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Coal Development

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Abbreviations

AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
CCA	*Coal Conservation Act*
CCR	*Coal Conservation Rules*
DDS	Digital Data Submission
EPEA	*Environmental Protection and Enhancement Act*
MFSP	Mine Financial Security Program
PLA	*Public Lands Act*
PLAR	*Public Lands Administration Regulation*
REDA	*Responsible Energy Development Act*
SEJR	*Specified Enactment Jurisdiction Regulation*
WA	*Water Act*

1 Introduction

This manual provides guidance on the submission requirements, application process, and evaluation criteria for development of coal resources in Alberta, which includes construction, operation, and closure of mines, coal processing plants, and in situ coal schemes.

When an applicant files an application with the AER, it must adhere to the appropriate requirements for coal developments as described in the *Responsible Energy Development Act* (*REDA*), *Coal Conservation Act* (*CCA*), the *Environmental Protection and Enhancement Act* (*EPEA*), the *Public Lands Act* (*PLA*), the *Water Act* (*WA*), the *Mines and Minerals Act*, the *Occupational Health and Safety Act*, and other applicable legislation.

Each piece of legislation uses different terminology. Throughout this manual you will see the terms "permit," "licence," "approval," and "disposition" used in different contexts, depending on the controlling legislation. The terms are essentially synonymous, though, indicating permission from the AER to do certain things.

We can only describe in detail our own responsibilities and processes. Where there are touch points with other agencies, we will point the reader in the right direction, but we cannot speak to those agencies' processes. Duty holders (an umbrella term that includes operators, permittees, licensees, approval holders, and applicants) are expected to be familiar with all provincial and federal legislation related to coal development. If a situation arises that is not covered in this manual, contact us for further direction.

1.1 How to Use

The manual has two primary divisions: (1) applications and (2) compliance and reporting.

The applications section is the lengthiest. It first presents general information relevant to most application types and then goes into detail about the specific applications we process. Those applications are grouped into three categories: exploration, operation, and closure.

The compliance and reporting section is also divided into three sections: compliance, operational reporting, and incident reporting.

Additionally, appendix 1 is the AER's Underground Mine Abandonment General Design Guidelines.

1.2 Legislative Overview

The aspects of coal development in Alberta that are managed by the AER are controlled by the following pieces of legislation. Brief descriptions of each, including key terms, are defined below. Links to these and all the other legislation under which the AER operates can be found on our website, Regulating Development > Rules and Directives > Acts, Regulations, and Rules.

1.2.1 *Responsible Energy Development Act*

This act established the AER, and it and its associated rules and regulations define our mandate, how we interoperate with other government agencies, and how we are expected to do our work. Basic requirements such as public notice requirements and hearing processes are defined in these documents.

1.2.2 *Coal Conservation Act* and *Rules*

Applications under the *CCA* and *CCR* are divided into the following four types:

- **Coal routine –** for proposed changes to approved activities. These changes are not expected to adversely and materially affect resource conservation, the environment, socioeconomic conditions, or rights of stakeholders assessed in the original application.
- **Coal operational –** for proposed changes to approved activities that may affect resource conservation or involve significant modifications. However, these changes are not expected to affect the rights of stakeholders or alter the environment and socioeconomic conditions assessed in the original application.
- **Coal nonroutine –** for new activities or amendments to approved activities. These activities may adversely and materially affect resource conservation, the environment, socioeconomic conditions, or rights of stakeholders assessed in the original application.
- **Coal pilot/experimental –** for nonroutine activities and can be for new activities or amendments to existing activities.

The AER may consider technical changes requested as a notification/waiver when the changes do not adversely or materially change resource conservation, the environment, socioeconomic conditions, or the rights of stakeholders assessed within the original approval.

More information on *CCA* application types and the target timelines can be found on our website, Regulating Development > Project Application > Application Processes > Coal Mining Authorizations.

Dispositions issued under the *CCA* are called permits, approvals, or licences depending on the type of facility or activity.

- **Coal permits:** issued to
  - explore for coal, or obtain coal for experimental purposes, at greater than 150 metres (m) in true vertical depth;
  - develop a bulk sample pit or other excavation to explore for coal or to obtain coal for experimental purposes; or
  - develop, operate, suspend, and abandon a mine site.

- **Coal approvals**: issued to develop, operate, suspend, and abandon a coal processing plant or in situ coal scheme.
- **Coal licences:** issued to develop, operate, suspend, and abandon a surface mine, underground mine, or external discard dump.

If you need to make corrections to a permission granted under this act, you must follow the voluntary self-disclosure process (see section 3.1).

1.2.3 *Environmental Protection and Enhancement Act*

EPEA is the primary act in Alberta through which regulatory requirements for air, water, land, and biodiversity are managed. The act supports and promotes the protection, enhancement, and wise use of the environment by designating proposed activities for which an approval or registration is required.

Under *EPEA*, the AER issues approvals and reclamation certificates and reviews environmental impact assessments.

- The environmental impact assessment process allows the AER to examine the effects that a proposed project may have on the environment and determine if the project is in the public interest (see section 2.1.3).
- An approval issued under *EPEA* identifies the applicant's obligations and responsibilities for design, construction, operation, and reclamation of a coal mine or coal processing plant relative to air, water, land, and biodiversity (see section 2.3.7).
- A reclamation certificate issued under *EPEA* asserts that all reclamation requirements have been met. Only companies with a reclamation certificate can close their projects and end their surface leases. Partial reclamation certificates can be issued for portions of a coal mine or coal processing plant to support progressive, timely reclamation (see section 2.4.1).

1.2.4 *Public Lands Act*

The *PLA* and the *Public Lands Administration Regulation* (*PLAR*) are provincial legislation that ensure that industrial development on public land is done in a way that is safe and orderly and protects the land for future generations.

Under the *PLA*, the AER issues dispositions authorizing the use of public land. The types of formal dispositions associated with coal development include the following:

- Mineral surface lease (MSL) for the mine site or a mine corridor (i.e., haul access road, conveyor, powerline, etc.)
- Licence of occupation (LOC) for access roads, diversion structures, outfalls, intakes, and ponds
- Miscellaneous lease (MLL) for storage sites

Purposes and activity types dictate the kind of disposition that is required; these are outlined in *Public Lands Administration Regulation (PLAR) Table A2: Alberta Energy Regulator (AER)* and in the *PLAR Approvals and Authorizations Administrative Procedures*.

A coal exploration program (CEP) is required for exploration activities on public land; private land exploration requires the consent of the landowner and notification under the *Code of Practice for Exploration Operations*. Section 2.1 of *Manual 008* details the requirements as it relates to public lands (scenarios on and off leased land) and on private lands.

1.2.5 *Water Act*

The *Water Act* is provincial legislation that supports and promotes the conservation and management of water in Alberta. Under the *Water Act*, the AER reviews applications and submissions related to the development of energy resources. The AER ensures that companies use and manage water safely by

- reviewing energy resource applications that relate to the *Water Act*;
- issuing water approvals for energy resource activities that occur in or near water bodies, including wetlands;
- issuing water licences and temporary diversion licences for energy resource operations that require water;
- requiring companies to have a licence before using surface water and groundwater; and
- allocating the amount of water companies can use.

2 Applications

The text has been organized to mirror, to a degree, the structure of the following two process-flow diagrams, which summarize the application and closure processes as they relate to coal development in Alberta.

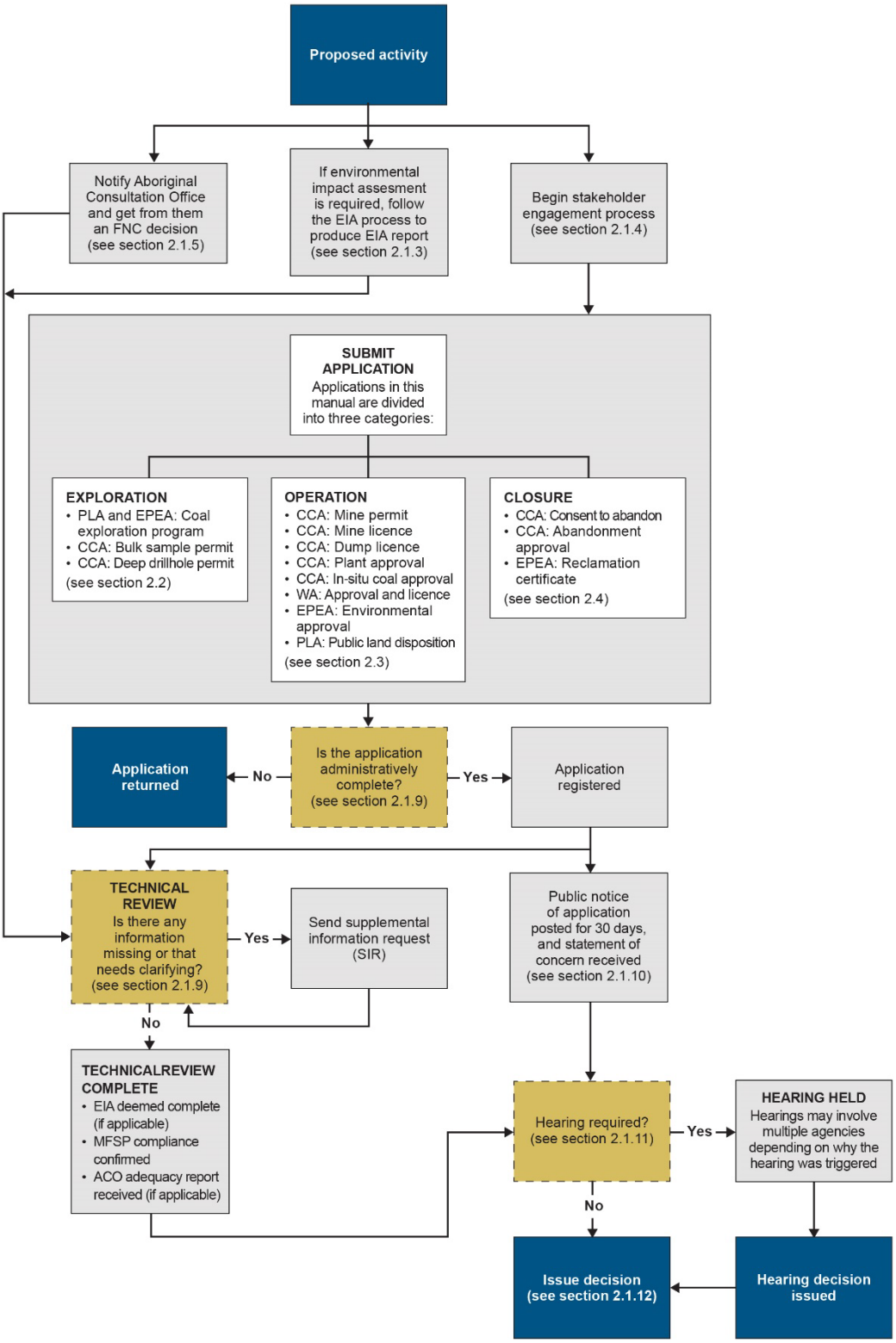

Figure 1. Regulatory process overview – coal development application

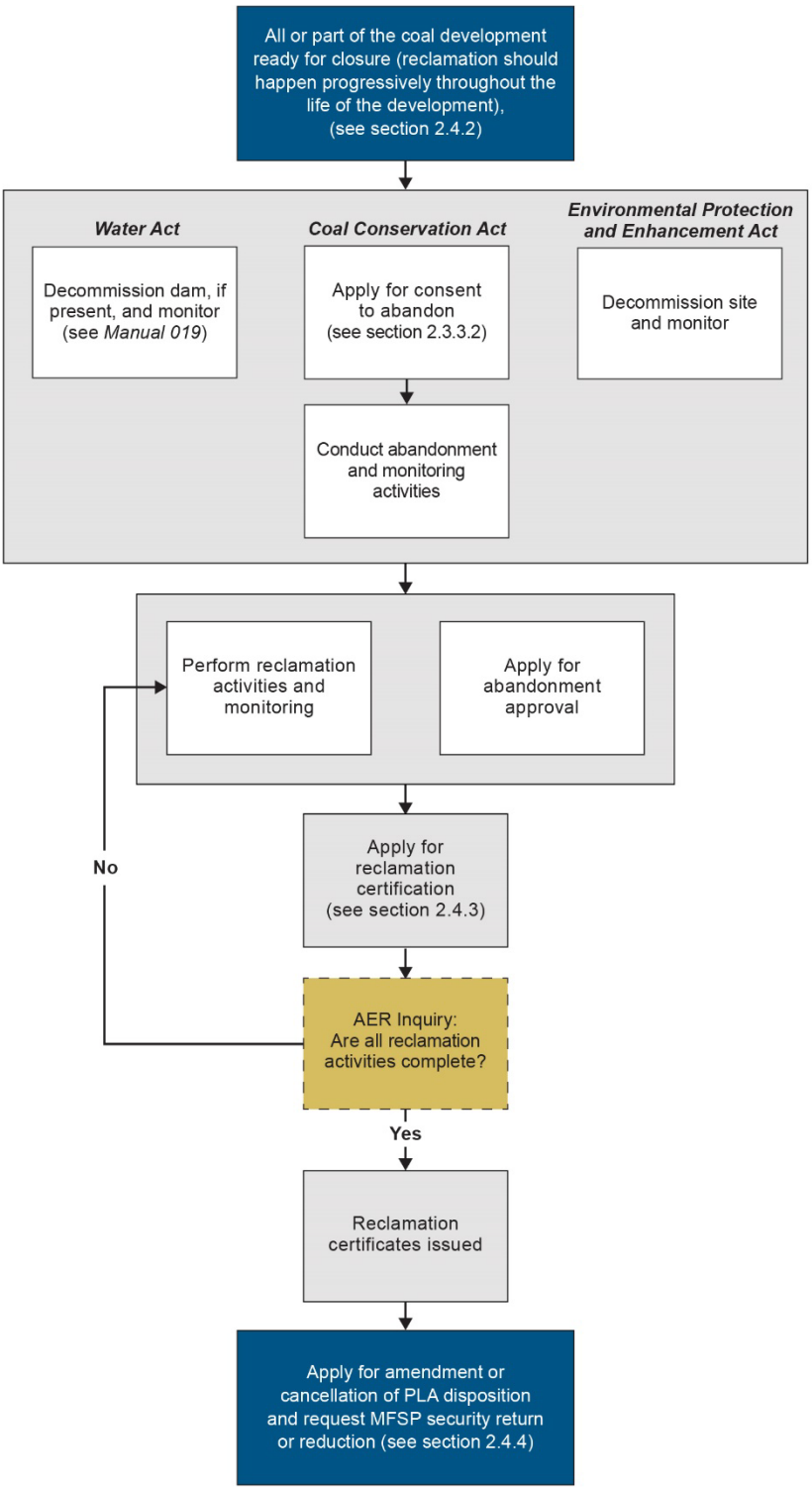

Figure 2. Regulatory process overview – coal closure

2.1 General Information

2.1.1 Applicant Responsibilities

An applicant is responsible for all aspects of application development, including planning the coal development, planning and conducting stakeholder involvement, retaining supporting documents, and submitting the application. Once an application is approved by the AER, the company becomes a duty holder and bears responsibility for the construction, installation, and safe operation of the coal development. They are also responsible for decommissioning, dismantling, abandonment, and reclamation.

- An applicant must obtain for itself, and ensure that all consultants have, a valid business associate (BA) code from Petrinex (referred to as an "identification code" in section 21(1) of the *Oil and Gas Conservation Act*).
- An applicant must obtain licensee eligibility under *Directive 067: Eligibility Requirements for Acquiring and Holding Energy Licences and Approvals.*
- An applicant is expected to retain all documentation relative to the application, including
  - approvals from other parties,
  - documentation related to the stakeholder involvement program, and
  - retain copies of all design work and other supporting documentation for the application.
- An applicant must obtain the appropriate AER dispositions before starting any site preparation, construction, or operation, with the exception of surveying (with restrictions; contact Alberta Energy for more information).
- The duty holder is responsible for any outcomes of actions conducted on its behalf by contracted personnel.
- The duty holder is expected to maintain an ongoing dialogue with members of the stakeholder involvement program during the life of the project.
- The applicant is expected to attempt to address concerns and objections and answer questions throughout the life of a project.
- All applicants should engage with the following agencies:
  - Alberta Environment and Parks (AEP)
  - Alberta Energy
  - Occupational Health and Safety

- Depending on the project, consider reaching out to the following agencies as well:
  - municipal authorities
  - Alberta Transportation
  - Alberta Community Development
  - Transport Canada
  - Alberta Utilities Commission
  - Fisheries and Oceans Canada
  - Impact Assessment Agency of Canada
  - Alberta Agriculture and Forestry
  - Alberta Culture, Multiculturalism and Status of Women
  - Natural Resources Canada

2.1.2 Preapplication Meeting

There are many factors to consider before filing a coal exploration or development permit, licence, approval, or scheme application. Applicants are encouraged to initiate preapplication discussions with AER staff. Discussion points may include the acquisition of a BA code and mineral and coal rights, other agency approval requirements, issues around land titles and occupancy rights, and any known concerns or objections to the project.

2.1.3 Environmental Impact Assessment

Environmental assessment is required when the complexity and scale of a proposed project, technology, resource allocation, or siting considerations create uncertainty about the exact nature of environmental effects or result in a potential for significant adverse environmental effects.

The environmental assessment process allows companies and government decision makers to examine the effects that a proposed project may have on the environment. The information gathered during the process helps the appropriate decision maker determine if the project is in the public interest.

As of October 1, 2014, the Alberta Energy Regulator is responsible for reviewing environmental assessments related to coal development in the province.

In order to determine the requirements for a specific environmental assessment, proponents must review the *Environmental Assessment (Mandatory and Exempted Activities) Regulation* and prepare and submit to the AER a project summary table and a project location map. Refer to the environmental assessment process map for details.

If an environmental impact assessment report is required, the proponent must prepare and submit it in accordance with the provisions of Division 1 of Part 2 of *EPEA*.

Alberta's Environmental Assessment website has comprehensive information on proposed activities that are subject to the environmental assessment process on proposed coal activities.

Information on our environmental assessment process can be found at our website, Protecting What Matters > Protecting the Environment > Environmental Assessments.

2.1.4 Stakeholder Involvement

An applicant expected to carry out a stakeholder involvement program to inform parties about the proposed coal project and to make good faith efforts to address and resolve concerns raised about the proposed project. The extent of stakeholder involvement efforts required by an applicant will depend on the nature, size, and scope of the project. Guidance on how to plan, develop, implement, and document a stakeholder involvement program can be found in *Directive 056: Energy Development Applications and Schedules* and *Directive 023: Oil Sands Project Applications*.

2.1.5 Aboriginal Consultation

The proponent should contact the Government of Alberta's Aboriginal Consultation Office (ACO) early in the process to determine whether aboriginal consultation is required. The AER will need a "file number for consultation" in order to register the application, and we will need an adequacy decision report before we can decide on the application.

For further information on indigenous engagement and aboriginal consultations, refer to our website, Protecting What Matters > Giving Albertans a Voice > Indigenous Engagement > Aboriginal Consultations.

2.1.6 General Guidance on Document Formatting

When submitting application materials, consider the following as best practices:

- All maps and figures should contain north arrows, annotated NAD83/UTM coordinate systems, annotated contour lines, and legends and be scalable.
- Figures depicting proposed approval boundaries or reclamation certificate boundaries should include the Alberta Township Survey System legal land description.
- Plan view and cross-section figures should encompass lands extending a minimum of 100 m beyond the proposed disturbance area.
- Cross-sections should contain representations of original ground, approved design, proposed design, and as-built surfaces.

- Cross-sections should contain both vertical and horizontal scales, as well as an accompanying plan view that depicts the cross-section locations.
- Cross-sections should include dimensions of all displayed infrastructure.
- Figures depicting drillholes must contain drillhole annotation as per section 2 of the *CCR*.
- Electronic files should be submitted in unlocked PDF file format.
- All underground mine layout figures must (as per section 749 of the *Occupational Health and Safety Code*) include the annotated contour lines depicting
  - complete depth of cover, including representation of the 50 m depth of cover, and
  - the 100 m horizontal buffer off the seam outcrop or subcrop (surface contact).

2.1.7 Submitting an Application

Applicants can submit coal applications via email as applicable:

CCA: coal.applications@aer.ca

EPEA: EPEA.WA.Applications@aer.ca

WA: EPEA.WA.Applications@aer.ca and http://www1.aer.ca/onestop/

Reclamation certificate applications: EPEA.Rec.Cert.Applications@aer.ca

PLA: AER.SurfaceActivityApplication@aer.ca and http://www1.aer.ca/onestop/

Alternatively, applicants can submit coal development applications to the following physical address:

Alberta Energy Regulator
Regulatory Applications
Suite 1000, 250 – 5th Street SW
Calgary, Alberta T2P 0R4

An applicant may bundle multiple related applications under the *CCA*, *EPEA*, the *WA*, and the *PLA* together as a project application. A project is defined as a combination of coal developments (e.g., a mine site and coal processing plant) that are interrelated and share a common area. For example, a project application may consist of a single permit application or of multiple licence applications for related mines and dumps.

2.1.8 Checking the Status of an Application

An applicant can review the status of applications submitted as or bundled with a *CCA* application in the Integrated Application Registry (IAR), accessible through the System & Tools Portal on the AER website. For all other application types please contact the AER.

2.1.9 Administrative and Technical Review

Before an application is registered, it is reviewed for "administrative completeness." This ensures that all the parts required by the applicable legislation, rules, and AER directives are present to register the application and conduct a technical review. If an application is determined incomplete, the AER advises the applicant in writing of the reason and the review processes are terminated. To reapply, the applicant is expected to submit a new, complete application after having met all applicable requirements. Once the application is complete, it is registered. Once registered, we begin our technical review of the risks associated with the proposed activity. Any variance must be justified, and alternative measures must be outlined to mitigate the associated risks. Schedules and attachments (including survey plans, process-flow diagrams, maps, detailed technical information and consultant reports) are reviewed for consistency and adherence to requirements. If we have any questions or need additional information, we will reach out to the applicant through a process called a supplemental information request. Failure to include required information or failure to respond to an information request within the specified timeframe will result in the application being closed and returned.

2.1.10 Public Notice and Statements of Concern

Once registered, an application is posted publicly, and statements of concern are solicited for a period of at least 30 days. Statements of concern are also sent to the applicant, who is expected to work with statement filers to resolve their concerns.

For more information on the statement of concern process, including the AER's alternative dispute resolution process, visit our website, Protecting What Matters > Giving Albertans a Voice > Statement of Concern.

2.1.11 Hearings

The decision whether to hold a public hearing is based on a number of criteria, the primary one being whether there are unresolved statements of concern from parties determined to be directly and adversely affected by the development.

For more information on the hearing process, visit our website, Regulating Development > Project Applications > Hearings.

2.1.12 Publish Decision

Applications are ultimately decided in one of the following ways:

- issuance of a permit, licence, or an approval (possibly with conditions);
- denial of a permit, licence, or approval;

- closure of the application (e.g., the application is incomplete); or
- withdrawal of the application by the applicant.

2.2 Exploration

2.2.1 Coal Exploration Programs

A coal exploration program is required for exploration activities on public land; private land exploration requires the consent of the landowner and notification under the *Code of Practice for Exploration Operations*. Section 2.1 of *Manual 008* details the requirements as it relates to public lands (scenarios on and off leased land) and on private lands.

Table 1. Summary of applications required for exploration on public land

	Public lands	
Applicable legislation	**Outside of approved MSL**	**Inside approved MSL**
PLA and *Environmental Protection and Enhancement Act*	Application under section 20 of the *PLA* and notification under the *Code of Practice for Exploration Operations*	Notification is required under section 3.1 of the *Code of Practice for Exploration Operations*
Energy resource enactments	Permit may be required in accordance with the *CCA*	Permit may be required in accordance with the *CCA*

Table 2. Summary of applications required for exploration on private land

	Private lands	
Legislative requirements	**Outside of approved MSL**	**Inside approved MSL**
Environmental Protection and Enhancement Act	Notification is required under section 3.1 of the *Code of Practice for Exploration Operations*	Notification is required under section 3.1 of the *Code of Practice for Exploration Operations*
Energy resource enactments	Permit may be required in accordance with the *Coal Conservation Act*	Permit may be required in accordance with the *CCA*

In addition to the *Manual 008* exploration application process, additional requirements can be found in the documents listed below:

- *Public Lands Act*
- *Alberta Energy Information Letter 2020-23: Rescission of A Coal Development Policy for Alberta and new leasing rules for Crown coal leases*
- *Coal Conservation Act*
- *Coal Conservation Rules*
- *Code of Practice for Exploration Operations under Environmental Protection and Enhancement Act*
- *Water Act*

Abandonment and reclamation should be ongoing and concurrent with operations to ensure that the term of the exploration program is adhered to and the condition of the lands are satisfactory. In addition to the requirement references above, the AEP directive *Coal and Oil Sands Exploration Reclamation Requirements* apply.

2.2.2 Deep Drillhole Permit Applications

As per section 2 of the *CCR*, this is an application for deep drillhole permit application may be for

- a single or multiple drillhole greater than 150 m in true vertical depth to explore for coal or to obtain coal for experimental purposes; or
- drillholes greater than 150 m in true vertical depth to explore for coal or to obtain coal for experimental purpose in a defined geographic area with a defined maximum depth.

The application requirements for a defined geographic area-based deep drillhole permit vary slightly from a non-area-based deep drillhole permit. The requirements and restrictions for deep drillhole permits are described in the *CCR* Parts 1 and 5.

Only area-based deep drillhole permits may be amended and only for changes in the permit area.

All deep drillhole permits are conditional upon an associated coal exploration program approval. (See section 2.2.1).

The abandonment of drillholes is described in section 21 of the *CCR*.

2.2.2.1 Area Based

An application for an area-based deep drillhole permit for a defined geographic area that can be issued within a mine permit area.

The applicant must

- specify an area for the drilling program and a maximum drillhole depth;
- submit maps or plans showing the boundary of the mine permit area and authority boundaries granted under the *PLA*;
- provide a geological map and related vertical cross-sections; and
- describe the formations to be completely or partially intersected.

2.2.3 Bulk Sample Permit Applications

A bulk sample permit can be issued to explore for coal or to obtain coal for experimental purposes. An AER-approved coal exploration program is required to obtain a bulk sampling permit (see section 2.2.1).

No amendments to bulk sample permits may be made.

The permit holder must complete all the excavation and reclamation for a bulk sample permit during the term specified.

2.3 Operation

2.3.1 Coal Mine Permit: All

An applicant must submit a coal permit application to develop, suspend, abandon, amend or resume mine site to the stage of commercial coal production as per the mine permit application requirements outlined in *CCR*, section 4.

2.3.1.1 Environmental Requirements

Environmental requirements related to mine permit applications are in section 4(1)(d) of the *CCR*. When submitting a mine permit application that is bundled with an *EPEA* application, section 4(1)(d) of the *CCR* is addressed by the *EPEA* application requirements (see section 2.3.7).

2.3.1.1 Resumption

If the applicant is applying to resume operations at a previously suspended or abandoned mine site, the applicant must submit the requirements outlined in sections 4(1), (2), and (3) and section 6 of the *CCR*.

2.3.2 Coal Mine Licence: Underground

An applicant must submit a coal licence application to develop, operate, suspend, abandon, amend, or resume operations at an underground mine.

The applicant is to provide the required technical details as per section 8 of the *CCR*.

The applicant must state any deletions, alterations, or additions to any plan, section, statement, or description submitted with the application for the mine permit that have resulted from the development program. Where there are extensive deletions, alterations, or additions, the revised plans, sections, statements, or descriptions must be included.

2.3.2.1 Amendments

The licensee must file an underground mine licence amendment application as per section 10 of the *CCR* when the underground mine licence is to be extended or otherwise modified.

2.3.2.2 Suspension

If a licensee chooses to suspend an underground mine licence, an application must be submitted to the AER for a change of status to the underground mine licence as per section 12(1) of the *CCR*.

2.3.2.3 Abandonment

An application is required under section 12(1) of the *CCR* to abandon an underground mine. For general design guidance, see appendix 1. Dam decommissioning, closure, and abandonment guidance is provided in *Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects*.

2.3.2.4 Resumption

To resume operations at a previously suspended or abandoned underground mine, the applicant must submit the requirements as per section 9 of the *CCR*.

2.3.3 Coal Mines Licence: Surface

An applicant must submit a coal licence application to develop, operate, suspend, abandon, amend, or resume operations at a surface mine.

The applicant is to provide the required technical details as per section 8 of the *CCR*.

The applicant must state any deletions, alterations, or additions to any plan, section, statement, or description submitted with the application for the mine permit that have resulted from the development program. Where there are extensive deletions, alterations, or additions, the revised plans, sections, statements, or descriptions must be included.

2.3.3.1 Amendments

The licensee must file a surface mine licence amendment application as per section 10 of the *CCR* when the surface mine licence is to be extended or otherwise modified.

Participant involvement requirements for licence amendment applications are based on the new licence area, if applicable.

The AER may consider technical changes requested as a notification/waiver when the changes do not adversely or materially change resource conservation, the environment, socioeconomic conditions, or the rights of stakeholders assessed within the original approval.

Examples of these acceptable change include the following:

- A temporary change to bench heights responding to local geotechnical factors
- Change to a temporary in-pit ramp
- Extracting a coal seam below the approved pit floor, provided geotechnical stability and closure plans will not be materially affected
- Change to mining sequence with no long-term effects

The process is as follows:

- The approval holder is expected to meet with AER staff to discuss the prospective changes from the approved plan.
- The approval holder must submit documentation outlining the prospective changes as per section 10 of the *CCR*.
- AER may either accept the information and allow the change or direct the approval holder to make an application.

2.3.3.2 Suspension and Abandonment

To suspend a surface mine licence, an application must be submitted to the AER as per section 12(2) of the *CCR*.

The abandonment processes are mapped out in figure 2. An application is required as per section 12(2) of the *CCR* to abandon a surface mine. For guidance on the submission requirements, application process, and evaluation criteria for coal mine pit wall abandonment under the *CCR*, see *Manual 017: Coal Mine Pit Wall Abandonment*. For guidance on dam decommissioning, closure, and abandonment, see *Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects*.

2.3.3.3 Resumption

If the applicant is applying to resume operations at a previously suspended or abandoned surface mine, the applicant must submit the requirements as per section 9 of the *CCR*.

2.3.4 Coal Mine Licence: External Discard Dump

An applicant must submit a coal licence application to construct an external discard dump if it meets one or more of the criteria found in section 8(4) of the *CCR*.

The applicant must provide the required technical details as per section 8(5) of the *CCR.*

The applicant must state any deletions, alterations, or additions to any plan, section, statement, or description submitted with the application for the mine permit that have resulted from the development program. Where there are extensive deletions, alterations, or additions, the revised plans, sections, statements, or descriptions must be included.

The abandonment processes are mapped out in figure 2. A licence application is required as per section 12(2) of the *CCR* to abandon a surface mine. For guidance on the submission requirements, application process, and evaluation criteria for coal mine pit wall abandonment under the *CCR*, see *Manual 017: Coal Mine Pit Wall Abandonment*.

2.3.5 In Situ Coal Scheme Applications

As per section 21.1 of the *CCR*, an applicant must submit an in situ coal scheme application to develop, operate, suspend, abandon, amend or resume operations at an in situ coal liquefaction or gasification scheme, including an experimental in situ coal liquefaction or gasification scheme.

Facilities, pipelines, or wells associated with an in situ coal scheme require licences in addition to an in situ coal scheme approval. These licences are to be obtained through the *Directive 056* process.

An applicant may submit any related facilities, pipelines, and well licence applications as a nonroutine project submission under *Directive 056*. This can be filed simultaneously with the in situ coal scheme approval application, if desired.

Before developing an in situ coal scheme, a person may choose to explore for coal. Coal exploration for in situ coal scheme purposes is different from that of coal exploration for coal mining purposes. An applicant must apply as per *Directive 056* for an evaluation well or to submit a well licence amendment.

An in situ coal scheme approval does not expire, unless otherwise indicated on the approval.

Confidentiality of information for an experimental in situ coal scheme will expire after an application-determined timeframe.

Licences for wells expire one year from the date issued if construction and operation has not yet started. After one year, the AER cancels the expired licence from the active records. For further information, refer to section 7.2 of *Directive 056*.

Licences for evaluation wells expire 30 days after drilling, as per the *Oil and Gas Conservation Rules*. An application to amend the evaluation well to an observation well may be made according to section 7.6 of *Directive 056.*

2.3.6 Coal Processing Plant

An applicant must submit a coal processing plant application to develop, operate, suspend, abandon, amend, or resume a coal processing plant as per sections 14, 15, 16, 17, and 19 of the *CCR*. In particular, submissions must include the following:

- A statement of its rights to the coal and use of the land surface and a legal description of the lands to which those rights apply.
- A general statement concerning marketing plans.

2.3.6.1 Exemptions

In certain circumstances, standalone screening and crushing installations are exempt from the definition of "coal processing plant." An applicant is expected to discuss such an application with the AER before applying (see section 3.1).

2.3.6.2 Amendments

The approval holder must file a coal processing plant approval amendment application as per section 16 of the *CCR* when the coal processing plant approval is to be rebuilt, re-equipped, or otherwise modified.

2.3.6.3 Suspension

A coal processing plant must be suspended if it will not be operated (meaning no coal will be processed in the plant) for more than three months. Suspensions must be applied for as per section 19 of the *CCR*.

2.3.6.4 Abandonment

The abandonment processes are mapped out in figure 2. An application is required as per section 19 of the *CCR*. For guidance on decommissioning, closure, and abandonment of dams see *Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects*.

2.3.6.5 Resumption

To resume operations at a previously suspended or abandoned coal processing plant, an application is required as per section 15 of the *CCR*.

2.3.7 *EPEA* Approval Applications

An EPEA approval is required to construct, operate, or reclaim a coal mine or a coal processing plant as per section 5(1) of the *Activities Designation Regulations*. *EPEA* approvals are for a new activity (construction and operation of a new coal mine or coal processing plant); renewal (in order to continue the activity in subsequent years); or an amendment (a change to the construction or operation of an operating coal mine or coal processing plant or the reclamation stage of the activity).

EPEA applications must be prepared in accordance with section 3(1) of the *Approvals and Registrations*

Procedure Regulation, the *Guide to Content for Energy Project Applications* (aer.ca > Regulating Development > Project Application > Application Legislation > Environmental Protection and Enhancement Act), and, if applicable, *EPEA* approval conditions (e.g., content requirements for amendments containing decommissioning plans and final land reclamation plans, etc.).

The Mine Financial Security Program (MFSP) is used by the Government of Alberta and the AER to strike a responsible balance between protecting Albertans from mining closure costs, and maximizing industry's opportunities for responsible and sustainable resource development. It is one of many liability management programs that ensure that Alberta's energy resources are developed responsibly.

MFSP compliance is required prior to the issuance of an *EPEA* approval for new developments or amendments that substantially alter the MFSP liabilities.

2.3.8 *PLA* Dispositions

Under the *PLA*, the AER issues dispositions authorizing the use of public land. The types of formal dispositions associated with coal development include the following, among others:

- Mineral surface lease (MSL) for the mine site or a mine corridor (i.e., haul access road, conveyor, powerline etc.)
- Licence of occupation (LOC) for access roads, diversion structures, outfalls, intakes, and ponds
- Miscellaneous lease (MLL) for storage sites

Purposes and activity types dictate the kind of disposition that is required; these are outlined in *Public Lands Administration Regulation (PLAR) Table A2: Alberta Energy Regulator (AER)* and in the *PLAR Approvals and Authorizations Administrative Procedures*.

The Government of Alberta document *Pre-Application Requirements for Formal Dispositions* sets expectations for the prospective applicant during the planning of the application on the following topics:

- existing land use (including obtaining consents, if necessary),
- indigenous consultation,
- reservations and notations,
- higher level plans,
- resource values, and
- access requirements.

2.3.9 *Water Act* Approvals

Companies must submit *Water Act* approval and approval amendment applications through OneStop.

2.3.9.1 Wetlands

The *Alberta Wetland Policy* took effect July 4, 2016, province wide. Refer to the Decision Process for *Alberta Wetland Policy* Applicability to determine whether the *Alberta Wetland Policy* applies to the project. Further information regarding the implementation of the *Alberta Wetland Policy* is provided in a Frequently Asked Questions document. *Water Act* approval applications related to wetlands are submitted through OneStop, with specific guidance provided in the New Water Act Application – Wetlands document.

2.3.9.2 Dam Safety

In addition, our Dam Safety Program regulates energy resource-related dams under Part 6 (Dam and Canal Safety) of the *Water (Ministerial) Regulation*. In December 2018, Alberta Environment and Parks (AEP) updated the *Water (Ministerial) Regulation* to include an *Alberta Dam and Canal Safety Directive*. This directive forms part of the regulation and provides details and requirements for

- the use of qualified professionals and qualified individuals;
- dam consequence classifications;
- the use of risk assessments;
- design, construction, and operation;
- dam submissions for approval/authorization;
- dam safety reporting;
- dam safety and emergency management; and
- decommissioning, closure, and abandonment.

The regulation and directive apply to all dams in the province; energy dams regulated by AER and non-energy dams regulated by AEP.

In January 2020, AER released *Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects*. This manual was designed to help dam owners in their applications to decommission, close, or abandon energy dams regulated by the AER by outlining how we assess and process these applications.

2.3.10 *Water Act* Licences and Temporary Diversion Licences

Under the *Water Act*, AER can issue multiyear-term water licences and temporary diversion licences for energy projects. A company with a temporary diversion licence can temporarily divert surface water or groundwater for up to one year.

Reasons to apply include the following:

- short-term diversion and use of water for emergency water supply;
- dust control and bridge washing;
- drilling oil and gas wells (drilling fluid);
- temporary use of water while a multiyear-term licence application is under review; and
- other short-term uses, except those exempted under schedules 3 and 4 of the *Water Ministerial Regulation* and the *Water Act*.

Companies must submit temporary diversion licence applications through AEP's Water Act Temporary diversion license Electronic Review System (WATERS).

Details regarding the submission of applications for *Water Act* licences are provided on the AER's Water Act Forms website. Companies must submit licence applications (or amendments) under the *Water Act* to EPEA.WA.Applications@aer.ca. Applications should be in PDF format and should include

- the activity's location;
- the diversion or activity's capacity and size;
- type of diversion or activity;
- the requested water amount, based on present and reasonable need; and
- an account of any public consultation carried out or proposed by the applicant.

Supporting forms and guides for specific activities should be used to build a submission. AER may waive requirements that do not apply to a proposed project.

2.3.11 *Water Act* Codes of Practice Notifications

Some activities present a lower level of environmental risk and impact. As a result, standard requirements and operating practices are outlined in codes of practice. The codes require a notification to be submitted and these activities are therefore exempt from requiring a *Water Act* approval or temporary diversion licence. The following codes of practice require notification to be submitted through OneStop:

- Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing of Pipelines
- Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body
- Code of Practice for Watercourse Crossings
- Code of Practice for Outfall Structures on Water Bodies

2.3.12 Change of Name or Ownership

In accordance with sections 15(1), 26(1), and 31.3(1) of the *CCA*, the operator of a mine, mine site, coal processing plant, or in situ coal scheme must apply to amend the permit, licence, or approval if a name change or transfer has occurred. It is important that companies taking a new ownership interest in coal mines and mine sites in Alberta understand that the liability and obligations associated with the permits, licences, or approvals are also transferred.

The former and new permit, licence, or approval holder must both submit evidence of the change in name or details on when such evidence was filed with the AER. For a name change to multiple permits, licences, or approvals, the operator may attach a list of the associated disposition numbers.

Name change applications may also be required for associated *PLA*, *EPEA*, and *WA* approvals.

2.4 Closure

Under section 137(1) of *EPEA*, operators of a coal mine or coal processing plant are required to conserve and reclaim specified land and obtain a reclamation certificate (see figure 2). The intent of reclamation certification is to ensure that the conservation and reclamation requirements have been met.

2.4.1 Requirements

Requirements for conservation and reclamation are provided in *EPEA*, the associated *Conservation and Reclamation Regulation*, the terms and conditions of the *EPEA* approval, and relevant regulatory policies (e.g., Land-use Framework regional plans, etc.; see section 137(2) of *EPEA*). Depending on the type of development, reclamation requirements set out in other legislation, such as the *CCA* or the *PLA*, may also apply. One of the purposes of the preapplication meeting for a reclamation certificate application (see figure 1) is to identify the applicable regulatory requirements for the reclaimed land being applied for.

Within six months of the coal processing plant, or the entire mine, ceasing operation, the approval holder must apply for an amendment to their *EPEA* approval for decommissioning and reclamation of the plant and final closure of the mine. If issued, the terms and conditions of the *EPEA* approval will provide further site-specific requirements for conducting decommissioning and reclamation and for the final outcome of the reclamation.

2.4.2 Progressive Reclamation

Progressive reclamation occurs throughout the life of the mine, with concurrent reclamation being undertaken during, following, or in connection with construction, development, and ongoing operations (see *Glossary of Reclamation and Remediation Terms Used in Alberta*). Reclamation should be conducted in a timely manner to minimize environmental and fiscal liabilities. The AER recommends that operators start decommissioning and reclamation activities for an area immediately after operations have ceased or when the disturbed land is no longer required for operations. When it has been determined that all the regulatory requirements have been met for the reclaimed area, including achieving the approved reclamation outcome, the approval holder must apply for a reclamation certificate from the AER (see section 12(1)(b) of *EPEA*).

2.4.3 Reclamation Certificate Applications

EPEA reclamation certificate applications must be prepared in accordance with section 12(1)(b) of the *Conservation and Reclamation Regulation*.

Reclamation certificate applications for coal mines or coal processing plants follow the same application process as other coal-related applications (see figure 1), including a public notice of application. In addition, the AER will conduct a reclamation inquiry as per section 136 of *EPEA* and section 6(1)(a) of the *Conservation and Reclamation Regulation*.

The reclamation inquiry is a formal review of the reclaimed site to determine if the conditions on the reclaimed land represent the conditions described in the application and validate the reclamation work to ensure the reclamation was conducted as reported by the operator. The operator and the landowner (which includes occupants as well) are invited to the inquiry. The reclamation inquiry always occurs during the growing season and after review of the application is completed.

Further information on the reclamation certificate application process can be found on our website (Regulating Development > Project Closure > Reclamation > Mine Reclamation Requirements), including a frequently asked questions document and the *Checklist for Preparing a Complete Reclamation Certificate Application for EPEA-Approved Activities*.

2.4.4 Closure of *Public Lands Act* Disposition

With the issuance of a reclamation certificate, the operator can apply to amend or cancel the *PLA* disposition to return the land back to the Crown and public use (figure 1).

2.4.5 Mine Financial Security Return or Reduction

Operators can request a reduction or the return of MFSP security when a reclaimed area has received a reclamation certificate. Further information on the MFSP program can be found on our website (aer.ca > Regulating Development > Project Closure > Liability Management Programs and Processes > Mine Financial Security Program).

3 Compliance and Reporting

3.1 Compliance

The AER's compliance assurance program is outlined in *Manual 013: Compliance and Enforcement Program*. Further information, including specifics on the voluntary self-disclosure process, can be found on our website, Regulating Development > Compliance > Compliance Assurance Program.

3.2 Operational Reporting

Refer to section 2.1.6 for a list of best practices for formatting materials for operational reports. The following additional recommendations will help expedite review:

- Compile and submit annual reports as file size limitations allow.
- Maximize use of tabular data and organize information by enactment or approval requirements. Minimize background information that does not directly tie to a reporting requirement.
- Include a concordance table linking a reporting requirement directly with the appropriate section of the report.
- Data can be more easily sorted and compared if submitted in a Microsoft Excel file rather than in PDF format.

Sample reports have been made available on our website to assist duty holders.

3.2.1 Submission Procedures

Approval holders can send submissions via email as applicable:

CCA: Coal.Submissions@aer.ca

EPEA/WA: EPEA.Reports@aer.ca, EPEA.WA.Plans.Authorizations@aer.ca

PLA: AERMajorProjects@aer.ca

Alternatively, approval holders can send the submissions to the following physical address:

Alberta Energy Regulator
Regulatory Applications
Suite 1000, 250 – 5th Street SW
Calgary, Alberta T2P 0R4

3.2.2 Report Review Process

The following flowchart summarizes the review process when a report or submission is received by the AER.

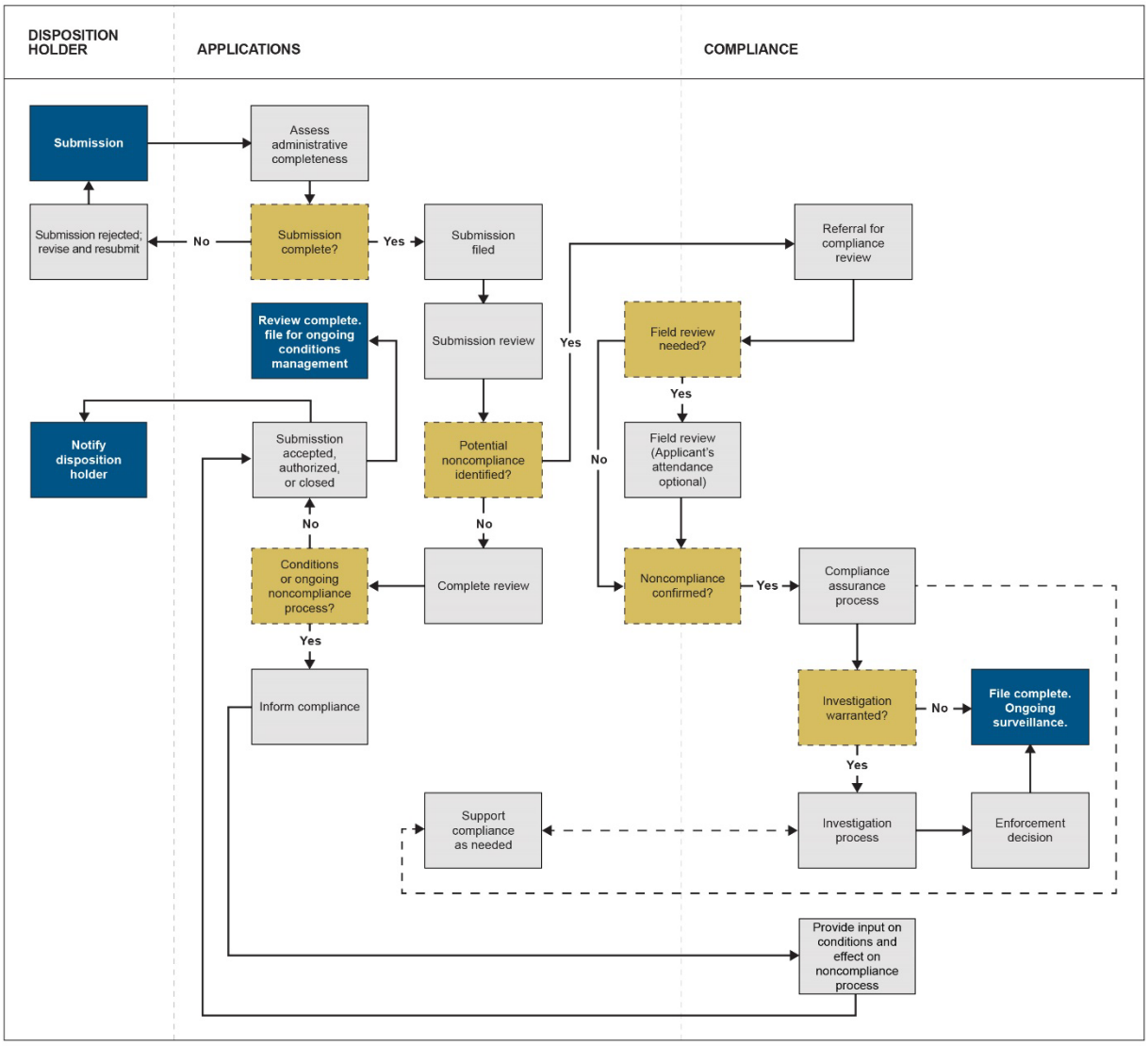

Figure 3. Report/submission review process

3.2.3 *Coal Conservation Act* and *Rules*

Under section 65 of the *CCR*, holders of a mine permit must submit, in the third quarter of each calendar year, a mine plan for the following year's proposed operation. Additionally, in the first quarter of each calendar year, mine permit holders must submit a report on the previous year's operations. This annual report is to describe the general progress of mining, abandonment, and reclamation, supported by maps or other appropriate materials.

Under section 65 of the *CCR*, holders of a mine licence must submit, no later than the fifteenth day of each month, a report on raw coal production, disposition, and storage volume; the value of sales; and discard material removed. The report is to be submitted on forms furnished or approved by the AER.

Under section 66 of the *CCR*, holders of a coal processing plant approval must submit, no later than the fifteenth day of each month, a report on production and disposition of plant products and the value of sales for the preceding month. The report is to be submitted on forms furnished or approved by the AER.

Under section 40 of the *CCR*, operators of a coal exploration program must submit annually and at the conclusion of an exploration program a report on all coal exploration activities conducted during the year.

Conditions of permits, licences, and approvals under the *CCA* will specify additional reporting requirements. Common examples of these reports include reoccurring geotechnical reports of pit and dump slopes, reoccurring operations summaries, or one-off design reports for a specific project.

3.2.4 *Environmental Protection and Enhancement Act*

The majority of reporting for a coal mine is under *EPEA*, and approval conditions specify most of the reporting requirements. Some common components of an annual report under *EPEA* are below. Note that select parts may not apply and operators should refer to their own approval conditions to determine their individual reporting requirements. The ordering of the reporting conditions in the approval can be used to derive the table of contents for the overall annual report.

- Annual Air Summary and Evaluation Report
- Annual Mine Wastewater Summary and Evaluation Report
- Annual Waste Management Summary Report
- Domestic Wastewater Report
- Annual Groundwater Monitoring Report
- Annual Conservation and Reclamation Report (should be submitted as a standalone document or appendix when submitting with a combined annual report)

EPEA approvals may also specify submittal of one-time or mine-specific reports or plans. Common examples include decommissioning plans, reclamation plans, dust management plans, wetland monitoring proposals, and wildlife monitoring plans.

3.2.5 *Public Lands Act*

Reporting requirements under the *PLA* are set by disposition conditions. Disposition holders should refer to their conditions to determine their individual reporting requirements.

3.2.6 *Water Act*

Reporting requirements under the *WA* are set by licence and approval conditions. Operators should refer to their own approval conditions to determine their individual reporting requirements. Some common examples include 90-day postconstruction reports for major works conducted within a fenceline approval, water management plans, and monthly water use reports.

Refer to the *Dam Safety Directive* for reporting requirements for dams under the *Water (Ministerial) Regulation*.

3.2.7 Codes of Practice Under *EPEA* and the *WA*

Numerous codes of practice exist under both *EPEA* and the *WA*, which may be applicable to coal mines in some circumstances. Operators should be aware of reporting and notification requirements of these codes of practice applicable to their activities. The codes most often referenced for coal mines include the *Code of Practice for Watercourse Crossings*, the *Code of Practice for Outfall Structures on Water Bodies*, the *Code of Practice for Exploration Operations*, and the *Code of Practice for Land Treatment of Soil Containing Hydrocarbons*. A full list of the codes of practice are available on the King's Printer website.

3.3 Incident Reporting

The *CCA*, *EPEA*, the *WA*, and the *PLA* all contain provisions for incident reporting. The permittee, licensee, or approval holder must report all incidents, contraventions of an approval, and circumstances specified by enactment, permit, licence, or approval as reportable to the AER through the Energy and Environmental Emergency 24-Hour Response Line (1-800-222-6514). Permittees, licensees, and approval holders are expected to be aware of the requirements to report incidents and other circumstances, as identified within their disposition conditions and any required reporting provisions in the applicable enactments.

A generalized version of the incident response process is provided in the following flowchart.

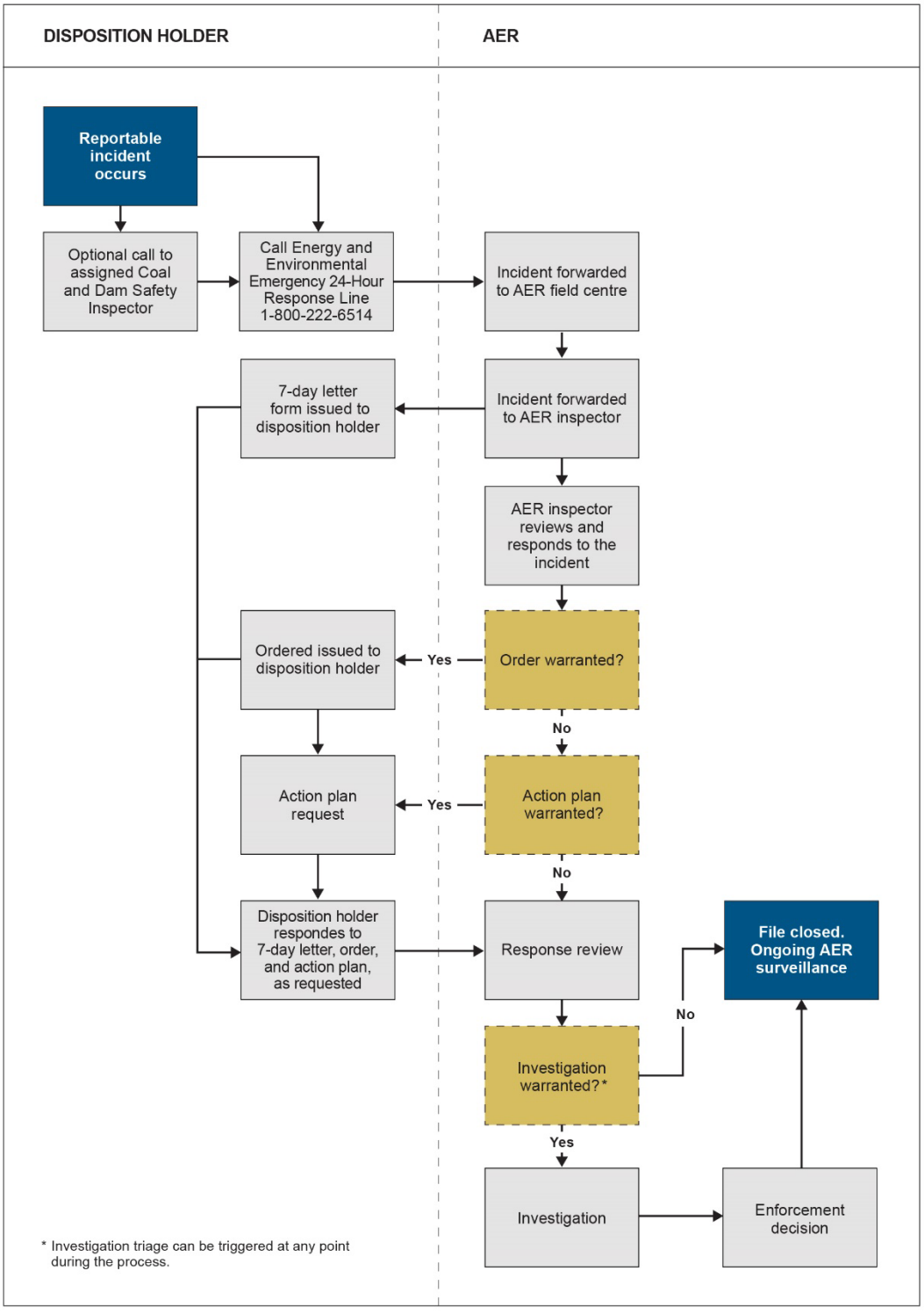

Figure 4. Incident reporting process

Incident reporting clauses under each enactment are below. Operators must be aware of incident reporting requirements contained within their disposition conditions, though most will require immediate reporting and a written follow up report within seven days.

3.3.1 *Coal Conservation Act*

Most *CCA* dispositions contain a condition requiring reporting of any incident or accident affecting or having the potential to affect safety or the environment.

3.3.2 *Environmental Protection and Enhancement Act*

EPEA approvals nearly always contain a condition requiring immediate reporting of any contravention of an approval condition and to provide a written report regarding the incident within seven days of the initial notification.

3.3.3 *Public Lands Act*

The *PLAR* requires disposition holders to report no later than seven days after becoming aware of or should have been aware of a reportable incident. Reportable events are defined under section 164 of the *PLAR*.

3.3.4 *Water Act*

WA licences and approvals nearly always contain a condition requiring immediate reporting of any contravention of terms or conditions of the licence or approval.

Appendix 1 Underground Mine Abandonment General Design Guidelines

Introduction

Application: This general specification covers the installation of concrete stoppings in underground mines where the portals are gently dipping (less than 8°) and remain open to allow safe access for their installation. It is intended to cover the general guidelines for design, materials, and installation under these mining conditions. The specification defines the minimum requirements for acceptable construction and lists preferred additions or stronger components where these may improve ease of construction or where local materials are available at low cost.

Exclusion: This specification is not applicable to blind adits (not connected with underground mines) that do not require a robust concrete stopping installed. Where safe access cannot be made for installation of the concrete stopping, different designs and methods of installation will be required. Steep dipping portals (greater than 8° gradient) and very steep raises and shafts (greater than 30° gradient) will be treated as a special case (see figures 5 and 6).

Design Objectives

The primary objectives of mine safety closure are to prevent human intrusion into underground workings and exposure to hazardous gases that may issue from the mine. The closure is intended to be permanent and in this context is designed to last for the foreseeable future, nominally assumed to be 100 years. The system of plugging mine openings should have the following characteristics:

The stoppings should prevent accidental and intentional human intrusion by being robust with sufficient armour to prevent human intrusion without the use of heavy equipment.

The stopping should restrict leakage to minimize the potential for natural mine ventilation circuits to form that might allow hazardous mine gases to issue from the mine at openings or fractures in the rock.

Although the individual components of the stopping system are each not specifically designed to withstand explosive pressures, the combination of stopping and entry fill in combination should be able to resist the pressures that might be exerted from an explosion of flammable gases in the mine without significant damage.

All significant structural components should be fire resistant so that the system will maintain its integrity in the event that a fire breaks out inside the mine or if there is a forest fire or other surface fire over the mitigated area.

The stoppings have not been designed to withstand hydraulic pressure due to significant build-up of water in the mine but should allow for mine water drainage at the lowest elevation opening where water inflows might flood the mine workings.

In order to meet these objectives for mines with open portals the design closure system consists of multiple barriers each providing an important aspect of the closure and including the following major components:

A robust concrete stopping installed a sufficient distance into the mine portal entry to minimize the potential for caving inbye the stopping to propagate to surface and develop sinkholes. The stopping will support the roof and form the main barrier between the mine gases and the outside atmosphere. A pipe should be installed through the stopping to act as a drain.

The remainder of the entry to the portal mouth will be filled with natural rock and overburden material with larger rocks placed at the mouth of the portal to discourage digging. The space on top of the fill should be filled with low strength cementitious material to provide some support if the entry roof collapses and to reduce the potential for air leakage.

The portal mouth will then be backfilled in lifts with locally available material to completely cover it up, sloped to maintain stability, covered with native soil, and seeded for revegetation. This will provide a natural closure that should be durable over the long term with vegetative cover providing resistance to erosion.

Permanent Concrete Stopping

The General Design Guide is flexible in defining the distance that the concrete stopping should be installed. The most conservative case is defined where the overburden cover is at least eight times the average height of the entry where the stopping is constructed. The minimum distance is defined as three times the entry width, which would typically be a distance of about 15 m from the portal mouth. The general configuration of the stopping and location is shown in figure 5.

In many cases a lesser overburden cover may be used where the main roof is composed of competent strong strata units that are unlikely to fail in the foreseeable future, providing that the shallow portion of the entry outbye the stopping is supported by the stopping and entry fill. In some cases, additional roof support may need to be installed inbye the stopping to reduce the likelihood that the roof will fail and shear at the stopping. Each case will need to be evaluated separately in order to justify the selected location.

Special circumstances may arise where it may be too difficult or costly to gain safe access to the preferred design location. These cases are more likely to be where the roof is weaker and may not be able to support itself over the long term. Individual conditions with different levels of danger and engineering options will need to be evaluated on a case-by-case basis. For example, if it is possible to partially fill the entry inbye the stopping, this may assist the bulking process when the roof fails. This general specification only covers the case where a robust concrete stopping is installed with access to the location for constructing formwork to enable the concrete to be placed by pumping.

The detailed stopping configuration is shown in figures 6 and 7 and the method of construction will involve the following components and methods:

- Where a drain is required the inlet portion inbye the stopping will need to be prepared using gravel, coarse rock, filter cloth, and pipe. Minimum requirements will be defined based on information available to predict expected mine inflows. The pipe inlet should be slotted or drilled to allow water, but not gravel, to flow into the pipe. Washed gravel should be packed around the inlet section for protection and then covered with filter cloth to restrict the ingress of fines that might otherwise clog the system. The filter cloth should be covered with washed gravel to provide further protection and multiple flow paths should there be a roof fall in the future.
- Formwork will need to be constructed with timber and of sufficient strength to prevent failure from the hydraulic pressure exerted by the concrete and pump. This should be assisted by bracing the timber against existing roof and rib supports, hitching posts into the roof and floor where possible, and installing ties between the formwork on each side of the stopping. Forms should be about 1 m apart, with this distance varied to suite the particular entry conditions and existing roof supports. Injection ports should be incorporated into the form to allow concrete placement. The formwork will be left in place to provide sealing and support.
- At the centre of the stopping the roof, floor and ribs should be exposed and where possible the floor and ribs should be excavated to form a hitch at least 0.10 m deep into competent coal and rock. If timber lagging is installed to support the ribs or roof it will need to be removed to excavate the hitch.
- Where materials are available, holes should be drilled in the inbye side of the form (approx. 0.1–0.2 m from form) at 1 m intervals and at least 0.5 m into the roof floor and ribs, and rebar or bolts installed in the holes with at least 1 m protruding into the entry if possible. Steel mesh should be installed and tied to these anchors in order to provide tensile resistance against ground pressure from the fill.
- Concrete should typically be pumped in at the top of the form and the base of the forms should be vibrated during pouring to ensure uniform mixing. A 15 MPa nominal mix is specified, but this may need to be increased in strength by adding more cement to assist the pumping characteristics.
- If the stopping is poured in multiple lifts, with concrete setting between lifts, then reinforcement bars will be placed into the lower lift (protruding at least 0.3 m) after it has been placed in order to provide sufficient interlocking of the joint.
- Return tubes/hose should be installed at the top of the forms to return air and water from the highest elevation in the form, thus allowing the concrete fill as much of the void as possible and act as a fill indicator. Care during the final stages of filling should be taken to prevent pumping overpressure from damaging the integrity of the form.

After the concrete has set sufficiently, the top of the form will be removed to inspect for any gaps in the concrete that may have resulted from leakage, movement of forms, insufficient filling, or shrinkage. Further stages of pumping or the installation of grout by hand or other suitable sealing compounds may be required to provide a complete seal and immediate support of the roof.

Entry Backfill

Following installation and sealing of the permanent concrete stopping the entry will require backfill. If a drain is installed in the entry the discharge pipe will need to be installed sufficiently ahead of the filling process to ensure that it can be protected during filling. This might involve encapsulation with concrete or covering with hand placed fill to form a cushion in the case of a pipe drain, or placement of rock, coarse gravel, and filter cloth in the case of a rock drain.

Entry backfill should be predominantly till, gravel or waste rock from mining operations that is uncontaminated and does not have a high proportion of clay or fines. Placement should be made loosely using a scoop, conveyor, or other suitable equipment. It will not be possible to completely fill the full width of the entry to the roof and a gap will inevitably remain above the fill. This gap should be filled with flowable cementitious fill after the entry has been backfilled and a pipe may be left in the ground during backfilling for later pumping of the flowable fill.

At the portal mouth large rocks should be intermixed with the fill to provide a deterrent to digging and additional durability should excess surface drainage scour through the portal backfill.

Following installation of the entry fill a flowable cementitious grout or foam concrete with a nominal strength of 1 MPa should be pumped into the void above the fill for the whole length of entry between the portal mouth and concrete stopping. The exact strength and characteristics of this grout should have a strength of at least 0.5 MPa, thus providing a support capacity of about 50 tonne per square metre. However, over the long term the fill volume will shrink during consolidation and the entry will gradually converge. It is likely that small gaps above the fill will remain over long periods of time, but the concrete stopping should maintain its integrity. In order to provide additional security, backfill should be placed over the portal mouth to prevent the potential for holes to open up that could result in a connection between the mine and surface.

Backfill Over Area

After the entry fill has been placed the portal mouth should be backfilled with uncontaminated native materials. Suitable material without excessive clay or fine material should be installed and compacted in lifts to a final grade that is a minimum of 2H:1V slope for long-term stability.

Where final reclamation requires revegetation, the slope will be 3H:1V and it will be covered with topsoil or suitable subsoil material that is available and seeded for revegetation.

Prior to backfilling, the portal extension should be cut away from the mouth and removed. The backfill should be installed to a height of twice the entry height above the floor of the entry and for at least one-half of the entry width at the top on either side.

Where a drain has been incorporated into the stopping a coarse gravel and rock drain should be covered with filter cloth and allowed to exit from the base of the backfill and lead into surface water drainage systems or be allowed to infiltrate into the ground. Where necessary, the details of how the mine water discharge will be directed into the surface water system will require interaction with AER to ensure that it forms an acceptable solution. It should be noted that a drain should generally be installed in each mine regardless of current conditions, in order for the mine closure systems to handle any future conditions that avoid the possibility of a major blow-out if water is allowed to build-up behind the stopping.

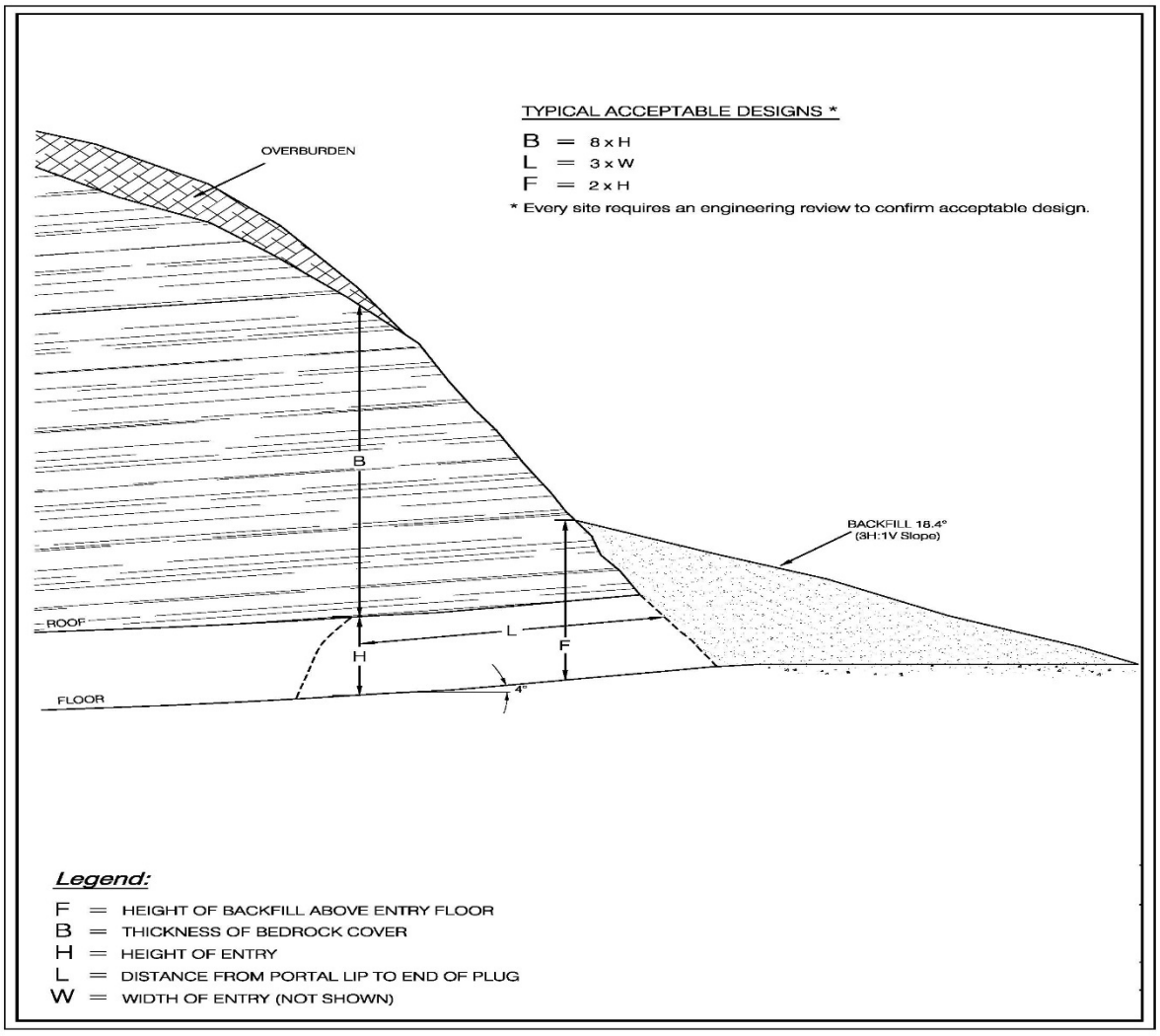

Figure 5. Typical permanent concrete stopping placement calculations and definitions

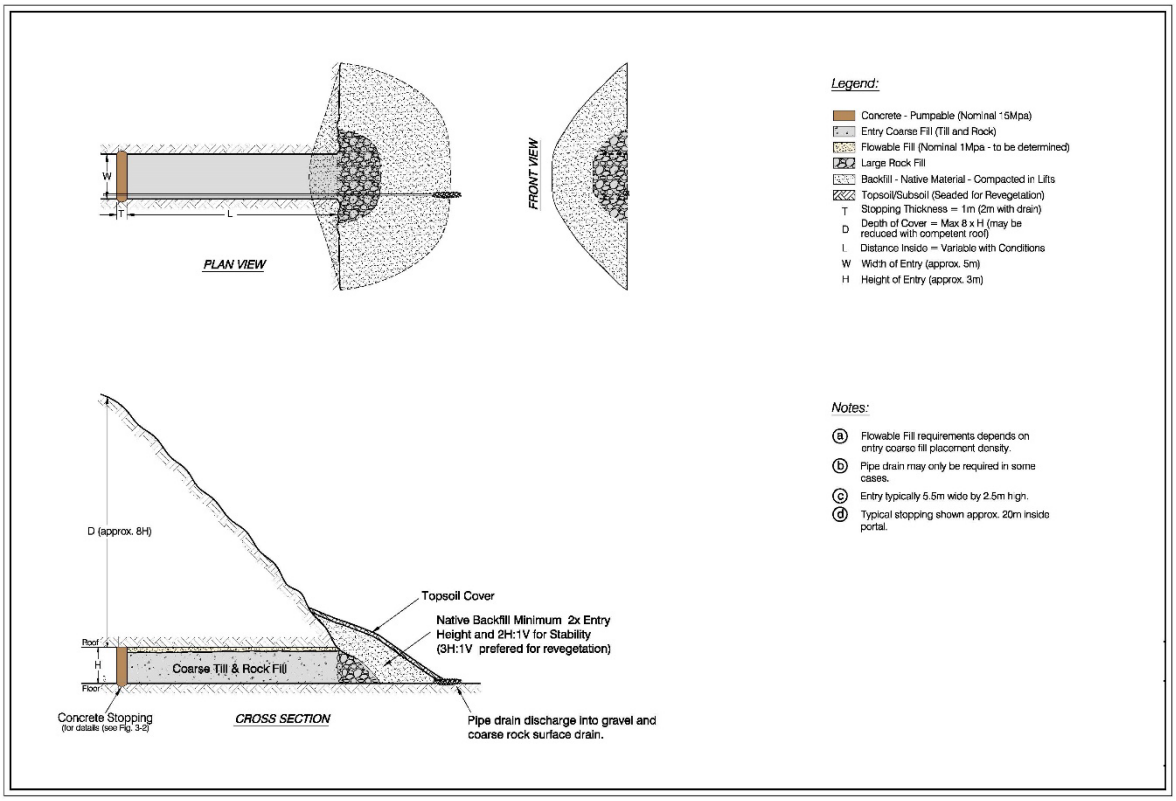

Figure 6. Flat entry general abandonment design

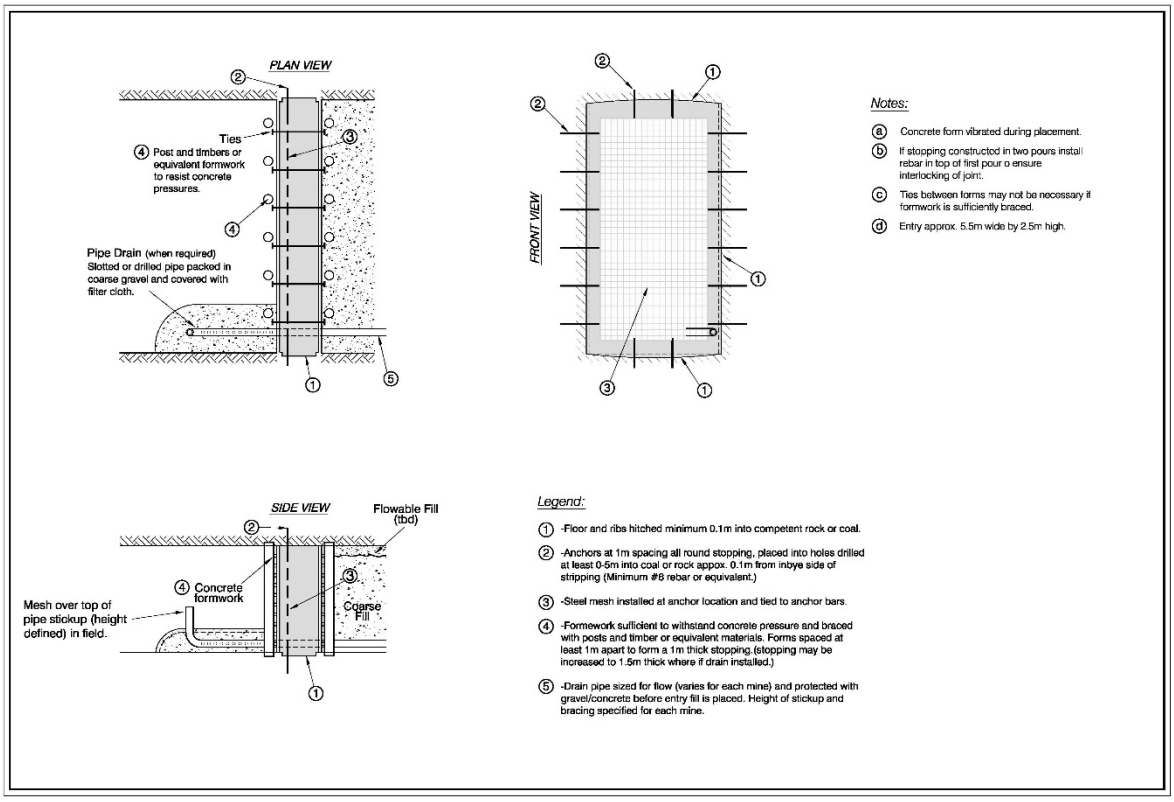

Figure 7. General stopping design

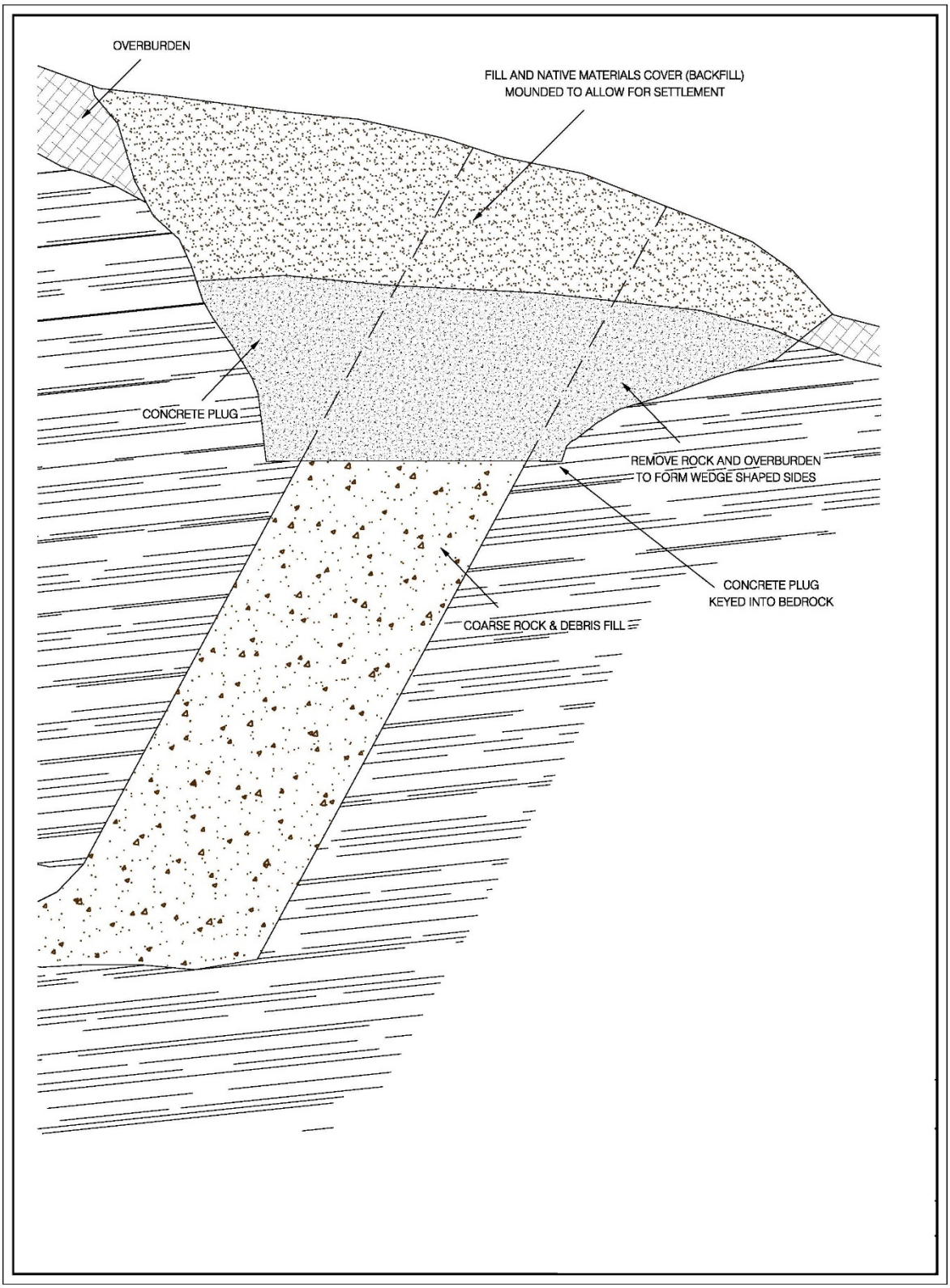

Figure 8. Shaft general abandonment design

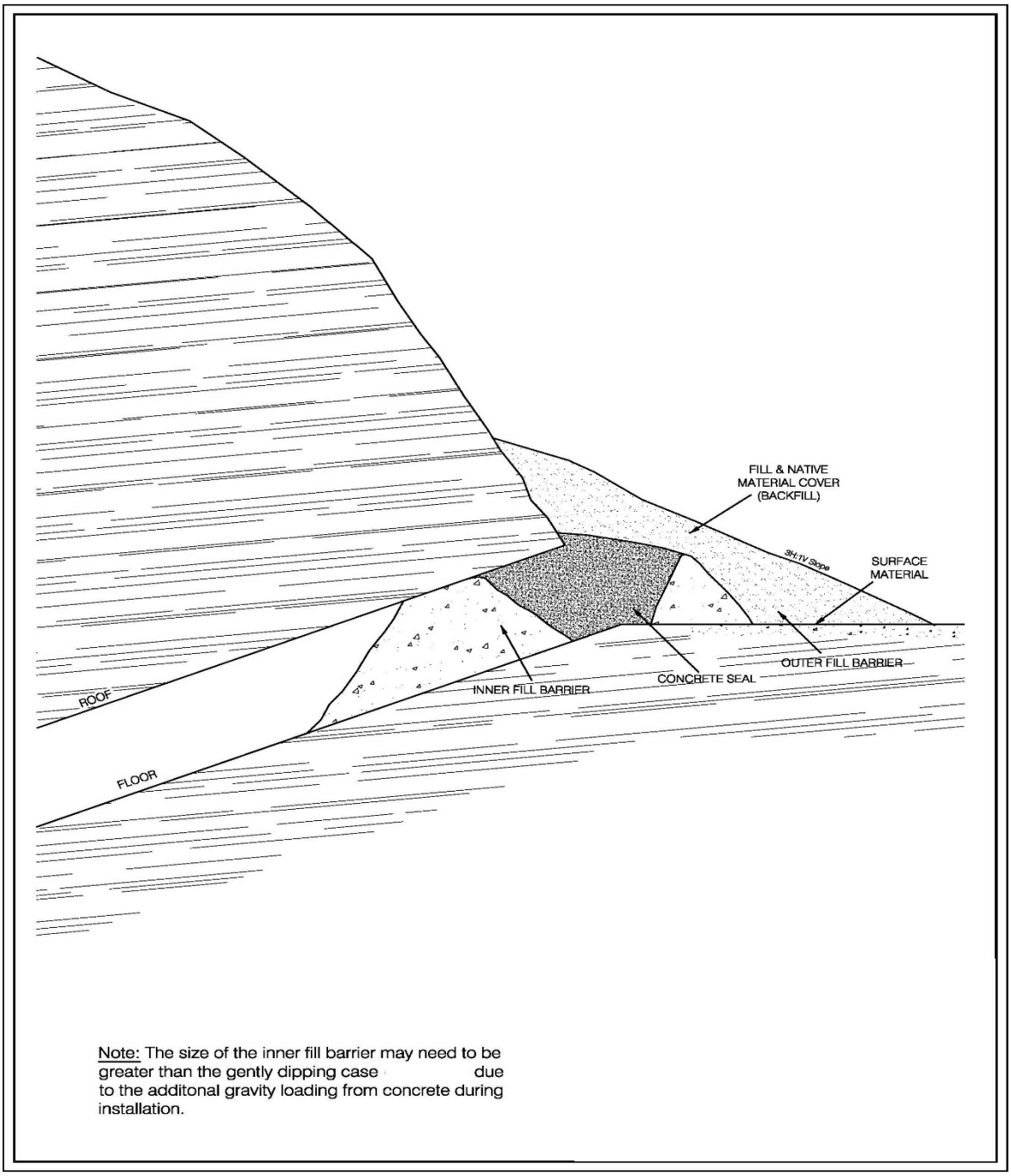

Figure 9. Steep dipping portal general abandonment design