GUIDE FOR OIL PRODUCTION SITES

Pursuant to the Environmental Protection and Enhancement Act and Regulations

CODE OF PRACTICE
COMES INTO EFFECT
JULY 1, 1997

Alberta Environmental Protection
Environmental Regulatory Services
Land Reclamation Division

February 1994

Further information and copies may be obtained from:

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This document may be cited as:

Alberta Environmental Protection, 1994. A Guide for Oil Production Sites, Pursuant to the Environmental Protection and Enhancement Act and Regulations. Alberta Environmental Protection, Land Reclamation Division, Edmonton, Alberta.

Acknowledgement:

This guide was prepared by the Oil Production Sites Task Group. The task group was established to help develop the regulations and information documents under the Environmental Protection and Enhancement Act. It had representatives from government, industry, and the public. Special thanks are owed to Ellen Havekotte, Karin Stiles and Jamie Legarie for their skills and patience in typing and formatting the document.

PARTS OF THE GUIDE

INTRODUCTION TO THE GUIDE

PART 1: CONSERVATION AND RECLAMATION APPROVAL AND ENVIRONMENTAL PROTECTION GUIDELINES

PART 2: RECLAMATION CERTIFICATION

INTRODUCTION TO THE GUIDE

1. GENERAL

Alberta Environmental Protection administers several acts related to the protection, enhancement and wise use of the environment. The major legislation is the Environmental Protection and Enhancement Act and regulations, the Public Lands Act, and the Water Resources Act. The administrative units responsible for implementing these acts and regulations are shown in Figure 1.

This Guide will assist proponents and operators of oil production sites in understanding the regulatory requirements under the Environmental Protection and Enhancement Act and regulations. An oil production site is the field production facilities for recovering heavy oil[1] or oil sands within a designated area in northern and eastern Alberta (Figure 1, p. 1-2). The intent of the Guide is to expedite the review and approval process and to communicate environmental objectives and standards.

The administrative units responsible for administering the major acts and regulations are shown in Figure 2. Environmental Assessment Division, Land Reclamation Division, Standards and Approvals Division, and Wastes and Chemicals Division are the main divisions within Alberta Environmental Protection that deal with oil production sites under the Environmental Protection and Enhancement Act and regulations. Water Resources Administration Division is the division that deals with permits, licences, and authorization required under the Water Resources Act. Land Administration Division is responsible for administering surface dispositions under the Public Land Act. The administration is done in conjunction with Alberta Agriculture, Food and Rural Development, who are responsible for the management of White Area public lands. Applicants are encouraged to contact the appropriate administrative unit for clarification or assistance, especially during the planning phase of an application or report.

2. OUTLINE OF THE PARTS OF THE GUIDE

The parts of the Guide and the administrative units that deal with them are as follows:

1. Conservation and Reclamation Approval and Environmental Protection Guidelines (Part 1). A Conservation and Reclamation Approval is required when the surface disturbance associated with the well pad

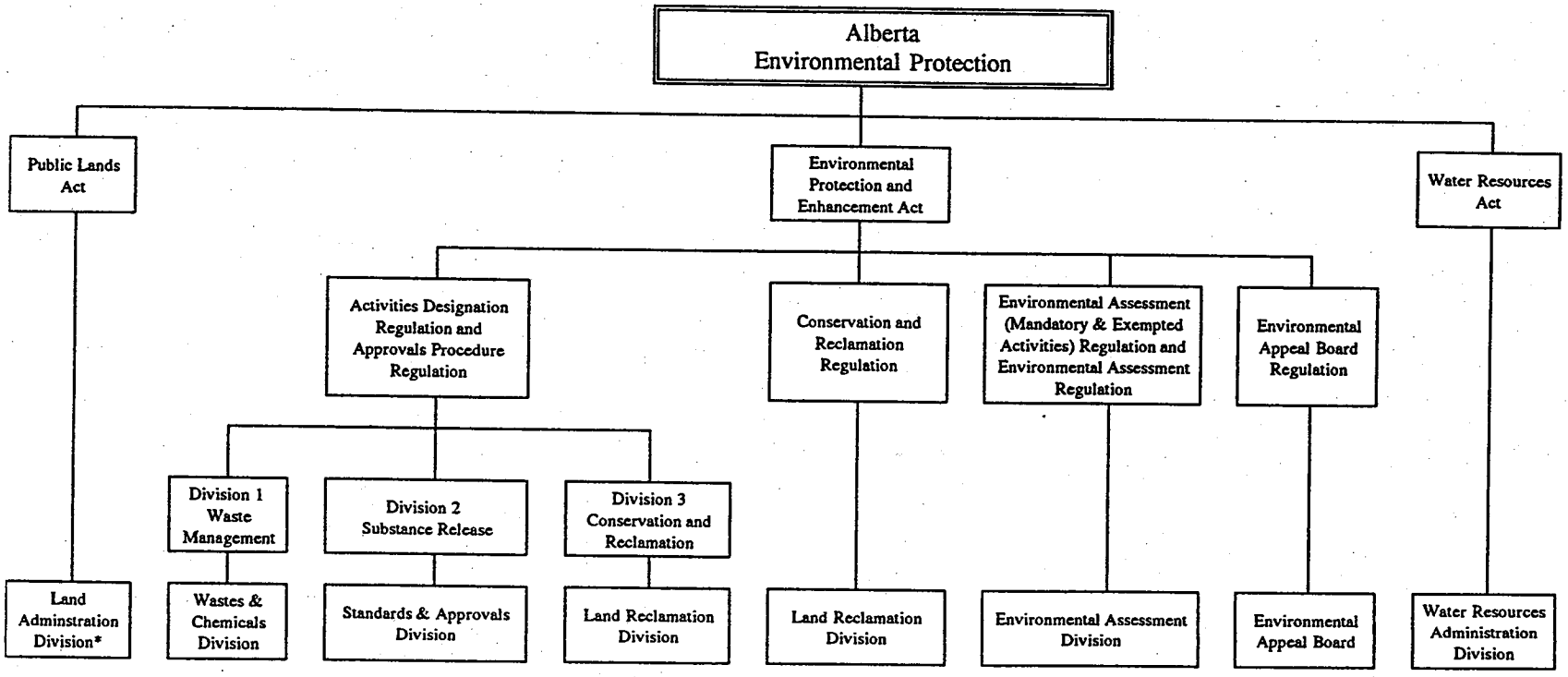
[1] The Act and regulations currently refer to "heavy oil" which is defined as oil with a density greater than 900 kg/m^3. The Oil Production Sites Task Group has recommended that the density criterion be deleted and that only the designated area map be used. The Department is currently pursuing this amendment.

development is greater than 5.7 hectares per quarter section and is located within the designated area in northern and eastern Alberta (Figure 1, p. 1-2). A Conservation and Reclamation Approval is also required for any oil production project within the designated area where the project has been subject to an Environmental Impact Assessment. Within Land Reclamation Division, the Conservation and Reclamation Review Committee provides technical reviews of applications and makes recommendations to the Director who issues the approvals. As part of the approval process, an operator must post a security deposit for reclamation purposes. There is a provision for partial return of security prior to reclamation certification. When required, an operator holding a Conservation and Reclamation Approval must also submit an Annual Report.

The Environmental Protection Guidelines provide direction for the conservation and reclamation of oil production sites. The guidelines apply to all oil production sites, including those that require a Conservation and Reclamation Approval (Class I) and those that do not (Class II). Adherence to the guidelines is monitored by Conservation and Reclamation Inspectors.

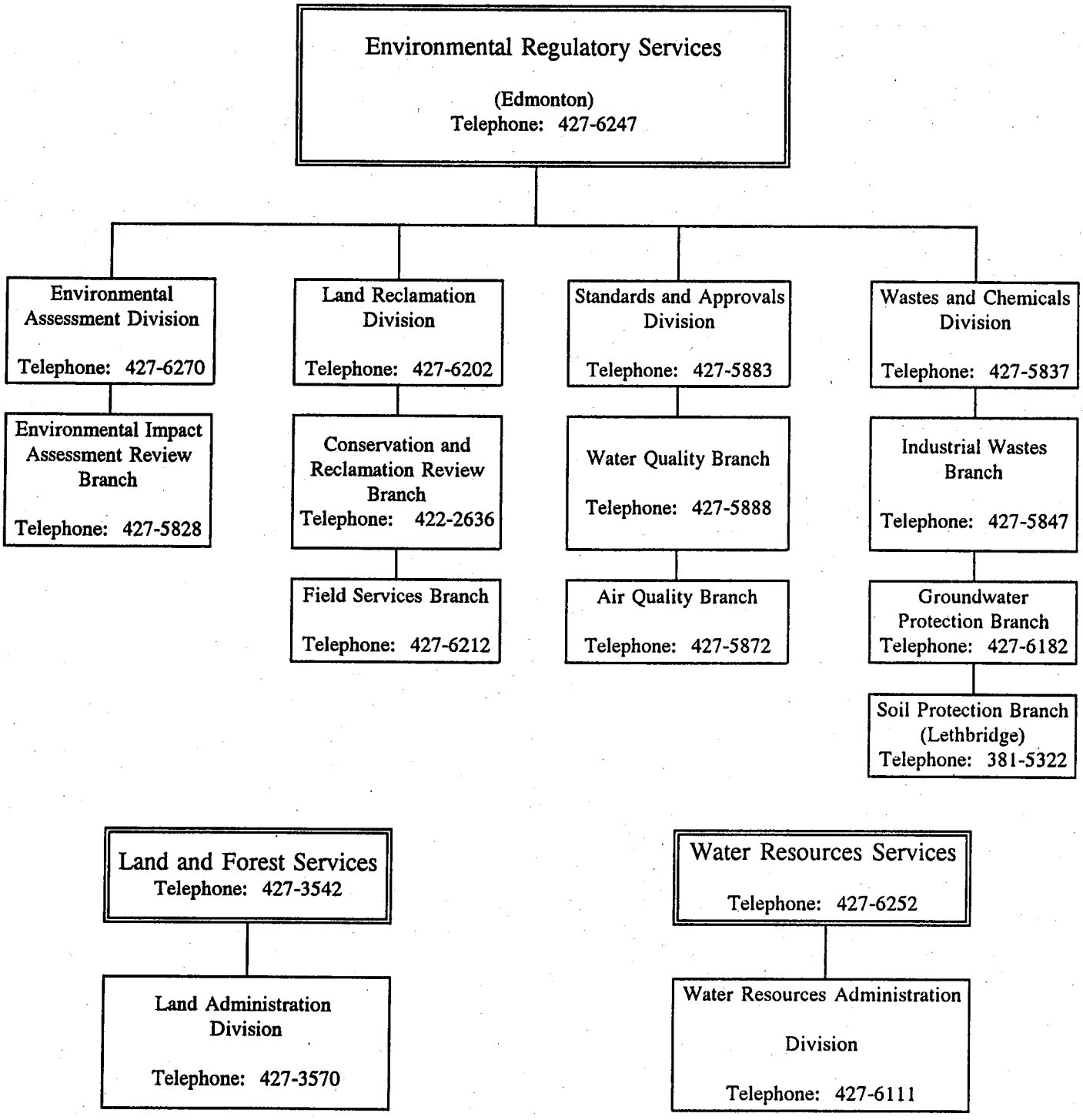
2. Reclamation Certification (Part 2). Operators must reclaim disturbed land and obtain a reclamation certificate to show that reclamation has been successful. In addition, a surface lease on private or public land is not legally terminated unless a certificate has been issued. Conservation and Reclamation Inspectors conduct the inquiries on applications for reclamation certificates.

FIGURE 1: ALBERTA ENVIRONMENTAL PROTECTION LEGISLATION AND ADMINISTRATIVE UNITS



* Administers the Public Lands Act in conjunction with Alberta Agriculture, Food and Rural Development who are responsible for land management on White Area public lands.

FIGURE 2: ADMINISTRATIVE UNITS IN ENVIRONMENTAL REGULATORY SERVICES, LAND AND FOREST SERVICES, AND WATER RESOURCES SERVICES.



PART 1: CONSERVATION AND RECLAMATION APPROVAL AND ENVIRONMENTAL PROTECTION GUIDELINES

PART 1 CONSERVATION AND RECLAMATION APPROVAL AND ENVIRONMENTAL PROTECTION GUIDELINES

FIGURES

APPENDIX

1. INTRODUCTION

1.1 General Information on the Guide

This document is Part 1 of a Guide dealing with the regulation of oil production sites under the Environmental Protection and Enhancement Act and regulations. Oil production sites are the field production facilities for recovering heavy oil[1] or oil sands located within a designated area in northern and eastern Alberta (see Section 1.5 and Figure 1). Part 1 of the Guide describes the review and approval process and provides Environmental Protection Guidelines that apply to all oil production sites. Part 2 describes the process and criteria for reclamation certification.

Part 1 focuses on the preparation of an application for a Conservation and Reclamation Approval, but also address the overall regulation of oil production sites. The purpose of the application is to identify and address environmental impacts that arise during the construction, operation and reclamation of an oil production site. Depending on the nature and extent of the surface disturbance, the content and level of detail in the application can be reduced or increased as needed. Proponents should discuss their projects as soon as possible with staff of Land Reclamation Division, Alberta Environmental Protection (3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone 422-2636)

1.2 General Information on the Environmental Protection and Enhancement Act

The objective of all Albertans should be to ensure the protection, improvement, and wise use of our environment now and in the future. The Environmental Protection and Enhancement Act and regulations reflect this objective by emphasizing the conservation and reclamation of land through environmental planning.

The Environmental Protection and Enhancement Act[2] requires an operator to conserve and reclaim specified land and obtain a reclamation certificate. Specified land is land on which an activity (such as the construction, operation and reclamation of an oil production site) is carried on. The Act[3] provides for the issuance of environmental protection orders to ensure conservation and reclamation standards are met during

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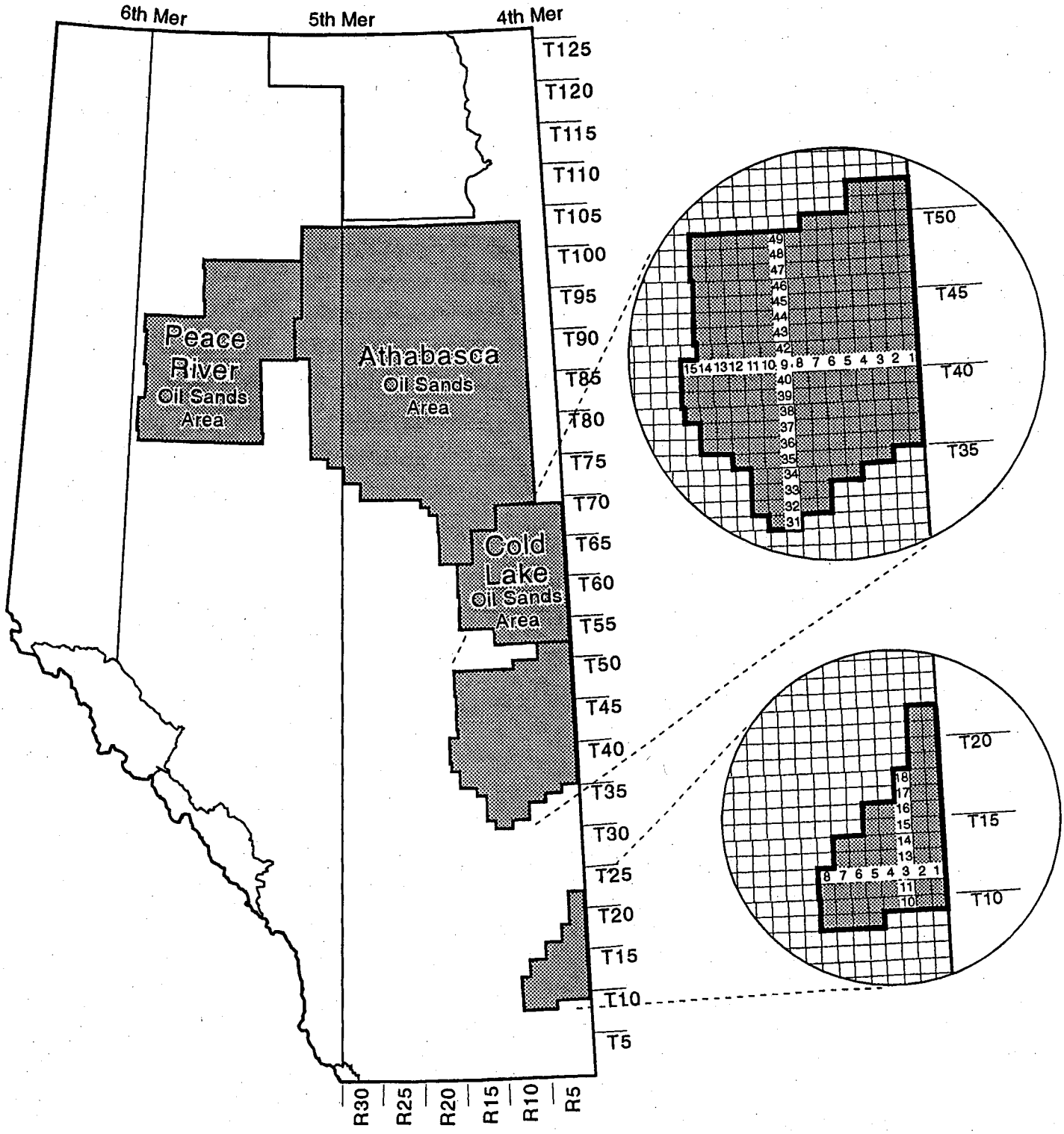
1 The Act and regulations currently refer to "heavy oil" which is defined as oil with a density greater than 900 kg/m^3. The Oil Production Sites Task Group has recommended that the density criterion be deleted and that only the designated area map be used. The Department is currently pursuing this amendment.

2 Section 122.

3 Sections 125 to 128.

FIGURE 1: OIL PRODUCTION SITE AREAS



construction, operation, and reclamation of an activity. When an oil production site is reclaimed, the operator must obtain a reclamation certificate to show that reclamation has been successful[1]. Under the Act[2], a surface lease with the landowner is not legally terminated until a reclamation certificate has been issued. Even if the operator owns the land, the site must be reclaimed and a certificate obtained[2].

The Conservation and Reclamation Regulation provides further direction on environmental protection orders, reclamation certification and security. The Activities Designation Regulation requires approvals for activities outlined in the Schedule attached to the regulation. Division 3 of the Schedule requires an approval for oil production sites. This approval is called a Conservation and Reclamation Approval. The Approvals Procedure Regulation outlines the review process for approvals issued under the Environmental Protection and Enhancement Act.

1.3 The Objective of Conservation and Reclamation

The objective of conservation and reclamation is to return disturbed land to an equivalent land capability[3]. Equivalent land capability means[4] that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that individual land uses will not necessarily be identical. This approach provides sustained levels of land use at least equivalent to those which existed prior to development. The concept provides for flexibility such that individual land capabilities may change, but overall land capability will be equivalent to pre-disturbance conditions.

Land capability is defined[5] as the ability of land (unaltered by future management inputs, activities, or alterations) to support a given land use, based on an evaluation of the physical, chemical, and biological characteristics of the land, including topography, drainage, hydrology, soils, and vegetation. This evaluation determines the inherent or natural ability of land resources to provide for use. It includes any existing abilities and conditions which are the result of alterations or management practices prior to the development.

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1 Section 122.

2 Section 129.

3 Conservation and Reclamation Regulation: Section 2.

4 Conservation and Reclamation Regulation: Section 1(i).

5 Conservation and Reclamation Regulation: Section 1(p).

The reclaimed land capability must be sustainable under normal management. This means that the land has no more soil and landscape limitations to various uses than it did before the disturbance. In the case of disturbances such as oil production sites, where the landscape is not changed, the focus of capability is on the soil and vegetation. In some cases, the landscape may be changed and this may require alternate land capabilities to be considered on a portion of the disturbed landscape. These must be approved in advance by the appropriate regulatory authority and the landowner.

Having regard to the objective of conservation and reclamation, the concept of "conservation" includes all practical and desirable methods for:

1. minimizing the extent of disturbance, regardless of the ability to reclaim the land.
2. minimizing or mitigating the effects of development on land and soil resources.
3. salvaging soil resources for use in reclamation.
4. controlling wind and water erosion.

The concept of "reclamation" includes all practical and desirable methods for:

1. designing and conducting an operation to enhance the potential for disturbed land to be reclaimed to equivalent land capability.
2. handling material to ensure reconstructed soils have an equivalent soil capability relative to the soils that existed prior to disturbance.
3. contouring the land surface to meet the land capability objective, as well as to ensure stability, to protect the surface against wind or water erosion, to provide for surface drainage, and to minimize hazards.
4. revegetating and managing the land to meet the land capability objective.
5. re-establishing surface water resources to meet the land capability objective.

1.4 Conservation and Reclamation Planning

Planning is the key to successful project development, land and soil conservation, and reclamation. Good planning prior to development will anticipate problems, prevent or minimize environmental impacts, and provide for proper reclamation.

Effective conservation and reclamation planning requires that reclamation objectives be drawn up as early as possible and that they be an integral part of the development plan. The reclamation plan must be developed through consultation with government (municipal and provincial), the public, and landowners.

1.5 Regulatory Framework for Oil Production Sites

1.5.1 Field Production Facilities.

The Activities Designation Regulation[1] describes oil production sites as the field production facilities for recovering heavy oil[2,3] or oil sands, including associated infrastructure, that occur within a designated area (Figure 1). A facility within this area requires a Conservation and Reclamation Approval when:

i. the total area of the site, excluding access roads, pipelines and battery sites (i.e., well pad only), exceeds 5.7 hectares (14 acres) per quarter section of land, or

ii. an Environmental Impact Assessment has been called on the facility.

The intent of conservation and reclamation is to mitigate environmental impacts and to minimize surface disturbance. In many instances, it is felt that 5.7 hectares (14 acres) of well pad development in a given quarter section is usually sufficient to allow development of the heavy oil or oil sands resource. This is based on surface development techniques and downhole technology (slant drilling, directional drilling, horizontal wells) that can minimize surface disturbance. On this basis, most oil production sites should not require a Conservation and Reclamation Approval. Well pad disturbance beyond this level, as well as disturbance associated with roads, pipelines, and batteries, causes greater interference with land use and requires greater conservation and reclamation effort. In certain instances, additional disturbance to existing pads, and possibly a new pad(s), may be required. Where more disturbance is required, the intent is to mitigate unavoidable environmental impacts.

Oil production sites in the province are categorized as Class I or Class II sites. Class I oil production sites require a Conservation and Reclamation Approval prior to any surface disturbance. Class I sites involve field facilities for recovering heavy oil or oil sands with a surface disturbance greater than 5.7 hectares per

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1 Section 5(e).

2 Environmental Protection and Enhancement Act: Section 1 (cc) defines heavy oil as oil with a density greater than 900 kg/m^3.

3 The Oil Production Sites Task Group has recommended that the density criterion be deleted and that only the designated area map be used. The Department is currently pursuing this amendment.

quarter section per individual operator, occurring within the designated area (Figure 1). The criterion for requiring an approval is based on the area disturbed by well pads only and excludes access roads, pipelines, and battery sites. In the case of a project with some quarter sections above the 5.7 hectare criterion and some below, an approval is required only for those above the criterion[1]. Although the 5.7 hectare criterion applies to the well pad only, the approval covers all areas disturbed by the field activities. A Class I designation also applies to any site subject to an Environmental Impact Assessment called under the Environmental Protection and Enhancement Act. In the case of a project subject to an Environmental Impact Assessment, a Conservation and Reclamation Approval is required for all the land associated with the project, regardless of the 5.7 hectare criterion. Class I sites are directed by the terms and conditions of the approval, as well as the Environmental Protection Guidelines (Section 3). They are subject to environmental protection orders and must also meet the criteria for reclamation certification (Part 2 of the Guide).

Class II sites do not require a Conservation and Reclamation Approval. They involve sites that disturb 5.7 hectares or less per quarter section. Environmental Protection Guidelines (Section 3) provide the necessary direction to achieve conservation and reclamation. As with Class I sites, they are subject to environmental protection orders and must meet the criteria for reclamation certification (Part 2 of the Guide).

Typically, oil production sites begin as a one or two well pad development smaller than the 5.7 hectare per quarter section criterion for Class I sites. At this stage a Conservation and Reclamation Approval is not required. If the addition of new wells increases the total well pad disturbance to more than 5.7 hectares per quarter section, an approval is required. ***The operator is responsible for determining if and when an approval is needed[2].***

Although the criterion for distinguishing Class I and II oil production sites is based on the area of the well pad only, the Conservation and Reclamation Approval, Environmental Protection Guidelines, environmental protection orders, and reclamation certificates apply to all disturbance associated with the site, including infrastructure (roads, pipelines, battery sites, borrow pits, off-site sumps, etc.) .

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1 Alberta Environmental Protection is pursuing an amendment to the Activities Designation Regulation that would allow operators to apply for a project basis approval (i.e., to include quarter sections above and below the 5.7 hectare criterion). The intent is to streamline the approval process for oil production wellsites.

2 Environmental Protection and Enhancement Act: Sections 58 and 59.

1.5.2 Processing Plants.

Processing plants associated with in-situ oil sands sites may require an approval pursuant to Division 2 (Substance Release) of the Activities Designation Regulation. Division 2 approvals are administered by Standards and Approvals Division (4th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone 427-5883). The regulation[1] defines an in-situ oil sands processing plant as a plant that processes or recovers crude bitumen by thermal or solvent in-situ recovery methods, but does not include any production facilities that are connected by pipeline to the plant. When an application is made for both an oil production site and a processing plant, they would each require an approval. In cases where two approvals are required, one of the Directors may issue one approval to cover all activities. The approval issued would deal with all aspects related to land, air and water.

1.6 Regulatory Process

1.6.1 Environmental Impact Assessment (EIA).

Prior to applying for a Conservation and Reclamation Approval issued pursuant to Division 3 of the Activities Designation Regulation, major heavy oil or oil sands projects will require an Environmental Impact Assessment. Major projects are commercial oil sands plants, heavy oil extraction plants, and upgrading or processing plants producing more than 2000 cubic metres of crude bitumen or its derivatives per day[2]. Projects smaller than this may be screened for an Environmental Impact Assessment[3]. Usually, the field production facilities requiring Conservation and Reclamation Approval will be detailed in the Environmental Impact Assessment and Energy Resources Conservation Board Application. When the field production activities are detailed in the these two submissions, they may be sufficient to satisfy the requirements of the conservation and reclamation review which follows Energy Resources Conservation Board Approval. The review process and application requirements (technical and environmental) are documented in the ***Energy Resources Conservation Board Guide G-23 (Guidelines Respecting an Application for a Commercial Crude Bitumen Recovery and Upgrading Project)***.

Proponents of a major heavy oil or oil sands project can discuss Environmental Impact Assessment requirements with the Director of Environmental Assessment Division (6th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone 427-5828).

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1 Activities Designation Regulation: Section 1(4)(q).

2 Environmental Assessment (Mandatory and Exempted Activities) Regulation: Schedule 1(j).

3 Environmental Enhancement and Protection Act: Section 42.

1.6.2 Class I Sites (Conservation and Reclamation Approval Required).

1.6.2.1 Overview of the Approval Process. Class I oil production sites (i.e., greater than 5.7 hectares of well pad development per quarter section or Environmental Impact Assessment required for the project) require a Conservation and Reclamation Approval from the Director of the Land Reclamation Division. Figure 2 shows the relationship of the Conservation and Reclamation Approval process, the Energy Resources Conservation Board Approval process, the Water Resources Approval process, and the surface disposition process on public lands. In-situ oil sands projects require a scheme approval from the Energy Resources Conservation Board. Heavy oil sites outside the oil sands area do not normally require a scheme approval from the Energy Resources Conservation Board. The Energy Resources Conservation Board Approval process for heavy oil projects consists of the individual well licences issued by the Board.

Proponents cannot proceed with site construction until the Conservation and Reclamation Approval is issued.[1] The Conservation and Reclamation Approval process will usually take longer than the Energy Resources Conservation Board well licence or scheme approval. The Energy Resources Conservation Board will not issue their well licences until surface access has been granted (i.e., surface disposition on public land, or surface lease on private land). Normally, a surface disposition on public land will not be granted until the Conservation and Reclamation Approval has been issued. Applications for an Energy Resources Conservation Board Approval (scheme approval or well licence), a Conservation and Reclamation Approval, a Water Resources Approval, and a surface disposition for public land will be reviewed concurrently by the respective agencies. The agencies will keep each other appropriately informed of their reviews.

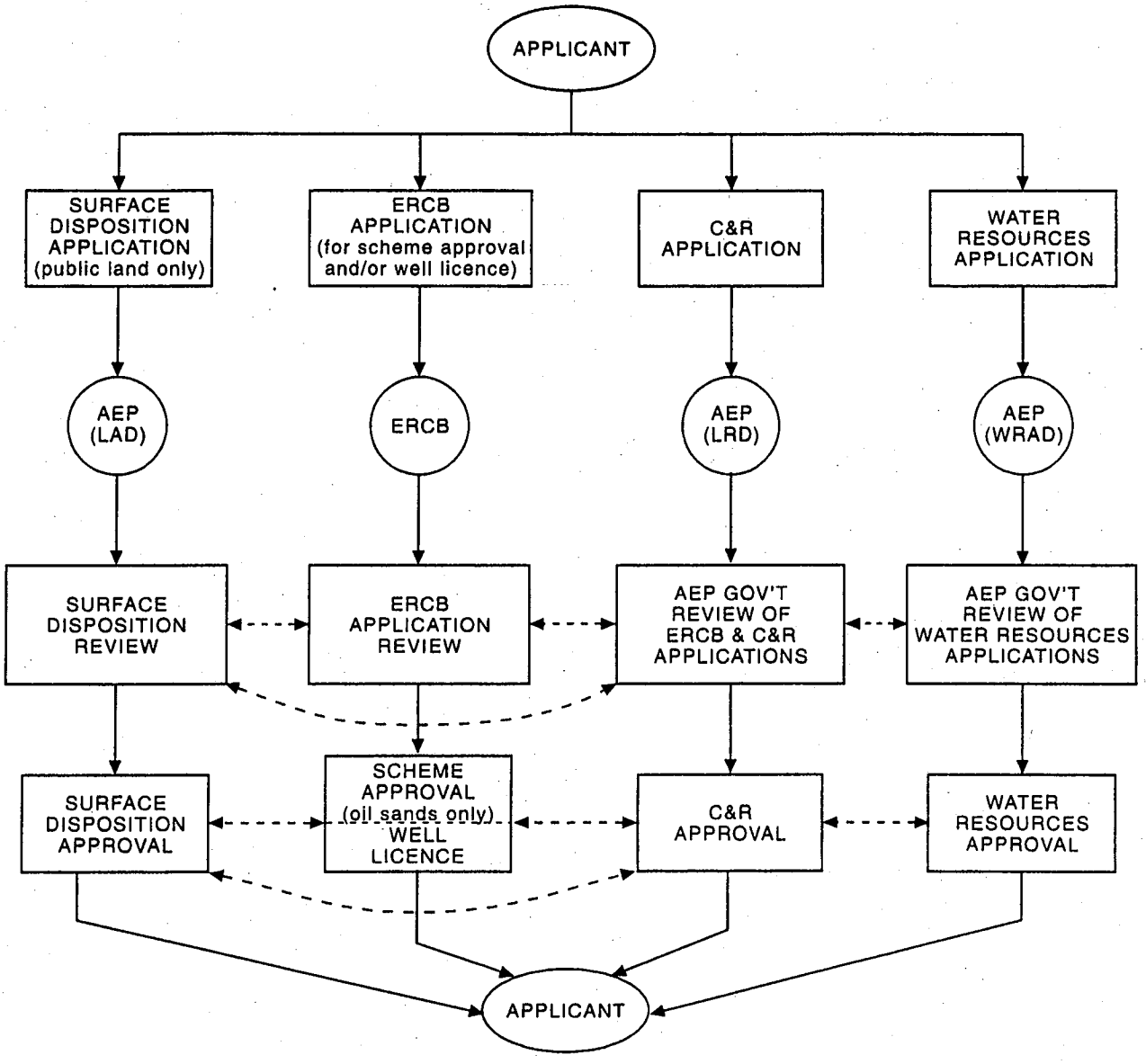
Before submitting a Conservation and Reclamation Application, the proponent should consult with staff of the Land Reclamation Division to ensure that the application will be complete. Information requirements and the procedures and methodologies to be used in preparation of the application should be discussed. The quality and adequacy of information will be major factors in the review of the application.

Figure 3 outlines the review and approval process for a Class I oil production site:

1. The applicant sends five (5) copies of the Conservation and Reclamation Application to the Director of Land Reclamation Division (3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6). More copies may be required for complex projects. It is the responsibility of the company to provide appropriate information and the name and address of an official company contact.

[1] Environmental Protection and Enhancement Act: Section 58 and 59.

FIGURE 2: RELATIONSHIP OF APPROVAL PROCESSES FOR CLASS 1 OIL PRODUCTION SITES

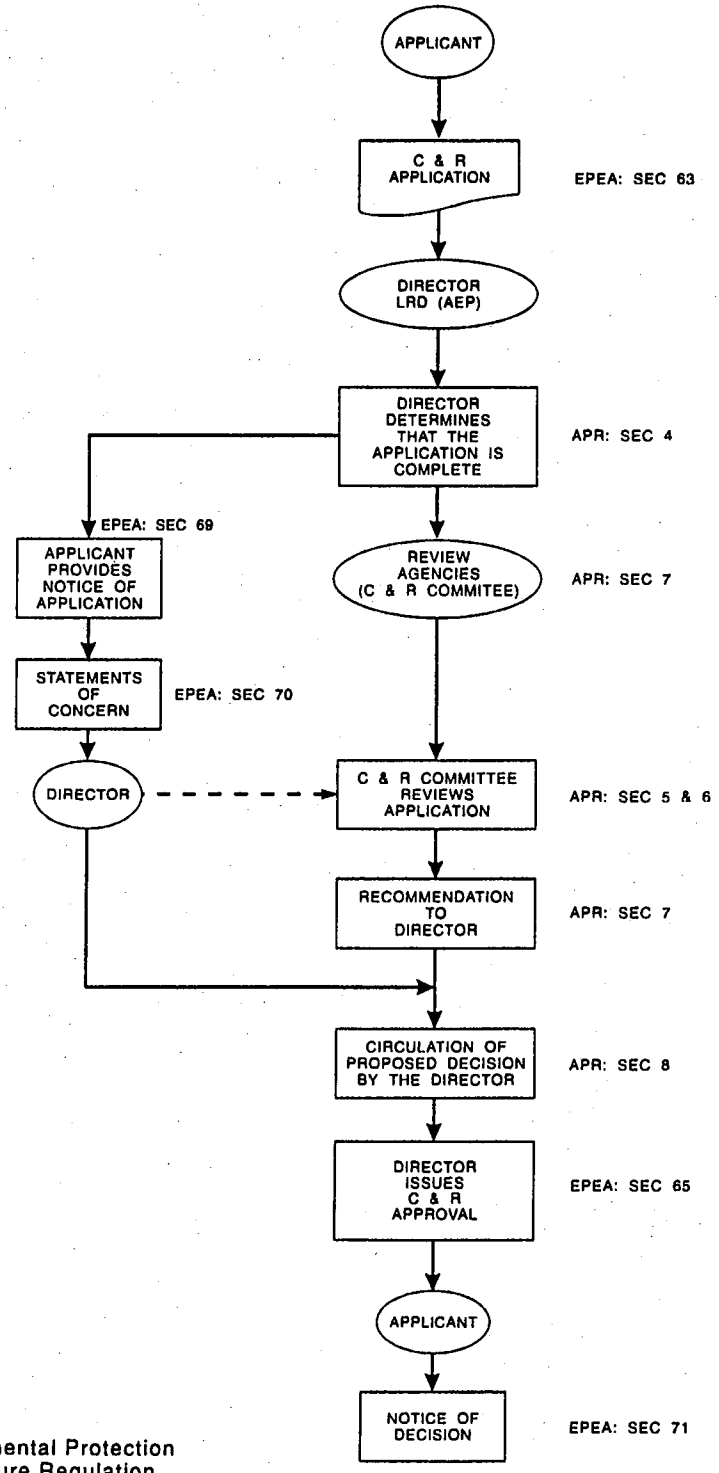


NOTES:

1. Diagram applies to projects not requiring an Environmental Impact Assessment. When an EIA is required, the C & R Application can be submitted at the same time as the EIA if the applicant chooses to do so.
2. Operators must have all four approvals before commencing construction.
3. ERCB well licence will not be issued until surface disposition for public land has been issued.
4. Surface disposition on public land will not be issued until C & R Approval has been issued.
5. Dashed lines indicate communication between agencies.

AEP - Alberta Environmental Protection
C&R - Conservation & Reclamation
ERCB - Energy Resources Conservation Board
LAD - Land Administration Division
LRD - Land Reclamation Division
WRAD - Water Resources Administration Division

FIGURE 3: REVIEW AND APPROVAL PROCESS FOR CONSERVATION & RECLAMATION APPLICATION FOR A CLASS I OIL PRODUCTION SITE



NOTES:

AEP - Alberta Environmental Protection
APR - Approval Procedure Regulation
C & R - Conservation and Reclamation
EPRA - Environmental Protection and Enhancement Act
LRD - Land Reclamation Division

2. The Director may require the applicant to give notice of the application in the local media[1]. The applicant may be required to hold meetings in the area of the proposed activity for the public to get information about the conservation and reclamation plan for the operation[2].
3. Any person who is directly affected by the proposed project may submit to the Director a written statement of concern with respect to the application[3]. A statement of concern must be submitted within 30 days after the notice of application or within any longer period determined by the Director.
4. Once the Director has determined that the application is complete[4], it is referred to the Conservation and Reclamation Review Committee for technical review. If the review identifies information deficiencies, the applicant will be asked to provide additional information to allow the review to be completed.
5. When the review is completed, a recommendation is made to the Director to issue or not issue an approval. When an approval is recommended, draft conditions will also be provided to the Director.
6. The Director may circulate the proposed decision, including a draft of any approval, to the applicant and to persons who filed statements of concern[5].
7. In the final step, the Director issues the approval. A notice of the decision to issue the approval is sent to every person who submitted a statement of concern[6].

Figure 4 provides a more detailed outline of the review and approval process within Alberta Environmental Protection. The Conservation and Reclamation Review Committee coordinates a technical review by government departments and agencies with respect to environmental matters. The Committee compiles the comments from those departments and agencies and sends a response to the applicant. Upon completion of the environmental review, the department issues a Conservation and Reclamation Approval to the proponent. When the oil production site involves activities associated with Division 1 (Waste Management) or Division 2

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1 Environmental Protection and Enhancement Act: Section 69(1); Section 69(3) allows notice to be waived in certain instances.

2 Approval Procedures Regulation: Section 5(2).

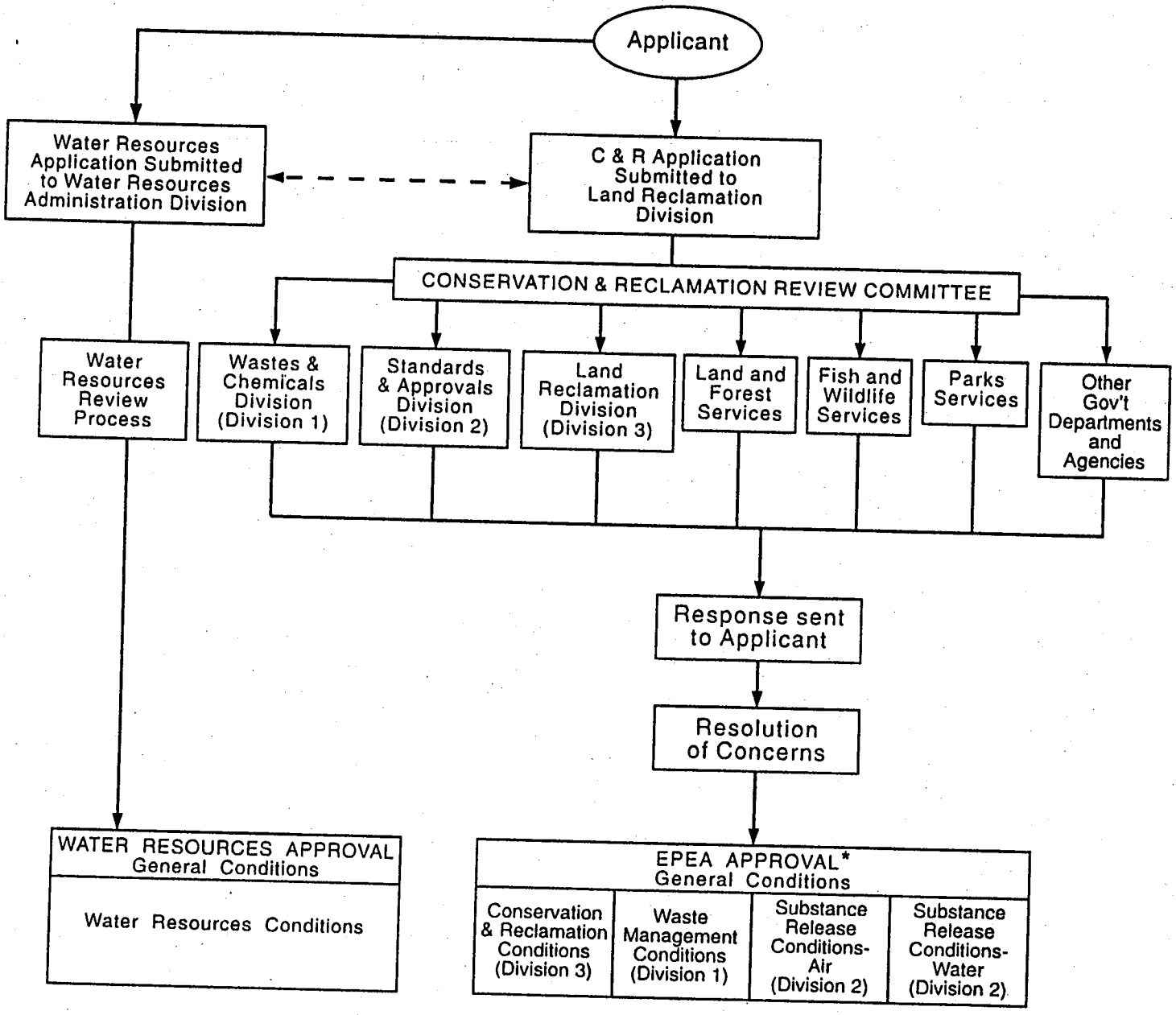
3 Environmental Protection and Enhancement Act: Section 70.

4 Approvals Procedure Regulation: Section 4.

5 Approvals Procedures Regulation: Section 8.

6 Environmental Protection and Enhancement Act: Section 71(3).

FIGURE 4: INTERNAL ALBERTA ENVIRONMENTAL PROTECTION REVIEW PROCESS FOR C&R APPROVAL



NOTES:

*Division 3 is the "window" for an EPEA approval for an oil production site.
Division 2 is the "window" for an oil sands processing plant.
Dashed line indicates coordination between review processes.

C&R - Conservation & Reclamation
EPEA - Environmental Protection and Enhancement Act

(Substance Release) of the Activities Designation Regulation, the terms and conditions for these activities will form part of the Conservation and Reclamation Approval. Approvals pursuant to the Water Resources Act must be obtained separately from Water Resources Administration Division. When necessary, the review of water resource approvals will be coordinated with the review of approvals required under the Environmental Protection and Enhancement Act.

1.6.2.2 Public Involvement. The Environmental Protection and Enhancement Act and regulations provide the opportunity for the public to be involved with the regulatory approval process, as is described in the following sections on notices, statements of concern, and appeals. Applicants are encouraged to inform the public of proposed activities and address issues that are raised.

1.6.2.3 Notice of Application and Notice of Decision. Normally, an application for an approval or an amendment requires that the applicant provide notice of the application[1]. The notice must be given in the area where the activity is proposed and contain information respecting the application[2].

The Director can waive the notice requirement when there is an emergency, when the application is considered routine, or when adequate notice of the application has been given[3]. An emergency would include a pressing situation that requires a fast response to avoid or minimize adverse environmental effects. A routine application would be one associated with little or minimal environmental effects. Adequate notice may occur when directly affected persons have been notified of the project and indicated, in writing, that they have no objections to the proposed activity.

When the Director waives the notice requirements, he must provide or require the provision of a notice of the decision to issue or amend the approval[4].

1.6.2.4 Statements of Concern. When the applicant provides notice of application, any person who is directly affected by the application can submit a statement of concern to the Director[5]. The statement must be submitted within 30 days of the last date of notice or within a longer period determined by the Director in the

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1 Environmental Protection and Enhancement Act: Section 69(1).

2 Environmental Protection and Enhancement (Miscellaneous) Regulation: Section 2.

3 Environmental Protection and Enhancement Act: Section 69(3).

4 Environmental Protection and Enhancement Act: Section 71(1).

5 Environmental Protection and Enhancement Act: Section 70.

notice. Statements of concerns will be considered in the review of the application and in the decision by the Director.

1.6.2.5 Appeals. An application for a Conservation and Reclamation Approval can be granted, with or without conditions, or refused. An applicant has 30 days to appeal any terms or conditions that are felt to be unreasonable, or to appeal a refusal to grant an approval[1]. When a notice of application was provided, any person who filed a statement of concern has 30 days to appeal the decision to issue an approval or any conditions of the approval that are felt to be unreasonable[3]. When a notice of application was not provided, any person who is directly affected by the decision has 30 days to appeal the approval or any conditions that are felt to be unreasonable[2].

Appeals do not act as a stay of the decision to issue the approval[3]. All appeals are made to the Environmental Appeal Board which makes recommendations to the Minister of Environmental Protection. The Minister may confirm or refuse the approval, vary it, or direct the Director to issue an approval with terms and conditions prescribed by him[4]. On matters of appeal the Minister's decision is final. Please refer to the Environmental Appeal Board Regulations for further information on the appeal process and who is eligible to make an appeal.

1.6.3 Class II Sites (Conservation and Reclamation Approval Not Required).

Class II oil production sites (i.e., where well pad development is 5.7 hectares or less per quarter section) do not require a Conservation and Reclamation Approval. Environmental Protection Guidelines provide the necessary guidance to achieve conservation and reclamation objectives for these sites (see Section 3). Figure 5 outlines the review process for Class II sites.

Before issuing a well licence on private land, the Energy Resources Conservation Board will refer some applications to the Conservation and Reclamation Inspector from Alberta Environmental Protection in accordance with criteria outlined in the ***Energy Resources Conservation Board Informational Letter IL 90-20 (Wellsite and Access Road Construction Prior to the Issuance of a Well Licence)*** (Appendix 1).

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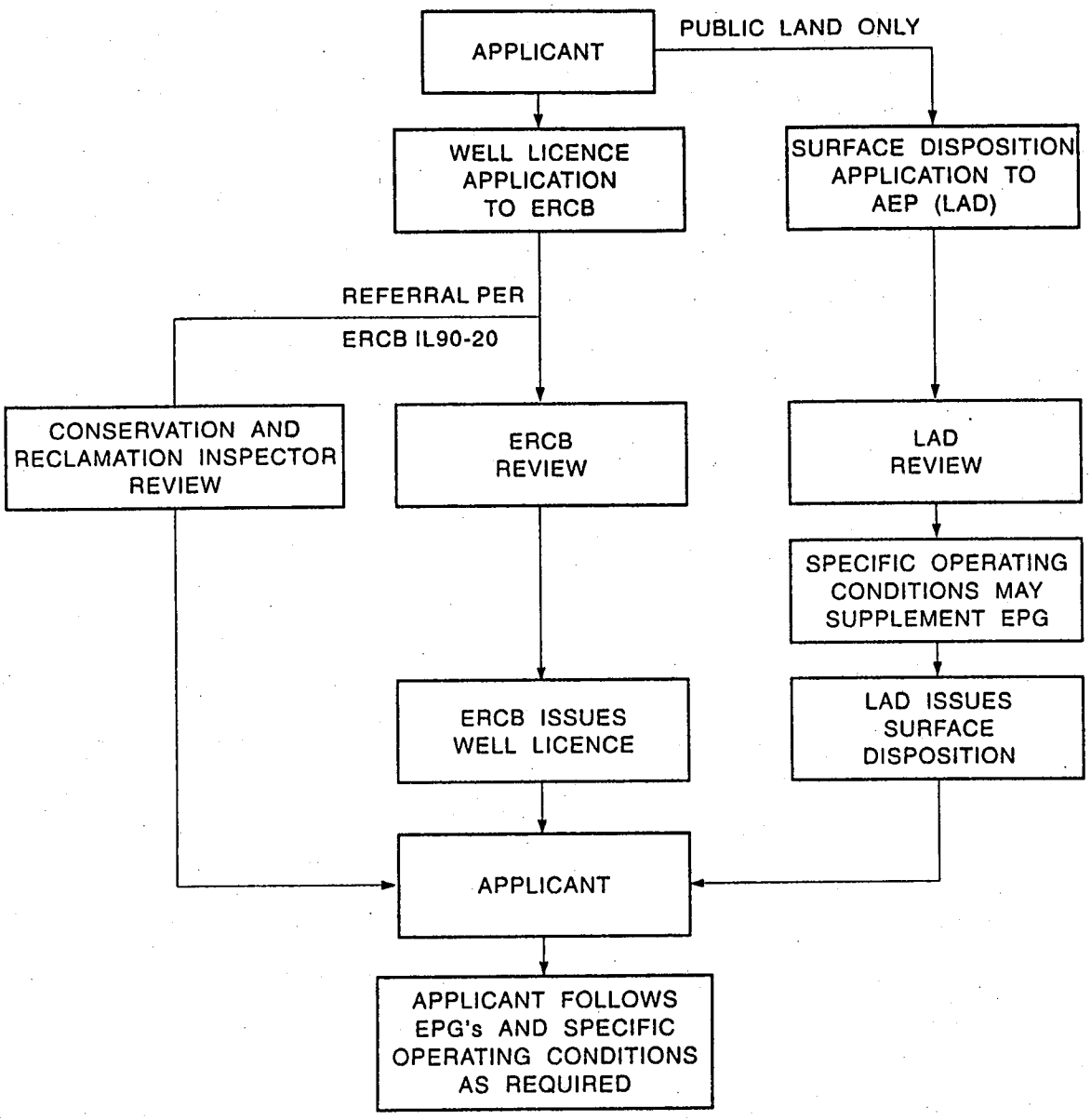
1 Environmental Protection and Enhancement Act: Section 84(1)(a)(iv) and Section 84(4)(c).

2 Environmental Protection and Enhancement Act: Section 84(1)(a)(v) and Section 84(4)(c).

3 Environmental Protection and Enhancement Act: Section 84(7) and 89(1).

4 Environmental Protection and Enhancement Act: Section 92(1).

FIGURE 5: REVIEW PROCESS FOR CLASS II OIL PRODUCTION SITES



NOTES:

1. Operators must have both approvals before commencing construction.
2. ERCB well licence will not be issued until surface disposition has been issued. The preference is that the operator obtain a surface disposition prior to submitting the well licence application to the ERCB.

AEP - Alberta Environmental Protection
EPG's - Environmental Protection Guidelines
ERCB - Energy Resources Conservation Board
IL90-20 - Wellsite and Access Road Construction Prior to the Issuance of a Well Licence
LAD - Land Administration Division

All Class II production sites on public land require a surface disposition (Mineral Surface Lease) from the Land Administration Division of Alberta Environmental Protection. In these cases, the Environmental Protection Guidelines may be supplemented by more specific operating conditions on the surface disposition.

1.7 Reclamation Security

An applicant must provide reclamation security for oil production sites subject to a Conservation and Reclamation Approval[1]. Security is due before an approval is issued[2] and must be sufficient to ensure completion of conservation and reclamation on the affected land[3]. The cost of reclamation will be estimated by the applicant[4]. For oil production sites, the estimate must include all disturbance associated with the site (i.e., well pads, access roads, pipelines, batteries, etc.).

The application of cost of reclamation security under the new Environmental Protection and Enhancement Act and regulations is not retroactive. Cost of reclamation applies only to activities on specified land constructed after September 1, 1993.

1.8 Amendment to Approval

A Conservation and Reclamation Approval for an oil production site authorizes a specific development sequence for a specific period of time. When the initial approval expires or when a major change to the conservation and reclamation plan is proposed, a formal amendment to the approval is required.

A major amendment or renewal application should update the life-of-scheme conservation and reclamation plan and provide details for the next development sequence of the operation. The amendment is reviewed in the same manner as the initial application and is approved for a specified development sequence and time period. Only new activities not documented in the initial application need to be described in the amendment. When public land is involved, an amendment to the Mineral Surface Lease must also be obtained from the Land Administration Division of Alberta Environmental Protection.

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1 Environmental Protection and Enhancement Act: Section 80; Conservation and Reclamation Regulation: Section 17(1).

2 Conservation and Reclamation Regulation: Section 17(1).

3 Conservation and Reclamation Regulation: Section 18(1).

4 Conservation and Reclamation Regulation: Section 18(2).

Requests for minor amendments are submitted in writing (two copies) to the Conservation and Reclamation Inspector authorized in the Approval. Minor amendments would include expansion of an existing pad, or in some cases, construction of a new pad that is clearly justifiable. The justification for additional disturbance must be provided in the request to the Conservation and Reclamation Inspector. Operators must recognize that the intent of conservation and reclamation is to minimize surface disturbance. In general, it is felt that 5.7 hectares of well pad disturbance in a given quarter section is sufficient to allow development of the heavy oil or oil sands resources. This is based on surface development techniques and downhole technology that can minimize surface disturbance. It is recognized that additional disturbance, and possibly a new well pad, may be needed in some instances. Approval of minor amendments may be granted in the field by the Conservation and Reclamation Inspector. If the Conservation and Reclamation Inspector feels the amendment is significant, he may request the operator to apply for a formal amendment from the Director.

1.9 Transitional Approvals for Class I Oil Production Sites

The Activities Designation Regulation[1] states that a Development and Reclamation (D&R) Approval issued before the coming into force of the regulation on September 1, 1993 is deemed to be a Conservation and Reclamation Approval. For these approvals, the operator has no further application obligations until a major amendment is required or until the approval term has expired. In some instances an operator may have held a Development and Reclamation Approval for an oil production site that disturbs 5.7 hectares or less per quarter section. Under the Environmental Protection and Enhancement Act and regulations, this would not be a Class I oil production site and would not require an approval. In these cases, a request may be submitted to the Director to cancel the new Conservation and Reclamation Approval created by the transition provision of the Act. Any security held would be returned. Deemed Conservation and Reclamation Approvals will be maintained for those projects which had an Environmental Impact Assessment called under previous legislation.

The Environmental Protection and Enhancement Act[2] requires a Conservation and Reclamation Approval for Class I oil production sites constructed before September 1, 1993. Some of these sites would not have had a Development and Reclamation Approval in place. Applications for approval for these facilities must be made by January 1, 1995. These sites must meet the criteria under the Act (i.e., greater than 5.7 hectares of well pad development per quarter section and within the area designated in Figure 1). An application would consist of as-built plans showing surface facilities (pads, roads, pipelines, batteries, etc.) and soil stockpiles, as

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1 Section 4(9).

2 Section 243(10).

well as a brief description of conservation and reclamation procedures used to develop the sites (e.g., soil salvage).

Oil production sites regulated by the Land Surface Conservation and Reclamation Act before September 1, 1993 usually have more than one environmental approval issued by Alberta Environmental Protection. For example, an oil production site might have a Development and Reclamation Approval as well as a Clean Water and Clean Air Licence. During the transitional period, approvals that expire first will be renewed to the same expiry date as the last approval. When the last approval expires, all approvals will be incorporated into one.

1.10 Land Access

1.10.1 Public Land and Surface Disposition Conditions

Industrial activities on public land require a surface disposition (Mineral Surface Lease) under the Public Lands Act to enter upon, occupy, or use the land. The Conservation and Reclamation Application can form the basis of the surface disposition application to the Land Administration Division (Alberta Environmental Protection). The review of the applications and issuance of the approvals would be concurrent.

For Class I oil production sites, environmental protection terms and conditions will normally be on the Conservation and Reclamation Approval. The surface disposition will focus on the agreement with the Crown to enter onto the land. Site specific operating conditions not addressed in the Conservation and Reclamation Approval may be attached to the surface disposition. The surface disposition will contain a clause making the disposition subject to compliance with the Conservation and Reclamation Approval. For oil production sites not requiring a Conservation and Reclamation Approval (Class II sites), site specific operating conditions may be attached to the surface disposition to supplement the Environmental Protection Guidelines.

1.10.2 Private Land

Before commencing development activity on private land, a holder of mineral rights who does not own the surface must negotiate with the owners, lessees, or occupants of the surface for consent to enter upon the land.

1.11 Reporting Requirements

A holder of a Conservation and Reclamation Approval will be required to submit an annual report by March 31st of each year. This requirement relates to a calendar year (January to December) for the past year's and current year's activities.

An annual report is required only when there has been new development or new conservation and reclamation activities in the past year or proposed for the current year.

The major objectives of the annual report are to:

1. demonstrate compliance with the approval.
2. document site conditions to demonstrate successful reclamation and to provide supportive information for reclamation certification.
3. outline general development activities.
4. outline general conservation and reclamation activities.
5. provide the status of surface disturbance and reclamation.
6. identify problem areas and their resolution.

The annual report is submitted to the Director, Land Reclamation Division (3rd floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone 427-6202).

1.12 Reclamation Certification

An operator must reclaim land disturbed by an oil production site and obtain a reclamation certificate[1]. Before applying for a certificate, the operator must obtain an abandonment approval from the Energy Resources Conservation Board. A surface lease is not legally cancelled until a certificate has been issued[2]. When an operator has abandoned and reclaimed all or part of an oil production site according to the Conservation and Reclamation Approval (Class I) or Environmental Protection Guidelines (Class II), an application can be made for a reclamation certificate. If reclamation is complete, a certificate is issued and any security held with respect to the land can be returned. See Part 2 of the Guide for details on the certification process and the certification criteria.

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[1] Environmental Protection and Enhancement Act: Section 122.

[2] Environmental Protection and Enhancement Act: Section 129.

2. CONSERVATION AND RECLAMATION APPLICATION FOR CLASS I OIL PRODUCTION SITES

This section outlines the information requirements for a Conservation and Reclamation Application for a Class I oil production site. The purpose of the application is to address environmental concerns and mitigate adverse environmental impacts during the construction, operation and reclamation of an oil production site. Proponents are encouraged to contact Land Reclamation Division to discuss the scope and level of detail appropriate to the project (3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone 422-2636). For larger or complex projects, more information may be required. This could include a more detailed pre-development site analysis (biophysical inventory), more comprehensive soil inventories and handling plans, wildlife mitigation plans, etc.

Oil production sites typically begin as a one or two well pad development smaller than the 5.7 hectare criterion for Class I sites. At this stage a Conservation and Reclamation Approval is not required. If the addition of new wells to the development increases the total wellsite disturbance to more than 5.7 hectares per quarter section, an approval is required. The application would consist of as-built plans for existing surface facilities, and a description of conservation and reclamation procedures previously used at the site and proposed for the new development.

An application for Conservation and Reclamation Approval should contain the following information:

1. ***Surface Disturbance Plan*** - Provide a general description of the project, including construction methods, sequence and schedule. Provide a topographic plan of the site showing all areas to be disturbed by the field production facilities, including well pads, roads, powerlines, pipelines, battery sites, borrow pits, and other facilities. Use contour intervals appropriate to the location.

2. ***Water Management Plan*** - Provide a plan showing drainage control on and off the site and the location of ditches, ponds, diversions, and stream crossings. Describe any modifications to existing drainage systems.

3. ***Waste Disposal Plan*** - Discuss the disposal of all production and non-production wastes generated at the field production facilities. Refer to the following Energy Resources Conservation Board documents: ***Informational Letter IL 93-6 (Drilling Waste Guidelines), Informational Letter 93-8 (Recommended Oilfield Waste Management Practices) and Guide G-50 (Drilling Waste Management).***

4. ***Land Use and Ownership*** - Describe the current land use for the development area and provide the names of the land owners or trustees.

5. ***Vegetation Management Plan*** - Provide a vegetation management plan showing short term and long term plans for the control and maintenance of vegetation, including weed control.

6. ***Timber Salvage Plan*** - Where applicable, provide a timber salvage plan. Refer to methods specified in ***The Alberta Forest Service Guidelines for the Assessment and Reforestation of Forest Land Disturbances (Alberta Forestry, Lands and Wildlife, Alberta Forest Service, Forest Land Use Branch, 1989)***. Include contract specifications; the quantity, sequence and schedule for timber salvage, and an overlay of the salvage areas on the forest inventory map. Timber salvage plans will be approved in the field by the appropriate Forestry Officer from Land and Forest Services, Alberta Environmental Protection.

7. ***Soil Handling Plan*** - Provide a topsoil and subsoil salvage plan based on soil information. Provide typical profiles of soils to be disturbed. This information may be obtained from existing soil survey reports or from field investigations, or both as required. Address the recoverable depths and volumes of soil materials and the location of soil stockpiles. Describe erosion control measures for stockpiles.

   Describe the depth and quality of soil materials to be replaced on recontoured areas. Discuss methods to isolate problem materials that may affect the capability of the replaced soil. Discuss methods to alleviate soil compaction.

8. ***Reclamation Plan*** - Provide a plan illustrating:
   a) the intended land use of the reclaimed areas and how the plan will provide for the return of equivalent land capability.
   b) removal of infrastructure.
   c) restoration of drainage.
   d) soil replacement.
   e) revegetation and conditioning of the site, including;
      - species list, seed source and quality, seeding rates and methods
      - fertilization rates and methods
      - wildlife habitat plans where applicable (target species and habitat).
   f) reclamation sequence and schedule.

9. *Maps* - Use maps wherever possible to show aspects of the conservation and reclamation plan. Provide maps at a scale appropriate to the development.

10. *Research and Monitoring Program* - Describe any research and monitoring programs that relate to conservation and reclamation planning. Discuss objectives, methods and timing.

11. *Public Involvement* - Summarize any public involvement programs that have or will be conducted. Highlight public reaction to issues relating to surface disturbance, conservation and reclamation.

12. *Security Estimate* - Provide an estimate of the cost of reclamation. Include all activities associated with the oil production site (i.e., well sites, roads, pipelines, batteries, etc.). As previously noted in Section 1.7, the collection of security on the basis of cost of reclamation is not retroactive to areas disturbed or approved for disturbance prior to September 1, 1993.

3. ENVIRONMENTAL PROTECTION GUIDELINES

3.1 Overview of the Guidelines

The Environmental Protection Guidelines apply to the construction, operation, and reclamation of oil production sites in Alberta. Following the guidelines will help ensure successful reclamation and certification. They apply to all disturbance associated with the site, including infrastructure (roads, pipeline, battery sites, borrow pits, off-site sumps, etc.) The guidelines are of particular relevance to Class II sites which do not go through a formal review and approval process related to conservation and reclamation. Conservation and Reclamation Inspectors will expect to see the guidelines being followed in the field. The inspectors or operator may request modifications in the guidelines in order to deal with site-specific conditions.

The guidelines promote and encourage:

- The return of a disturbed site to a land capability equivalent to the pre-disturbance land capability.
- Acceptance of pre-development soil, landscape and vegetation conditions as the standard for post-development conditions.

- Identification of potential environmental concerns through pre-construction site assessments and pre-planning.
- Protection of the environmental characteristics of the project site to minimize post-construction remedial requirements.
- Awareness of the value of soil, the sensitivity of soil to disturbance, and the difficulty of reclaiming degraded soils.
- Awareness of the importance of native vegetation and the need for protection and rapid reestablishment of vegetation that is similar to, or compatible with, the adjacent land.
- Monitoring and on-site supervision by personnel responsible for environmental quality control of all activities to ensure a complete record of conservation, degradation, mitigation and reclamation events.
- Reclamation of as much of the disturbed area as possible each year to minimize land disturbance.
- Site assessments following reclamation which provide a complete evaluation of soil, landscape and vegetation conditions and compare them to pre-development conditions, prior to application for a reclamation certificate.
- Monitoring during the operating life of the facility to ensure that integrity of the environment on and adjacent to the site is maintained.

The following sections outline Environmental Protection Guidelines for project planning; site preparation, construction and operation; and site reclamation. Further information can be obtained from regional Conservation and Reclamation Inspectors.

3.2 Project Planning

Advance planning and discussions with regulatory authorities and landowners will lead to a smooth operation with few surprises. Planning should minimize the overall impact of the development and promote the return of the land to equivalent land capability. Plans should be flexible to allow for unforseen events (e.g., adverse weather). Plans must be developed for off-site disturbances (e.g., remote sumps, borrow pits) as well as for the main site (including roads, pipelines, and batteries).

3.2.1 Communication

Objective: To ensure that all affected parties understand what is planned and what is happening on the site and have the opportunity for input into conservation and reclamation planning.

Considerations:

- Start communicating with landowners, occupants, other affected parties, and Conservation and Reclamation Inspectors before starting work on the site.
- Discuss with the landowner ways of minimizing impacts on the landowner's operation (e.g., timing, fencing, access, etc.).
- Educate on-site construction and operation personnel about environmental concerns on the site and the Environmental Protection Guidelines.

3.2.2 Site Location

Objective: To locate the well pad and associated facilities (roads, pipelines) to minimize disturbance and adverse environmental effects. Proper siting can greatly reduce the difficulty and cost of conservation and reclamation and facilitate reclamation certification.

Considerations:

- Where possible, consider drilling techniques that allow multi-well pads to be built, thereby reducing surface disturbance (e.g., directional wells, slant wells, horizontal wells).
- Avoid environmentally sensitive areas such as erodible knolls, saline or sodic depressions, unstable sidehills, waterbodies and wetlands, streams and seepage areas.
- Avoid areas likely to have rare plant or animal species, or other areas where the environment could be compromised.
- Set well pads and associated facilities appropriate distances back from valley breaks, ravines, stream and river banks, and lakeshore lands.
- Consult the document ***Petroleum Activity on Native Prairie: Guidelines for Surface Disturbances (Energy Resources Conservation Board Informational Letter IL 92-12).***
- Avoid disrupting drainage.
- Minimize significant cut and fill.
- Minimize interference with agricultural or silvicultural practices.

3.2.3 Scheduling/Timing

Objective: To schedule activities to avoid adverse environmental effects and interference with the landowner's activities.

Considerations:

- Contact appropriate agencies regarding timing restrictions on the operation due to wildlife activity, land use, etc.
- Contact the landowner regarding his views on the timing of any activities associated with the oil production site.

3.2.4 End Land Use

Objective: To determine the end land use for the site at the planning stage and to identify soil conservation, reclamation and revegetation methods to achieve this land use.

Considerations:

- Begin early consultation with the landowner and appropriate provincial and municipal agencies (Municipal District, County, Improvement District) to determine the desired end land use.

3.3 Site Preparation, Construction and Operation

Site preparation, construction and operation should be conducted to conserve and protect the soil, vegetation and landform features of the site. Care taken at this phase will reduce final reclamation costs.

3.3.1 Timber Salvage and Clearing

Objective: To create a suitable area for development. To minimize soil loss and degradation, disturbance of adjacent forest cover, and loss of merchantable timber.

Considerations:

- Consult the ***Alberta Timber Management Regulations*** administered by Land and Forest Services (Alberta Environmental Protection) for specific requirements on public lands.
- Minimize the area required for development.
- Minimize soil loss during clearing by using appropriate equipment, procedures and scheduling.

3.3.2 Soil Salvage

Objective: To salvage, store and protect sufficient soil materials for future replacement and reclamation.

Considerations:

- It is highly recommended that the operator identify and document topsoil depths to guide soil salvage and to provide documentation for future reclamation certification.
- Selectively salvage and store topsoil for future replacement, unless otherwise approved by the Conservation and Reclamation Inspectors. Make every effort to maximize topsoil salvage. On forested land in the Green Area, the top 15 cm of mineral soil and surface organic material is to be salvaged, unless otherwise authorized by the Conservation and Reclamation Inspectors.
- Selectively salvage and replace sufficient suitable subsoil to improve reclamation success.
- Prevent excessive soil handling and overstripping.
- Locate topsoil stockpiles in a secure area at the edge of the well pad away from: grade, subsoil and spoil materials; drilling activities; and day to day operations.
- Contour and seed soil stockpiles to minimize loss by wind and water erosion.

3.3.3 Construction and Operation

Objective: To plan and control all construction and operation activities to prevent environmental degradation and to simplify reclamation of the site.

Considerations:

- Prevent or control soil or water contamination (pollution), soil erosion and landscape instability.
- Avoid disrupting drainage.
- Avoid off-lease contamination.
- Dispose of drilling wastes according to ***Energy Resources Conservation Board Guide G-50 (Drilling Waste Management), Informational Letter IL 93-6 (Drilling Waste Management, Hydrocarbon/Salt Disposal Plan Content and Data Base Reporting), and Informational Letter IL 93-8 (Recommended Oilfield Waste Management Practices).***
- Locate sump and flare pits a minimum of three metres from soil stockpiles.

- During construction, contour cut and fill slopes such that they are not steeper than 2:1 (27°). Recontour cut slopes to a 3:1 (18°) slope or less once drilling is complete and production begins.
- Once a well is operating, reclaim as much of the lease as possible to reduce the area of disturbance.
- Store the remaining salvaged soil so that it is accessible and available for replacement during final reclamation.

3.4 Site Reclamation *This section refers to the final reclamation of the site.*

3.4.1 Contaminant Identification and Remediation

Objective: To ensure levels of contaminants on the site do not form a hazard to human or animal health, do not detrimentally affect water quality and do not impede germination, growth, survival or management of the vegetation used for site reclamation.

Considerations:

- Contain and clean up all spills as soon as possible.
- Document and report all spills to the appropriate authority.
- Remediate chemical contamination to meet the requirements of Alberta Environmental Protection, and where applicable, the Energy Resources Conservation Board.
- Undertake remediation on-site unless otherwise authorized.
- Resample soils following remediation to confirm that remediation goals have been met.

3.4.2 Site Reconstruction

Objective: To contour the site and prepare it for soil replacement and revegetation.

Considerations:

- Contour the site to conform to, or blend into, the surrounding topography unless otherwise approved.
- Avoid backfilling sumps with frozen materials where year round access is available. Backfilling with frozen material may require remediation of subsidence.
- Use spoil materials for site grading and contouring. Salvaged subsoil may only be used for minor grading. Do not use salvaged topsoil for grading and contouring.
- Restore surface and subsurface drainage to conform to the adjacent drainage system.
- Do not divert, block or impound natural surface or subsurface drainage.

- If necessary, use appropriate erosion control or stabilization measures.
- Remove rocks, roots, slash or debris on or within the soil to meet the reclamation certification criteria.
- Remove and dispose of all garbage and debris at an approved waste management facility, unless otherwise approved.
- Remove physical equipment and facilities from the site. Remove all solid materials, or when necessary, compact the material and bury it at least 1.2 metres beneath the final land surface.

3.4.3 Soil Replacement

Objective: To replace salvaged soil material so that soil depth and quality is equivalent to the original or representative undisturbed land. In cases where the land capability and end land use will change, soil depth and quality may vary from representative lands, but variances must be approved, in advance, by the Conservation and Reclamation Inspectors.

Considerations:

- Replace salvaged subsoil, and then topsoil, evenly across the site.
- Alleviate subsoil compaction, before topsoil replacement, to help establish suitable subsoil conditions and rooting depth.
- Replace topsoil only after contouring is complete and subsidence is no longer a concern.
- When necessary, apply soil amendments to return soil capability.

3.4.4 Revegetation

Objective: To ensure the establishment and growth of species compatible with the intended land capability and end land use. The vegetation should be self-sustaining in uncultivated areas or sustainable under normal management practices in cultivated areas.

Considerations:

- Cultivate the entire site to alleviate topsoil compaction.
- Avoid pulverization of the soil.
- Discuss revegetation methods and species with the landowner or public land manager.
- Re-establish vegetation (species, composition) so that it is compatible with original or adjacent vegetation.

- Where required, use native species or mixes that will allow the establishment of native species. Consult the document ***Petroleum Activity on Native Prairie: Guideline for Surface Disturbance (Energy Resources Conservation Board Informational Letter IL 92-12).***
- Minimize the introduction of undesirable species and eliminate those that are inconsistent with the adjacent land (exceptions are granted for cover crops).

APPENDIX 1: ENERGY RESOURCES CONSERVATION BOARD INFORMATIONAL LETTER IL 90-20 (WELLSITE AND ACCESS ROAD CONSTRUCTION PRIOR TO THE ISSUANCE OF A WELL LICENCE)

ERCB

Energy Resources Conservation Board
640 Fifth Avenue SW
Calgary, Alberta
Canada T2P 3G4

Informational Letter

IL 90-20

TO: All Oil, Gas, and Oil Sands Operators

23 November 1990

WELL SITE AND ACCESS ROAD CONSTRUCTION PRIOR TO THE ISSUANCE OF A WELL LICENCE

The Board understands that it has been the practice of industry, in many instances, to commence lease construction upon acquisition of the surface lease and coincidental with the filing of the well licence application. It also understands that timing is a crucial consideration in drilling operations. However, with the current increase in public, landowner, and government concerns respecting environmental impacts from well sites and access roads, the Board expects industry to avoid initiating lease construction before a well licence has been issued.

Since a primary function of the ERCB well licensing process is to ensure that all potential concerns related to the well licence application have been identified and adequately addressed, the Board would encourage industry to obtain the well licence prior to initiating any activities other than the surveying of the well site and access road. The Board will only allow pre-licensing construction of well sites and access roads in cases where it is satisfied that all the appropriate site inspections have been conducted and the appropriate mitigative measures have been incorporated into the design and construction.

The ERCB well licensing process is especially important on freehold surface lands where it is the principal vehicle for dealing with environmental concerns raised by other government departments, local authorities, and special interest groups such as Ducks Unlimited Canada and the Alberta Wilderness Association. As part of its overall well licence application review, the ERCB will occasionally refer applications on freehold surface lands to its field offices and the Land Conservation and Reclamation Council (LCRC) of Alberta Environment for their review prior to licensing. This review usually includes an on-site inspection by ERCB and LCRC field staff to determine if the proposed site will restrict or prohibit sound conservation and reclamation practices and is acceptable from an overall environmental perspective. Special well-site or access road construction or operational measures may be required.

The concerns and requirements identified in this IL do not normally apply to applications on Crown surface lands because of the internal government department mineral surface lease (MSL) reviews that take place. The exception to this is Special Areas (Municipal Affairs) lands which are administered as freehold.

The Board emphasizes the importance of an applicant providing, on the well-site survey, sufficient detail regarding surface topography and surface improvements adjacent to well sites and access roads. Section 2.020, subsections (3) and (3.1) of the Oil and Gas Conservation Regulations outline the minimum information required on a well-site plan. Details which include information on drainage

patterns, valley and coulee breaks, corner elevations, cross-section elevations, beaver dams, muskeg, or wet areas and flood plains are beneficial to ERCB/LCRC staff, and to the industry as well, in providing an opportunity to assess the suitability of a well site or road prior to filing a well licence application. An applicant should also clearly identify in its application any special mitigative measures it proposes to ameliorate the impacts a well site may cause as required by section 2.120 of the Oil and Gas Conservation Regulations.

In cases where an applicant has any doubt with respect to the environmental sensitivity of a site, it is encouraged to initiate a consultation or inspection through the appropriate ERCB area office and with the landowner prior to filing the application for the well licence. This will minimize delays during the processing of the application. To assist in this review process, attached is a list of the basic criteria used by the ERCB Well Licensing staff in assessing the need for referring applications to the ERCB/LCRC field staff.

Any queries with respect to this matter may be directed to the Supervisor of Well Licensing at 297-8554.

E. J. Morin
Board Member

attachment

ATTACHMENT

The following is a listing of the general criteria used by the ERCB Well Licensing Section when referring applications to ERCB/LCRC field staff. NOTE: site-specific circumstances may dictate other considerations additional to those listed here.

1. Construction involving side-hill or top-hill cuts.

2. Construction involving cut and fill.

3. Significant elevation differences across the well site.

4. Locations in sensitive land-use areas such as in or adjacent to urban centres and flood-irrigated land.

5. Sensitive soil conditions such as permeable sand or gravel areas and muskeg that may be inappropriate to use for sump material and are difficult to reclaim.

6. Access road considerations such as

   - roads of considerable length,
   - roads immediately adjacent to valley breaks and river valleys, and
   - significant elevation differences along the road.

7. Construction in or adjacent to dry sloughs, wet areas, rivers, lakes, and valley breaks.

8. Construction of a pad.

9. Significant topographical changes adjacent to well site and access road.

10. Proximity of well site or access road to buildings and other improvements of all kinds.

PART 2: RECLAMATION CERTIFICATION

PART 2 RECLAMATION CERTIFICATION

1. INTRODUCTION

1.1 General Information on the Guide

Oil production sites are the field production facilities for recovering heavy oil or oil sands located within a designated area in northern and eastern Alberta (Figure 1). This document is Part 2 of a Guide dealing with the regulation of oil production sites. It addresses the reclamation certification process. Part 1 of the Guide describes the application and review process for a Conservation and Reclamation Approval, as well as Environmental Protection Guidelines for oil productions sites.

1.2 General Information on the Environmental Protection and Enhancement Act and Regulations

The objective of all Albertans should be to ensure the protection, improvement, and wise use of our environment now and in the future. The Environmental Protection and Enhancement Act and regulations reflect this objective by emphasizing the conservation and reclamation of land through environmental planning.

The Environmental Protection and Enhancement Act[1] requires an operator to conserve and reclaim specified land and obtain a reclamation certificate. Specified land is land on which an activity (such as the construction, operation and reclamation of an oil production site) is carried on. The Act[2] provides for the issuance of environmental protection orders to ensure conservation and reclamation standards are met during construction, operation, and reclamation of an activity. When an oil production site is reclaimed, the operator must obtain a reclamation certificate to show that reclamation has been successful[1]. Under the Act[3], a surface lease with the landowner is not legally terminated until a reclamation certificate has been issued. Even when the operator owns the land, the oil production site must be reclaimed and a certificate obtained[1]. The Conservation and Reclamation Regulation provides further direction on environmental protection orders, reclamation certification, and security (which is required for oil production sites with a Conservation and Reclamation Approval).

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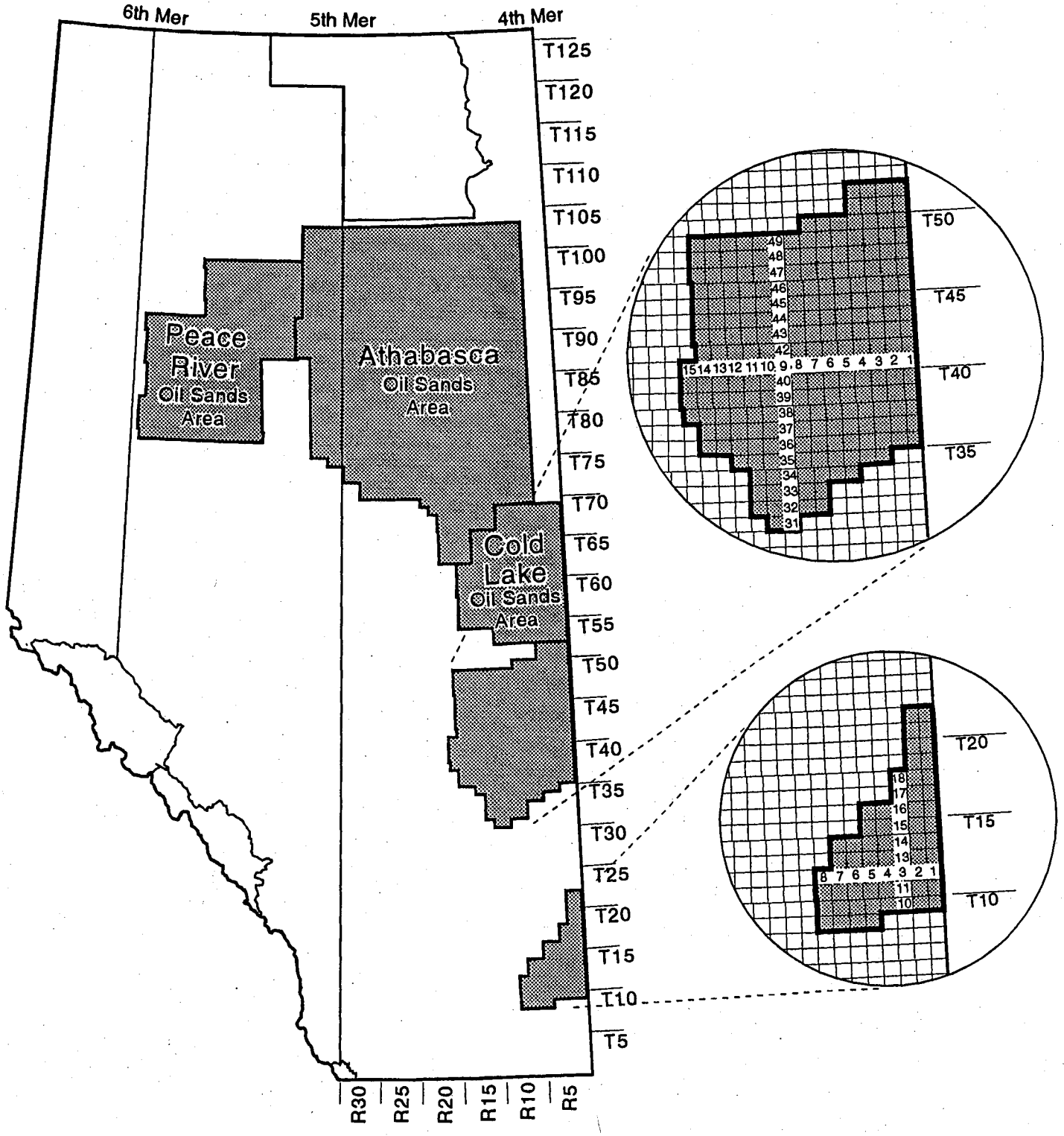
1 Section 122.

2 Sections 125 to 128.

3 Section 129.

FIGURE 1: OIL PRODUCTION SITE AREAS



1.3 The Objective of Conservation and Reclamation

The objective of conservation and reclamation is to return disturbed land to an equivalent land capability[1]. Equivalent land capability means[2] that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that individual land uses will not necessarily be identical. This approach provides sustained levels of land use at least equivalent to those which existed prior to development. The concept provides for flexibility such that individual land capabilities may change, but overall land capability will be equivalent to pre-disturbance conditions.

Land capability is defined[3] as the ability of land (unaltered by future management inputs, activities, or alterations) to support a given land use, based on an evaluation of the physical, chemical, and biological characteristics of the land, including topography, drainage, hydrology, soils, and vegetation. This evaluation determines the inherent or natural ability of land resources to provide for use. It includes any existing abilities and conditions which are the result of alterations or management practices prior to the development.

The reclaimed land capability must be sustainable under normal management. This means that the land has no more soil and landscape limitations to various uses than it did before the disturbance. In the case of disturbances such as oil production sites, where the landscape is not changed, the focus of capability is on the soil and vegetation. In some cases, the landscape may be changed and this may require alternate land capabilities to be considered on a portion of the disturbed landscape. These must be approved in advance by the appropriate regulatory authority and the landowner.

2. REVIEW AND APPROVAL PROCESS FOR A RECLAMATION CERTIFICATE

Class II oil production sites (i.e., disturbance of 5.7 hectares or less per quarter section based on the area of the well pad only) use the reclamation criteria developed for conventional well sites (see Section 4 of this Part of the Guide). Class I sites also use these criteria, but in addition will be evaluated according to the approved plans and conditions of the Conservation and Reclamation Approval.

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1 Conservation and Reclamation Regulation: Section 2.

2 Conservation and Reclamation Regulation: Section 1(i).

3 Conservation and Reclamation Regulation: Section 1(p).

2.1 Review Process

The process for reclamation certification is shown in Figure 2. An operator can apply for a reclamation certificate when the reclamation obligations have been met on part or all of the land disturbed by an activity. Reclamation certification will consider the reclamation requirements at the time of disturbance, including approved plans and conditions in the Conservation and Reclamation Approval. The application and supporting documentation are submitted in accordance with Table 1.

Once a complete application for a reclamation certificate is received, it is forwarded to the Conservation and Reclamation Inspectors. At their request the technical information is evaluated by staff in the Land Reclamation Division or other agencies as required. Once the Conservation and Reclamation Inspectors are satisfied with the technical evaluation, they will hold an inquiry.

Upon completion of the inquiry, which is conducted with the applicant and the landowners, the Conservation and Reclamation Inspectors will issue a reclamation certificate or provide direction for additional work or an additional waiting period[1]. The direction for further work can be done informally through a letter or formally through an environmental protection order.

2.2 Appeal Procedures

Under the Environmental Protection and Enhancement Act, an operator can appeal to the Environmental Appeal Board concerning the issuance of an environmental protection order[2]. The operator has 30 days to file an appeal on an environmental protection order[3]. A landowner can appeal a reclamation certificate[4]. The appeal must be made within one year of the date the certificate was issued[5].

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1 Conservation and Reclamation Regulation: Section 14.

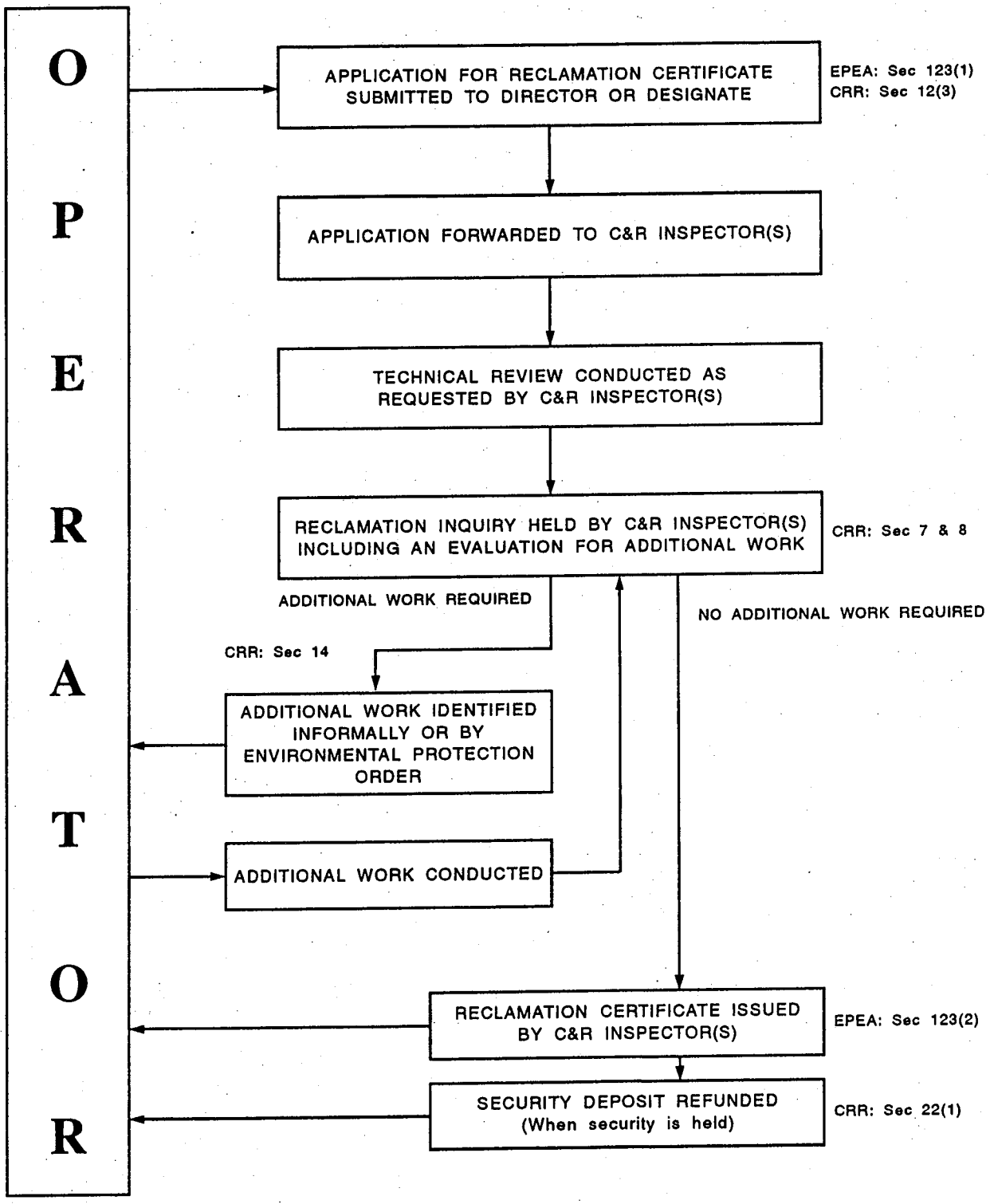
2 Environmental Protection and Enhancement Act: Section 84(1)(h).

3 Environmental Protection and Enhancement Act: Section 84(4)(c).

4 Environmental Protection and Enhancement Act: Section 84(1)(i).

5 Environmental Protection and Enhancement Act: Section 84(4)(b).

FIGURE 2: APPLICATION AND REVIEW PROCESS FOR RECLAMATION CERTIFICATES



NOTES:

C&R - Conservation and Reclamation
CRR - Conservation and Reclamation Regulation
EPEA - Environmental Protection and Enhancement Act

TABLE 1: SUBMISSION OF RECLAMATION CERTIFICATE APPLICATION

1. Oil production sites with a Conservation and Reclamation Approval.
   Oil production sites on non-public land.

   Director, Land Reclamation Division
   Alberta Environmental Protection
   3rd Floor, Oxbridge Place
   9820 - 106 Street
   Edmonton, Alberta T5K 2J6
   Telephone: 427-6202

2. Oil production sites without a Conservation and Reclamation Approval and located on public land in the Green Area.

   Director, Forest Management Division
   Alberta Environmental Protection
   9th Floor, Bramalea Building
   9920 - 108 Street
   Edmonton, Alberta T5K 2M4
   Telephone: 427-8474

3. Oil production sites without a Conservation and Reclamation Approval and located on public land in the White Area.

   Head, Public Land Management Branch
   Alberta Agriculture, Food and Rural Development
   2nd Floor, J.G. O'Donaghue Building
   7000 - 113 Street
   Edmonton, Alberta T6H 5T6
   Telephone: 427-3595

2.3 Relationship Between Reclamation Certificate and Abandonment Approval

When an oil production site, or portion of it, is to be abandoned, the operator must obtain an abandonment approval from the Energy Resources Conservation Board. This procedure informs government agencies of the intention to abandon the site and provides assurance that the abandonment is necessary. The Board approval assures that the abandonment can be done safely and economically, and in a manner consistent with reclamation objectives. It also ensures that the area will not be a hazard to public safety or future activities or development.

In some instances the applications for abandonment approval and reclamation certification may occur simultaneously and can be coordinated between the Energy Resources Conservation Board and the agency responsible for certification (see Table 1). This would involve coordination of information requirements and joint inspections. In other instances, the two processes may not be linked. Even in these instances there would be communication between the Energy Resources Conservation Board and the agency responsible for certification to ensure a coordinated approach.

3. INFORMATION REQUIREMENTS

The information requirements for a reclamation certificate application are outlined in the Conservation and Reclamation Regulation[1]:

1. A map, with references to legal boundaries, showing the land for which the certificate is being requested and the status of adjacent land.

2. Documentation of the characteristics and properties of the reclaimed land including topography, drainage, soils, vegetation, and land capability.

3. Documentation of conservation and reclamation procedures.

4. Documentation of the history of surface disturbance.

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[1] Section 14.

5. Documentation of any surface improvements to be left on the reclaimed land and acceptance of the improvements by the landowner or occupant.

6. Documentation of compliance with any terms and conditions of any approval in effect for the site.

7. The name, address and telephone number of any landowners or occupants.

8. Documentation of any surface lease or right of entry order for the site.

9. A declaration of any substances that may cause, are causing, or have caused a significant adverse effect that are present on the site.

10. Any additional information requested by the Director.

Appendix 1 provides the ***Information Letter on Reclamation Criteria for Wellsites (Alberta Land Conservation and Reclamation Council, IL 93-2, 1993)***. Reclamation certificate application forms for well sites can be obtained from the Conservation and Reclamation Inspectors.

4. RECLAMATION CRITERIA

The fundamental principle of these criteria is that any changes caused by project activities should be measured against the original or representative site conditions. In most cases, the land, soil and vegetation adjacent to your site will be used as a comparison. However, in special cases, you may have to find representative land, soil and vegetation a short distance from your site; your reasons for doing this must be explained to the Land Reclamation Division and to the Conservation and Reclamation Inspectors at the inquiry.

The document is divided into two sections:

- Level I - certification criteria; and
- Level II - problem identification and characterization.

The certification criteria describe the allowable changes in site conditions that will still maintain equivalent capability.

Drilling wastes and other oilfield wastes must be properly disposed of according to Energy Resources Conservation Board Guide G-50 (Drilling Waste Management), Informational Letter IL 93-6 (Drilling Waste Management, Hydrocarbon/Salt Disposal Plan Content and Data Base Recording) and Informational Letter IL 93-8 (Recommended Oilfield Waste Management Practices). All contamination must be treated prior to certification. Specific criteria for the assessment and remediation of contaminants (e.g., metals, sterilants, organic chemicals) will be provided by Alberta Environmental Protection.

The certification criteria apply to wellsite leases, access roads, and off-site borrow pits, sumps, and campsites. They do not apply to facilities that are left in place (e.g., roads, pads, dugouts, etc.) with the landowners approval.

When the Conservation and Reclamation Inspectors inspect your site for certification they will be confirming the information you supplied. ***If problems are noted, subsequent requests for site inspections will receive lower priority than first time requests, therefore it is to your advantage to ensure that a site is ready for certification before submitting an application.***

These criteria combine Land Reclamation Division field experience and published documents. The latter include ***Soil Quality Criteria Relative to Disturbance and Reclamation (Alberta Agriculture, 1987)***, ***Land Capability Classification For Arable Agriculture in Alberta (Alberta Agriculture, 1987)***, reports from the Alberta Soils Advisory Committee and the Reclamation Research Technical Advisory Committee, existing government handbooks and guidelines, and textbooks.

4.1 Level I - Certification Criteria

Level I criteria will be used to judge reclamation success and grant the reclamation certificate. You must supply information relative to the criteria on the Wellsite Reclamation Certificate Application form (Appendix 1). In Level I, field assessments are used, rather than laboratory data; however, you should undertake sampling and laboratory analyses when problems are apparent, or when spills have occurred or sterilants have been used.

4.1.1 Landscape

Landscape criteria will be assessed by comparing the site with the pre-disturbance conditions or adjacent land. Differences between the site and the adjacent land must not interfere with normal land use.

DRAINAGE

- Site drainage should be consistent with the original patterns, direction and capacity or compatible with the surrounding landscape.

EROSION

- No more erosion gullies or blowouts than on adjacent land are allowed.

CONTOUR

- Contour and roughness must conform and blend with adjacent contours.
- Older, well-vegetated and stabilized sites may be exempt from this requirement. Authorization from the Land Reclamation Division or Conservation and Reclamation Inspector must be obtained.

STABILITY

- No visible evidence of slope movement, slumping, subsidence, or tension cracks is allowed.

COARSE FRAGMENTS (Gravel, stone, rock)

- Private Land
  - ≤ 10 cm in diameter - An increase of 10% in surface cover is allowed (for example, if the control has 5% cover your site may have up to 15% cover).
  - > 10 cm in diameter - No increase (0%) in surface cover is allowed.
- Public Land
  - An increase of 10% in surface cover is allowed.

DEBRIS

- No industrial or domestic debris is allowed.
- No woody debris (roots, slash) is allowed unless previously authorized by the Land Reclamation Division or Conservation and Reclamation Inspector.

4.1.2 Topsoil/Surface Soil

For private land and cultivated public land, "topsoil" is defined as all "A" horizon (Ah, Ahe, Ae, and Ap) material within the soil profile. Ae or AB horizons will have to be salvaged with the topsoil or separately salvaged (as a second lift). When the Ae or AB horizons are salvaged with the topsoil, the control for the quality comparison must be a mix of the topsoil and the Ae or AB horizons.

Organic soils and soil layers will also be salvaged and replaced. Shallow organic layers ($\leq$15 cm; L-F-H layers) will be mixed with the topsoil. Deeper organic layers will be assessed to a maximum depth of 40 cm.

Quantity and quality of replaced topsoil will be assessed on a 20 m x 20 m grid, inset 5 m from the lease boundaries (approximately 25 locations per hectare) on the disturbed area. The individual assessment points must be representative of the 20 m x 20 m block they are in. On access roads, one paired location (an on-road sample and off-road control) must be assessed every 30 m. Highly diverse landscapes will require more assessment locations.

For non-cultivated public land, "surface soil" will be defined as a specific depth of soil to be salvaged and replaced. Depth of replaced surface soil will be assessed on a 20 m x 20 m grid, inset 5 m from the lease boundaries (approximately 25 locations per hectare) on the disturbed area. The individual assessment points must be representative of the 20 m x 20 m block they are in. On access roads, one paired location must be assessed every 250 m. Highly diverse landscapes will require more assessment locations.

The topsoil/surface soil depth criteria take into account the various legislated soil salvage and replacement requirements that have been in effect at different times. In some cases, you may have salvaged topsoil/surface soil when you were not required to; you are encouraged to replace these materials over your site.

A minimum of four control sites (one on each side of the disturbed area) must be assessed to provide comparisons for the disturbed area; more control sites will provide a better assessment of the natural variability in the undisturbed soils. On access roads, control sites (off the road) will be assessed at the same locations as the access road is assessed. Where control site characteristics vary significantly, you should not use the average values for your comparisons; rather, you should use each control to represent a portion of the site or access road.

TOPSOIL/ SURFACE SOIL QUANTITY

Private Land and Cultivated Public Land

- Average replaced topsoil depth must be:
  - 90% of control for sites constructed in 1993 or later.
  - 80% of control for sites constructed from 1983 to 1992.
  - 70% of control for sites in CLI[1] Class 1 to 4 lands constructed prior to 1983.
  - 50% of control for CLI[1] Class 5 and 6 lands constructed prior to 1983.

[1] CLI refers to the Canada Land Inventory and, in this case, focuses only on the soil capability. If does not include the climate or landscape limitations.

- 90% of the assessment sample sites must be ≥80% of the average replaced depth on the site.
- 100% of the assessment sample sites must be ≥50% of the average replaced depth on the site.
- No assessment sample site with less than 80% of the average replaced depth may be adjacent to another assessment sample site with less than 80% of the average replaced depth.

Non-cultivated Public Land

- Average replaced surface soil depth must be ≥70% of the depth stated in the disposition or the depth specified in writing by the Land Reclamation Division or Conservation and Reclamation Inspector.

TOPSOIL QUALITY

Private Land and Cultivated Public Land

- When compared side by side with representative control samples from similar depths under similar light and moisture conditions, the assessment point samples must be in the same class as the controls as defined below. Improvements in the soil quality class are acceptable.
  - % admixing of subsoil (no more than 20% more subsoil in the assessment point sample than in the control). Note: drilling wastes are generally not acceptable in topsoil because soil quality problems have been identified in the past and because we do not have a good understanding of the long term effects on soil quality. However, some waste types in some soil types may be appropriate provided the waste plus subsoil meets the admixing criteria and all the other topsoil quality criteria.
  - texture (classes - see Figure 1).
  - aggregate size (classes - <2 cm; 2 cm to 5 cm; >5 cm to 10 cm). Note: no aggregates greater than 10 cm are allowed unless similar size aggregates are present in the control soil. No pulverised soil is allowed.
  - aggregate strength (classes - friable, firm, hard).
  - layering (classes - no difference in extent; evident difference in extent; obvious difference in extent).

- Each of the parameters is assessed at each assessment point. The assessment point passes only when all the criteria are met. The site passes only when all the assessment points pass.
- When most or all of the topsoil depth is made up through the use of amendments, the topsoil quality criteria may be waived. All amendments must be approved by the Land Reclamation Division or Conservation and Reclamation Inspector.

SALINITY

- No increase in visible salts is allowed.

COARSE FRAGMENTS (gravel, stones, rocks)

- Private Land
  - ≤10 cm in diameter - An increase of 10% (by volume) is allowed.
  - >10 cm in diameter - No increase (0%) is allowed.
- Public Land - An increase of 10% (by volume) is allowed.

COMPACTNESS

- Use a shovel, screwdriver, or penetrometer to assess compactness.
- Maintain or improve the quality of the following ratings:
  - Non-compacted - penetrates easily.
  - Moderately compacted - penetrates with moderate effort.
  - Very compacted - penetrates with difficulty.

4.1.3 Subsoil

Subsoil will be evaluated at a minimum of five locations to a depth of 70 cm from the soil surface. On the lease, the locations must include excavated or intensively used areas such as the sump, well centre, flare pit, access road entry point, and tank area, if present. On the access road, randomly select five of the topsoil assessment locations. Subsoil samples will be compared to control samples from the same depth.

SALINITY

- No increase in visible salts is allowed.

COARSE FRAGMENTS (gravel, stones, rocks)

- An increase of 10% (by volume) is allowed on both private and public land.

COMPACTNESS

- Use a shovel, screwdriver, or penetrometer to assess compactness.
- Maintain or improve the quality of the following ratings:
  - Non-compacted - penetrates easily.
  - Moderately compacted - penetrates with moderate effort.
  - Very compacted - penetrates with difficulty.

4.1.4 Vegetation

Private land sites will not be certified without vegetation unless you provide detailed soil physical and chemistry data (Level II assessment) or vegetation performance information from previous years. Public land sites will not be certified without vegetation. In the case of producing wellsites where sterilants have been used, or where spills (e.g., hydrocarbon, salt) have occurred, vegetation which meets the criteria below must be present at the time of certification. Contact the Land Reclamation Division or Conservation and Reclamation Inspector to determine how long vegetation must grow on the site before you can apply for a certificate.

Reclaimed sites should not require any additional or special management in comparison to adjacent or representative lands to be sustainable or to provide similar crop yields.

SPECIES COMPOSITION

- Revegetation species and species composition should be compatible with original or adjacent vegetation.

VIGOUR

- Plant vigour should be similar to original or adjacent vegetation.

HEIGHT and DENSITY

- Height and density should be $\geq 80\%$ of adjacent growth based on a visual assessment. Assess height and density when the crop/vegetation on the site is the same as that surrounding the site. When the crops/vegetation are different, use vigour only.

COVER

- Where the adjacent vegetation is similar, $\geq 80\%$ of adjacent ground cover based on a visual assessment. Note: for erosion control purposes, there must be a minimum of 40% ground cover on the site.
- Where there is no adjacent vegetation or the adjacent vegetation is different, $\geq 80\%$ ground cover based on a visual assessment unless otherwise authorized by the Land Reclamation Division in writing.
- Litter can be included in the ground cover assessment.
- The required cover must be evenly distributed on the site.
- The cover criterion does not apply to annual crops. Density is a better measure.

ROOTING

- There should be no obvious rooting restrictions (e.g., reduced root length, root mats, compressed roots, roots along the cracks only, no roots) in topsoil or subsoil.

BARE AREAS

- The frequency and extent of bare areas should not be greater than original or adjacent vegetation.

4.2 Level II - Problem Identification and Characterization

Level II will be used to help identify and characterize problem areas that require further reclamation prior to application for certification. ***These characteristics will not be used to determine certification;*** however, if a problem is identified, the Land Reclamation Division or Conservation and Reclamation Inspector may require you to evaluate any or all of these characteristics. ***You may also be required to provide data for the landscape, soil or vegetation criteria in Level I or any other environmental factors.***

4.2.1 Landscape

SLOPES

- Final slope gradients must not exceed the original slope gradients by more than 20%.

EROSION

- The rate of erosion on the site must not exceed the off-site rate.

4.2.2 Soil

In the Level II assessment, the subsoil must be evaluated to a minimum depth of 100 cm from the soil surface. More sampling locations may be required for both topsoil (surface soil) and for subsoil.

ORGANIC MATTER

- Organic matter content (in percent) must be at least 80% of the control value.

CHEMISTRY

- Soil Ph, salinity and sodicity must be consistent with original or representative land. There should be no negative change in rating (Good, Fair, Poor, Unsuitable).

White Area

	GOOD	FAIR	POOR	UNSUITABLE
ph	6.5 to 7.5	5.5 to 6.4 or 7.6 to 8.4	4.5 to 5.4 or 8.5 to 9.0	<4.5 or >9.0
Salinity (EC Ds/m)	**Topsoil** <2 **Subsoil** <3	2 to 4 3 to 5	4 to 8 5 to 10	>8 >10
Sodicity (SAR)	<4	4 to 8	8 to 12	>12

Green Area

	GOOD	FAIR	POOR	UNSUITABLE
ph	5.0 to 6.5	4.0 to 5.0 or 6.5 to 7.5	3.5 to 4.0 or 7.5 to 9.0	<3.5 or >9.0
Salinity (EC Ds/m)	**0 to 30 cm** <2 **30 to 70 cm** <3	2 to 4 3 to 5	4 to 8 5 to 8>8 >8	
Sodicity (SAR)	<4	4 to 8	8 to 12	>12

TEXTURE and STRUCTURE

- The quality should be maintained or improved in the following categories:

Topsoil/Surface Soil	GOOD	FAIR	POOR
• Texture	FSL, VFSL, L, SiL, SL	CL, SCL, SiCL	S, LS, SiC, C, HC
• Soil Aggregate Size	<2 cm diameter	2 to 5 cm diameter	>5 to 10 cm diameter
• Soil Aggregate Structure	Granular or fine blocky	Powdery or medium blocky	Massive or large clods present
• Soil Aggregate Strength (as measured by consistence) (m=moist; d=dry)	Friable	Loose, firm (m) or hard (d)	Very firm (m), or very hard to rigid (d)

Subsoil	GOOD	FAIR	POOR	UNSUITABLE
• Texture	FSL, VFSL, L, SiL, SL	CL, SCL, SiCL	S, LS, SiC, C, HC	
• Soil Aggregate Size (diameter)	<2 cm	2 to <10 cm	10 to 30 cm	>30 cm
• Soil Aggregate Structure	Granular or fine blocky	Blocky	Large blocky	Massive or bedded
• Soil Aggregate Strength (as measured by consistence) (m=moist; d=dry)	Friable	Slightly firm (m) or hard (d)	Very firm (m) or very hard (d)	Extremely hard or rigid (d)

4.2.3 Vegetation

Quantitative assessment of Level I criteria may be required. Methods for the assessment will be provided by the Land Reclamation Division.