the Environment Department, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D. (Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone (204) 474-3119).

Press any Key to Continue

Formal assessments are more likely when streams are crossed, significant wildlife habitat is affected, or parks are crossed. A formal assessment is possible in this case. To reduce the need for formal assessment, cooperate with all departmental requests and attempt to obtain an informal endorsement of the preferred route. The endorsement is likely to include conditions, such as adherence to standard environmental codes of practice, Recommended Fish Protection Procedures for Stream Crossing in Manitoba, and Timber Harvesting Practices for Forestry Operations in Manitoba (1994).

Press any Key to Continue

Agency Concerns

The Environment Department will be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff will also be of concern to environment officials. Environment officials may also be concerned with socio-economic impact of the proposed projects.

Press any Key to Continue

Construction Practices

Manitoba Hydro has published a list of general environmental protection measures (Appendix A). These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety.

Press any Key to Continue

The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines, guidelines for the planning and site selection and the construction and operation of borrow pits, and sand and gravel washing guidelines. Some or all of these guidelines may be recommended by the Department.

Press any Key to Continue

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General Information

During the initial selection and assessment phase, Manitoba Hydro will provide the Department of Highways and Transportation (Address: Department of Highways and Transportation, 215 Garry St. Winnipeg, MB) with a copy of the project description. The Department may provide comments and input, and may request additional information. Standard Manitoba Hydro practices should address most Department concerns.

Press any Key to Continue

Attempt to route sub-transmission lines where they will not interfere with present and future roadways. If concerns do arise, discuss these concerns with Departmental officials. It should be noted that not all roadways are administered by the Department of Highways. The respective municipalities should be contacted to discuss concerns relating to municipal roads. These concerns will be addressed in the municipal concerns module.

Press any Key to Continue

General Information

During the route planning and assessment process of sub-transmission lines, it is Manitoba Hydro's practice to provide the Historic Resources Branch of the Department of Culture, Heritage, and Citizenship with a description of the project to review. Historic Resources will then assess the likelihood of encountering an area of historic significance during project construction and operation. If such areas are known or suspected, then the Branch will notify Manitoba Hydro and advise that the areas be avoided or mitigation measures be applied.

Press any Key to Continue

No Endorsement Required

Since no areas of historic significance have been identified by the Historic Resources Branch as potentially affected by the proposed sub-transmission line, no further Historic Resources analysis will be required at this time. Historic Resources will generally provide a written confirmation that no historic sites will be affected by the development. However, if obvious unexpected historic sites are found in during sub-transmission line construction or operation, halt all operations in the area and contact the Historic Resources Branch immediately.

Press any Key to Continue

Agency Concerns

The Historic Resources Branch is concerned with the preservation of "...works of nature or human endeavor that have prehistoric, historic, cultural, natural, scientific, or aesthetic value." (Manitoba Historic Resources Branch, 1995) Arrowheads, fossils, and old buildings are examples of the tangible history that the Branch wishes to preserve. Historic sites are most likely to be located on areas of high ground, and along watercourses, especially at rapids and stream confluences. Development at or near these areas may concern the Branch as construction activities could damage these resources. Unless historic sites are noted and proper

mitigation applied, sub-transmission line development could threaten these sites. However, the use of Manitoba Hydro general environmental protection measures should assist in preventing damage to historic sites.

Press any Key to Continue

Construction Practices

Standard Manitoba Hydro construction practices, reproduced in Appendix A, should reduce the impact of sub-transmission line construction on historic resources. These practices regulate access road construction to reduce the risk of damaging historic sites.

Press any Key to Continue

General Information

During the route planning and assessment of sub-transmission line development, contact the Department of Rural Development (Address: Community Economic Development Branch, 20 First St. S., P.O. Box 50, Beausejour, MB, R0E 0C0, Phone: (204) 268-6058). Provide the Department with a copy of the project description for review and comment. If concerns are raised, consult with the Department.

Press any Key to Continue

Minimal Concerns

As the sub-transmission or distribution line does not cross agricultural land, Rural Development should not have any concerns with the line. Consult with the Department if other concerns are raised.

Press any Key to Continue

General Information

The Canadian Environmental Assessment Agency (CEAA) (Address: CEAA, Federal Building, 500-269 Main St., Winnipeg, MB, R3C 1B2, Phone: 984-2457) is responsible for administering the Canadian Environmental Assessment Act (CEAA). This Act and the accompanying regulations stipulate when assessments under CEAA are required and what type of assessments are required. According to the Act, a 66 kV sub transmission line will not require an assessment unless two conditions are met. If the line is to require assessment, it must not be excluded from assessment, and it must trigger the Act.

Press any Key to Continue

All non-international electricity transmission lines of less than 130 kV are automatically excluded from the Act unless: i) the line is constructed on a new Right of way (ROW); ii) the poles are placed below the high water line of a waterbody, or iii) a polluting substance might be released into a wetland that is covered by water for three consecutive months of the year (Part 3, Section 21, Exclusion list, Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). If one or more of these conditions are true, then the line may be subject to assessment.

Press any Key to Continue

Under CEAA, the most likely trigger, in the case of sub-

transmission lines, is a government decision on the Law List. The most likely cases are: i) a leave under the Railway Act; ii) an approval under the Navigable Waters Protection Act; or iii) an authorisation to harmfully alter, disrupt, or destroy fish habitat under the Fisheries Act (Annotated Law List, Policy and Regulatory Affairs, Canadian Environment Assessment Agency, 1995). The issuance of any one of these approvals qualifies as a department of the federal government issuing some form of approval before the construction can take place. If this occurs on a non-excluded line, then a federal environmental assessment known as a screening will be required.

Press any Key to Continue

No Approval Required

As the above conditions for a federal environmental assessment screening are not met, no screening will be required.

Press any Key to Continue

Agency Concerns

CEAA, as will the Manitoba Environment Department, may be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff may also be of concern to environment officials. Environment officials may also be concerned with socio-economic impacts of proposed projects.

Press any Key to Continue

Construction Practices

Should CEAA suggest recommended construction practices they are likely to be similar to ones contained in Manitoba Hydro and Department of Fisheries and Oceans guidelines. Manitoba Hydro has published general environmental protection measures for Environmental Protection (Appendix A).

Press any Key to Continue

These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety.

Press any Key to Continue

The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines, guidelines for the planning and site selection and construction and operation of borrow pits, and sand and gravel washing guidelines.

Press any Key to Continue

General Information

If the sub-transmission line could affect Indian reservations, contact Indian and Northern Affairs Canada. Obtain the Department's input in routing the line and addressing any issues and concerns that may arise. 119

Press any Key to Continue

Minimal Concerns

As the sub-transmission line does not cross any Indian reservations, Indian and Northern Affairs Canada should not have any concerns with the line.

Press any Key to Continue

General Information

If any waterways will be crossed, contact the Coast Guard in Selkirk, Manitoba (Address: PO Box 216, Selkirk, MB, R1A 2B2, Phone (204) 785-6030), during the route planning and assessment phase. If waterways will be crossed, the Coast Guard will request information concerning the exact nature of the crossing. Send them a copy of the screening report, the exact locations of the proposed crossings; the type of crossings, whether the crossing will be overhead, trenched, or tunneled; and the technical drawings of the crossings.

Press any Key to Continue

They will require that CSA (Canadian Standards Association) electrical conductor clearance standards be met (Settee, R, Coast Guard, Personal Communication, 1995). Ask whether the Navigable Waters Protection Act will apply to the watercourse or watercourses in question. If the Act applies, a permit will be required.

Press any Key to Continue

Definition: According to the Transport Canada, a permit is required for any structure crossing a navigable waterway. Although the term "navigable waterway" has no legal definition, the department considers a waterway to be navigable if it will float a vessel of any size, including canoes, in its natural state (Settee, R, Coast Guard, Personal Communication, 1995). Natural state refers to the summer low water level, in the absence of beaver dams or other water-level raising structures. Since many waterbodies might fit this definition, the safest course of action is to request a ruling on the applicability of all waterbodies.

Press any Key to Continue

No approval Required

As no navigable waters are crossed by the line, no permit under the Navigable Waters Protection Act will be required.

Press any Key to Continue

Agency Concerns

The Coast Guard may be concerned that clearances be maintained on the waterways to permit the passage of vessels. To ensure this, they will require that CSA standards be met and that permits be obtained. The projects's design specifications should meet these requirements.

Press any Key to Continue

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General Information

Sub-transmission lines are often constructed along the two foot line (0.62 m) of a municipal road allowance. According to Section 23(1) of the Manitoba Hydro Act, Manitoba Hydro has the right to place poles within the road allowance. However, the municipality should be contacted in the route selection and assessment phase of the project, and their input solicited. If concerns are raised by the municipality, discuss the issues with the reeve and councillors.

Press any Key to Continue

Possible Municipal Concerns

As the sub-transmission line will be located in a 66 foot (20.1 metre) road allowance, the municipality may express concerns. Construction of a sub-transmission line on the two foot line (0.62 metre) of a 66 foot road allowance may cause ditch maintenance problems for the municipality. According to the municipality, if the sub-transmission line is located so close to the ditch, it can be difficult to avoid damaging the line during routine maintenance.

Press any Key to Continue

As a result, it has been suggested that, when a pole is damaged, the municipality not pay the full replacement cost but a depreciated cost based on the age of the pole structure (Steiner, D., Reeve of Whitemouth Municipality, Personal Communication, 1995). Manitoba Hydro staff should be prepared to respond to this argument should it be raised. Further dialogue with the municipality may be required if these concerns are raised.

Press any Key to Continue

Agency Concerns

The municipality's concern is that the presence of the sub-transmission line may interfere with municipal operations, specifically with ditch maintenance. Construction of a line along a 66 foot (20.1 m) road allowance, apparently means that the ditch and sub-transmission line are located close together. Because the ditch and line are so close together, poles are occasionally damaged as the ditches are being cleared. As a result, the municipality may request that lines be constructed along 99 foot (30.2m) road allowances or that the municipality not pay the full replacement fee for damaged poles. Dialogue with the municipality should be pursued.

Press any Key to Continue

General Information

During the route selection and assessment phase of sub-transmission line development, Manitoba Hydro practice is to supply the Manitoba Telephone System (MTS) with a description of the proposed project for review and comment. If the proposed line could interfere with telephone line operations, then MTS will seek input into the development process and suggest mitigation to control and negative effects.

Press any Key to Continue

Possible Concerns

Since the sub-transmission line may have effects on MTS facilities, MTS may have concerns with the line. MTS is concerned with the noise induction interference caused by electricity transmission lines on telephone lines (Zelig, D, Network Services, Manitoba Telephone System, Personal Communication, 1995). Noise induction is affected by the amount of separation between the lines and the length of parallel.

Press any Key to Continue

If the sub-transmission line will cause interference, then Manitoba Hydro practice is to mitigate these effects through the installation of line noise controlling equipment. Contact MTS directly to determine whether noise mitigation is required, and if so, how the costs of the mitigation should be shared. Initial contact should be made with the regional MTS office, but MTS Headquarters Network Services staff may become involved.

Press any Key to Continue

Agency Concerns

MTS will be concerned that the sub-transmission line not interfere with the operation of the telephone system.

Press any Key to Continue

General Information

During the route planning and planning process, contact the owners of any railways that will be crossed or approached. The railways, CN and CP, will be concerned that the sub-transmission line construction and operation not affect the railway operation. If special studies or requirements are requested by the railway company, the company in question will contact Manitoba Hydro to resolve these concerns.

Press any Key to Continue

Obtain Approval

Contact the railway and request permission to cross or approach the railway. Refer to the CN or CP sections as required.

Press any Key to Continue

Canadian National

Contact Engineering and Environmental Services (Address: 1004-104 Avenue, Edmonton, Alberta, T5K 0K2, Phone: (403) 421-6688, Fax (403) 421-6689). Request permission to cross or approach the railway. According to CN, require detailed engineering drawings with the following information will be required:

Press any Key to Continue

1. "Profile of Crossing" detail (vertical elevation)
2. "Plan View" detail (showing CNR property line and adjacent lot numbers);
3. "Crossing Structure" pole framing detail;
4. "Scale" for each of the above and dimensions ("not to scale" unacceptable);
5. When power line parallels railway Signal and Communication lines, separate drawing must be submitted together with Signals and

Press any Key to Continue

6. Revised drawings must be marked as revised and reason for revision stated;

7. When joint use facilities are used, drawing must show information pertaining to both users and approval of other user denoted on drawing; and

8. Drawing must have caption:

"Construction, maintenance and operation of the line shall be in accordance with Transport Canada General Orders Number E-11 and E12 and Canadian Standards Association Standards CAN/CSA-C22.3 No.1-M87 and CAN3-C22.3 no.7-M86 as applicable."

Press any Key to Continue

9. Drawing referred to must contain the seal and signature of the professional engineer responsible for the work.

Press any Key to Continue

The drawing must also have the following technical information:

a) Poles and adjacent structures or towers: height; class; set; material; pole number; owner.

b) Anchor(s) and anchor rods: type; size; setting depth; owner; anchor rod size.

c) Guy(s): lead and height; material; minimum breaking strength; grade; size; point of attachment; owner.

d) Crossarm(s): size, material.

e) Insulator(s): type; flashover rating.

f) Power conductors and communication wires: size; material; type; minimum breaking strength; maximum tension; maximum sag; present number; ultimate number.

Press any Key to Continue

g) Power Circuit Voltage: volts phase-to-phase; phase to effectively grounded neutral.

h) Minimum clearances under maximum sag: above rails; above Signals and Communication plant.

i) Separation between wires and cables: horizontal and vertical.

j) Distances: crossing pole to crossing pole; crossing pole to adjacent pole; crossing pole to gauge of rail(s); crossing pole to Signals and Communication plant.

k) Tower and communication cables: number of conductors; type; diameter; weight; method of installation; number of cables.

l) Messenger(s): diameter; type; grade; minimum breaking strength; maximum tension.

Press any Key to Continue

m) Angle of crossing: angle of line to Signals and Communications line; angle of change of direction at crossing and/or adjacent pole(s) (Signals and Communications, CN North America, 1993).

Press any Key to Continue

This information should be sufficient to obtain an endorsement for crossings. If the sub-transmission line is to be routed in parallel to the railway, additional studies may be required. CN should be informed of the location of the line relative to CN facilities, and they will contact Manitoba Hydro if more information

is required.

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Press any Key to Continue

Canadian Pacific

Contact Land Support Services (Address: CP Rail System, 800-200 Granville St., Vancouver, B.C. V6C 2R3, Phone: (604) 643-3295, Fax (604) 643 3274). Request permission to cross or approach the railway. According to CP, CP will require the following information (CPRS, Land Management, Information Package for Utility Crossing Applications, 1994):

Press any Key to Continue

1. Title Block stating:

- a) Company Name,
- b) Title - Proposed Wire Crossing at Mile ,
Subdivision,
- c) Date,
- d) Drawing Number.

Press any Key to Continue

2. Plan View Showing :

- a) Poles, guys, wires, tracks, property lines, street name if any, dimensions from the crossing to a permanent reference ie: Street, property line, dimension from the poles to the centre of the track, dimensions from CP property line to the centre of the track, north arrow, any existing facilities, and the angle of the crossing in relation to the track.

Press any Key to Continue

3. Profile showing:

- a) Cross level of the existing grade at the crossing, CP property lines, elevation of the top of rail at the crossing, poles, wires, guys, dimension from the wire to the top of rail, dimension from the wire to the top telegraph wires if any, dimension from the top of rail to the ground elevation at the pole locations and dimensions from the centre line of the track to the poles and guys.

Press any Key to Continue

4. Wire Information:

- a) Number of wires
- b) Specification of conductors
- c) Messenger material, size and strength (if any)
- d) Voltage
- e) Type of voltage (AC/DC)

5. Pole Information:

- a) Number of poles on the property
- b) Class of pole
- c) Length of pole
- d) Depth of bury

Press any Key to Continue

6. Guy Information:

- a) Ultimate Strength
- b) Diameter of anchor rod

7. Note Stating:

"To be constructed and maintained in accordance with the National Transportation Agencies General Order E-11." (if the poles are shared by two or more utilities, add "and E-12" to the note.

If more information is required, Manitoba Hydro will be

informed by the railway.

124

Press any Key to Continue

Agency Concerns

Both railways will be concerned with the possibility of interference with railway operations. The railways may also be concerned with parallelisms, where the sub-transmission line and the railway line parallel each other. Special mitigation may be required in these cases. Contact the railway if these situations occur.

Press any Key to Continue

Press any key to end.


```
Runtime;  
BKCOLOR = 0;
```

Actions

```
COLOR = 7  
Display "PREASES Ver 1.0"  
DISPLAY "The approvals component will advise you on what  
type of approvals are necessary to construct this particular  
sub-transmission line.
```

Press any key to begin~"

```
CLS  
Automatic = yes
```

```
Find Procedures  
Display "The following procedures are recommended  
{#Procedures}."
```

```
Display "Press any key to display recommendations.~"  
SAVEFACTS d:\vpexpert\info\facts  
CHAIN d:\vpexpert\info\display;
```

!!!!!!!!!!!!!! RULES !!!!!!!!!!!

!!!!!!!!!!!!!! FORESTRY !!!!!!!!!!!

```
Rule No_Clearing  
IF Clear_Forest = No  
THEN Procedures = Forest_1;
```

```
Rule Yes_Clearing  
IF Clear_Forest = Yes AND  
    Merchantable = No  
THEN Procedures = Forest_2;
```

```
Rule Merchantable  
IF Clear_Forest = Yes AND  
    Merchantable = Yes  
THEN Procedures = Forest_3;
```

!!!!!!!!!!!!!! FISHERIES !!!!!!!!!!!

```
Rule Fish  
IF Stream_Crossing = YES  
THEN Procedures = Fisheries_2  
ELSE Procedures = Fisheries_1;
```

!!!!!!!!!!!!!! WATER RES !!!!!!!!!!!

```
Rule Waterres  
IF Water_Res = YES
```

```
THEN Procedures = Water_Res_2
ELSE Procedures = Water_Res_1;
```

!!!!!!! RAILWAYS !!!!!!!!

```
Rule Railapp
IF Rail = YES
THEN Procedures = Rail_2
ELSE Procedures = Rail_1;
```

!!!!!!! PARKS !!!!!!!!

```
Rule Parks
IF Parks = YES
THEN Procedures = Parks_2
ELSE Procedures = Parks_1;
```

!!!!!!! LANDS !!!!!!!!

```
Rule Lands
IF Lands = YES
THEN Procedures = Lands_2
ELSE Procedures = Lands_1;
```

!!!!!!! WILDLIFE !!!!!!!!

```
Rule Wildlife
IF Wild = YES
THEN Procedures = Wild_2
ELSE Procedures = Wild_1;
```

!!!!!!! HISTORIC RESOURCES !!

```
Rule Historic_Resources
IF Historic = YES
THEN Procedures = Historic_2
ELSE Procedures = Historic_1;
```

!!!!!!! MUNICIPAL !!!!!!!!

```
Rule Municipal_Road-Allowances_No
IF Municipal = NO
THEN Procedures = Municipal_1;
```

```
Rule Municipal_Road-Allowances_Yes_66_No
IF Municipal = YES AND
  66_ROW = NO
THEN Procedures = Municipal_2;
```

```
Rule Municipal_Road-Allowances_Yes_66_Yes
IF Municipal = YES AND
  66_ROW = YES
THEN Procedures = Municipal_3;
```

!!!!!!! PROV ENVIRONMENT

```
Rule Prov_Environment
IF New_ROW = Yes AND
    Stream_Crossing = Yes OR
    Wild = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Prov_Environ_Extra
IF Parks = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Inelegant
IF Procedures = Prov_Env2
THEN Procedures = Nothing
ELSE Procedures = Prov_Env1;
```

!!!!!!!!!!!!!! FEDERAL ENVIRONMENT

```
Rule Federal
IF New_ROW = Yes OR
    Penta = Yes OR
    High_Water = Yes AND
    Railway = Yes OR
    Navigable_Water = Yes OR
    Destroy_Fish = Yes
THEN Procedures = Federal_2
ELSE Procedures = Federal_1;
```

!!!!!!!!!!!!!! INDIAN AFFAIRS !!!!!!!!!

```
Rule Indian_Affairs
IF Indian = YES
THEN Procedures = Indian_2
ELSE Procedures = Indian_1;
```

!!!!!!!!!!!!!! MTS !!

```
Rule MTS
IF MTS = YES
THEN Procedures = MTS_2
ELSE Procedures = MTS_1;
```

!!!!!!!!!!!!!! HIGHWAYS !!

```
Rule Highways
IF Highways = YES
THEN Procedures = Highways_2
ELSE Procedures = Highways_1;
```

!!!!!!!!!!!!!! RURAL DEVELOPMENT !!

```
Rule Rural_Development
IF Rural_Dev = YES
THEN Procedures = Rural_Dev_2
ELSE Procedures = Rural_Dev_1;
```

!!!!!!!!!!!!!! MINES !!

Rule Mines
IF Mines = YES
THEN Procedures = Mines_2
ELSE Procedures = Mines_1;

!!!!!!! Navigable !!!!!

Rule Navigable
IF Stream_Crossing = YES AND
 Navigable_Water = YES
THEN Procedures = Navig_2
ELSE Procedures = Navig_1;

!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!

ASK Clear_Forest : "Will any forested Crown land, merchantable
or non-merchantable, need to be cleared?";
CHOICES Clear_Forest : Yes, No;

ASK Merchantable : "Will any merchantable timber on Crown land
need to be cleared?";
CHOICES Merchantable : Yes, No;

ASK Water_Res : "Will drainage ditches administered by Water
Resources be affected?";
CHOICES Water_Res : Yes, No;

ASK Stream_Crossing : "Will any streams need to be crossed?";
CHOICES Stream_Crossing : Yes, No;

ASK Navigable_Water : "Will any navigable waters need to be crossed?";
CHOICES Navigable_Water : Yes, No;

ASK Destroy_Fish : "Will fish habitat need to be destroyed?";
CHOICES Destroy_Fish : Yes, No;

ASK Parks : "Will any provincial parks be crossed?";
CHOICES Parks : Yes, No;

ASK Lands : "Will any Crown lands administered by the provincial Lands
branch be crossed?";
CHOICES Lands : Yes, No;

ASK Wild : "Will any areas that are significant to wildlife, flora or
fauna, be crossed or otherwise affected?";
CHOICES Wild : Yes, No;

ASK Historic : "Will a Historic Resources Assessment be required?";
CHOICES Historic : Yes, No;

ASK Indian : "Will any Indian reservations be crossed?";
CHOICES Indian : Yes, No;

ASK MTS : "Will MTS facilities be affected by the sub-transmission or
distribution line?";
CHOICES MTS : Yes, No;

ASK Highways : "Will current or potential highway's road allowances
be affected by the line?";
CHOICES Highways : Yes, No;

ASK Rural_Dev : "Will the line cross agricultural land at a point other
than on a road allowance or on a quarter section line?";
CHOICES Rural_Dev : Yes, No;

ASK Mines : "Will a developed or high capability undeveloped gravel lease
be crossed by the line?";
CHOICES Mines : Yes, No;

ASK Municipal : "Will the line be constructed along any developed or
undeveloped road allowances?";
CHOICES Municipal : Yes, No;

ASK 66_ROW : "Will the line be constructed along a 66 foot (20.1 metre)
developed or undeveloped road allowance?";
CHOICES 66_ROW : Yes, No;

ASK New_ROW : "Will a new ROW be needed?";
CHOICES New_ROW : Yes, No;

ASK Penta : "Will pentachlorophenol treated poles be placed in a wetland?";
CHOICES Penta : Yes, No;

ASK High_Water : "Will poles be placed below the high water line of any
watercourse?";
CHOICES High_Water : Yes, No;

ASK Railway : "Will a leave be required to cross or approach a railway?";
CHOICES Railway : Yes, No;

ASK Rail : "Will a railway be approached or crossed?";
CHOICES Rail : Yes, No;

PLURAL : Procedures;

```
runtime;  
BKCOLOR = 0;
```

```
Actions  
printon  
LOADFACTS d:\vpexpert\info\facts
```

```
Color = 7
```

```
Find Output  
Find Gi  
Find Ag  
Find Apps  
Find Rec
```

```
Display "Press any key to end.~";
```

```
!!!!!!!!!!!!!! RULES !!!!!!!!!  
!!!!!!!!!!!!!! Outputs !!!!!!!!!  
!!! System Recommendations !
```

```
Rule Automatics  
IF Automatic = Yes  
THEN Output = this  
    WHILEKNOWN sysr  
        RECEIVE sysrec.txt, sysr  
        DISPLAY "{sysr}"  
    END;
```

```
!!!!!!!!!!!!!! Policy Coordination !!!!!
```

```
Rule Polco_General_Info  
IF Gi = Yes  
    AND Automatic = Yes  
THEN Output = this  
    WHILEKNOWN plcgi  
        RECEIVE polcogi.txt, plcgi  
        DISPLAY "{plcgi}"  
    END;
```

```
Rule Polco_Apps  
IF Automatic = Yes  
THEN Output = this  
    WHILEKNOWN polapp  
        RECEIVE polcoapp.txt, polapp  
        DISPLAY "{polapp}"  
    END;
```

```
Rule Polco_Concerns  
IF Ag = Yes  
    AND Automatic = Yes  
THEN Output = this  
    WHILEKNOWN polcon  
        RECEIVE polcocon.txt, polcon  
        DISPLAY "{polcon}"  
    END;
```


!!!!!!! Fisheries !!!!!!!

```
Rule Fish_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN fshgi
        RECEIVE fishgi.txt, fshgi
        DISPLAY "{fshgi}"
    END;
```

```
Rule Fish_Apps_No
IF Apps = Yes AND
    Procedures = Fisheries_1
THEN Output = this
    WHILEKNOWN fshno
        RECEIVE fishapno.txt, fshno
        DISPLAY "{fshno}"
    END;
```

```
Rule Fish_Apps_Yes
IF Apps = Yes AND
    Procedures = Fisheries_2
THEN Output = this
    WHILEKNOWN fshja
        RECEIVE fishapja.txt, fshja
        DISPLAY "{fshja}"
    END;
```

```
Rule Fish_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN fshcon
        RECEIVE fishcon.txt, fshcon
        DISPLAY "{fshcon}"
    END;
```

```
Rule Fish_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN fshrec
        RECEIVE fishpra.txt, fshrec
        DISPLAY "{fshrec}"
    END;
```

!!!!!!! Forest !!!!!!!

```
Rule Forest_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN forgi
        RECEIVE fortgi.txt, forgi
        DISPLAY "{forgi}"
    END;
```

```
Rule Forest_Apps_No
IF Apps = Yes AND
    Procedures = Forest_1
```

```

THEN Output = this
    WHILEKNOWN forno
        RECEIVE fortno.txt, forno
        DISPLAY "{forno}"
    END;

Rule Forest_Apps_Nonmerch
IF Apps = Yes AND
    Procedures = Forest_2
THEN Output = this
    WHILEKNOWN fornon
        RECEIVE fortnon.txt, fornon
        DISPLAY "{fornon}"
    END;

Rule Forest_Apps_merch
IF Apps = Yes AND
    Procedures = Forest_3
THEN Output = this
    WHILEKNOWN former
        RECEIVE fortmerc.txt, former
        DISPLAY "{former}"
    END;

Rule Forest_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN forcon
        RECEIVE fortcon.txt, forcon
        DISPLAY "{forcon}"
    END;

Rule Forest_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN forrec
        RECEIVE fortpra.txt, forrec
        DISPLAY "{forrec}"
    END;

!!!!!!! Lands !!!!!!!!

Rule land_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN langi
        RECEIVE landgi.txt, langi
        DISPLAY "{langi}"
    END;

Rule land_Apps_No
IF Apps = Yes AND
    Procedures = Lands_1
THEN Output = this
    WHILEKNOWN lanno
        RECEIVE landno.txt, lanno
        DISPLAY "{lanno}"

```

END;

```
Rule land_Apps_Yes
IF Apps = Yes AND
  Procedures = Lands_2
THEN Output = this
  WHILEKNOWN lanja
    RECEIVE landja.txt, lanja
    DISPLAY "{lanja}"
  END;
```

```
Rule land_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN lancon
    RECEIVE landcon.txt, lancon
    DISPLAY "{lancon}"
  END;
```

!!!!!!! parks !!!!!!!

```
Rule park_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN pargi
    RECEIVE parkgi.txt, pargi
    DISPLAY "{pargi}"
  END;
```

```
Rule Park_Apps_No
IF Apps = Yes AND
  Procedures = Parks_1
THEN Output = this
  WHILEKNOWN parno
    RECEIVE parkno.txt, parno
    DISPLAY "{parno}"
  END;
```

```
Rule Park_Apps_Yes
IF Apps = Yes AND
  Procedures = Parks_2
THEN Output = this
  WHILEKNOWN parja
    RECEIVE parkja.txt, parja
    DISPLAY "{parja}"
  END;
```

!!!!!!! Water Resources !!!!!!!

```
Rule WaterRes_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN watgi
    RECEIVE watergi.txt, watgi
    DISPLAY "{watgi}"
  END;
```

```

Rule WaterRes_Apps_No
IF Apps = Yes AND
  Procedures = Water_Res_1
THEN Output = this
  WHILEKNOWN watno
    RECEIVE waterno.txt, watno
    DISPLAY "{watno}"
  END;

```

```

Rule WaterRes_Apps_Yes
IF Apps = Yes AND
  Procedures = Water_Res_2
THEN Output = this
  WHILEKNOWN watja
    RECEIVE waterja.txt, watja
    DISPLAY "{watja}"
  END;

```

```

Rule WaterRes_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN watcon
    RECEIVE watercon.txt, watcon
    DISPLAY "{watcon}"
  END;

```

!!!!!!! Wildlife !!!!!!!

```

Rule wildlife_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN widgi
    RECEIVE wildgi.txt, widgi
    DISPLAY "{widgi}"
  END;

```

```

Rule Wild_Apps_No
IF Apps = Yes AND
  Procedures = Wild_1
THEN Output = this
  WHILEKNOWN widno
    RECEIVE wildno.txt, widno
    DISPLAY "{widno}"
  END;

```

```

Rule Wild_Apps_Yes
IF Apps = Yes AND
  Procedures = Wild_2
THEN Output = this
  WHILEKNOWN widja
    RECEIVE wildja.txt, widja
    DISPLAY "{widja}"
  END;

```

```

Rule Wild_Agency_Concerns
IF Ag = Yes
THEN Output = this

```

```

WHILEKNOWN widcon
    RECEIVE wildcon.txt, widcon
    DISPLAY "{widcon}"
END;

```

```

Rule Wild_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN widrec
        RECEIVE wildpra.txt, widrec
        DISPLAY "{widrec}"
    END;

```

!!!!!!! Mines !!!!!!!

```

Rule mine_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN mingi
        RECEIVE minegi.txt, mingi
        DISPLAY "{mingi}"
    END;

```

```

Rule mine_Apps_No
IF Apps = Yes AND
    Procedures = Mines_1
THEN Output = this
    WHILEKNOWN minno
        RECEIVE mineno.txt, minno
        DISPLAY "{minno}"
    END;

```

```

Rule mine_Apps_Yes
IF Apps = Yes AND
    Procedures = Mines_2
THEN Output = this
    WHILEKNOWN minja
        RECEIVE mineja.txt, minja
        DISPLAY "{minja}"
    END;

```

```

Rule mine_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN mincon
        RECEIVE minecon.txt, mincon
        DISPLAY "{mincon}"
    END;

```

!!!!!!! Provin Environ !!!!!!!

```

Rule prov_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN progi
        RECEIVE provgi.txt, progi
        DISPLAY "{progi}"

```

END;

```
Rule prov_Apps_No
IF Apps = Yes AND
  Procedures = Prov_Env1
THEN Output = this
  WHILEKNOWN prono
    RECEIVE provmini.txt, prono
    DISPLAY "{prono}"
  END;
```

```
Rule prov_Apps_Yes
IF Apps = Yes AND
  Procedures = Prov_Env2
THEN Output = this
  WHILEKNOWN proja
    RECEIVE provposs.txt, proja
    DISPLAY "{proja}"
  END;
```

```
Rule prov_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN procon
    RECEIVE provcon.txt, procon
    DISPLAY "{procon}"
  END;
```

```
Rule prov_Recommendations
IF Rec = Yes
THEN Output = this
  WHILEKNOWN prorec
    RECEIVE provpra.txt, prorec
    DISPLAY "{prorec}"
  END;
```

!!!!!!! Highways !!!!!!!

```
Rule high_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN highi
    RECEIVE highgi.txt, highi
    DISPLAY "{highi}"
  END;
```

```
Rule high_Apps_No
IF Apps = Yes AND
  Procedures = Highways_1
THEN Output = this
  WHILEKNOWN hino
    RECEIVE highno.txt, hino
    DISPLAY "{hino}"
  END;
```

```
Rule high_Apps_Yes
IF Apps = Yes AND
```

```

Procedures = Highways_2
THEN Output = this
    WHILEKNOWN hija
        RECEIVE highja.txt, hija
        DISPLAY "{hija}"
    END;

```

!!!!!!! Historic !!!!!!!

```

Rule Hist_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN hisgi
        RECEIVE histgi.txt, hisgi
        DISPLAY "{hisgi}"
    END;

```

```

Rule Hist_Apps_No
IF Apps = Yes AND
    Procedures = Historic_1
THEN Output = this
    WHILEKNOWN hisno
        RECEIVE histno.txt, hisno
        DISPLAY "{hisno}"
    END;

```

```

Rule Hist_Apps_Yes
IF Apps = Yes AND
    Procedures = Historic_2
THEN Output = this
    WHILEKNOWN hisja
        RECEIVE histja.txt, hisja
        DISPLAY "{hisja}"
    END;

```

```

Rule Hist_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN hiscon
        RECEIVE histcon.txt, hiscon
        DISPLAY "{hiscon}"
    END;

```

```

Rule Hist_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN hisrec
        RECEIVE histpra.txt, hisrec
        DISPLAY "{hisrec}"
    END;

```

!!!!!!! Rural Development !!!!!!!

```

Rule rural_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN rurgi

```

```
        RECEIVE rdgi.txt, rurgi
        DISPLAY "{rurgi}"
    END;
```

```
Rule rural_Apps_No
IF Apps = Yes AND
    Procedures = Rural_Dev_1
THEN Output = this
    WHILEKNOWN rurno
        RECEIVE rdno.txt, rurno
        DISPLAY "{rurno}"
    END;
```

```
Rule rural_Apps_Yes
IF Apps = Yes AND
    Procedures = Rural_Dev_2
THEN Output = this
    WHILEKNOWN rurja
        RECEIVE rdja.txt, rurja
        DISPLAY "{rurja}"
    END;
```

!!!!!!! Federal Environ !!!!!!!

```
Rule fed_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN federgi
        RECEIVE fedgi.txt, federgi
        DISPLAY "{federgi}"
    END;
```

```
Rule fed_Apps_No
IF Apps = Yes AND
    Procedures = Federal_1
THEN Output = this
    WHILEKNOWN federno
        RECEIVE fedno.txt, federno
        DISPLAY "{federno}"
    END;
```

```
Rule fed_Apps_Yes
IF Apps = Yes AND
    Procedures = Federal_2
THEN Output = this
    WHILEKNOWN federja
        RECEIVE fedja.txt, federja
        DISPLAY "{federja}"
    END;
```

```
Rule fed_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN federcon
        RECEIVE fedcon.txt, federcon
        DISPLAY "{federcon}"
    END;
```



```

Rule fed_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN federrec
        RECEIVE fedpra.txt, federrec
        DISPLAY "{federrec}"
    END;

```

!!!!!!!!!!!! Inac !!!!!!!!!!!!!

```

Rule Inac_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN inacgi
        RECEIVE indgi.txt, inacgi
        DISPLAY "{inacgi}"
    END;

```

```

Rule Inac_Apps_No
IF Apps = Yes AND
    Procedures = Indian_1
THEN Output = this
    WHILEKNOWN inacno
        RECEIVE indno.txt, inacno
        DISPLAY "{inacno}"
    END;

```

```

Rule Inac_Apps_Yes
IF Apps = Yes AND
    Procedures = Indian_2
THEN Output = this
    WHILEKNOWN inacja
        RECEIVE indja.txt, inacja
        DISPLAY "{inacja}"
    END;

```

!!!!!!!!!!!! Navigable !!!!!!!!!!!!!

```

Rule Navi_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN navgi
        RECEIVE navigi.txt, navgi
        DISPLAY "{navgi}"
    END;

```

```

Rule Navi_Apps_No
IF Apps = Yes AND
    Procedures = Navig_1
THEN Output = this
    WHILEKNOWN navno
        RECEIVE navino.txt, navno
        DISPLAY "{navno}"
    END;

```

```

Rule Navi_Apps_Yes

```

```

IF Apps = Yes AND
  Procedures = Navig_2
THEN Output = this
  WHILEKNOWN navja
    RECEIVE navija.txt, navja
    DISPLAY "{navja}"
  END;

```

```

Rule Navi_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN navcon
    RECEIVE navicon.txt, navcon
    DISPLAY "{navcon}"
  END;

```

!!!!!!! Municipal !!!!!!!

```

Rule Muni_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN mungi
    RECEIVE munigi.txt, mungi
    DISPLAY "{mungi}"
  END;

```

```

Rule Muni_Apps_Minimal
IF Apps = Yes AND
  Procedures = Municipal_1
THEN Output = this
  WHILEKNOWN munno
    RECEIVE munimin.txt, munno
    DISPLAY "{munno}"
  END;

```

```

Rule Muni_Apps_99
IF Apps = Yes AND
  Procedures = Municipal_2
THEN Output = this
  WHILEKNOWN munja
    RECEIVE muni99.txt, munja
    DISPLAY "{munja}"
  END;

```

```

Rule Muni_Apps_66
IF Apps = Yes AND
  Procedures = Municipal_3
THEN Output = this
  WHILEKNOWN mun66
    RECEIVE muni66.txt, mun66
    DISPLAY "{mun66}"
  END;

```

```

Rule Muni_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN muncon

```

```
        RECEIVE municon.txt, muncon
        DISPLAY "{muncon}"
    END;
```

!!!!!!! MTS !!!!!!!!

```
Rule MTS_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN mtqi
        RECEIVE mtsgi.txt, mtqi
        DISPLAY "{mtqi}"
    END;
```

```
Rule mts_Apps_No
IF Apps = Yes AND
    Procedures = MTS_1
THEN Output = this
    WHILEKNOWN mtno
        RECEIVE mtsno.txt, mtno
        DISPLAY "{mtno}"
    END;
```

```
Rule mts_Apps_Yes
IF Apps = Yes AND
    Procedures = MTS_2
THEN Output = this
    WHILEKNOWN mtja
        RECEIVE mtsja.txt, mtja
        DISPLAY "{mtja}"
    END;
```

```
Rule mts_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN mtcon
        RECEIVE mtscon.txt, mtcon
        DISPLAY "{mtcon}"
    END;
```

!!!!!!! Railway !!!!!!!!

```
Rule rail_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN raigi
        RECEIVE railgi.txt, raigi
        DISPLAY "{raigi}"
    END;
```

```
Rule rail_Apps_No
IF Apps = Yes AND
    Procedures = Rail_1
THEN Output = this
    WHILEKNOWN raino
        RECEIVE railno.txt, raino
        DISPLAY "{raino}"
```

END;

```
Rule rail_Apps_Yes
IF Apps = Yes AND
  Procedures = Rail_2
THEN Output = this
  WHILEKNOWN raija
    RECEIVE railja.txt, raija
    DISPLAY "{raija}"
  END;
```

```
Rule rail_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN raicon
    RECEIVE railcon.txt, raicon
    DISPLAY "{raicon}"
  END;
```

!!!!!!!!!!!!!!!!!!!!!!!!!!!! END !!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!!!

ASK Gi : "Would you like to see the General Information sections on each
topic?";
CHOICES Gi : Yes, No;

ASK Ag : "Would you like to see the Agency Concerns sections on each topic?";
CHOICES Ag : Yes, No;

ASK Rec : "Would you like to see the Recommended Construction Practises for each
topic?";
CHOICES Rec : Yes, No;

ASK Apps : "Would you like to see the Approval or Endorsement sections for each
topic?";
CHOICES Apps : Yes, No;

PLURAL : Procedures, Output;

Display

This text file contains the source code information for the output component of PREASES 1.0

```
runtime;  
BKCOLOR = 0;
```

```
Actions  
printon  
LOADFACTS d:\vpexpert\info\facts
```

```
Color = 7
```

```
Find Output  
Find Gi  
Find Ag  
Find Apps  
Find Rec
```

```
Display "Press any key to end.-";
```

```
!!!!!!!!!!!!!! RULES !!!!!!!!!!!  
!!!!!!!!!!!!!! Outputs !!!!!!!!!!!  
!!! System Recommendations !
```

```
Rule Automatics  
IF Automatic = Yes  
THEN Output = this  
    WHILEKNOWN sysr  
        RECEIVE sysrec.txt, sysr  
        DISPLAY "{sysr}"  
    END;
```

```
!!!!!!!!!!!!!! Policy Coordination !!!!!!!
```

```
Rule Polco_General_Info  
IF Gi = Yes  
    AND Automatic = Yes  
THEN Output = this  
    WHILEKNOWN plcgi  
        RECEIVE polcogi.txt, plcgi  
        DISPLAY "{plcgi}"  
    END;
```

```
Rule Polco_Apps  
IF Automatic = Yes  
THEN Output = this  
    WHILEKNOWN polapp  
        RECEIVE polcoapp.txt, polapp  
        DISPLAY "{polapp}"  
    END;
```

Display

```
Rule Polco_Concerns
IF Ag = Yes
  AND Automatic = Yes
THEN Output = this
  WHILEKNOWN polcon
    RECEIVE polcocon.txt, polcon
    DISPLAY "{polcon}"
  END;
```

!!!!!!!!!!!! Fisheries !!!!!!!!!!

```
Rule Fish_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN fshgi
    RECEIVE fishgi.txt, fshgi
    DISPLAY "{fshgi}"
  END;
```

```
Rule Fish_Apps_No
IF Apps = Yes AND
  Procedures = Fisheries_1
THEN Output = this
  WHILEKNOWN fshno
    RECEIVE fishapno.txt, fshno
    DISPLAY "{fshno}"
  END;
```

```
Rule Fish_Apps_Yes
IF Apps = Yes AND
  Procedures = Fisheries_2
THEN Output = this
  WHILEKNOWN fshja
    RECEIVE fishapja.txt, fshja
    DISPLAY "{fshja}"
  END;
```

```
Rule Fish_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN fshcon
    RECEIVE fishcon.txt, fshcon
    DISPLAY "{fshcon}"
  END;
```

```
Rule Fish_Recommendations
IF Rec = Yes
THEN Output = this
  WHILEKNOWN fshrec
    RECEIVE fishpra.txt, fshrec
    DISPLAY "{fshrec}"
  END;
```

Display

!!!!!!! Forest !!!!!!!!

Rule Forest_General_Info

IF Gi = Yes

THEN Output = this

 WHILEKNOWN forgi

 RECEIVE fortgi.txt, forgi

 DISPLAY "{forgi}"

 END;

Rule Forest_Apps_No

IF Apps = Yes AND

 Procedures = Forest_1

THEN Output = this

 WHILEKNOWN forno

 RECEIVE fortno.txt, forno

 DISPLAY "{forno}"

 END;

Rule Forest_Apps_Nonmerch

IF Apps = Yes AND

 Procedures = Forest_2

THEN Output = this

 WHILEKNOWN fornon

 RECEIVE fortnon.txt, fornon

 DISPLAY "{fornon}"

 END;

Rule Forest_Apps_merch

IF Apps = Yes AND

 Procedures = Forest_3

THEN Output = this

 WHILEKNOWN former

 RECEIVE fortmerc.txt, former

 DISPLAY "{former}"

 END;

Rule Forest_Agency_Concerns

IF Ag = Yes

THEN Output = this

 WHILEKNOWN forcon

 RECEIVE fortcon.txt, forcon

 DISPLAY "{forcon}"

 END;

Rule Forest_Recommendations

IF Rec = Yes

THEN Output = this

 WHILEKNOWN forrec

 RECEIVE fortpra.txt, forrec

 DISPLAY "{forrec}"

Display

END;

!!!!!!! Lands !!!!!!!!

Rule land_General_Info

IF Gi = Yes

THEN Output = this

WHILEKNOWN langi

RECEIVE landgi.txt, langi

DISPLAY "{langi}"

END;

Rule land_Apps_No

IF Apps = Yes AND

Procedures = Lands_1

THEN Output = this

WHILEKNOWN lanno

RECEIVE landno.txt, lanno

DISPLAY "{lanno}"

END;

Rule land_Apps_Yes

IF Apps = Yes AND

Procedures = Lands_2

THEN Output = this

WHILEKNOWN lanja

RECEIVE landja.txt, lanja

DISPLAY "{lanja}"

END;

Rule land_Agency_Concerns

IF Ag = Yes

THEN Output = this

WHILEKNOWN lancon

RECEIVE landcon.txt, lancon

DISPLAY "{lancon}"

END;

!!!!!!! parks !!!!!!!!

Rule park_General_Info

IF Gi = Yes

THEN Output = this

WHILEKNOWN pargi

RECEIVE parkgi.txt, pargi

DISPLAY "{pargi}"

END;

Rule Park_Apps_No

IF Apps = Yes AND

Procedures = Parks_1

THEN Output = this

Display

```
WHILEKNOWN parno
  RECEIVE parkno.txt, parno
  DISPLAY "{parno}"
END;
```

```
Rule Park_Apps_Yes
IF Apps = Yes AND
  Procedures = Parks_2
THEN Output = this
  WHILEKNOWN parja
    RECEIVE parkja.txt, parja
    DISPLAY "{parja}"
  END;
```

!!!!!!!!!!!! Water Resources !!!!!!!!!!!!!

```
Rule WaterRes_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN watgi
    RECEIVE watergi.txt, watgi
    DISPLAY "{watgi}"
  END;
```

```
Rule WaterRes_Apps_No
IF Apps = Yes AND
  Procedures = Water_Res_1
THEN Output = this
  WHILEKNOWN watno
    RECEIVE waterno.txt, watno
    DISPLAY "{watno}"
  END;
```

```
Rule WaterRes_Apps_Yes
IF Apps = Yes AND
  Procedures = Water_Res_2
THEN Output = this
  WHILEKNOWN watja
    RECEIVE waterja.txt, watja
    DISPLAY "{watja}"
  END;
```

```
Rule WaterRes_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN watcon
    RECEIVE watercon.txt, watcon
    DISPLAY "{watcon}"
  END;
```

!!!!!!!!!!!! Wildlife !!!!!!!!!!!!!

Display

Rule wildlife_General_Info

IF Gi = Yes

THEN Output = this

WHILEKNOWN widgi

RECEIVE wildgi.txt, widgi

DISPLAY "{widgi}"

END;

Rule Wild_Apps_No

IF Apps = Yes AND

Procedures = Wild_1

THEN Output = this

WHILEKNOWN widno

RECEIVE wildno.txt, widno

DISPLAY "{widno}"

END;

Rule Wild_Apps_Yes

IF Apps = Yes AND

Procedures = Wild_2

THEN Output = this

WHILEKNOWN widja

RECEIVE wildja.txt, widja

DISPLAY "{widja}"

END;

Rule Wild_Agency_Concerns

IF Ag = Yes

THEN Output = this

WHILEKNOWN widcon

RECEIVE wildcon.txt, widcon

DISPLAY "{widcon}"

END;

Rule Wild_Recommendations

IF Rec = Yes

THEN Output = this

WHILEKNOWN widrec

RECEIVE wildpra.txt, widrec

DISPLAY "{widrec}"

END;

!!!!!!! Mines !!!!!!!!

Rule mine_General_Info

IF Gi = Yes

THEN Output = this

WHILEKNOWN mingi

RECEIVE minegi.txt, mingi

DISPLAY "{mingi}"

END;

Display

```
Rule mine_Apps_No
IF Apps = Yes AND
  Procedures = Mines_1
THEN Output = this
  WHILEKNOWN minno
    RECEIVE mineno.txt, minno
    DISPLAY "{minno}"
  END;

Rule mine_Apps_Yes
IF Apps = Yes AND
  Procedures = Mines_2
THEN Output = this
  WHILEKNOWN minja
    RECEIVE mineja.txt, minja
    DISPLAY "{minja}"
  END;

Rule mine_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN mincon
    RECEIVE minecon.txt, mincon
    DISPLAY "{mincon}"
  END;

!!!!!!! Provin Environ !!!!!!

Rule prov_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN progi
    RECEIVE provgi.txt, progi
    DISPLAY "{progi}"
  END;

Rule prov_Apps_No
IF Apps = Yes AND
  Procedures = Prov_Env1
THEN Output = this
  WHILEKNOWN prono
    RECEIVE provmini.txt, prono
    DISPLAY "{prono}"
  END;

Rule prov_Apps_Yes
IF Apps = Yes AND
  Procedures = Prov_Env2
THEN Output = this
  WHILEKNOWN proja
    RECEIVE provposs.txt, proja
    DISPLAY "{proja}"
```

Display

END;

Rule prov_Agency_Concerns

IF Ag = Yes

THEN Output = this

 WHILEKNOWN procon

 RECEIVE provcon.txt, procon

 DISPLAY "{procon}"

END;

Rule prov_Recommendations

IF Rec = Yes

THEN Output = this

 WHILEKNOWN prorec

 RECEIVE provpra.txt, prorec

 DISPLAY "{prorec}"

END;

!!!!!!!!!!!! Highways !!!!!!!!!!

Rule high_General_Info

IF Gi = Yes

THEN Output = this

 WHILEKNOWN higi

 RECEIVE highgi.txt, higi

 DISPLAY "{higi}"

END;

Rule high_Apps_No

IF Apps = Yes AND

 Procedures = Highways_1

THEN Output = this

 WHILEKNOWN hino

 RECEIVE highno.txt, hino

 DISPLAY "{hino}"

END;

Rule high_Apps_Yes

IF Apps = Yes AND

 Procedures = Highways_2

THEN Output = this

 WHILEKNOWN hija

 RECEIVE highja.txt, hija

 DISPLAY "{hija}"

END;

!!!!!!!!!!!! Historic !!!!!!!!!!

Rule Hist_General_Info

IF Gi = Yes

THEN Output = this

 WHILEKNOWN hisgi

```

                                Display
        RECEIVE histgi.txt, hisgi
        DISPLAY "{hisgi}"
END;

```

```

Rule Hist_Apps_No
IF Apps = Yes AND
    Procedures = Historic_1
THEN Output = this
    WHILEKNOWN hisno
        RECEIVE histno.txt, hisno
        DISPLAY "{hisno}"
    END;

```

```

Rule Hist_Apps_Yes
IF Apps = Yes AND
    Procedures = Historic_2
THEN Output = this
    WHILEKNOWN hisja
        RECEIVE histja.txt, hisja
        DISPLAY "{hisja}"
    END;

```

```

Rule Hist_Agency_Concerns
IF Ag = Yes
THEN Output = this
    WHILEKNOWN hiscon
        RECEIVE histcon.txt, hiscon
        DISPLAY "{hiscon}"
    END;

```

```

Rule Hist_Recommendations
IF Rec = Yes
THEN Output = this
    WHILEKNOWN hisrec
        RECEIVE histpra.txt, hisrec
        DISPLAY "{hisrec}"
    END;

```

!!!!!!!!!!!! Rural Development !!!!!!!

```

Rule rural_General_Info
IF Gi = Yes
THEN Output = this
    WHILEKNOWN rurgi
        RECEIVE rdgi.txt, rurgi
        DISPLAY "{rurgi}"
    END;

```

```

Rule rural_Apps_No
IF Apps = Yes AND
    Procedures = Rural_Dev_1
THEN Output = this

```

Display

```
WHILEKNOWN rurno
  RECEIVE rdno.txt, rurno
  DISPLAY "{rurno}"
END;
```

```
Rule rural_Apps_Yes
IF Apps = Yes AND
  Procedures = Rural_Dev_2
THEN Output = this
  WHILEKNOWN rurja
    RECEIVE rdja.txt, rurja
    DISPLAY "{rurja}"
  END;
```

!!!!!!! Federal Environ !!!!!!!

```
Rule fed_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN federgi
    RECEIVE fedgi.txt, federgi
    DISPLAY "{federgi}"
  END;
```

```
Rule fed_Apps_No
IF Apps = Yes AND
  Procedures = Federal_1
THEN Output = this
  WHILEKNOWN federno
    RECEIVE fedno.txt, federno
    DISPLAY "{federno}"
  END;
```

```
Rule fed_Apps_Yes
IF Apps = Yes AND
  Procedures = Federal_2
THEN Output = this
  WHILEKNOWN federja
    RECEIVE fedja.txt, federja
    DISPLAY "{federja}"
  END;
```

```
Rule fed_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN federcon
    RECEIVE fedcon.txt, federcon
    DISPLAY "{federcon}"
  END;
```

```
Rule fed_Recommendations
IF Rec = Yes
```

Display

```
THEN Output = this
  WHILEKNOWN federrec
    RECEIVE fedpra.txt, federrec
    DISPLAY "{federrec}"
  END;
```

!!!!!!!!!!!! Inac !!!!!!!!!!!!!!!

```
Rule Inac_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN inacgi
    RECEIVE indgi.txt, inacgi
    DISPLAY "{inacgi}"
  END;
```

```
Rule Inac_Apps_No
IF Apps = Yes AND
  Procedures = Indian_1
THEN Output = this
  WHILEKNOWN inacno
    RECEIVE indno.txt, inacno
    DISPLAY "{inacno}"
  END;
```

```
Rule Inac_Apps_Yes
IF Apps = Yes AND
  Procedures = Indian_2
THEN Output = this
  WHILEKNOWN inacja
    RECEIVE indja.txt, inacja
    DISPLAY "{inacja}"
  END;
```

!!!!!!!!!!!! Navigable !!!!!!!!!!!!!

```
Rule Navi_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN navgi
    RECEIVE navigi.txt, navgi
    DISPLAY "{navgi}"
  END;
```

```
Rule Navi_Apps_No
IF Apps = Yes AND
  Procedures = Navig_1
THEN Output = this
  WHILEKNOWN navno
    RECEIVE navino.txt, navno
    DISPLAY "{navno}"
  END;
```

Display

```
Rule Navi_Apps_Yes
IF Apps = Yes AND
  Procedures = Navig_2
THEN Output = this
  WHILEKNOWN navja
    RECEIVE navija.txt, navja
    DISPLAY "{navja}"
  END;
```

```
Rule Navi_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN navcon
    RECEIVE navicon.txt, navcon
    DISPLAY "{navcon}"
  END;
```

!!!!!!!!!!!! Municipal !!!!!!!!!!!

```
Rule Muni_General_Info
IF Gi = Yes
THEN Output = this
  WHILEKNOWN mungi
    RECEIVE munigi.txt, mungi
    DISPLAY "{mungi}"
  END;
```

```
Rule Muni_Apps_Minimal
IF Apps = Yes AND
  Procedures = Municipal_1
THEN Output = this
  WHILEKNOWN munno
    RECEIVE munimin.txt, munno
    DISPLAY "{munno}"
  END;
```

```
Rule Muni_Apps_99
IF Apps = Yes AND
  Procedures = Municipal_2
THEN Output = this
  WHILEKNOWN munja
    RECEIVE muni99.txt, munja
    DISPLAY "{munja}"
  END;
```

```
Rule Muni_Apps_66
IF Apps = Yes AND
  Procedures = Municipal_3
THEN Output = this
  WHILEKNOWN mun66
    RECEIVE muni66.txt, mun66
```


Display

```
        DISPLAY "{mun66}"
    END;
```

Rule Muni_Agency_Concerns

```
IF Ag = Yes
THEN Output = this
    WHILEKNOWN muncon
        RECEIVE municon.txt, muncon
        DISPLAY "{muncon}"
    END;
```

!!!!!!!!!!!! MTS !!!!!!!!!!!!!

Rule MTS_General_Info

```
IF Gi = Yes
THEN Output = this
    WHILEKNOWN mtgi
        RECEIVE mtsgi.txt, mtgi
        DISPLAY "{mtgi}"
    END;
```

Rule mts_Apps_No

```
IF Apps = Yes AND
    Procedures = MTS_1
THEN Output = this
    WHILEKNOWN mtno
        RECEIVE mtsno.txt, mtno
        DISPLAY "{mtno}"
    END;
```

Rule mts_Apps_Yes

```
IF Apps = Yes AND
    Procedures = MTS_2
THEN Output = this
    WHILEKNOWN mtja
        RECEIVE mtsja.txt, mtja
        DISPLAY "{mtja}"
    END;
```

Rule mts_Agency_Concerns

```
IF Ag = Yes
THEN Output = this
    WHILEKNOWN mtcon
        RECEIVE mtscon.txt, mtcon
        DISPLAY "{mtcon}"
    END;
```

!!!!!!!!!!!! Railway !!!!!!!!!!!!!

Rule rail_General_Info

```
IF Gi = Yes
THEN Output = this
```

Display

```
WHILEKNOWN raigi
  RECEIVE railgi.txt, raigi
  DISPLAY "{raigi}"
END;
```

```
Rule rail_Apps_No
IF Apps = Yes AND
  Procedures = Rail_1
THEN Output = this
  WHILEKNOWN raino
    RECEIVE railno.txt, raino
    DISPLAY "{raino}"
  END;
```

```
Rule rail_Apps_Yes
IF Apps = Yes AND
  Procedures = Rail_2
THEN Output = this
  WHILEKNOWN raija
    RECEIVE railja.txt, raija
    DISPLAY "{raija}"
  END;
```

```
Rule rail_Agency_Concerns
IF Ag = Yes
THEN Output = this
  WHILEKNOWN raicon
    RECEIVE railcon.txt, raicon
    DISPLAY "{raicon}"
  END;
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! END !!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!!!!!!!
```

```
ASK Gi : "Would you like to see the General Information sections on each topic?";
CHOICES Gi : Yes, No;
```

```
ASK Ag : "Would you like to see the Agency Concerns sections on each topic?";
CHOICES Ag : Yes, No;
```

```
ASK Rec : "Would you like to see the Recommended Construction Practises for each topic?";
CHOICES Rec : Yes, No;
```

```
ASK Apps : "Would you like to see the Approval or Endorsement sections for each topic?";
CHOICES Apps : Yes, No;
```

```
PLURAL : Procedures, Output;
```

Display

66_ROW = Yes CNF 100
Automatic = yes CNF 100
Clear_Forest = Yes CNF 100
d:\vpexpert\info\QUERY.kbs = yes CNF 0
Destroy_Fish = No CNF 100
High_Water = No CNF 100
Highways = Yes CNF 100
Historic = No CNF 100
Indian = No CNF 100
Lands = Yes CNF 100
Merchantable = Yes CNF 100
Mines = No CNF 100
MTS = Yes CNF 100
Municipal = Yes CNF 100
Navigable_Water = No CNF 100
New_ROW = Yes CNF 100
Parks = No CNF 100
Penta = No CNF 100
Procedures = Navig_1 CNF 100
Procedures = Mines_1 CNF 100
Procedures = Rural_Dev_1 CNF 100
Procedures = Highways_2 CNF 100
Procedures = MTS_2 CNF 100
Procedures = Indian_1 CNF 100
Procedures = Federal_1 CNF 100
Procedures = Nothing CNF 100
Procedures = Prov_Env2 CNF 100
Procedures = Municipal_3 CNF 100
Procedures = Historic_1 CNF 100
Procedures = Wild_2 CNF 100
Procedures = Lands_2 CNF 100
Procedures = Parks_1 CNF 100
Procedures = Rail_2 CNF 100
Procedures = Water_Res_1 CNF 100
Procedures = Fisheries_1 CNF 100
Procedures = Forest_3 CNF 100
Rail = Yes CNF 100
Railway = No CNF 100
Rural_Dev = No CNF 100
Stream_Crossing = No CNF 100
Water_Res = No CNF 100
Wild = Yes CNF 100

Fedcon

Agency Concerns

CEAA, as will the Manitoba Environment Department, may be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff may also be of concern to environment officials. Environment officials may also be concerned with socio-economic impacts of proposed projects.

Press any Key to Continue ~

Fedgi

General Information

The Canadian Environmental Assessment Agency (CEAA) (Address: CEAA, Federal Building, 500-269 Main St., Winnipeg, MB, R3C 1B2, Phone: 984-2457) is responsible for administering the Canadian Environmental Assessment Act (CEAA). This Act and the accompanying regulations stipulate when assessments under CEAA are required and what type of assessments are required. According to the Act, a 66 kV sub transmission line will not require an assessment unless two conditions are met. If the line is to require assessment, it must not be excluded from assessment, and it must trigger the Act.

Press any Key to Continue ~

All non-international electricity transmission lines of less than 130 kV are automatically excluded from the Act unless: i) the line is constructed on a new Right of way (ROW); ii) the poles are placed below the high water line of a waterbody, or iii) a polluting substance might be released into a wetland that is covered by water for three consecutive months of the year (Part 3, Section 21, Exclusion list, Canadian Environmental Assessment Act, Canada Gazette Part II Vol. 128, No. 21). If one or more of these conditions are true, then the line may be subject to assessment.

Press any Key to Continue ~

Under CEAA, the most likely trigger, in the case of sub-transmission lines, is a government decision on the Law List. The most likely cases are: i) a leave under the Railway Act; ii) an approval under the Navigable Waters Protection Act; or iii) an authorisation to harmfully alter, disrupt, or destroy fish habitat under the Fisheries Act (Annotated Law List, Policy and Regulatory Affairs, Canadian Environment Assessment Agency, 1995). The issuance of any one of these approvals qualifies as a department of the federal government issuing some form of approval before the construction can take place. If this occurs on a non-excluded line, then a federal environmental assessment known as a screening will be required.

Press any Key to Continue ~

Fedja

Approval Required

As the above conditions for screening are met, a federal environmental assessment screening report will be required. The screening report must consider (Section 16(1), Canadian Environmental Assessment Act, 1992).

Press any Key to Continue -

- a) The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- b) The significance of the effects referred to in paragraph (a);
- c) Comments from the public that are received in accordance with this Act and the regulations; [S.C. 1993, c. 34, ss. 22(1) (French)]

Press any Key to Continue -

- d) Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and
- e) Any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the responsible authority may require to be considered. [S.C. 1993, c. 34, ss. 22(2) (French)] (Parts a-e, Section 16(1), Canadian Environmental Assessment Act, 1992).

Press any Key to Continue -

Should a screening be required, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D (Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone: (204) 474-3119).

Press any Key to Continue -

Fedno

No Approval Required

As the above conditions for a federal environmental assessment screening are not met, no screening will be required.

Press any Key to Continue ~

Fedpra

Construction Practices

Should CEAA suggest recommended construction practices they are likely to be similar to ones contained in Manitoba Hydro and Department of Fisheries and Oceans guidelines. Manitoba Hydro has published general environmental protection measures for Environmental Protection (Appendix A).

Press any Key to Continue -

These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety.

Press any Key to Continue -

The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines, guidelines for the planning and site selection and construction and operation of borrow pits, and sand and gravel washing guidelines.

Press any Key to Continue -

Fishapja

Endorsement Procedures - Endorsement Required

If a stream crossing is necessary, fish habitat may be affected. If concerns are raised, the Policy Coordination Branch should supply Manitoba Hydro with the contact information.

General information can be obtained through the Manitoba Department of Natural Resources, Fisheries Branch (Fisheries Branch 200 Saulteax Cr., Winnipeg, R3J 3W3, Phone (204) 945-8105). Fisheries Branch may request that certain mitigative steps be taken. Manitoba Hydro construction practices should suffice.

Press any Key to Continue ~

Inquire as to the presence and types of fish present in the watercourse. This information will be required to obtain input from DFO. If fish are present, determine whether any critical habitat or critical seasons, including spawning habitat of these fish, will be affected.

Press any Key to Continue ~

Information regarding species, habitat, and critical season information should be passed on to DFO (Address: Fisheries and Habitat Management, Freshwater Institute, 501 University Crescent, Winnipeg, MB, R3T 2N6. Contact Person: Fish Habitat Management Co-ordinator, Phone (204) 983-5220, Fax: (204) 984-2402). DFO is concerned with the preservation of fish habitat. They will then determine whether an authorization will be required to alter fish habitat. To prevent having to obtain a licence to alter fish habitat (and to prevent altering or destroying habitat), construction practices that do not affect habitat should be followed. Manitoba Hydro's construction codes are designed to meet these standards. DFO has also issued non-binding guidelines that should be followed whenever possible.

Press any Key to Continue ~

Fishapno

Endorsement Procedures - No Endorsement

With no stream crossings, fisheries are not of concern, and no endorsement is necessary.

Press any Key to Continue -

Fishcon

Agency Concerns

Unless proper construction practices are followed, the construction and operation of sub-transmission lines can have negative effects on aquatic habitat and fish. Shoreline erosion which may be caused by improper drainage, direct disruption of the banks, or vehicle traffic in the streambed can lead to an increased amount of sediment in the watercourse. Sediment in the water can coat fish eggs and restrict the flow of oxygen to the eggs. This can reduce spawning success and fish numbers. The sediment laden water can also affect adult fish. Fish that hunt by sight, such as trout, cannot hunt as well in murky water, and may suffer losses as a result.

Press any Key to Continue -

Proper construction practices that protect the shoreline and streambed from disruption, and control runoff into the watercourse, should prevent most of these negative effects.

Press any Key to Continue -

Chemical contamination of the watercourses is another potential concern. Petroleum products and other chemical compounds can kill fish and other aquatic organisms. As a result, potentially damaging chemicals should be kept out of the watercourse. By keeping petroleum product storage containers away from the watercourse, and restricting the fueling of construction equipment near the stream, many of these problems can be avoided. DFO has also expressed concern about placing pentachlorophenol (penta) treated wooden poles below the high water line of the watercourse. Manitoba Hydro's practice is to use chromated copper arsenate (CCA) treated poles in and immediately adjacent to wetland and waterbody crossings.

Press any Key to Continue -

Fishgi

General Description

The Fisheries Branch of the Department of Natural Resources and the federal Department of Fisheries and Oceans are interested in maintaining the health of fish and of aquatic ecosystems. Sub-transmission line construction and operation may be of some concern to those charged with their protection. Although proper construction practices should prevent damage, construction could disturb the shoreline and lead to erosion without such practices (Berger, 1995). This erosion could increase the amount of sediment in the water which could damage larval fish populations, and ultimately reduce the stocks of certain types of fish.

Press any Key to Continue ~

Fishpra

Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning fisheries. These guidelines include recommendations concerning: borrow pits, access roads, marshaling yards, erosion and sedimentation control, drainage protection, wetlands management, and timber clearing adjacent to watercourses. DFO has published additional guidelines, reproduced in Appendix B. These address: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, and general transmission line construction guidelines.

Press any Key to Continue ~

Fortcon

Agency Concerns

Forestry Branch officials prefer that merchantable timber be used, where feasible. If the timber cannot be used then it should be properly disposed of. The permitting procedure addresses these considerations. Forestry managers may also be concerned with the cumulative loss of forested lands. No legislative requirement exists that would require a consideration of the cumulative loss of forested lands. However, it appears that forestry managers may see the permanent removal of forested lands, especially land that might support merchantable stands, as an important consideration.

Press any Key to Continue ~

Forestry managers suspect that cumulative reduction of forested lands from all sources, e.g. agriculture, ROW for highways, telephone lines, and electricity transmission lines, will reduce annual

allowable cuts (in the areas where merchantable timber can be grown) and could reduce the sustainability of forest ecosystems (Atkinson, J., and S. Kaczanowski, Regional Forester and Regional Forestry Manager, Personal Communication, 1995). Although the Department of Natural Resources would prefer that a no net loss policy be observed, no policy has been established.

Press any Key to Continue ~

No Net Loss Policy

A No Net Loss policy is one that requires any loss to be balanced by a gain in another area. The forested land may be replanted, or contributions may be made to groups that sponsor replanting efforts. The difficulty with a No Net Loss policy is that efforts to increase the amount of forested land would necessitate the reduction of some other land cover type. If a No Net Loss policy is to be effective there must be an area of non-forested land that can be replanted without raising concerns about the loss of that non-forested land. Forestry Branch officials or local Natural Resources Officers should be contacted for further information if these concerns are raised.

Press any Key to Continue ~

Fortgi

General Description

The Forestry Branch oversees the use of forested Crown land in the Province of Manitoba. The Forestry Branch will receive a copy of the proposed project description from the Policy Co-ordination Branch. If the planned route will require the harvesting of timber, the Forestry Branch will require that permits be obtained. These permits will specify the ROW clearing and line construction practices that should be undertaken. When planning the line, input should be sought from the Branch. The Branch would generally prefer that high quality timber stands or high capability areas, especially merchantable ones, be avoided whenever possible.

Press any Key to Continue ~

Fortmerc

Permits Required for Merchantable Timber

The Regional Forestry Manager, and the local Natural Resources Officers should be contacted by Manitoba Hydro staff in the route planning process. Forest inventory maps will also be useful in this process. These maps may be obtained from the Forest Inventory Branch of the Department of Natural Resources (Forest Inventory Branch, Address: 200 Saulteax Cr. Winnipeg, MB, R3J 3W3, Phone: (204) 945-7957), and provide information about each forest stand. When possible contact the branch at least six months before construction is to begin to discuss permit requirements and concerns. The Branch would prefer that the merchantable timber be used. Contact the Branch to determine whether it is feasible that the timber be salvaged. If the timber can be salvaged, two scenarios are likely.

Press any Key to Continue ~

If the merchantable stands are included in a timber operator's FML area, then the particular timber operator should be given the option to clear the timber.

If the merchantable stands are not included in a FML area, then the wood should be made available to interested local residents.

If the timber cannot be salvaged, a fee will be assessed under the Forest Damage Appraisal and Valuation System (1995). Calculating the Forest Damage Appraisal fees should be done in consultation with Forestry Branch officials.

Press any Key to Continue ~

The wood should then be disposed of in a manner acceptable to local Natural Resources Officers and Manitoba Hydro. Acceptable methods include piling and burning, and chipping. Methods and details should be arranged with local Natural Resources Officers. However, wood cut along an existing ROW in a developed area will probably be used by local residents.

Press any Key to Continue ~

Fortno

No Permit Required

As no forested Crown land will be cleared, Forestry Branch should have no concerns with the line and no permits should be required.

Press any Key to Continue ~

Fortnon

Permits Required for Non-merchantable Timber

Initial contact information for the Regional Forestry Manager, and/or the local Natural Resources Officers will be provided by the Policy Coordination Branch. Input from the local Natural Resources should be solicited in the route planning process. Forest inventory maps can also be useful in this process. They may be obtained from the Forest Inventory Branch of the Department of Natural Resources Forest Inventory Branch, (Address: 200 Saulteax Cr. Winnipeg, MB, R3J 3W3, Phone: (204) 945-7957). These maps provide information about each forest stand. As non-merchantable forested Crown land will be cleared, Forestry Branch will require that permits be obtained before clearing may take place.

Press any Key to Continue ~

These permits are generally provided by local Natural Resources Officers or the Regional Forestry Manager (Address: Regional Forestry Manager, Eastern Regional Office, 20 First St. S. Beausejour, MB, R0E 0C0. Phone: (204) 268-6052). To obtain these permits, inform the Forestry Branch of the stands to be cut. If the Branch does not consider the stands to be valuable, they will be principally concerned with disposing of the wood. If the Branch considers the stands to be of value they may require fees to be paid under the Forest Damage Appraisal and Valuation System (1995). Calculating the Forest Damage Appraisal fees should be done in consultation with Forestry Branch officials. They may require the following information to calculate these fees:

Press any Key to Continue ~

Photos, Inventory maps

Forest inventory area reports, Forest inventory S.S.V.T,
Gross Merchantable Timber volume by sub-type by F.M.U.

Nursery stock cost, site preparation cost, planting cost,
silviculture survey cost, and tending cost

Forest protection cost

Mean annual increment by working group and site class, age
distribution by Forest Section and species. (If applicable)

Press any Key to Continue ~

Disposal methods are generally outlined in the ROW clearing permits. Chipping, piling, and piling and burning, are the usual procedures.

Chipping is most likely with small amounts of timber.

Piling may be used to create habitat.

Piling and burning are likely when large amounts of timber must be disposed of. The burns must be conducted in a manner that minimizes the risk of uncontrolled blazes. Burning should only be conducted in winter and should not be conducted over peat bogs, to reduce the chance of peat fires. Following burning, the site is usually inspected by representatives of both Manitoba Hydro and the Department of Natural Resources staff to ensure that the fires are out.

Fortnon

Press any Key to Continue ~

Fortpra

Recommended Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning forestry and clearing practices. These include: timber removal permits, clearing methods, buffer zones, danger tree considerations, and vegetation management. The federal Department of Fisheries and Oceans has also published recommendations that may be of concern in Right-of-Way clearing. These guidelines are printed in Appendix B. They include: reservations, or buffer zones; clearing in reservations; use of herbicides; and maintenance of Rights-of-Way.

Press any Key to Continue ~

Highcon

Possible Concerns

As the sub-transmission or distribution line will be constructed within or adjacent to an existing or future road allowance administered by the Department of Highways and Transportation, the Department may have concerns and should be consulted before construction takes place.

Press any Key to Continue -

Highways may be concerned with safety and future highway expansion issues. For safety reasons, the poles must be set back a distance at least equal to their height in case of pole collapse. The poles should also be set back far enough that out of control vehicles are unlikely to strike them (Chadha, A., Department of Highways and Transportation, Personal Communication, 1995). The Department would prefer that the line be located a minimum of 10 metres from the edge of the shoulder (Kopansky, K., Manitoba Highways Department, Personal Communication, 1995).

Press any Key to Continue -

Contact the regional Highways office (In the case of the Whitemouth Municipality: Highways and Transportation, 316-323 Main St., Steinbach, MB, R0A 2A0, Phone: (204) 326-4434) and ask the technical services engineer how far the sub-transmission line must be set back. Certain highways, especially Provincial Trunk Highways, may be expanded in the future to accommodate future traffic flows. As a result, sub-transmission lines should be set back far enough to accommodate planned highway improvements. The Department would prefer that the line be located at the edge of the road allowance.

Press any Key to Continue -

Manitoba Hydro practice is to construct on the two foot line of the road allowance. Road allowance widths vary: four lane highways may have 600 foot road allowances; provincial trunk highways road allowances are up to 200 feet; new or reconstructed provincial roads have 150 foot road allowances; while older provincial roads have 99 foot road allowances. If no improvements are planned, then Manitoba Hydro should obtain written confirmation from the Department stating that the no highway expansions are planned that would interfere with the sub-transmission or distribution line.

Press any Key to Continue -

Highgi

General Information

During the initial selection and assessment phase, Manitoba Hydro will provide the Department of Highways and Transportation (Address: Department of Highways and Transportation, 215 Garry St. Winnipeg, MB) with a copy of the project description. The Department may provide comments and input, and may request additional information. Standard Manitoba Hydro practices should address most Department concerns.

Press any Key to Continue ~

Attempt to route sub-transmission lines where they will not interfere with present and future roadways. If concerns do arise, discuss these concerns with Departmental officials. It should be noted that not all roadways are administered by the Department of Highways. The respective municipalities should be contacted to discuss concerns relating to municipal roads. These concerns will be addressed in the municipal concerns module.

Press any Key to Continue ~

Highno

Minimal Concerns

Since no present or planned future highways road allowances are involved, the Department of Highways and Transport should not have any concerns with the sub-transmission line. Request a letter from Highways stating that the line is not being constructed in any existing or planned highways road allowance.

Press any Key to Continue ~

Histcon

Agency Concerns

The Historic Resources Branch is concerned with the preservation of "...works of nature or human endeavor that have prehistoric, historic, cultural, natural, scientific, or aesthetic value." (Manitoba Historic Resources Branch, 1995) Arrowheads, fossils, and old buildings are examples of the tangible history that the Branch wishes to preserve. Historic sites are most likely to be located on areas of high ground, and along watercourses, especially at rapids and stream confluences. Development at or near these areas may concern the Branch as construction activities could damage these resources. Unless historic sites are noted and proper mitigation applied, sub-transmission line development could threaten these sites. However, the use of Manitoba Hydro general environmental protection measures should assist in preventing damage to historic sites.

Press any Key to Continue ~

Histgi

General Information

During the route planning and assessment process of sub-transmission lines, it is Manitoba Hydro's practice to provide the Historic Resources Branch of the Department of Culture, Heritage, and Citizenship with a description of the project to review. Historic Resources will then assess the likelihood of encountering an area of historic significance during project construction and operation. If such areas are known or suspected, then the Branch will notify Manitoba Hydro and advise that the areas be avoided or mitigation measures be applied.

Press any Key to Continue ~

Histja

Endorsement Required

As the sub-transmission line may affect a historic site, a Historic Resources Assessment may be required. Contact the Historic Resources Branch (Address: Historic Resources Branch, Manitoba Culture, Heritage, and Citizenship, Main Floor, 213 Notre Dame Ave., Winnipeg, MB, R3B 1N3. Contact Person: Impact Assessment Officer, Phone: 945-1830). The Branch will issue guidelines and assist Manitoba Hydro staff in arranging the necessary studies (Manitoba Historic Resources Branch, 1995). Mitigation may be required to reduce or eliminate the impact of the sub-transmission line. Ongoing consultation with Historic Resources will be necessary in this case. In some cases, the route may need to be altered. Seek input from the Branch to determine whether route re-alignment will be necessary.

Press any Key to Continue ~

Histno

No Endorsement Required

Since no areas of historic significance have been identified by the Historic Resources Branch as potentially affected by the proposed sub-transmission line, no further Historic Resources analysis will be required at this time. Historic Resources will generally provide a written confirmation that no historic sites will be affected by the development. However, if obvious unexpected historic sites are found in during sub-transmission line construction or operation, halt all operations in the area and contact the Historic Resources Branch immediately.

Press any Key to Continue ~

Histpra

Construction Practices

Standard Manitoba Hydro construction practices, reproduced in Appendix A, should reduce the impact of sub-transmission line construction on historic resources. These practices regulate access road construction to reduce the risk of damaging historic sites.

Press any Key to Continue ~

Indgi

General Information

If the sub-transmission line could affect Indian reservations, contact Indian and Northern Affairs Canada. Obtain the Department's input in routing the line and addressing any issues and concerns that may arise.

Press any Key to Continue -

Indja

Possible Concerns

As the sub-transmission line will cross Indian reservation lands, Indian and Northern Affairs Canada may have concerns with the line. Contact Indian and Northern Affairs Canada for more information (Address: 1100-275 Portage Ave., Winnipeg, MB. Phone (204) 983-4689). A federal environmental assessment screening may also be required. Contact Licensing & Environmental Assessment, Design Division T&D (Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone: (204) 474-3119).

Press any Key to Continue ~

Indno

Minimal Concerns

As the sub-transmission line does not cross any Indian reservations, Indian and Northern Affairs Canada should not have any concerns with the line.

Press any Key to Continue ~

Landcon

Agency Concerns

Lands Branch may be concerned with addressing any existing encumbrances that may exist on the Crown lands that are to be crossed.

Press any Key to Continue ~

Landgi

General Description

During initial route assessment, the Lands Branch (Address: Lands Branch, 1007 Century Ave. Winnipeg, MB, R3H 0W4.

Phone: (204) 945-6616 or 123 Main St. Neepawa, MB.

Phone: (204) 476-3441) will have been provided with a copy of the proposed project description by the Policy Coordination Branch.

The Lands Branch oversees the use of non-forested Crown land in the Province of Manitoba. For example, leaves, or buffer zones, must be left around airstrips, and the Lands Branch is responsible for this. Depending on the route to be traversed, the Lands Branch may have comments.

Press any Key to Continue ~

Landgi

General Description

During initial route assessment, the Lands Branch (Address: Lands Branch, 1007 Century Ave. Winnipeg, MB, R3H 0W4.

Phone: (204) 945-6616 or 123 Main St. Neepawa, MB.

Phone: (204) 476-3441) will have been provided with a copy of the proposed project description by the Policy Coordination Branch.

The Lands Branch oversees the use of non-forested Crown land in the Province of Manitoba. For example, leaves, or buffer zones, must be left around airstrips, and the Lands Branch is responsible for this. Depending on the route to be traversed, the Lands Branch may have comments.

Press any Key to Continue ~

Landja

Clearance Required

The Lands Branch is responsible for administering non-forested Crown lands. Certain areas of Crown land, e.g. leaves around airports, have certain restrictions placed on development. As the sub-transmission line in question has been identified as crossing areas with existing encumbrances, these restrictions, or encumbrances, will have to be addressed prior to the construction of the line. Lands Branch will inform Manitoba Hydro staff of the encumbrances and assist in contacting the land holder or land holders in question (Lancaster, G., Senior Winnipeg Manager, Lands Branch, Personal Communication, 1995).

Press any Key to Continue ~

Landno

No Clearance Required

As no Crown lands with existing encumbrances, or barriers or holds to development will be crossed by the new sub-transmission line, the Lands Branch of Department of Natural Resources should not have any concerns related to the transmission line. If concerns do arise, deal directly with the Lands Branch to resolve the concerns.

Press any Key to Continue ~

Minecon

Agency Concerns

The Mines Branch is concerned when sub-transmission lines cross active or high quality gravel lease areas. However, if the line is routed around the area to be quarried or mined, then the Branch should not raise objections.

Press any Key to Continue ~

Minegi

General Information

During the route selection and assessment phase, Manitoba Hydro typically contacts the Mines Branch Address: Mines Branch, Department of Energy and Mines, 1385 Ellice Ave, Winnipeg MB, Phone: (204) 945-6546. Contact Person: Aggregate Geologist. of the Department of Energy and Mines and supplies them with a copy of the project description for review and comment. If the Branch has concerns, then consult Branch officials to resolve the issues.

Press any Key to Continue ~

Mineja

Possible Concerns

If the planned sub-transmission line crosses an active or undeveloped gravel leave, contact the lease holder. This information should be available from Mines Branch. Negotiate with the lease holder and consider routing the line around the active pits and undeveloped areas with high potential for gravel quarrying.

Press any Key to Continue ~

Mineno

Minimal Concerns

Since no mining operations will be affected by the sub-transmission line, Mines Branch should have no objections.

Press any Key to Continue ~

Mtscon

Agency Concerns

MTS will be concerned that the sub-transmission line not interfere with the operation of the telephone system.

Press any Key to Continue ~

Mtsgi

General Information

During the route selection and assessment phase of sub-transmission line development, Manitoba Hydro practice is to supply the Manitoba Telephone System (MTS) with a description of the proposed project for review and comment. If the proposed line could interfere with telephone line operations, then MTS will seek input into the development process and suggest mitigation to control and negative effects.

Press any Key to Continue -

Mtsgi

General Information

During the route selection and assessment phase of sub-transmission line development, Manitoba Hydro practice is to supply the Manitoba Telephone System (MTS) with a description of the proposed project for review and comment. If the proposed line could interfere with telephone line operations, then MTS will seek input into the development process and suggest mitigation to control and negative effects.

Press any Key to Continue ~

Mtsja

Possible Concerns

Since the sub-transmission line may have effects on MTS facilities, MTS may have concerns with the line. MTS is concerned with the noise induction interference caused by electricity transmission lines on telephone lines (Zelig, D, Network Services, Manitoba Telephone System, Personal Communication, 1995). Noise induction is affected by the amount of separation between the lines and the length of parallel.

Press any Key to Continue -

If the sub-transmission line will cause interference, then Manitoba Hydro practice is to mitigate these effects through the installation of line noise controlling equipment. Contact MTS directly to determine whether noise mitigation is required, and if so, how the costs of the mitigation should be shared. Initial contact should be made with the regional MTS office, but MTS Headquarters Network Services staff may become involved.

Press any Key to Continue -

Mtsno

No Concerns

Since the sub-transmission line will not affect any MTS facilities, MTS should not have any concerns with the line. MTS generally provides written correspondence which indicates whether MTS facilities will be affected by the transmission line.

Press any Key to Continue ~

Muni66

Possible Municipal Concerns

As the sub-transmission line will be located in a 66 foot (20.1 metre) road allowance, the municipality may express concerns. Construction of a sub-transmission line on the two foot line (0.62 metre) of a 66 foot road allowance may cause ditch maintenance problems for the municipality. According to the municipality, if the sub-transmission line is located so close to the ditch, it can be difficult to avoid damaging the line during routine maintenance.

Press any Key to Continue ~

As a result, it has been suggested that, when a pole is damaged, the municipality not pay the full replacement cost but a depreciated cost based on the age of the pole structure (Steiner, D., Reeve of Whitemouth Municipality, Personal Communication, 1995). Manitoba Hydro staff should be prepared to respond to this argument should it be raised. Further dialogue with the municipality may be required if these concerns are raised.

Press any Key to Continue ~

Muni99

Minor Municipal Concerns

As the sub-transmission or distribution line will be located in a municipal road allowance, though not in 66 foot (20.1 metre) allowances, the municipality may have concerns. If outstanding issues are raised, contact the municipal reeve and councilors.

Press any Key to Continue ~

Municon

Agency Concerns

The municipality's concern is that the presence of the sub-transmission line may interfere with municipal operations, specifically with ditch maintenance. Construction of a line along a 66 foot (20.1 m) road allowance, apparently means that the ditch and sub-transmission line are located close together. Because the ditch and line are so close together, poles are occasionally damaged as the ditches are being cleared. As a result, the municipality may request that lines be constructed along 99 foot (30.2m) road allowances or that the municipality not pay the full replacement fee for damaged poles. Dialogue with the municipality should be pursued.

Press any Key to Continue ~

Munigi

General Information

Sub-transmission lines are often constructed along the two foot line (0.62 m) of a municipal road allowance. According to Section 23(1) of the Manitoba Hydro Act, Manitoba Hydro has the right to place poles within the road allowance. However, the municipality should be contacted in the route selection and assessment phase of the project, and their input solicited. If concerns are raised by the municipality, discuss the issues with the reeve and councillors.

Press any Key to Continue ~

Munimin

Minimal Municipal Concerns

As the sub-transmission or distribution line will not be constructed in municipal road allowances, the municipality should not have any concerns. If outstanding issues are raised, contact the municipal reeve and councilors.

Press any Key to Continue ~

Navicon

Agency Concerns

The Coast Guard may be concerned that clearances be maintained on the waterways to permit the passage of vessels. To ensure this, they will require that CSA standards be met and that permits be obtained. The projects's design specifications should meet these requirements.

Press any Key to Continue ~

Navigi

General Information

If any waterways will be crossed, contact the Coast Guard in Selkirk, Manitoba (Address: PO Box 216, Selkirk, MB, R1A 2B2, Phone (204) 785-6030), during the route planning and assessment phase. If waterways will be crossed, the Coast Guard will request information concerning the exact nature of the crossing. Send them a copy of the screening report, the exact locations of the proposed crossings; the type of crossings, whether the crossing will be overhead, trenched, or tunneled; and the technical drawings of the crossings.

Press any Key to Continue ~

They will require that CSA (Canadian Standards Association) electrical conductor clearance standards be met (Settee, R, Coast Guard, Personal Communication, 1995). Ask whether the Navigable Waters Protection Act will apply to the watercourse or watercourses in question. If the Act applies, a permit will be required.

Press any Key to Continue ~

Definition: According to the Transport Canada, a permit is required for any structure crossing a navigable waterway. Although the term "navigable waterway" has no legal definition, the department considers a waterway to be navigable if it will float a vessel of any size, including canoes, in its natural state (Settee, R, Coast Guard, Personal Communication, 1995). Natural state refers to the summer low water level, in the absence of beaver dams or other water-level raising structures. Since many waterbodies might fit this definition, the safest course of action is to request a ruling on the applicability of all waterbodies.

Press any Key to Continue ~

Navija

Approval Required

If the Department has decided that the waterway to be crossed is navigable, then a permit will be required. The Coast Guard will require that CSA standards be met. Contact Coast Guard officials directly if more information is required.

Note: If a permit is required, and a new ROW will be needed, then a federal environmental assessment known as a screening will also be required.

Press any Key to Continue ~

Navino

No approval Required

As no navigable waters are crossed by the line, no permit under the Navigable Waters Protection Act will be required.

Press any Key to Continue -

Parkgi

General Description

The Parks Branch Address: (Parks Branch, 200 Saulteax Cr., Winnipeg, MB, R3J 3W3. Phone: (204) 945-6808) of the Department of Natural Resources is responsible for the administration of provincial parks in the province. During initial route assessment, the Parks Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. If the proposed sub-transmission line is to cross a Provincial park, the Parks Branch is likely to request input into the routing and construction process.

Press any Key to Continue -

Manitoba Hydro has the legal authority to construct sub-transmission lines, as well as other types of electricity transmission lines, in provincial parks. Depending on the nature, designation, and location of the park, the Parks Branch may have various concerns, including the aesthetic effects of sub-transmission line development. Efforts should be made to incorporate these concerns into the development of the sub-transmission line project.

Press any Key to Continue -

Parkja

Endorsement Procedures

If the sub-transmission or distribution line will cross a Provincial park, and the Parks Branch has concerns, then the Policy Coordination Branch will supply contact information for Parks staff. Obtain the input of Parks Branch staff and attempt to incorporate their concerns into route planning. Although Manitoba Hydro has the legal authority to develop sub-transmission lines within parks, attempt to incorporate Parks concerns in the route. A common concern of Parks staff are the aesthetic impacts of transmission line development (Hood, E., Park Superintendent, Retired Communication, 1995). They would prefer that the lines be "invisible." The discreet placement of poles and the proper attention to the direction of approach of the lines will reduce this potential negative aesthetic effect.

Press any Key to Continue ~

Parkno

No Endorsement Required

As the sub-transmission or distribution line does not pass through any Provincial parks, the Parks Branch should not have any concerns regarding the line.

Press any Key to Continue ~

Polcoapp

Endorsement Procedure

Contact the Policy Coordination Branch of the Department of Natural Resources (Address: PO Box 38, 200 Saulteax, Winnipeg, MB, R3J 3V3. Phone (204) 945-6658. Contact Person: Director, Policy Coordination Branch) and supply them with ten (10) copies of a screening report (Baker, G., Director, Policy Coordination Branch, Personal Communication, 1995). This report should include:

The proposed location of the line.

A brief description of the need for the new line.

Press any Key to Continue ~

A brief description of the type of line. e.g. single pole with a cross arm to support insulators and conductors.

A description of the study area, complete with maps.

If any of the line is to be constructed within road allowances, this fact should be noted.

A brief description of how Manitoba Hydro plans to acquire the right to develop Crown Land, e.g. by easement, Crown Land reservation, etc.

A brief description of how Manitoba Hydro plans to acquire the right to develop private land, e.g. by easement, etc.

The name and contact information of the Manitoba Hydro contact person.

Press any Key to Continue ~

This screening report will then be circulated to each branch of the Department as well as to the regional offices for review and comment. A consolidated response from the Department will then be forwarded to the Manitoba Hydro contact person by the Policy Coordination Branch.

Press any Key to Continue ~

Polcocon

Agency Concerns

A number of concerns may be raised by the Department of Natural Resources including fisheries, forestry, wildlife issues. The Policy Co-ordination Branch may provide the proponent with a list of concerns and individuals to consult with to address these concerns. Common concerns from each branch will be dealt with under the specific section dealing with that branch.

Press any Key to Continue ~

Polcogi

General Description

The Policy Coordination Branch of the Department of Natural Resources is responsible for distributing proposed project information from the proponent to the various branches of the Department. The Policy Coordination Branch also will provide the proponent with a consolidated departmental response.

Press any Key to Continue ~

Provcon

Agency Concerns

The Environment Department will be concerned with the preservation of environmental quality. Many of the concerns outlined by Natural Resources staff will also be of concern to environment officials. Environment officials may also be concerned with socio-economic impact of the proposed projects.

Press any Key to Continue ~

Provgi

General Information

The Manitoba Department of Environment is responsible for environmental protection in the province. Power lines of less than 115 kV, including sub-transmission lines, do not generally require formal assessment.

Press any Key to Continue ~

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. As the development of a sub-transmission line may have impacts on the environment, the Department will informally review the proposed project. If environmental concerns are raised, then the Department will contact Manitoba Hydro with its concerns. According to the Department, concerns may be raised if the proposed line is to cross streams, significant wildlife habitats, or Provincial parks. In these cases, it is possible that the Department may request formal assessment (Blunt, B., Manitoba Environment Department, Personal Communication, 1995).

Press any Key to Continue ~

The Environment Department should be appraised of any significant impacts and issues. They may request time of year restrictions and other forms of mitigation to reduce any negative impacts on the environment. Efforts should be made to incorporate these concerns into sub-transmission line development.

Press any Key to Continue ~

Provmini

Minimal Environmental Effects

In this case, since the sub-transmission or distribution line does not affect a Provincial park, any streams, or any areas of significant to wildlife, formal assessment is very unlikely. However the Department should be contacted and their comments solicited.

Press any Key to Continue ~

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. This information should then be sent to the Land Use Approvals section of the Environment Department (Address: Environmental Approvals, Building Two, Fort Osborne Complex, 139 Tuxedo Avenue, Winnipeg, R3N 0H6). The project will then be subject to an informal review by interested government departments.

Press any Key to Continue ~

Should a formal provincial assessment be requested by the Environment Department, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D (Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone (204) 474-3119). However, a formal assessment is unlikely in this case. The Department is likely to suggest that standard environmental codes of practice be followed.

Press any Key to Continue ~

Provposs

Possible Formal Assessment

Although power lines of less than 115 kV or less require no formal approval, the department may request an assessment, in certain cases. In this case, since the sub-transmission or distribution line crosses streams, areas of significant to wildlife, or Provincial parks, formal assessment is possible. However, early consultation and informal endorsement from the Department should reduce the need for formal assessment.

Press any Key to Continue ~

During initial route assessment, provide the Land Use section of the Department with a copy of the proposed project description. This information should then be sent to the Land Use Approvals section of the Environment Department. The project will then be subject to an informal review by interested government departments. Should a formal provincial assessment be requested by the Environment Department, contact Manitoba Hydro's Licensing & Environmental Assessment, Design Division T&D. (Manitoba Hydro, Licensing & Environmental Assessment, Design Division T&D, 820 Taylor Ave. PO Box 815, Winnipeg, MB, R3C 2P4, Phone (204) 474-3119).

Press any Key to Continue ~

Formal assessments are more likely when streams are crossed, significant wildlife habitat is affected, or parks are crossed. A formal assessment is possible in this case. To reduce the need for formal assessment, cooperate with all departmental requests and attempt to obtain an informal endorsement of the preferred route. The endorsement is likely to include conditions, such as adherence to standard environmental codes of practice, Recommended Fish Protection Procedures for Stream Crossing in Manitoba, and Timber Harvesting Practices for Forestry Operations in Manitoba (1994).

Press any Key to Continue ~

Provpra

Construction Practices

Manitoba Hydro has published a list of general environmental protection measures (Appendix A). These guidelines outline a variety of methods by which the environment may be protected including: general management, clearing, borrow pits, access, marshaling yards, material handling and storage, waste management, wildlife, safety, regulatory requirements, environmental protection measures for construction in urban environments, environmental protection measures of agricultural lands, stream crossing, wetlands, erosion and sedimentation control, drainage protection, vegetation management, and security and safety.

Press any Key to Continue ~

The federal Department of Fisheries and Oceans has also published environmental protection guidelines (Appendix B). These include: groundwater management, erosion control, pit restoration, gravel washing, construction waste guidelines, timber clearing adjacent to watercourses, buffers, general transmission line construction guidelines, guidelines for the planning and site selection and the construction and operation of borrow pits, and sand and gravel washing guidelines. Some or all of these guidelines may be recommended by the Department.

Press any Key to Continue ~

```
Runtime;  
BKCOLOR = 0;
```

Actions

```
COLOR = 7  
Display "PREASES Ver 1.0"  
DISPLAY "The approvals component will advise you on what  
type of approvals are necessary to construct this particular  
sub-transmission line.
```

Press any key to begin~"

```
CLS  
Automatic = yes
```

```
Find Procedures  
Display "The following procedures are recommended  
{#Procedures}."
```

```
Display "Press any key to display recommendations.~"  
SAVEFACTS d:\vpexpert\info\facts  
CHAIN d:\vpexpert\info\display;
```

!!!!!!!!!!!!!! RULES !!!!!!!!!!!

!!!!!!!!!!!!!! FORESTRY !!!!!!!!!!!

```
Rule No_Clearing  
IF Clear_Forest = No  
THEN Procedures = Forest_1;
```

```
Rule Yes_Clearing  
IF Clear_Forest = Yes AND  
    Merchantable = No  
THEN Procedures = Forest_2;
```

```
Rule Merchantable  
IF Clear_Forest = Yes AND  
    Merchantable = Yes  
THEN Procedures = Forest_3;
```

!!!!!!!!!!!!!! FISHERIES !!!!!!!!!!!

```
Rule Fish  
IF Stream_Crossing = YES  
THEN Procedures = Fisheries_2  
ELSE Procedures = Fisheries_1;
```

!!!!!!!!!!!!!! WATER RES !!!!!!!!!!!

```
Rule Waterres  
IF Water_Res = YES
```

```
THEN Procedures = Water_Res_2
ELSE Procedures = Water_Res_1;
```

!!!!!!! RAILWAYS !!!!!!!!

```
Rule Railapp
IF Rail = YES
THEN Procedures = Rail_2
ELSE Procedures = Rail_1;
```

!!!!!!! PARKS !!!!!!!!

```
Rule Parks
IF Parks = YES
THEN Procedures = Parks_2
ELSE Procedures = Parks_1;
```

!!!!!!! LANDS !!!!!!!!

```
Rule Lands
IF Lands = YES
THEN Procedures = Lands_2
ELSE Procedures = Lands_1;
```

!!!!!!! WILDLIFE !!!!!!!!

```
Rule Wildlife
IF Wild = YES
THEN Procedures = Wild_2
ELSE Procedures = Wild_1;
```

!!!!!!! HISTORIC RESOURCES !!

```
Rule Historic_Resources
IF Historic = YES
THEN Procedures = Historic_2
ELSE Procedures = Historic_1;
```

!!!!!!! MUNICIPAL !!!!!!!!

```
Rule Municipal_Road_Allowances_No
IF Municipal = NO
THEN Procedures = Municipal_1;
```

```
Rule Municipal_Road_Allowances_Yes_66_No
IF Municipal = YES AND
  66_ROW = NO
THEN Procedures = Municipal_2;
```

```
Rule Municipal_Road_Allowances_Yes_66_Yes
IF Municipal = YES AND
  66_ROW = YES
THEN Procedures = Municipal_3;
```

!!!!!!! PROV ENVIRONMENT

```
Rule Prov_Environment
IF New_ROW = Yes AND
  Stream_Crossing = Yes OR
  Wild = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Prov_Environ_Extra
IF Parks = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Inelegant
IF Procedures = Prov_Env2
THEN Procedures = Nothing
ELSE Procedures = Prov_Env1;
```

!!!!!!!!!!!! FEDERAL ENVIRONMENT

```
Rule Federal
IF New_ROW = Yes OR
  Penta = Yes OR
  High_Water = Yes AND
  Railway = Yes OR
  Navigable_Water = Yes OR
  Destroy_Fish = Yes
THEN Procedures = Federal_2
ELSE Procedures = Federal_1;
```

!!!!!!!!!!!! INDIAN AFFAIRS !!!!!!!!!

```
Rule Indian_Affairs
IF Indian = YES
THEN Procedures = Indian_2
ELSE Procedures = Indian_1;
```

!!!!!!!!!!!! MTS !!

```
Rule MTS
IF MTS = YES
THEN Procedures = MTS_2
ELSE Procedures = MTS_1;
```

!!!!!!!!!!!! HIGHWAYS !!

```
Rule Highways
IF Highways = YES
THEN Procedures = Highways_2
ELSE Procedures = Highways_1;
```

!!!!!!!!!!!! RURAL DEVELOPMENT !!

```
Rule Rural_Development
IF Rural_Dev = YES
THEN Procedures = Rural_Dev_2
ELSE Procedures = Rural_Dev_1;
```

!!!!!!!!!!!! MINES !!

Rule Mines
IF Mines = YES
THEN Procedures = Mines_2
ELSE Procedures = Mines_1;

!!!!!!! Navigable !!!!!

Rule Navigable
IF Stream_Crossing = YES AND
 Navigable_Water = YES
THEN Procedures = Navig_2
ELSE Procedures = Navig_1;

!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!

ASK Clear_Forest : "Will any forested Crown land, merchantable
or non-merchantable, need to be cleared?";
CHOICES Clear_Forest : Yes, No;

ASK Merchantable : "Will any merchantable timber on Crown land
need to be cleared?";
CHOICES Merchantable : Yes, No;

ASK Water_Res : "Will drainage ditches administered by Water
Resources be affected?";
CHOICES Water_Res : Yes, No;

ASK Stream_Crossing : "Will any streams need to be crossed?";
CHOICES Stream_Crossing : Yes, No;

ASK Navigable_Water : "Will any navigable waters need to be crossed?";
CHOICES Navigable_Water : Yes, No;

ASK Destroy_Fish : "Will fish habitat need to be destroyed?";
CHOICES Destroy_Fish : Yes, No;

ASK Parks : "Will any provincial parks be crossed?";
CHOICES Parks : Yes, No;

ASK Lands : "Will any Crown lands administered by the provincial Lands
branch be crossed?";
CHOICES Lands : Yes, No;

ASK Wild : "Will any areas that are significant to wildlife, flora or
fauna, be crossed or otherwise affected?";
CHOICES Wild : Yes, No;

ASK Historic : "Will a Historic Resources Assessment be required?";
CHOICES Historic : Yes, No;

ASK Indian : "Will any Indian reservations be crossed?";
CHOICES Indian : Yes, No;

ASK MTS : "Will MTS facilities be affected by the sub-transmission or
distribution line?";
CHOICES MTS : Yes, No;

ASK Highways : "Will current or potential highway's road allowances be affected by the line?";
CHOICES Highways : Yes, No;

ASK Rural_Dev : "Will the line cross agricultural land at a point other than on a road allowance or on a quarter section line?";
CHOICES Rural_Dev : Yes, No;

ASK Mines : "Will a developed or high capability undeveloped gravel lease be crossed by the line?";
CHOICES Mines : Yes, No;

ASK Municipal : "Will the line be constructed along any developed or undeveloped road allowances?";
CHOICES Municipal : Yes, No;

ASK 66_ROW : "Will the line be constructed along a 66 foot (20.1 metre) developed or undeveloped road allowance?";
CHOICES 66_ROW : Yes, No;

ASK New_ROW : "Will a new ROW be needed?";
CHOICES New_ROW : Yes, No;

ASK Penta : "Will pentachlorophenol treated poles be placed in a wetland?";
CHOICES Penta : Yes, No;

ASK High_Water : "Will poles be placed below the high water line of any watercourse?";
CHOICES High_Water : Yes, No;

ASK Railway : "Will a leave be required to cross or approach a railway?";
CHOICES Railway : Yes, No;

ASK Rail : "Will a railway be approached or crossed?";
CHOICES Rail : Yes, No;

PLURAL : Procedures;

```
Runtime;  
BKCOLOR = 0;
```

Actions

```
printon
```

```
COLOR = 7  
Display "PREASES Ver 1.0"  
DISPLAY "The approvals component will advise you on what  
type of approvals are necessary to construct this particular  
sub-transmission line.
```

```
Press any key to begin~"
```

```
CLS  
Automatic = yes
```

```
Find Procedures  
Display "The following procedures are recommended  
{#Procedures}."
```

```
Display "Press any key to display recommendations.~"  
SAVEFACTS d:\vpexpert\info\facts  
CHAIN d:\vpexpert\info\display;
```

```
!!!!!!!!!!!!!! RULES !!!!!!!!!!!
```

```
!!!!!!!!!!!!!! FORESTRY !!!!!!!!!!!
```

```
Rule No_Clearing  
IF Clear_Forest = No  
THEN Procedures = Forest_1;
```

```
Rule Yes_Clearing  
IF Clear_Forest = Yes AND  
Merchantable = No  
THEN Procedures = Forest_2;
```

```
Rule Merchantable  
IF Clear_Forest = Yes AND  
Merchantable = Yes  
THEN Procedures = Forest_3;
```

```
!!!!!!!!!!!!!! FISHERIES !!!!!!!!!!!
```

```
Rule Fish  
IF Stream_Crossing = YES  
THEN Procedures = Fisheries_2  
ELSE Procedures = Fisheries_1;
```

```
!!!!!!!!!!!!!! WATER RES !!!!!!!!!!!
```

```
Rule Waterres  
IF Water_Res = YES
```



```
THEN Procedures = Water_Res_2
ELSE Procedures = Water_Res_1;
```

!!!!!!! RAILWAYS !!!!!!!

```
Rule Railapp
IF Rail = YES
THEN Procedures = Rail_2
ELSE Procedures = Rail_1;
```

!!!!!!! PARKS !!!!!!!

```
Rule Parks
IF Parks = YES
THEN Procedures = Parks_2
ELSE Procedures = Parks_1;
```

!!!!!!! LANDS !!!!!!!

```
Rule Lands
IF Lands = YES
THEN Procedures = Lands_2
ELSE Procedures = Lands_1;
```

!!!!!!! WILDLIFE !!!!!!!

```
Rule Wildlife
IF Wild = YES
THEN Procedures = Wild_2
ELSE Procedures = Wild_1;
```

!!!!!!! HISTORIC RESOURCES !!

```
Rule Historic_Resources
IF Historic = YES
THEN Procedures = Historic_2
ELSE Procedures = Historic_1;
```

!!!!!!! MUNICIPAL !!!!!!!

```
Rule Municipal_Road-Allowances_No
IF Municipal = NO
THEN Procedures = Municipal_1;
```

```
Rule Municipal_Road-Allowances_Yes_66_No
IF Municipal = YES AND
  66_ROW = NO
THEN Procedures = Municipal_2;
```

```
Rule Municipal_Road-Allowances_Yes_66_Yes
IF Municipal = YES AND
  66_ROW = YES
THEN Procedures = Municipal_3;
```

!!!!!!! PROV ENVIRONMENT

```
Rule Prov_Environment
IF New_ROW = Yes AND
    Stream_Crossing = Yes OR
    Wild = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Prov_Environ_Extra
IF Parks = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Inelegant
IF Procedures = Prov_Env2
THEN Procedures = Nothing
ELSE Procedures = Prov_Env1;
```

!!!!!!!!!!!!!! FEDERAL ENVIRONMENT

```
Rule Federal
IF New_ROW = Yes OR
    Penta = Yes OR
    High_Water = Yes AND
    Railway = Yes OR
    Navigable_Water = Yes OR
    Destroy_Fish = Yes
THEN Procedures = Federal_2
ELSE Procedures = Federal_1;
```

!!!!!!!!!!!!!! INDIAN AFFAIRS !!!!!!!!!

```
Rule Indian_Affairs
IF Indian = YES
THEN Procedures = Indian_2
ELSE Procedures = Indian_1;
```

!!!!!!!!!!!!!! MTS !!

```
Rule MTS
IF MTS = YES
THEN Procedures = MTS_2
ELSE Procedures = MTS_1;
```

!!!!!!!!!!!!!! HIGHWAYS !!

```
Rule Highways
IF Highways = YES
THEN Procedures = Highways_2
ELSE Procedures = Highways_1;
```

!!!!!!!!!!!!!! RURAL DEVELOPMENT !!

```
Rule Rural_Development
IF Rural_Dev = YES
THEN Procedures = Rural_Dev_2
ELSE Procedures = Rural_Dev_1;
```

!!!!!!!!!!!!!! MINES !!

Rule Mines

IF Mines = YES

THEN Procedures = Mines_2

ELSE Procedures = Mines_1;

!!!!!!! Navigable !!!!!

Rule Navigable

IF Stream_Crossing = YES AND

 Navigable_Water = YES

THEN Procedures = Navig_2

ELSE Procedures = Navig_1;

!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!

ASK Clear_Forest : "Will any forested Crown land, merchantable
or non-merchantable, need to be cleared?";

CHOICES Clear_Forest : Yes, No;

ASK Merchantable : "Will any merchantable timber on Crown land
need to be cleared?";

CHOICES Merchantable : Yes, No;

ASK Water_Res : "Will drainage ditches administered by Water
Resources be affected?";

CHOICES Water_Res : Yes, No;

ASK Stream_Crossing : "Will any streams need to be crossed?";

CHOICES Stream_Crossing : Yes, No;

ASK Navigable_Water : "Will any navigable waters need to be crossed?";

CHOICES Navigable_Water : Yes, No;

ASK Destroy_Fish : "Will fish habitat need to be destroyed?";

CHOICES Destroy_Fish : Yes, No;

ASK Parks : "Will any provincial parks be crossed?";

CHOICES Parks : Yes, No;

ASK Lands : "Will any Crown lands administered by the provincial Lands
branch be crossed?";

CHOICES Lands : Yes, No;

ASK Wild : "Will any areas that are significant to wildlife, flora or
fauna, be crossed or otherwise affected?";

CHOICES Wild : Yes, No;

ASK Historic : "Will a Historic Resources Assessment be required?";

CHOICES Historic : Yes, No;

ASK Indian : "Will any Indian reservations be crossed?";

CHOICES Indian : Yes, No;

ASK MTS : "Will MTS facilities be affected by the sub-transmission or
distribution line?";

CHOICES MTS : Yes, No;

ASK Highways : "Will current or potential highway's road allowances
be affected by the line?";
CHOICES Highways : Yes, No;

ASK Rural_Dev : "Will the line cross agricultural land at a point other
than on a road allowance or on a quarter section line?";
CHOICES Rural_Dev : Yes, No;

ASK Mines : "Will a developed or high capability undeveloped gravel lease
be crossed by the line?";
CHOICES Mines : Yes, No;

ASK Municipal : "Will the line be constructed along any developed or
undeveloped road allowances?";
CHOICES Municipal : Yes, No;

ASK 66_ROW : "Will the line be constructed along a 66 foot (20.1 metre)
developed or undeveloped road allowance?";
CHOICES 66_ROW : Yes, No;

ASK New_ROW : "Will a new ROW be needed?";
CHOICES New_ROW : Yes, No;

ASK Penta : "Will pentachlorophenol treated poles be placed in a wetland?";
CHOICES Penta : Yes, No;

ASK High_Water : "Will poles be placed below the high water line of any
watercourse?";
CHOICES High_Water : Yes, No;

ASK Railway : "Will a leave be required to cross or approach a railway?";
CHOICES Railway : Yes, No;

ASK Rail : "Will a railway be approached or crossed?";
CHOICES Rail : Yes, No;

PLURAL : Procedures;

Query

This text file contains the source code information for the input component of PREASES 1.0.

```
Runtime;  
BKCOLOR = 0;
```

Actions

```
printon
```

```
COLOR = 7  
Display "PREASES Ver 1.0"  
DISPLAY "The approvals component will advise you on what  
type of approvals are necessary to construct this particular  
sub-transmission line.
```

```
Press any key to begin~"
```

```
CLS  
Automatic = yes
```

```
Find Procedures  
Display "The following procedures are recommended  
{#Procedures}."
```

```
Display "Press any key to display recommendations.~"  
SAVEFACTS d:\vpexpert\info\facts  
CHAIN d:\vpexpert\info\display;
```

```
!!!!!!!!!!!!!! RULES !!!!!!!!!!!
```

```
!!!!!!!!!!!!!! FORESTRY !!!!!!!!!!!
```

```
Rule No_Clearing  
IF Clear_Forest = No  
THEN Procedures = Forest_1;
```

```
Rule Yes_Clearing  
IF Clear_Forest = Yes AND  
Merchantable = No  
THEN Procedures = Forest_2;
```

```
Rule Merchantable  
IF Clear_Forest = Yes AND  
Merchantable = Yes  
THEN Procedures = Forest_3;
```

```
!!!!!!!!!!!!!! FISHERIES !!!!!!!!!!!
```

Query

Rule Fish

```
IF Stream_Crossing = YES
THEN Procedures = Fisheries_2
ELSE Procedures = Fisheries_1;
```

!!!!!!!!!!!! WATER RES !!!!!!!!!!!!!

Rule Waterres

```
IF Water_Res = YES
THEN Procedures = Water_Res_2
ELSE Procedures = Water_Res_1;
```

!!!!!!!!!!!! RAILWAYS !!!!!!!!!!!!!

Rule Railapp

```
IF Rail = YES
THEN Procedures = Rail_2
ELSE Procedures = Rail_1;
```

!!!!!!!!!!!! PARKS !!!!!!!!!!!!!

Rule Parks

```
IF Parks = YES
THEN Procedures = Parks_2
ELSE Procedures = Parks_1;
```

!!!!!!!!!!!! LANDS !!!!!!!!!!!!!

Rule Lands

```
IF Lands = YES
THEN Procedures = Lands_2
ELSE Procedures = Lands_1;
```

!!!!!!!!!!!! WILDLIFE !!!!!!!!!!!!!

Rule Wildlife

```
IF Wild = YES
THEN Procedures = Wild_2
ELSE Procedures = Wild_1;
```

!!!!!!!!!!!! HISTORIC RESOURCES !!

Rule Historic_Resources

```
IF Historic = YES
THEN Procedures = Historic_2
ELSE Procedures = Historic_1;
```

!!!!!!!!!!!! MUNICIPAL !!!!!!!!!!!!!

Rule Municipal_Road_Allowances_No

```
IF Municipal = NO
THEN Procedures = Municipal_1;
```

Query

```
Rule Municipal_Road-Allowances_Yes_66_No
IF Municipal = YES AND
  66_ROW = NO
THEN Procedures = Municipal_2;
```

```
Rule Municipal_Road-Allowances_Yes_66_Yes
IF Municipal = YES AND
  66_ROW = YES
THEN Procedures = Municipal_3;
```

!!!!!!!!!!!! PROV ENVIRONMENT

```
Rule Prov_Environment
IF New_ROW = Yes AND
  Stream_Crossing = Yes OR
  Wild = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Prov_Environ_Extra
IF Parks = Yes
THEN Procedures = Prov_Env2;
```

```
Rule Inelegant
IF Procedures = Prov_Env2
THEN Procedures = Nothing
ELSE Procedures = Prov_Env1;
```

!!!!!!!!!!!! FEDERAL ENVIRONMENT

```
Rule Federal
IF New_ROW = Yes OR
  Penta = Yes OR
  High_Water = Yes AND
  Railway = Yes OR
  Navigable_Water = Yes OR
  Destroy_Fish = Yes
THEN Procedures = Federal_2
ELSE Procedures = Federal_1;
```

!!!!!!!!!!!! INDIAN AFFAIRS !!!!!!!!!

```
Rule Indian_Affairs
IF Indian = YES
THEN Procedures = Indian_2
ELSE Procedures = Indian_1;
```

!!!!!!!!!!!! MTS !!

```
Rule MTS
IF MTS = YES
```

Query

```
THEN Procedures = MTS_2
ELSE Procedures = MTS_1;
```

!!!!!!!!!!!! HIGHWAYS !!

```
Rule Highways
IF Highways = YES
THEN Procedures = Highways_2
ELSE Procedures = Highways_1;
```

!!!!!!!!!!!! RURAL DEVELOPMENT !!

```
Rule Rural_Development
IF Rural_Dev = YES
THEN Procedures = Rural_Dev_2
ELSE Procedures = Rural_Dev_1;
```

!!!!!!!!!!!! MINES !!

```
Rule Mines
IF Mines = YES
THEN Procedures = Mines_2
ELSE Procedures = Mines_1;
```

!!!!!!!!!!!! Navigable !!!!!

```
Rule Navigable
IF Stream_Crossing = YES AND
   Navigable_Water = YES
THEN Procedures = Navig_2
ELSE Procedures = Navig_1;
```

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! ASK QUESTIONS !!!!!!!

```
ASK Clear_Forest : "Will any forested Crown land, merchantable
or non-merchantable, need to be cleared?";
CHOICES Clear_Forest : Yes, No;
```

```
ASK Merchantable : "Will any merchantable timber on Crown land
need to be cleared";
CHOICES Merchantable : Yes, No;
```

```
ASK Water_Res : "Will drainage ditches administered by Water
Resources be affected";
CHOICES Water_Res : Yes, No;
```

```
ASK Stream_Crossing : "Will any streams need to be crossed?";
CHOICES Stream_Crossing : Yes, No;
```

```
ASK Navigable_Water : "Will any navigable waters need to be crossed?";
CHOICES Navigable_Water : Yes, No;
```


Query

ASK Destroy_Fish : "Will fish habitat need to be destroyed?";

CHOICES Destroy_Fish : Yes, No;

ASK Parks : "Will any provincial parks be crossed?";

CHOICES Parks : Yes, No;

ASK Lands : "Will any Crown lands administered by the provincial Lands
branch be crossed?";

CHOICES Lands : Yes, No;

ASK Wild : "Will any areas that are significant to wildlife, flora or
fauna, be crossed or otherwise affected?";

CHOICES Wild : Yes, No;

ASK Historic : "Will a Historic Resources Assessment be required?";

CHOICES Historic : Yes, No;

ASK Indian : "Will any Indian reservations be crossed?";

CHOICES Indian : Yes, No;

ASK MTS : "Will MTS facilities be affected by the sub-transmission or
distribution line?";

CHOICES MTS : Yes, No;

ASK Highways : "Will current or potential highway's road allowances
be affected by the line?";

CHOICES Highways : Yes, No;

ASK Rural_Dev : "Will the line cross agricultural land at a point other
than on a road allowance or on a quarter section line?";

CHOICES Rural_Dev : Yes, No;

ASK Mines : "Will a developed or high capability undeveloped gravel lease
be crossed by the line?";

CHOICES Mines : Yes, No;

ASK Municipal : "Will the line be constructed along any developed or
undeveloped road allowances?";

CHOICES Municipal : Yes, No;

ASK 66_ROW : "Will the line be constructed along a 66 foot (20.1 metre)
) developed or undeveloped road allowance?";

CHOICES 66_ROW : Yes, No;

ASK New_ROW : "Will a new ROW be needed?";

CHOICES New_ROW : Yes, No;

Query

ASK Penta : "Will pentachlorophenol treated poles be placed in a wetland?";

CHOICES Penta : Yes, No;

ASK High_Water : "Will poles be placed below the high water line of any watercourse?";

CHOICES High_Water : Yes, No;

ASK Railway : "Will a leave be required to cross or approach a railway?";

CHOICES Railway : Yes, No;

ASK Rail : "Will a railway be approached or crossed?";

CHOICES Rail : Yes, No;

PLURAL : Procedures;

Railcon

Agency Concerns

Both railways will be concerned with the possibility of interference with railway operations. The railways may also be concerned with parallelisms, where the sub-transmission line and the railway line parallel each other. Special mitigation may be required in these cases. Contact the railway if these situations occur.

Press any Key to Continue ~

Railgi

General Information

During the route planning and planning process, contact the owners of any railways that will be crossed or approached. The railways, CN and CP, will be concerned that the sub-transmission line construction and operation not affect the railway operation. If special studies or requirements are requested by the railway company, the company in question will contact Manitoba Hydro to resolve these concerns.

Press any Key to Continue ~

Railja

Obtain Approval

Contact the railway and request permission to cross or approach the railway. Refer to the CN or CP sections as required.

Press any Key to Continue - Canadian National

Contact Engineering and Environmental Services (Address: 1004-104 Avenue, Edmonton, Alberta, T5K 0K2, Phone: (403) 421-6688, Fax (403) 421-6689). Request permission to cross or approach the railway. According to CN, require detailed engineering drawings with the following information will be required:

Press any Key to Continue ~

1. "Profile of Crossing" detail (vertical elevation)
2. "Plan View" detail (showing CNR property line and adjacent lot numbers);
3. "Crossing Structure" pole framing detail;
4. "Scale" for each of the above and dimensions ("not to scale" unacceptable);
5. When power line parallels railway Signal and Communication lines, separate drawing must be submitted together with Signals and Communication Inductive Coordination Form;

Press any Key to Continue ~

6. Revised drawings must be marked as revised and reason for revision stated;
7. When joint use facilities are used, drawing must show information pertaining to both users and approval of other user denoted on drawing; and
8. Drawing must have caption:
"Construction, maintenance and operation of the line shall be in accordance with Transport Canada General Orders Number E-11 and E12 and Canadian Standards Association Standards CAN/CSA-C22.3 No.1-M87 and CAN3-C22.3 no.7-M86 as applicable."

Press any Key to Continue ~

9. Drawing referred to must contain the seal and signature of the professional engineer responsible for the work.

Press any Key to Continue ~

The drawing must also have the following technical information:

- a) Poles and adjacent structures or towers: height; class; set; material; pole number; owner.
- b) Anchor(s) and anchor rods: type; size; setting depth; owner; anchor rod size.
- c) Guy(s): lead and height; material; minimum breaking strength; grade; size; point of attachment; owner.
- d) Crossarm(s): size, material.
- e) Insulator(s): type; flashover rating.

Railja

f) Power conductors and communication wires: size; material; type; minimum breaking strength; maximum tension; maximum sag; present number; ultimate number.

Press any Key to Continue ~

g) Power Circuit Voltage: volts phase-to-phase; phase to effectively grounded neutral.

h) Minimum clearances under maximum sag: above rails; above Signals and Communication plant.

i) Separation between wires and cables: horizontal and vertical.

j) Distances: crossing pole to crossing pole; crossing pole to adjacent pole; crossing pole to gauge of rail(s); crossing pole to Signals and Communication plant.

k) Tower and communication cables: number of conductors; type; diameter; weight; method of installation; number of cables.

l) Messenger(s): diameter; type; grade; minimum breaking strength; maximum tension.

Press any Key to Continue ~

m) Angle of crossing: angle of line to Signals and Communications line; angle of change of direction at crossing and/or adjacent pole(s) (Signals and Communications, CN North America, 1993).

Press any Key to Continue ~

This information should be sufficient to obtain an endorsement for crossings. If the sub-transmission line is to be routed in parallel to the railway, additional studies may be required.

CN should be informed of the location of the line relative to CN facilities, and they will contact Manitoba Hydro if more information is required.

Press any Key to Continue ~

Canadian Pacific

Contact Land Support Services (Address: CP Rail System, 800-200 Granville St., Vancouver, B.C. V6C 2R3, Phone: (604) 643-3295, Fax (604) 643 3274). Request permission to cross or approach the railway. According to CP, CP will require the following information (CPRS, Land Management, Information Package for Utility Crossing Applications, 1994):

Press any Key to Continue ~

1. Title Block stating:

a) Company Name,

b) Title - Proposed Wire Crossing at Mile ____, __

Subdivision,

c) Date,

d) Drawing Number.

Press any Key to Continue ~

Railja

2. Plan View Showing :

a) Poles, guys, wires, tracks, property lines, street name if any, dimensions from the crossing to a permanent reference ie: Street, property line, dimension from the poles to the centre of the track, dimensions from CP property line to the centre of the track, north arrow, any existing facilities, and the angle of the crossing in relation to the track.

Press any Key to Continue ~

3. Profile showing:

a) Cross level of the existing grade at the crossing, CP property lines, elevation of the top of rail at the crossing, poles, wires, guys, dimension from the wire to the top of rail, dimension from the wire to the top telegraph wires if any, dimension from the top of rail to the ground elevation at the pole locations and dimensions from the centre line of the track to the poles and guys.

Press any Key to Continue ~

4. Wire Information:

- a) Number of wires
- b) Specification of conductors
- c) Messenger material, size and strength (if any)
- d) Voltage
- e) Type of voltage (AC/DC)

5. Pole Information:

- a) Number of poles on the property
- b) Class of pole
- c) Length of pole
- d) Depth of bury

Press any Key to Continue ~

6. Guy Information:

- a) Ultimate Strength
- b) Diameter of anchor rod

7. Note Stating:

"To be constructed and maintained in accordance with the National Transportation Agencies General Order E-11." (if the poles are shared by two or more utilities, add "and E-12" to the note.

If more information is required, Manitoba Hydro will be informed by the railway.

Press any Key to Continue ~

Railno

No Approval Required

Since no railways will be crossed or paralleled, no further action in this regard is needed.

Press any Key to Continue ~

Rdgi

General Information

During the route planning and assessment of sub-transmission line development, contact the Department of Rural Development (Address: Community Economic Development Branch, 20 First St. S., P.O. Box 50, Beausejour, MB, R0E 0C0, Phone: (204) 268-6058). Provide the Department with a copy of the project description for review and comment. If concerns are raised, consult with the Department.

Press any Key to Continue ~

Rdja

Possible Concerns

As the sub-transmission or distribution line crosses agricultural land in a place other than a quarter section line, Rural Development may have concerns. Rural Development may be concerned when agricultural land is bisected, especially when small tracts of land are created which are then difficult to work with large farm machinery (Jackson, R., Rural Development Community Planner, Personal Communication, 1995).

Press any Key to Continue ~

Rdno

Minimal Concerns

As the sub-transmission or distribution line does not cross agricultural land, Rural Development should not have any concerns with the line. Consult with the Department if other concerns are raised.

Press any Key to Continue ~

Sysrec

System Information

This section contains the information modules that will assist the user with the agency contact and agency concerns phases of the environmental self assessment. The user's responses and the preceding rules are used to determine which of the following sections will be displayed for each specific case.

Press any Key to Continue ~

The following sub-sections outline this information. Each agency is listed separately, and sub-sections provide: contact information; agency approval or endorsement procedures; the information that the agency will require; common concerns that the agency may have; suggestions by which these concerns may be addressed; and in some cases, Manitoba Hydro or Department of Fisheries and Oceans (DFO) recommended construction practices. The user will also be supplied with some general information about the importance of these issues.

Press any Key to Continue ~

Watercon

Agency Concerns

The Water Resources Branch is concerned when sub-transmission line poles are placed in or near drainage ditches. Apparently, the poles can interfere with the drainage and the cutting of hay along the ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). The Branch would also prefer that the siting of the poles not interfere with planned or foreseen drainage ditch expansions.

Press any Key to Continue ~

Watergi

General Information

The Water Resources Branch (Address: Water Resources Branch, 1577 Dublin Ave., Winnipeg, MB, R3E 3J5, Phone: (204) 945-6497) of the Department of Natural Resources manages the use, development, and protection of the province's surface and groundwater resources. During initial route selection and planning, the Water Resource Branch will have been provided with a copy of the proposed project description by the Policy Coordination Branch. The Water Resources Branch rarely has concerns with sub-transmission line development.

Press any Key to Continue ~

However, the Branch would prefer that poles not be located where they might interfere with the maintenance or future expansion of drainage ditches (Dearman, R., Drainage Officer, Water Resources Branch, Personal Communication, 1996). Efforts should be made to incorporate these concerns into sub-transmission line development.

Press any Key to Continue ~

Waterja

Input Recommended

As the planned route for the sub-transmission line will interfere with the maintenance or planned expansion of the drainage system, input should be sought from the Water Resources Branch. The Branch may request a minor route modification. Ongoing contact with the Branch should assist in resolving any possible concerns.

Press any Key to Continue ~

Waterno

No Endorsement Required

As the line will not interfere with the maintenance or planned future expansion of any drainage systems, the Water Resources Branch should not have any concerns with the line.

Press any Key to Continue -

Wildcon

Agency Concerns

The Wildlife Branch is concerned with the maintenance of wildlife and wildlife habitat. They would prefer that certain habitats and features not be disturbed. To prevent disturbance, some habitats need only be avoided at certain times of the year. Others must be avoided completely. Mitigation may be possible in some cases. Ongoing dialogue with and input the local Natural Resources Officer is an important method of determining the wildlife features that may be of concern in the local area. Some of these features may include:

Press any Key to Continue ~

Breeding and calving grounds. These areas are significant because disruptions in or near the areas could reduce the animal's chance of successfully breeding or bearing young. Such a disruption could reduce the numbers of young, and in time, reduce the overall population size. However, if construction is restricted in the critical months or weeks, the area may be crossed without causing problems.

Habitats for economically significant species, species that are hunted, trapped, or otherwise contribute to the local economy. Any significant reduction in the numbers of these species could also have a negative effect on the people who depend on them.

Press any Key to Continue ~

Habitats for rare and uncommon species. If a species is common in the local area, then, in most cases, the small habitat altered by sub-transmission line development should have little effect. However, if the species is rare, then even a small loss of significant habitat could reduce the numbers of an already small population. If the loss is serious, then the species could be eliminated from the local area. This loss could be significant. The eliminated species could have been important in the local area, and its loss could trigger other losses. Some would also see a species' extirpation as an aesthetic loss or the loss of a potential future resource. Avoid these areas or reduce the impact of crossing whenever possible.

Press any Key to Continue ~

Large contiguous blocks of habitat, especially if that habitat is comparatively rare in the region. Large blocks of habitat, not broken up by other habitat types are used by species intolerant of habitat edges. Some songbirds, for example, prefer contiguous habitats. Although some species prefer edges and may be positively affected by sub-transmission line development, others are negatively affected by such development.

Wetlands. Wetlands are important habitats for maintaining many species including many game species of waterfowl. Sub-transmission lines should not be located directly adjacent to wetlands to reduce the risk of birds striking the poles and

Wildcon

conductors. Poles in wet areas should not be treated with pentachlorophenol (penta) to reduce the risk of these chemicals leaching out of the wood and damaging the local area.

Press any Key to Continue ~

Heron rookeries. Herons nest in trees in colonial structures known as rookeries. The presence or absence of these rookeries is an important factor determining the number of herons in a local area. The accidental destruction or disturbance of a rookery will have a serious impact on the heron population. Avoid these areas, especially when they are in use. Winter construction may reduce the impact of sub-transmission line construction.

Raptor nests (birds-of-prey, eg, eagles, ospreys). These birds tend to return to the same nest year after year, often building large distinctive nests. To avoid disrupting the birds and their young, avoid these areas when the nests are in use. Winter construction may reduce the impact of sub-transmission line construction.

Press any Key to Continue ~

Salt licks. Salt licks are specific sites where certain species go to obtain minerals needed in their diets. Avoid these sites so that the animals will be able to use the salt lick without being disturbed. Whenever possible, construction should only be carried out when the salt licks are not in use.

Specific sites of rare and uncommon species (eg. rare plants). Occasionally, rare species, often plants, will exist in a certain area. To avoid damaging these sites which could reduce or remove significant numbers of these species, route around these areas.

Press any Key to Continue ~

Other habitat types that may be important in the local area. Not all significant wildlife habitats have been covered here, and other important ones may exist in the local area. Contact the local Natural Resources office.

Other local features may be of importance. Consult with local Natural Resources Officers to determine whether this is the case in the local area.

Press any Key to Continue ~

Wildgi

General Information

The Wildlife Branch (Address: Wildlife Branch, 200 Saulteaux Cr., Winnipeg, MB, R3J 3W3, Phone: (204) 945-7775) of the Department of Natural Resources is responsible for the administration of game and non-game species of wildlife in the province. During initial route planning, the Wildlife Branch will be provided with a copy of the proposed project description by the Policy Coordination Branch. The development of a sub-transmission line may have impacts on wildlife. Line construction and operation will turn the existing habitat from the original habitat to a (usually) shrub and grass habitat.

Press any Key to Continue ~

The exact effects, both positive and negative, will vary according to the habitats involved. If the proposed sub-transmission line is to cross an area of sensitive wildlife habitat, the Wildlife Branch is likely to request input into the routing and construction process. The Branch may request time of year restrictions and other forms of mitigation to reduce any negative impacts on wildlife. Attempt to incorporate these concerns into sub-transmission line development.

Press any Key to Continue ~

Wildja

Endorsement Procedures

Since areas of significant wildlife habitat will be traversed or affected by the sub-transmission or distribution line, the Wildlife Branch may have concerns or may suggest certain construction practices to reduce the impact of the line. The Policy Coordination Branch will supply Manitoba Hydro with the contact people to consult with to resolve these problems.

Press any Key to Continue ~
DU Endorsement

Although Ducks Unlimited (DU) is not a agency of the Province, DU often has important information concerning the effect of developments on wildlife. Contact DU (Contact: Ducks Unlimited, P.O. Box 1160, Stonewall, MB, R0C 2Z0, Phone: (204) 467-3000) Ask DU officials whether DU will have any concerns with the proposed sub-transmission line. They are concerned with the bird strikes and the possible effects of sub-transmission development on wetlands quality (Sexton, D., Personal Communication, 1995). They would prefer that sub-transmission lines, and other electricity transmission lines, not be constructed adjacent to high quality wetlands.

Press any Key to Continue ~

They would also prefer that pentachlorophenol treated poles not be used in wet areas. Seek the input of DU officials if the line must pass close to wetlands. If DU has been involved in the site selection process, and their concerns have been addressed, then it is more likely that they will support the route even if some good waterfowl habitat must be crossed.

If other organizations have expressed interest or concerns over the new sub-transmission line attempt to address their concerns by mitigation or minor route adjustments.

Press any Key to Continue ~

Wildja

Endorsement Procedures

Since areas of significant wildlife habitat will be traversed or affected by the sub-transmission or distribution line, the Wildlife Branch may have concerns or may suggest certain construction practices to reduce the impact of the line. The Policy Coordination Branch will supply Manitoba Hydro with the contact people to consult with to resolve these problems.

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Press any Key to Continue ~
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If other organizations have expressed interest or concerns over the new sub-transmission line attempt to address their concerns by mitigation or minor route adjustments.

Press any Key to Continue ~

Wildno

No Endorsement Needed

Since no areas that have been identified as sensitive wildlife habitat will be affected by the new line, departmental concerns should be minimal. If non-governmental organizations have expressed interest then the opinions of these groups should be considered in this phase. Manitoba Hydro general environmental protection measures should be followed to reduce any negative effects of development.

Press any Key to Continue ~

Wildpra

Construction Practices

Manitoba Hydro general environmental protection measures, reproduced in Appendix A, have a number of recommendations concerning wildlife. These include: waste management and garbage control, wildlife treatment, important wildlife features, wetlands considerations, and vegetation management.

Press any Key to Continue ~